Physics 0625 Classified Paper 1

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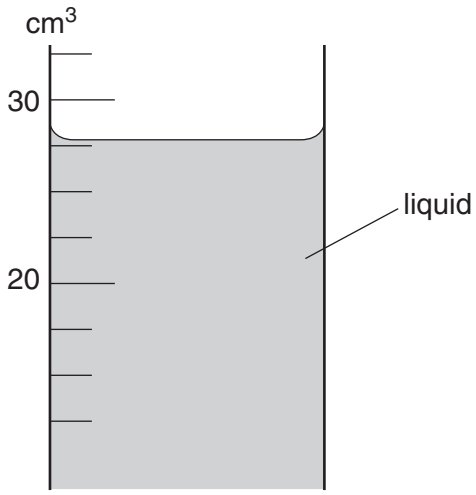
Lenght and Time

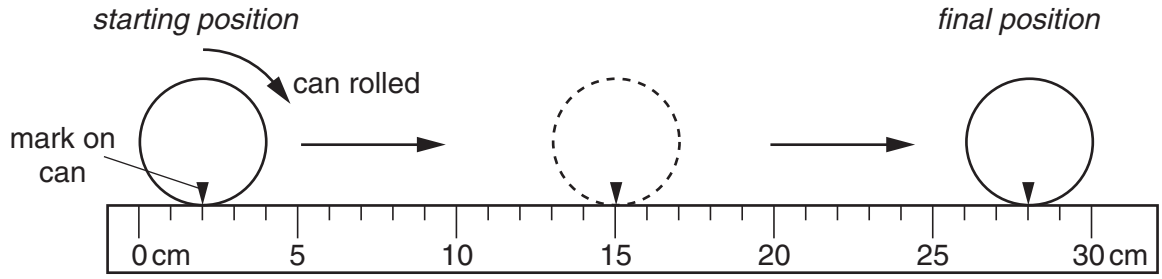
1 The diagram shows the level of liquid in a measuring cylinder.



What is the volume of the liquid?

A 24 cm^3 **B** 28 cm^3 **C** 29 cm^3 **D** 32 cm^3

2 A cylindrical can is rolled along the ruler shown in the diagram.



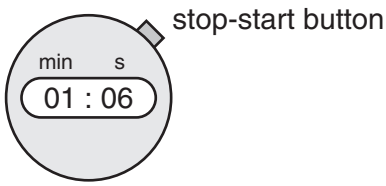
The can rolls over twice.

What is the circumference (distance all round) of the can?

A 13 cm **B** 14 cm **C** 26 cm **D** 28 cm

3 The diagram shows a stopwatch, originally set at 00:00.

When a car was first seen, the stop-start button was pressed. When the car passed the observer, the stopwatch showed 01:06.



How long did the car take to reach the observer?

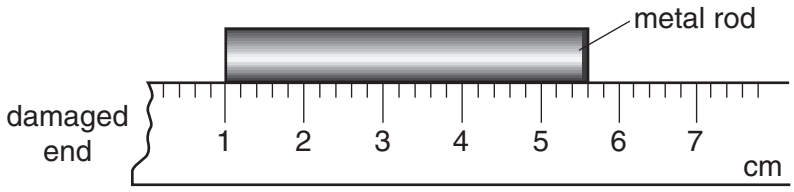
A 1.06 seconds

B 6 seconds

C 66 seconds

D 106 seconds

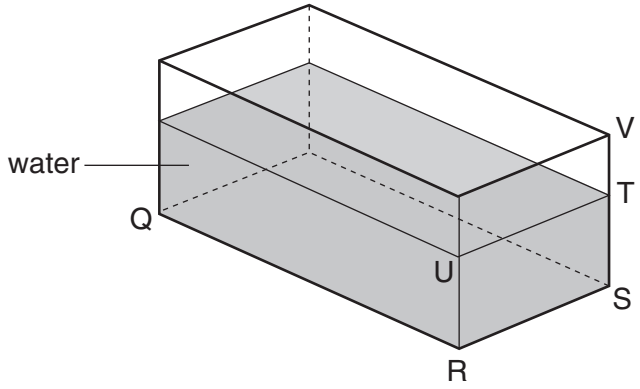
4 A girl uses a rule to measure the length of a metal rod. Because the end of the rule is damaged, she places one end of the rod at the 1 cm mark as shown.



How long is the metal rod?

A 43 mm **B** 46 mm **C** 53 mm **D** 56 mm

5 A glass tank contains some water.

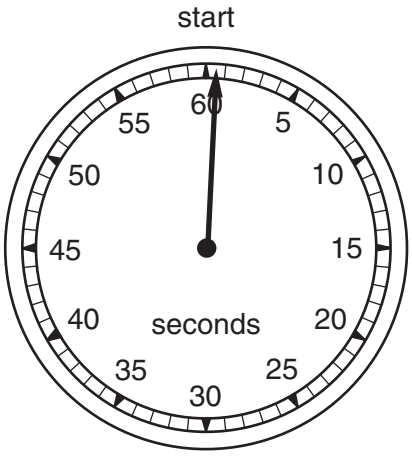


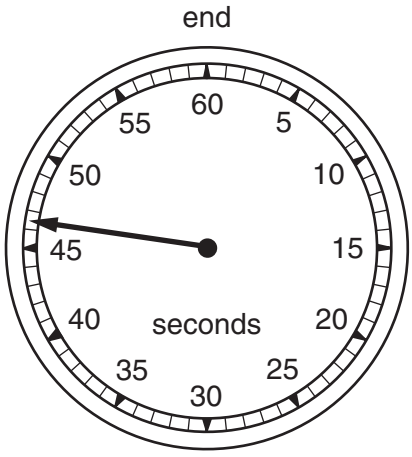
The length QR and the width RS of the tank are known.

What other distance needs to be measured in order to be able to calculate the volume of the water?

A ST **B** SV **C** TU **D** TV

6 A stopwatch is used to time a race. The diagrams show the watch at the start and at the end of the race.





How long did the race take?

A 45.7 s **B** 46.0 s **C** 46.5 s **D** 47.0 s

7 Which of the following is **not** necessary when using a measuring cylinder to measure the volume of a quantity of water?

A making sure that the measuring cylinder is vertical

B making sure that your eye is level with the liquid surface

C reading the bottom of the meniscus

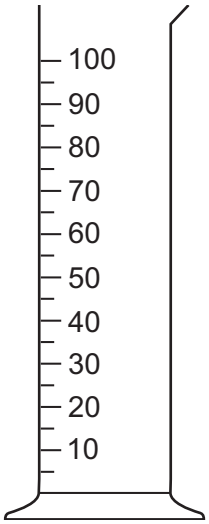
D using the largest measuring cylinder possible

8 A pendulum is set in motion and 20 complete swings are timed. The time measured is 30 s.

What is the time for one complete swing of the pendulum?

A 0.67 s **B** 0.75 s **C** 1.5 s **D** 3.0 s

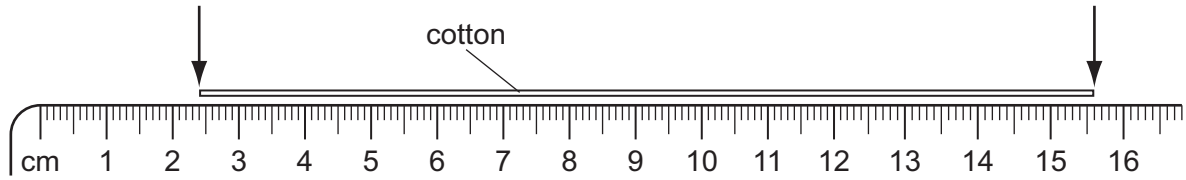
9 The diagram shows a measuring cylinder.



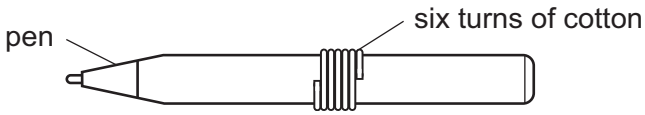
Which unit would be most suitable for its scale?

A mm^2 **B** mm^3 **C** cm^2 **D** cm^3

10 A piece of cotton is measured between two points on a ruler.



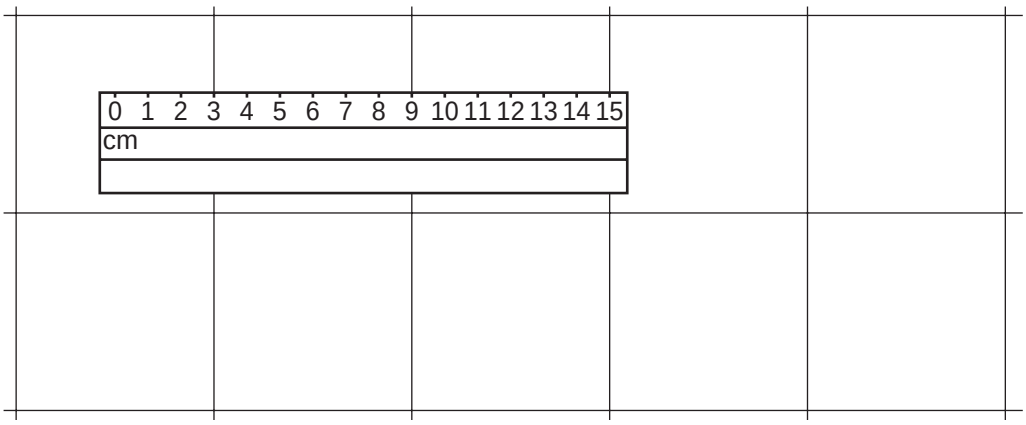
When the length of cotton is wound closely around a pen, it goes round six times.



What is the distance once round the pen?

A 2.2 cm **B** 2.6 cm **C** 13.2 cm **D** 15.6 cm

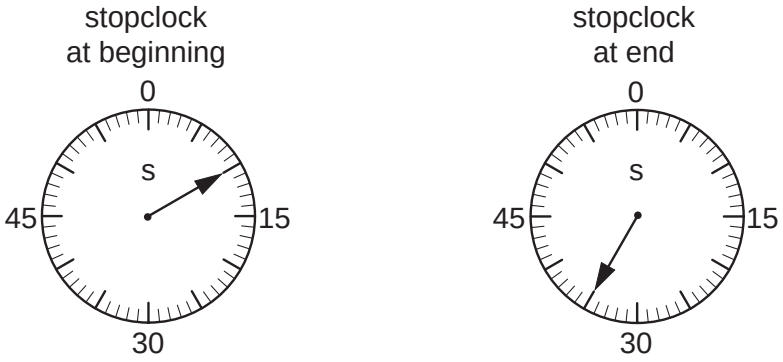
11 A floor is covered with square tiles. The diagram shows a ruler on the tiles.



How long is one tile?

A 3 cm **B** 6 cm **C** 9 cm **D** 12 cm

12 The diagrams show the times on a stopclock at the beginning and at the end of an experiment.



How long did the experiment take?

A 10 s **B** 25 s **C** 35 s **D** 45 s

13 A decorator wishes to calculate the area of a bathroom tile so that he can estimate the amount of adhesive that he needs to buy.

What must he use?

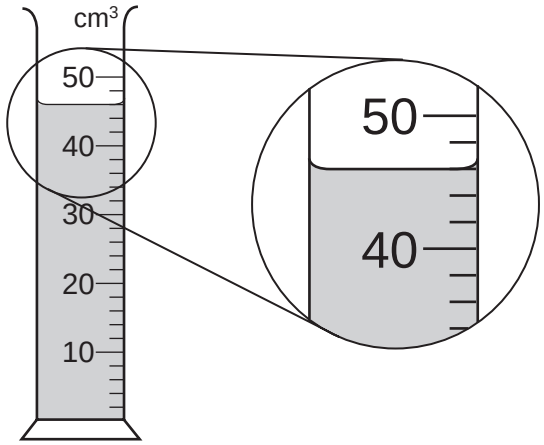
A a measuring cylinder only

B a ruler only

C a measuring cylinder and a clock only

D a measuring cylinder and a ruler only

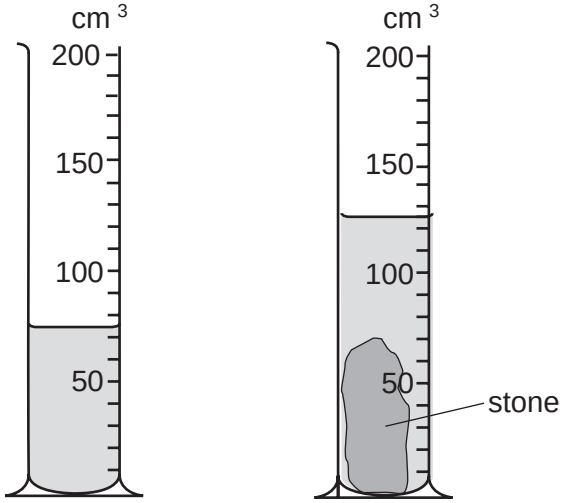
14 A measuring cylinder is used to measure the volume of a liquid.



What is the volume of the liquid?

A 43 cm^3 **B** 46 cm^3 **C** 48 cm^3 **D** 54 cm^3

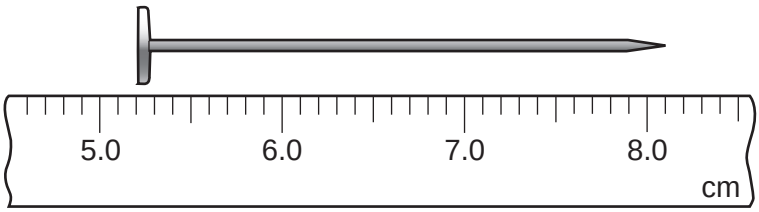
15 A measuring cylinder contains some water. When a stone is put in the water, the level rises.



What is the volume of the stone?

A 50 cm^3 **B** 70 cm^3 **C** 75 cm^3 **D** 125 cm^3

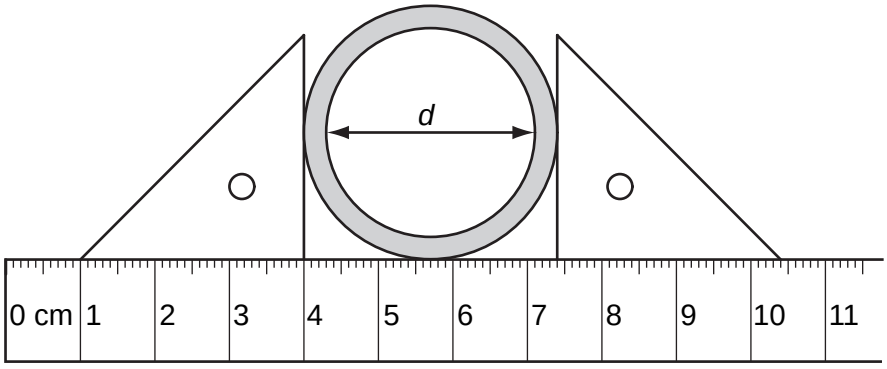
16 A ruler is used to measure the length of a nail.



What is the length of the nail?

A 1.3 cm **B** 2.9 cm **C** 5.2 cm **D** 8.1 cm

17 The diagram shows a thick-walled tube. The thickness of the wall is 3 mm.



What is the internal diameter *d* of the tube?

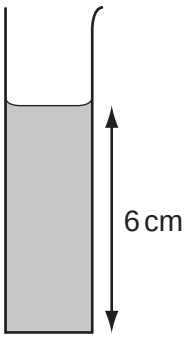
A 2.8 cm **B** 3.1 cm **C** 3.4 cm **D** 7.4 cm

18 Some water is poured into four tubes of different cross-sectional areas.

Which tube contains the largest volume of water?

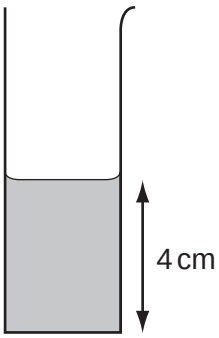
A

area = 10 cm^2



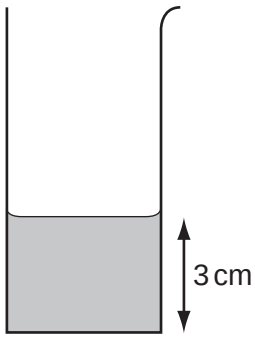
B

area = 20 cm^2



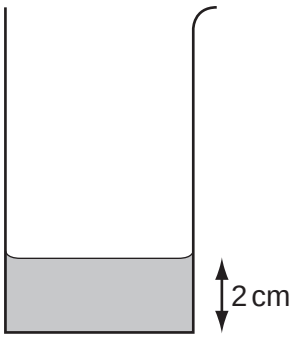
C

area = 30 cm^2



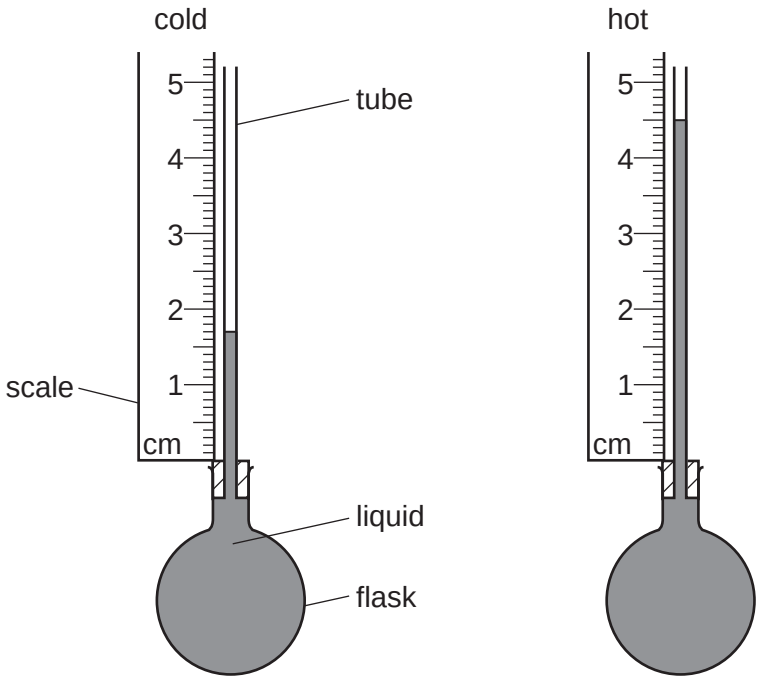
D

area = 40 cm^2



19 Some liquid is heated in a flask.

The diagrams show the height of the liquid in the tube when the liquid is cold and when it is hot.



What is the difference in the heights?

A 1.7 cm **B** 2.8 cm **C** 3.2 cm **D** 4.5 cm

20 Two digital stopwatches X and Y, which record in minutes and seconds, are used to time a race.

The readings of the two stopwatches, at the start and at the end of the race, are shown.

	start	end
stopwatch X	00:00	00:40

	start	end
stopwatch Y	01:30	02:20

Which statement about the time of the race is correct?

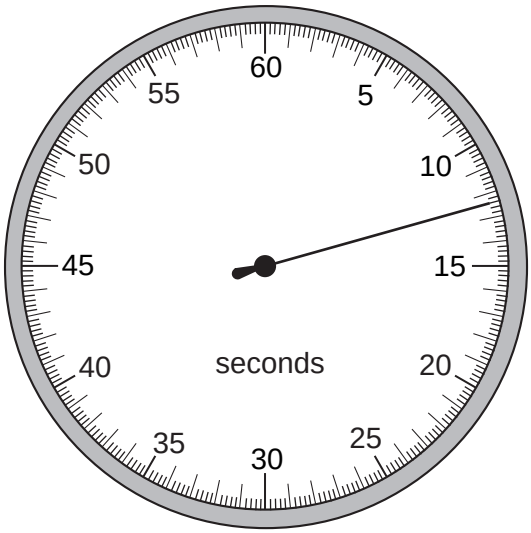
A Both stopwatches record the same time interval.

B Stopwatch X recorded 10 s longer than stopwatch Y.

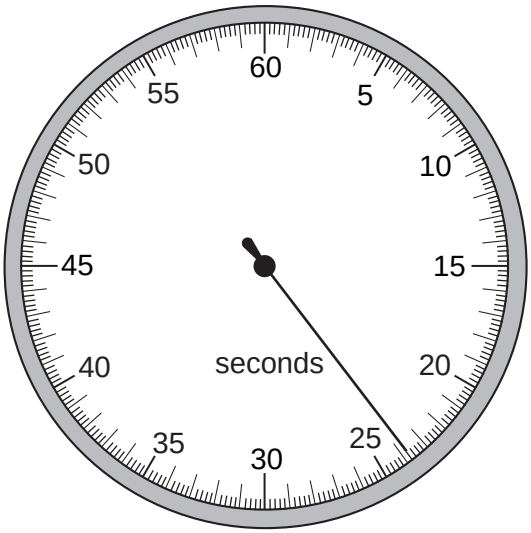
C Stopwatch Y recorded 10 s longer than stopwatch X.

D Stopwatch Y recorded 50 s longer than stopwatch X.

21 A stopwatch is used to time an athlete running 100 m. The timekeeper forgets to reset the watch to zero before using it to time another athlete running 100 m.



stopwatch at end of first athlete's run



stopwatch at end of second athlete's run

How long does the second athlete take to run 100 m?

A 11.2 s **B** 11.4 s **C** 12.4 s **D** 23.8 s

22 A student uses a stopwatch to time a runner running around a circular track. The runner runs two laps (twice around the track). The diagrams show the reading on the stopwatch when the runner starts running, at the end of the first lap, and at the end of the second lap.

reading when runner starts

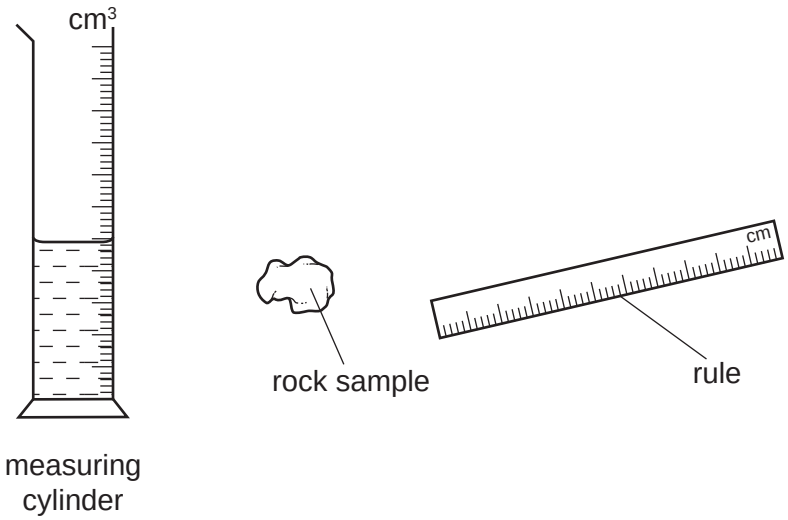
reading at end of first lap

reading at end of second lap

What is the time taken for the runner to run the second lap?

A 0 min 50 s **B** 1 min 10 s **C** 1 min 13 s **D** 2 min 03 s

23 A scientist needs to determine the volume of a small, irregularly shaped rock sample. Only a rule and a measuring cylinder, partially filled with water, are available.



To determine the volume, which apparatus should the scientist use?

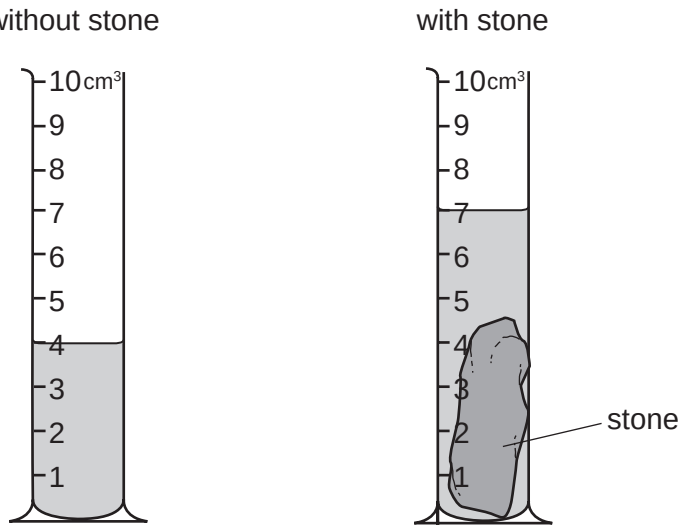
A both the measuring cylinder and the rule

B neither the measuring cylinder nor the rule

C the measuring cylinder only

D the rule only

24 The diagrams show an experiment to determine the volume of a stone.



What is the volume of the stone?

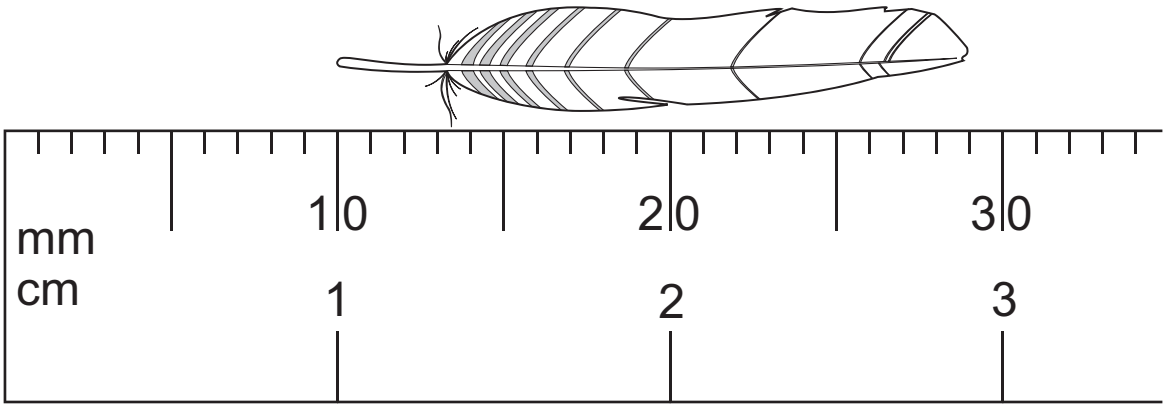
A 3 cm^3 **B** 4 cm^3 **C** 7 cm^3 **D** 11 cm^3

25 Four athletes run twice around a track. The table shows their times at the end of each lap.

Which athlete runs the second lap the fastest?

athlete	time at end of first lap / s	time at end of second lap / s
A	22.99	47.04
B	23.04	47.00
C	23.16	47.18
D	23.39	47.24

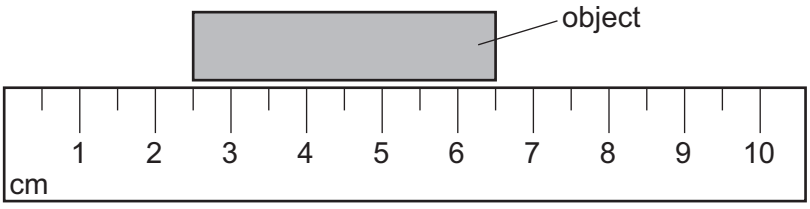
26 The diagram shows an enlarged drawing of the end of a metre rule. It is being used to measure the length of a small feather.



What is the length of the feather?

A 19 mm **B** 29 mm **C** 19 cm **D** 29 cm

27 A ruler is used to measure the length of an object.



What is the length of the object?

A 3.0 cm **B** 4.0 cm **C** 5.0 cm **D** 6.5 cm

Length and Time

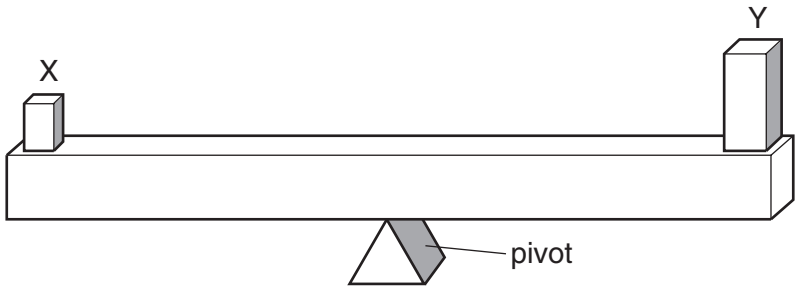
1	B	11	B	21	B
2	A	12	B	22	A
3	C	13	B	23	C
4	B	14	B	24	A
5	A	15	A	25	D
6	B	16	B	26	A
7	D	17	A	27	B
8	C	18	C		
9	D	19	B		
10	A	20	C		

Mass and Weight

1 What are correct units used for mass and for weight?

	mass	weight
A	kg	kg
B	kg	N
C	N	kg
D	N	N

2 Two objects X and Y are placed on a beam as shown. The beam balances on a pivot at its centre.



What does this show about X and Y?

A They have the same mass and the same density.

B They have the same mass and the same weight.

C They have the same volume and the same density.

D They have the same volume and the same weight.

3 Which of the following statements is correct?

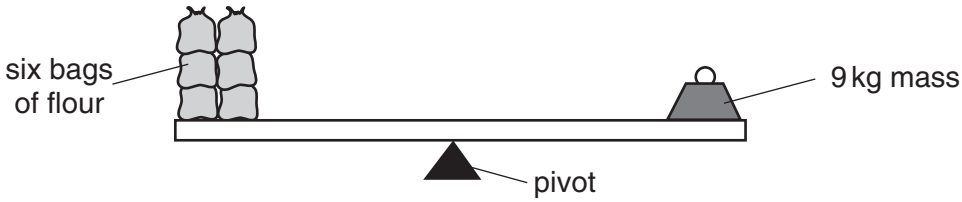
A Mass and weight are different names for the same thing.

B The mass of an object is different if the object is taken to the Moon.

C The weight of a car is one of the forces acting on the car.

D The weight of a chocolate bar is measured in kilograms.

4 In an experiment, six identical bags of flour are balanced by a 9 kg mass.



Two bags of flour are removed. What mass will balance the remaining bags?

A 3 kg **B** 6 kg **C** 7 kg **D** 9 kg

5 Which statement is correct?

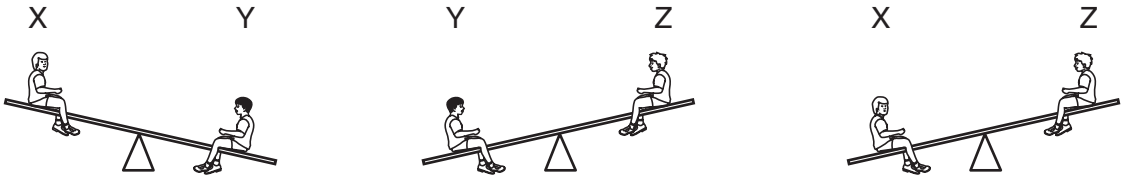
A Mass is a force, measured in kilograms.

B Mass is a force, measured in newtons.

C Weight is a force, measured in kilograms.

D Weight is a force, measured in newtons.

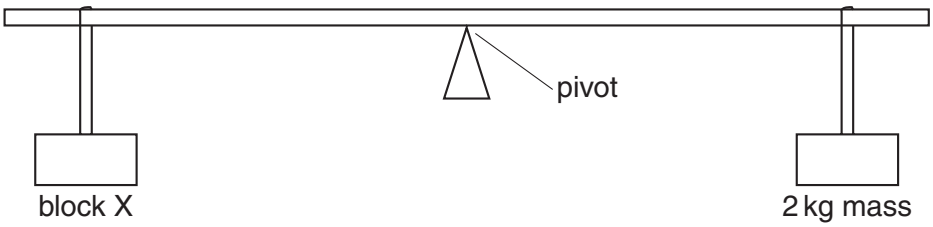
6 Three children, X, Y and Z, are using a see-saw to compare their weights.



Which line in the table shows the correct order of the children's weights?

	heaviest ⟷ lightest		
A	X	Y	Z
B	X	Z	Y
C	Y	X	Z
D	Y	Z	X

7 A beam is pivoted at its centre. Two masses are suspended at equal distances from the pivot as shown in the diagram.



Which statement is correct?

A If X has a mass of exactly 2 kg, it will rise.

B If X has a mass of less than 2 kg, it will fall.

C If X has a mass of more than 2 kg, it will fall.

D If X has a mass of more than 2 kg, it will rise.

8 The mass of a full bottle of cooking oil is 1.30 kg.

When exactly half of the oil has been used, the mass of the bottle plus the remaining oil is 0.90 kg.

What is the mass of the bottle?

A 0.40 kg **B** 0.50 kg **C** 0.65 kg **D** 0.80 kg

9 Which statement about the mass of a falling object is correct?

A It decreases as the object falls.

B It is equal to the weight of the object.

C It is measured in newtons.

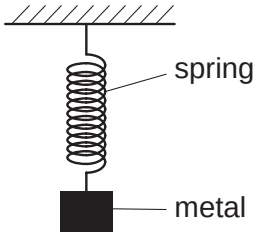
D It stays the same as the object falls.

10 The weights of four objects, 1 to 4, are compared using a balance.

Which object is the lightest?

A object 1 **B** object 2 **C** object 3 **D** object 4

11 A spring is stretched by hanging a piece of metal from it.



What is the name given to the force that stretches the spring?

A friction

B mass

C pressure

D weight

12 Which statement is correct?

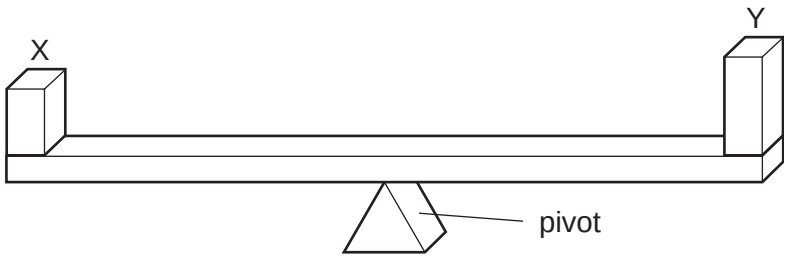
A The mass of a bottle of water at the North Pole is different from its mass at the Equator.

B The mass of a bottle of water is measured in newtons.

C The weight of a bottle of water and its mass are the same thing.

D The weight of a bottle of water is one of the forces acting on it.

13 Two blocks X and Y are placed on a beam as shown. The beam balances on a pivot at its centre.



What does this show about X and Y?

A They have the same mass and the same density.

B They have the same mass and the same weight.

C They have the same volume and the same density.

D They have the same volume and the same weight.

14 What is the gravitational force that the Earth exerts on an object?

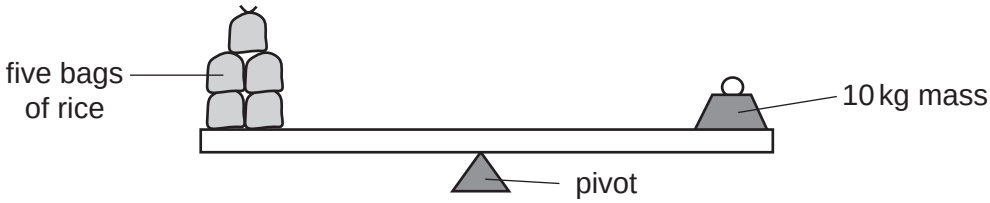
A the density of the object

B the mass of the object

C the volume of the object

D the weight of the object

15 In an experiment, five identical bags of rice are balanced by a 10 kg mass.



Two bags of rice are added to the other five.

What mass will now balance the bags?

A 3.5 kg **B** 7.0 kg **C** 10 kg **D** 14 kg

16 Below are four statements about the effects of forces on objects.

Three of the statements are correct.

Which statement is **incorrect**?

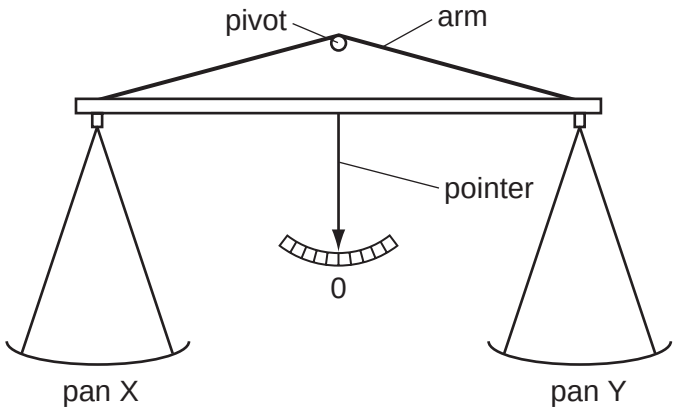
A A force can change the length of an object.

B A force can change the mass of an object.

C A force can change the shape of an object.

D A force can change the speed of an object.

17 A simple balance has two pans suspended from the ends of arms of equal length. When it is balanced, the pointer is at 0.



Four masses (in total) are placed on the pans, with one or more on pan X and the rest on pan Y.

Which combination of masses can be used to balance the pans?

A 1 g, 1 g, 5 g, 10 g

B 1 g, 2 g, 2 g, 5 g

C 2 g, 5 g, 5 g, 10 g

D 2 g, 5 g, 10 g, 10 g

18 A newton is a unit of force.

Which quantity is measured in newtons?

A acceleration

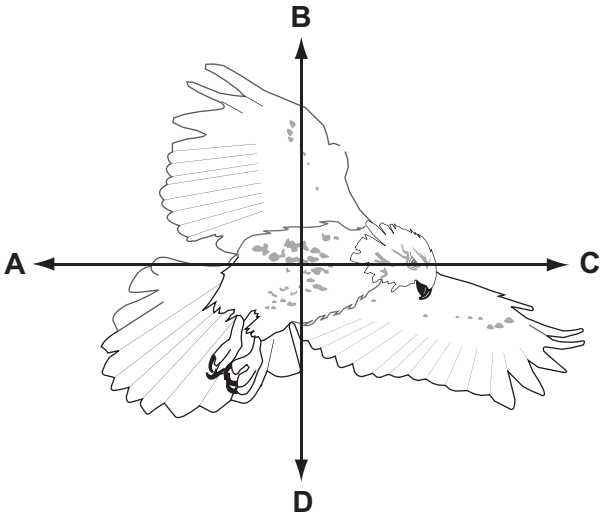
B density

C mass

D weight

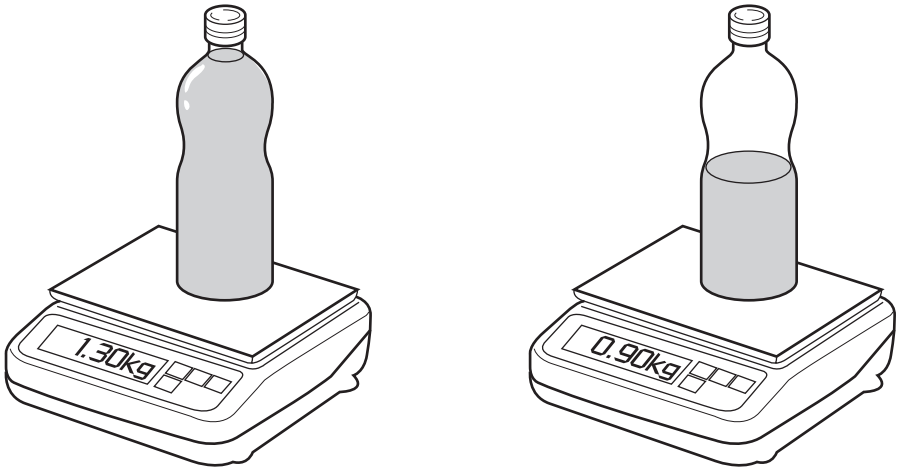
19 The diagram shows a bird in flight.

In which direction does the weight of the bird act?



20 The mass of a full bottle of cooking oil is 1.30 kg.

When exactly half of the oil has been used, the mass of the bottle plus the remaining oil is 0.90 kg.



What is the mass of the empty bottle?

A 0.40 kg **B** 0.50 kg **C** 0.65 kg **D** 0.80 kg

21 What are the correct units for force and for weight?

	force	weight
A	kg	kg
B	kg	N
C	N	kg
D	N	N

22 The table shows the weight of a 10 kg mass on each of five planets.

planet	weight of a 10 kg mass / N
Mercury	40
Venus	90
Earth	100
Mars	40
Jupiter	250

On which planets would an astronaut have a smaller weight than on Earth?

A Mercury, Mars and Jupiter

B Mercury, Venus and Mars

C Mercury, Venus and Jupiter

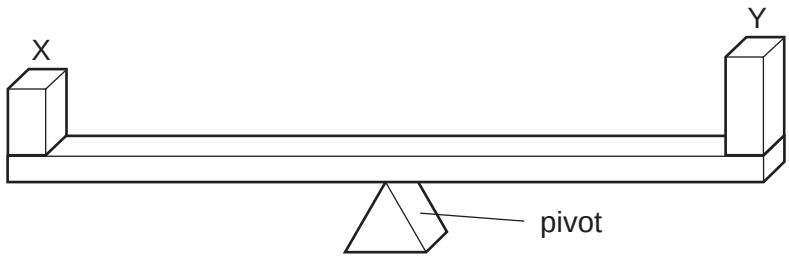
D Venus, Mars and Jupiter

23 The force of gravity acting on an astronaut in an orbiting spacecraft is less than when she is on the Earth's surface.

Compared with being on the Earth's surface, how do her mass and weight change when she goes into orbit?

	mass in orbit	weight in orbit
A	decreases	decreases
B	decreases	unchanged
C	unchanged	decreases
D	unchanged	unchanged

24 When two blocks X and Y are placed on a uniform beam, the beam balances on a pivot at its centre as shown.



What does this show about X and Y?

A They have the same mass and the same density.

B They have the same mass and the same weight.

C They have the same volume and the same density.

D They have the same volume and the same weight.

25 What is the meaning of the *weight* of an object?

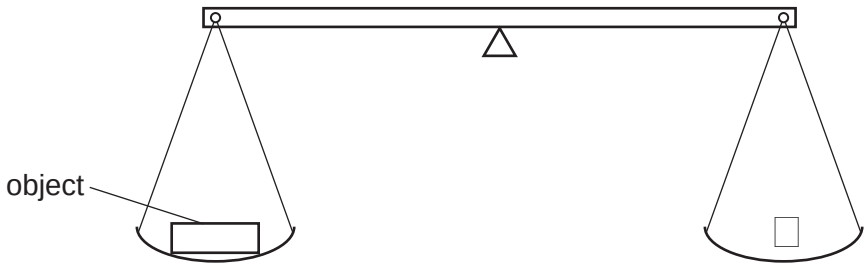
A the density of the material from which it is made

B the force exerted on it by gravity

C the mass of the matter it contains

D the pressure it exerts on the floor

26 The weight of an object is to be found using the beam balance shown in the diagram.



The object is put in the left-hand pan and various standard weights are put in the right-hand pan, with the following results.

weights in the right hand pan	effect
0.1 N, 0.1 N, 0.05 N, 0.02 N	balance tips down slightly on the left-hand side
0.2 N, 0.1 N, 0.01 N	balance tips down slightly on the right-hand side

What is the best estimate of the weight of the object?

A 0.27 N **B** 0.29 N **C** 0.31 N **D** 0.58 N

27 Which statement about the masses and weights of objects on the Earth is correct?

A A balance can only be used to compare weights, not masses.

B Heavy objects always have more mass than light ones.

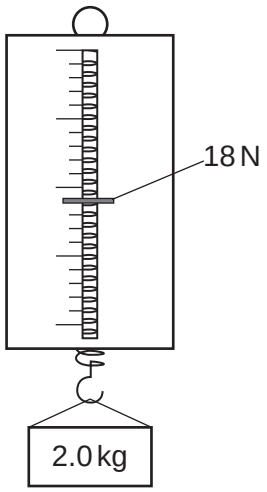
C Large objects always have more mass than small ones.

D Mass is a force but weight is not.

28 The table shows the weight in newtons of a10 kg mass on each of four planets.

planet	weight of a 10 kg mass / N
Earth	100
Jupiter	250
Mercury	40
Venus	90

The diagram shows a force meter (spring balance) being used.



On which planet is the force meter (spring balance) being used?

A Earth

B Jupiter

C Mercury

D Venus

29 Which property of a body can be measured in newtons?

A density

B mass

C volume

D weight

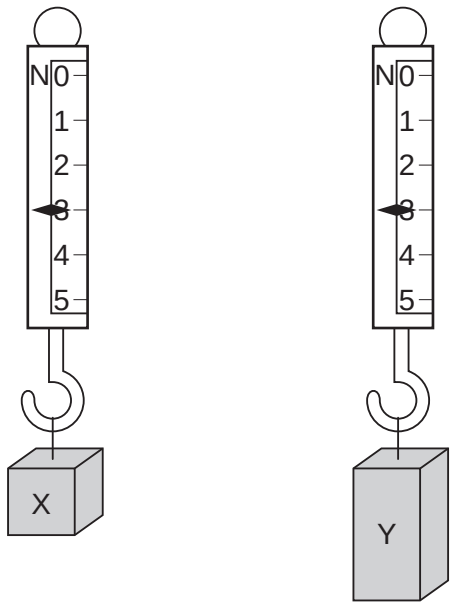
30 A cup contains hot liquid.

Some of the liquid evaporates as it cools.

What happens to the mass and to the weight of the liquid in the cup as it cools?

	mass	weight
A	decreases	decreases
B	decreases	stays the same
C	stays the same	decreases
D	stays the same	stays the same

31 Two blocks of metal X and Y hang from spring balances as shown in the diagram.



What does the diagram show about X and Y?

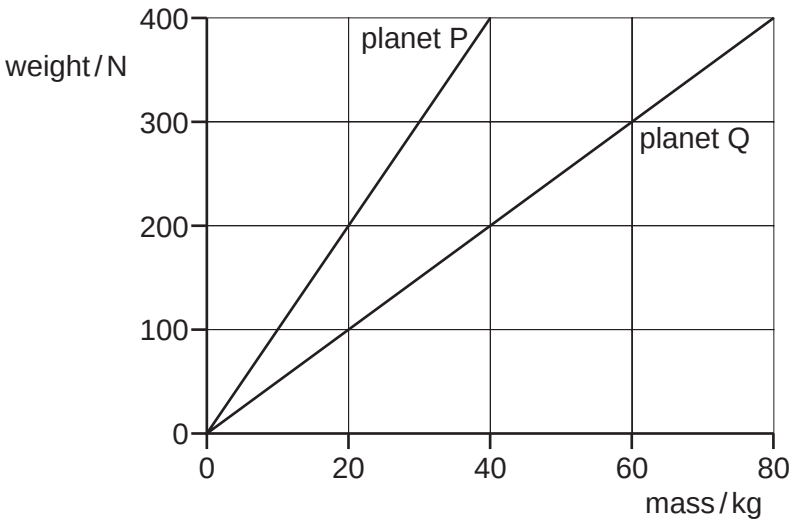
A They have the same mass and the same volume but different weights.

B They have the same mass and the same weight but different volumes.

C They have the same mass, the same volume and the same weight.

D They have the same weight and the same volume but different masses.

32 The graph shows how weight varies with mass on planet P and on planet Q.



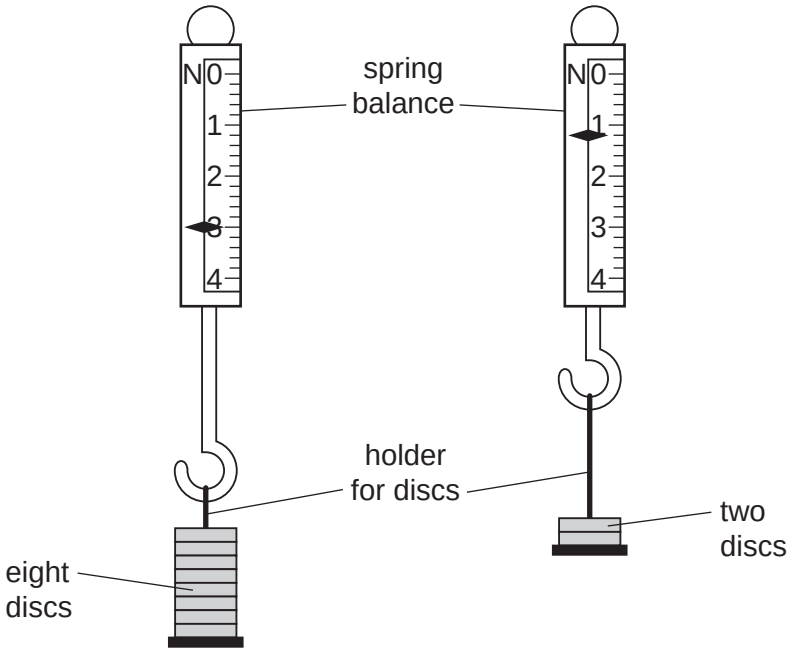
An object weighs 400 N on planet P. The object is taken to planet Q.

Which row is correct?

	mass of object on planet Q / kg	weight of object on planet Q / N
A	40	200
B	40	400
C	80	200
D	80	400

33 The reading on a spring balance with a holder and eight identical discs is 3.0 N.

Six discs are removed and the reading becomes 1.2 N.



What is the weight of one disc?

A 0.2 N **B** 0.3 N **C** 0.5 N **D** 0.6 N

34 Which statement about mass and weight is correct?

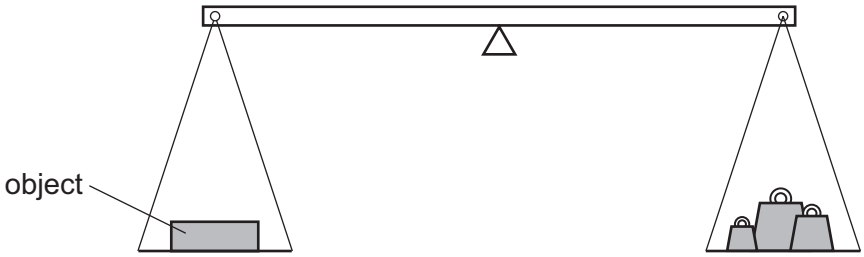
A Mass and weight are both forces.

B Neither mass nor weight is a force.

C Only mass is a force.

D Only weight is a force.

35 The weight of an object is to be found using the balance shown in the diagram.



The object is put in the left-hand pan and various standard weights are put in the right-hand pan. These are the results.

weights in the right-hand pan	effect
0.1 N, 0.1 N, 0.05 N, 0.02 N	balance tips down slightly on the left-hand side
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What is the best estimate of the weight of the object?

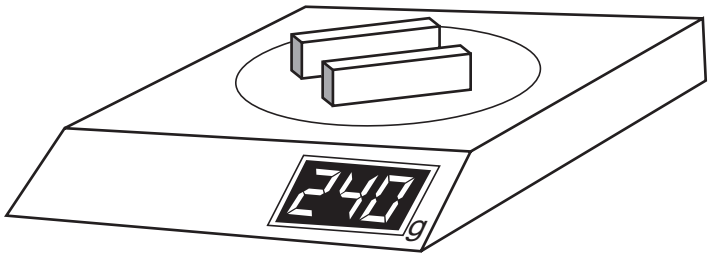
A 0.27 N **B** 0.29 N **C** 0.31 N **D** 0.58 N

Mass and Weight

1	B	11	D	21	D	31	B
2	B	12	D	22	B	32	A
3	C	13	B	23	C	33	B
4	B	14	D	24	B	34	D
5	D	15	D	25	B	35	B
6	C	16	B	26	B		
7	C	17	B	27	B		
8	B	18	D	28	D		
9	D	19	D	29	D		
10	D	20	B	30	A		

Density

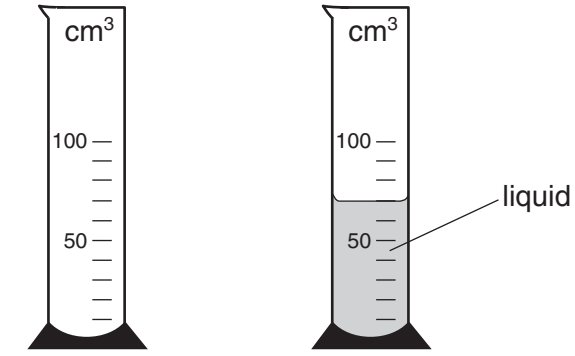
1 A shop-keeper places two identical blocks of cheese on a set of scales and notices that their combined mass is 240 g. Each block measures 2.0 cm x 5.0 cm x 10.0 cm.



What is the density of the cheese?

A 0.42 g / cm^3 **B** 0.83 g / cm^3 **C** 1.2 g / cm^3 **D** 2.4 g / cm^3

2 The masses of a measuring cylinder before and after pouring some liquid are shown in the diagram.



What is the density of the liquid?

A $\frac{217}{52}$ g / cm^3 **B** $\frac{217}{70}$ g / cm^3 **C** $\frac{77}{52}$ g / cm^3 **D** $\frac{77}{70}$ g / cm^3

3 What apparatus is needed to determine the density of a regularly-shaped block?

A a balance and a ruler

B a balance and a forcemeter (spring balance)

C a measuring cylinder and a ruler

D a measuring cylinder and a beaker

4 A student tries to find the density of a metal block. First he measures the weight with a forcemeter (spring balance). Next he measures the sides of the block using a rule, in order to calculate the volume of the block. Finally he divides the weight by the volume to find the density.

The student has made a mistake.

Why does his method **not** give the density?

A Density is volume divided by weight.

B He should have measured the surface area, not the volume.

C He should have used the mass in his calculation, not the weight.

D Weight is not measured with a forcemeter (spring balance).

5 Which of the following is a unit of density?

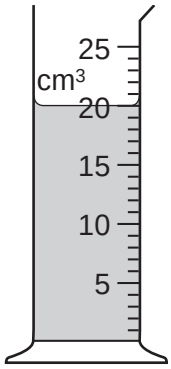
A cm^3 / g

B g / cm^2

C g / cm^3

D kg / m^2

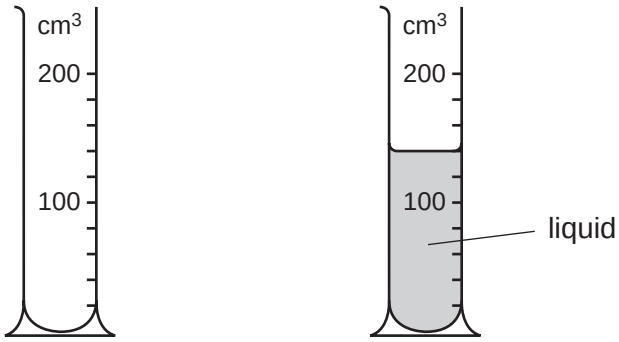
6 The diagram shows some liquid in a measuring cylinder. The mass of the liquid is 16 g.



What is the density of the liquid?

A $320\,g/cm^3$ **B** $36\,g/cm^3$ **C** $1.25\,g/cm^3$ **D** $0.8\,g/cm^3$

7 The masses of a measuring cylinder before and after pouring some liquid into it are shown in the diagram.

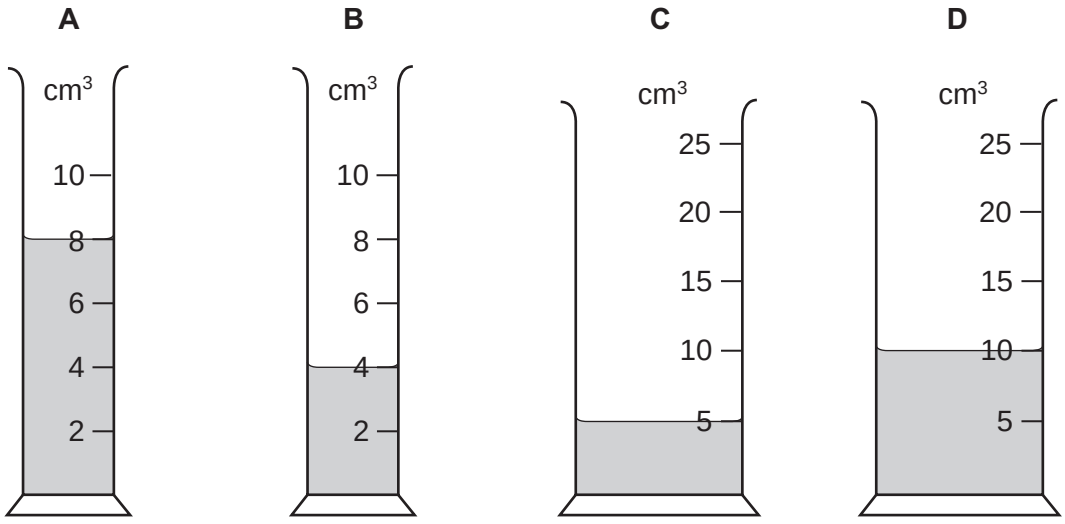


What is the density of the liquid?

A $\frac{100}{120}\,g/cm^3$ **B** $\frac{100}{140}\,g/cm^3$ **C** $\frac{180}{120}\,g/cm^3$ **D** $\frac{180}{140}\,g/cm^3$

8 The same mass of four different liquids is placed in some measuring cylinders.

Which measuring cylinder contains the liquid with the greatest density?



9 A person measures the length, width, height and mass of a rectangular metal block.

Which of these measurements are needed in order to calculate the density of the metal?

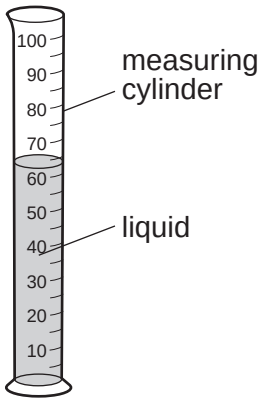
A mass only

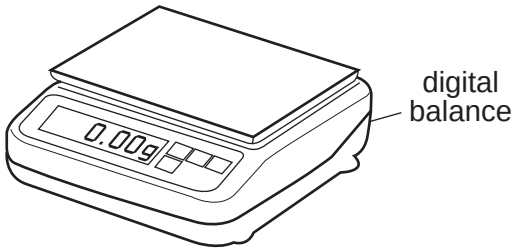
B height and mass only

C length, width and height only

D length, width, height and mass

10 A student pours liquid into a measuring cylinder.





The student records the volume of the liquid from the scale on the measuring cylinder. He then puts the measuring cylinder containing the liquid on a balance and records the mass.

What else needs to be measured before the density of the liquid can be calculated?

A the depth of the liquid in the measuring cylinder

B the mass of the empty measuring cylinder

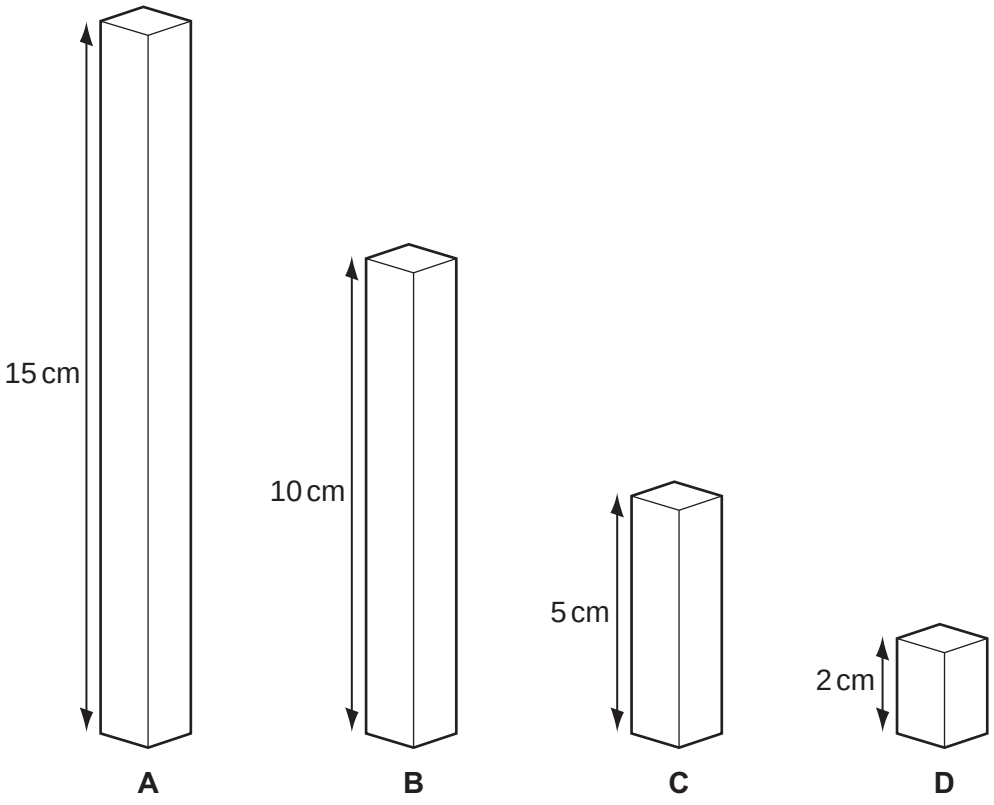
C the temperature of the liquid in the measuring cylinder

D the volume of the empty measuring cylinder

11 The diagram shows four blocks, each made of glass of density 2.6 g / cm^3.

The top of each block has an area of 1 cm^2.

Which block has a mass of 13 g?

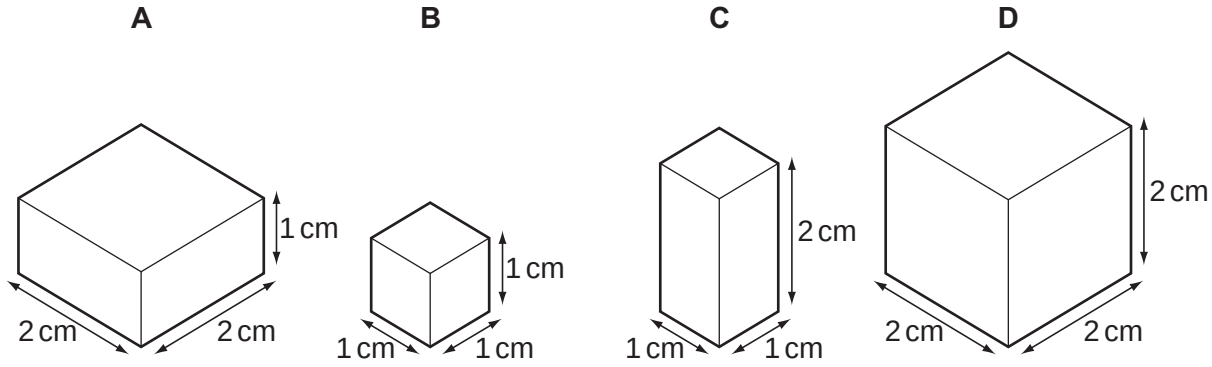


12 Which of the following is a unit of density?

A cm^3/g **B** g/cm^2 **C** g/cm^3 **D** kg/m^2

13 Each of the solids shown in the diagram has the same mass.

Which solid has the greatest density?



14 A student is trying to find the density of water and of a large, regularly-shaped solid.

Which apparatus is needed to find the density of **both**?

A balance, clock, ruler

B balance, measuring cylinder, ruler

C balance, measuring cylinder, string

D clock, ruler, string

15 A metal drum has a mass of 200 kg when empty and 1000 kg when filled with 1.0 m^3 of methylated spirit.

What is the density of methylated spirit?

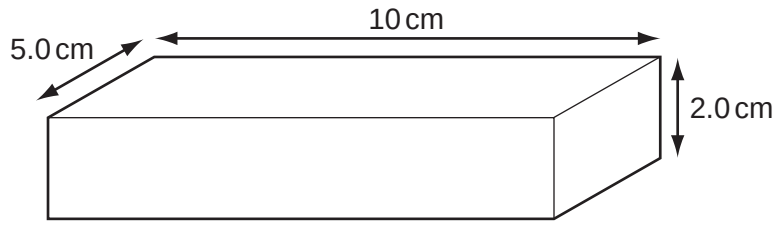
A $0.0050\,kg/m^3$

B $0.11\,kg/m^3$

C $800\,kg/m^3$

D $1000\,kg/m^3$

16 The diagram shows a rectangular metal block measuring 10 cm × 5.0 cm × 2.0 cm.

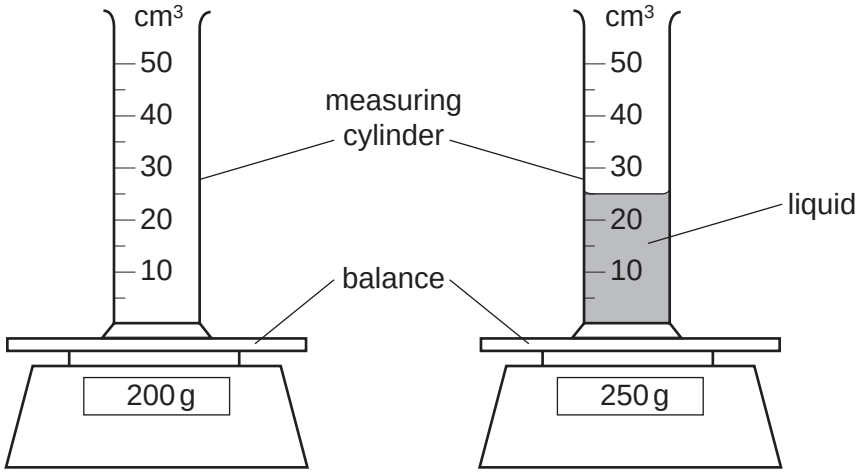


Its mass is 250 g.

What is the density of the metal?

A 0.20 g / cm^3 **B** 0.40 g / cm^3 **C** 2.5 g / cm^3 **D** 5.0 g / cm^3

17 The diagram shows an experiment to find the density of a liquid.



What is the density of the liquid?

A 0.5 g / cm^3 **B** 2.0 g / cm^3 **C** 8.0 g / cm^3 **D** 10.0 g / cm^3

18 A student needs to find the density of a cubic block of wood.

Which two pieces of apparatus should she use?

A balance and metre rule

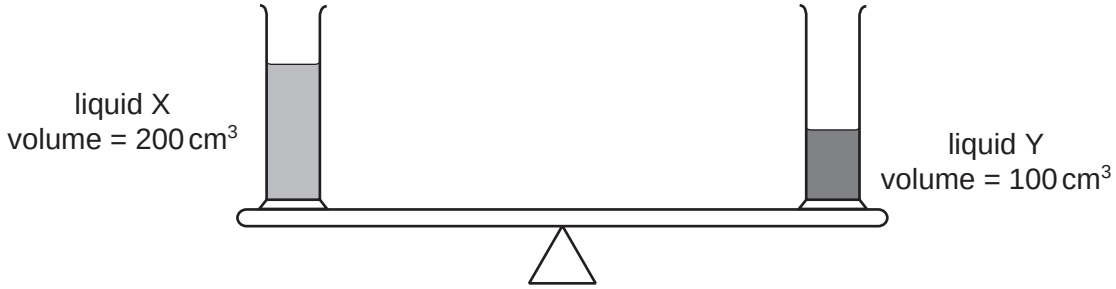
B balance and thermometer

C measuring cylinder and metre rule

D measuring cylinder and thermometer

19 Two identical measuring cylinders containing different liquids are placed on a simple balance.

They balance as shown.



How does the density of X compare with the density of Y?

A density of X = $\frac{1}{2}$ × density of Y

B density of X = density of Y

C density of X = 2 × density of Y

D density of X = 4 × density of Y

20 Which items of apparatus are required to determine the density of a liquid?

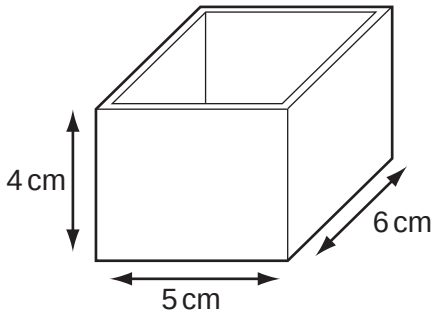
A balance and measuring cylinder

B balance and thermometer

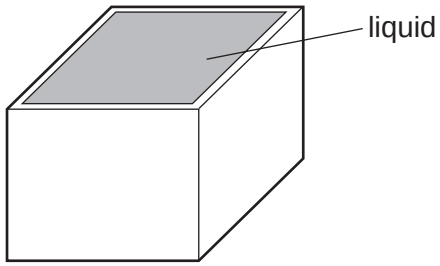
C metre rule and measuring cylinder

D metre rule and thermometer

21 The diagrams show a rectangular box with inside measurements of 5 cm × 6 cm × 4 cm.



mass = 40 g



total mass = 220 g

The box has a mass of 40 g when empty. When filled with a liquid, it has a total mass of 220 g.

What is the density of the liquid?

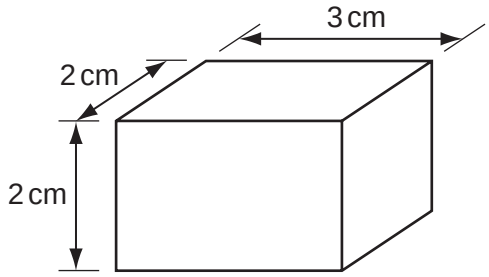
A $\frac{220}{(5\times6\times4)}\,g/cm^3$

B $\frac{(220-40)}{(5\times6\times4)}\,g/cm^3$

C $\frac{(5\times6\times4)}{220}\,g/cm^3$

D $\frac{(5\times6\times4)}{(220-40)}\,g/cm^3$

22 The diagram shows a rectangular block of density $2\,g/cm^3$.



What is the mass of the block?

A 2 g **B** 6 g **C** 14 g **D** 24 g

23 A student is trying to find the density of water and of a large, regularly shaped concrete block.

Which apparatus is needed to find the density of **both** the water and the concrete block?

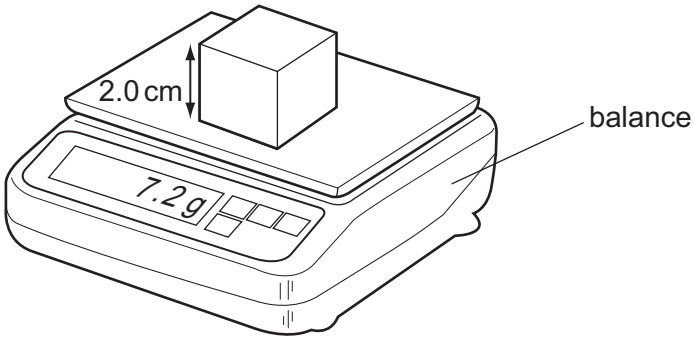
A balance, clock, measuring cylinder

B balance, clock, ruler

C balance, measuring cylinder, ruler

D clock, measuring cylinder, ruler

24 A cube of side 2.0 cm is placed on a balance.



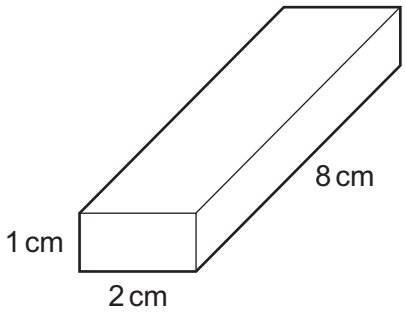
What is the density of the cube?

A $0.90\,g/cm^3$ **B** $1.2\,g/cm^3$ **C** $1.8\,g/cm^3$ **D** $3.6\,g/cm^3$

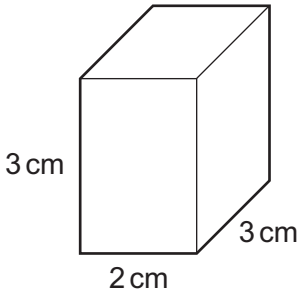
25 The diagrams show four blocks with the same mass.

Which block is made from the least dense material?

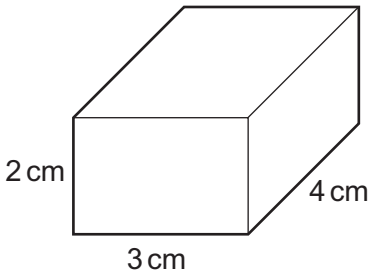
A



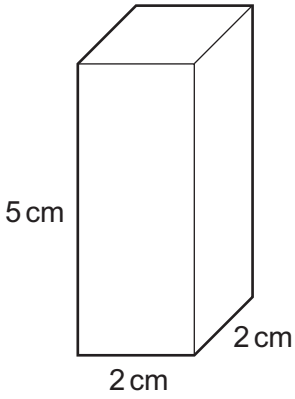
B



C



D



26 A student is told to measure the density of a liquid and also of a large cube of metal.

Which pieces of equipment are sufficient to be able to take the measurements needed?

A balance, measuring cylinder and ruler

B balance and thermometer

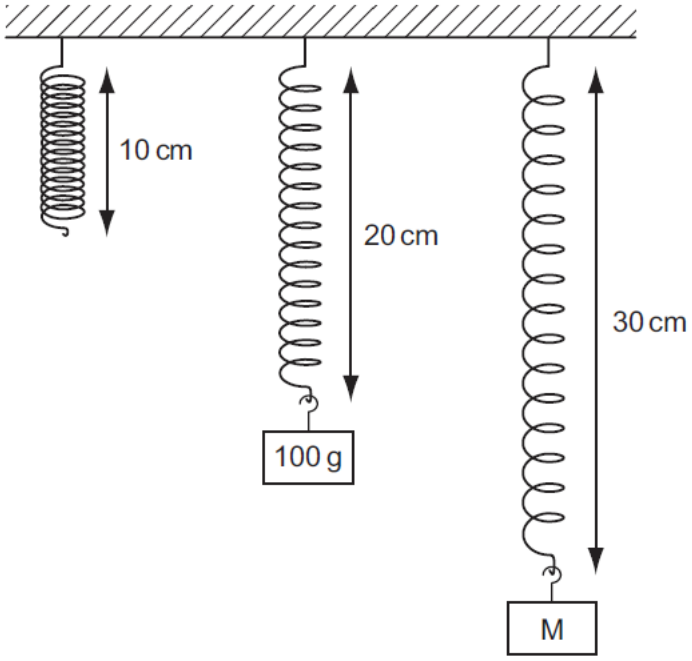
C measuring cylinder and ruler

D measuring cylinder, ruler and thermometer

Density

1	C	11	C	21	B
2	D	12	C	22	D
3	A	13	B	23	C
4	C	14	B	24	A
5	C	15	C	25	C
6	D	16	C	26	A
7	B	17	B		
8	B	18	A		
9	D	19	A		
10	B	20	A		

1. Objects with different masses are hung on a spring. The diagram shows how much the spring stretches.



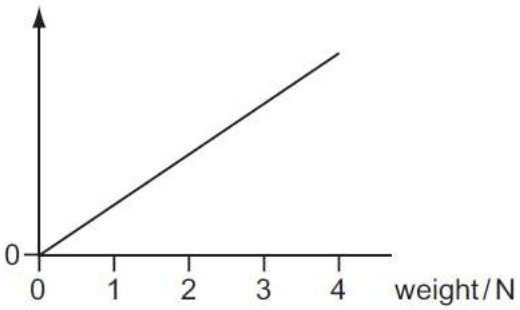
The extension of the spring is directly proportional to the mass hung on it.

What is the mass of object M?

A 110 g **B** 150 g **C** 200 g **D** 300 g

2. A student adds weights to an elastic cord. He measures the length of the cord for each weight.

He then plots a graph from the results, as shown.



Which length has he plotted on the vertical axis?

A measured length

B original length

C (measured length – original length)

D (measured length + original length)

3. A force acts on a moving rubber ball.

Which of these changes could **not** happen to the ball because of the force?

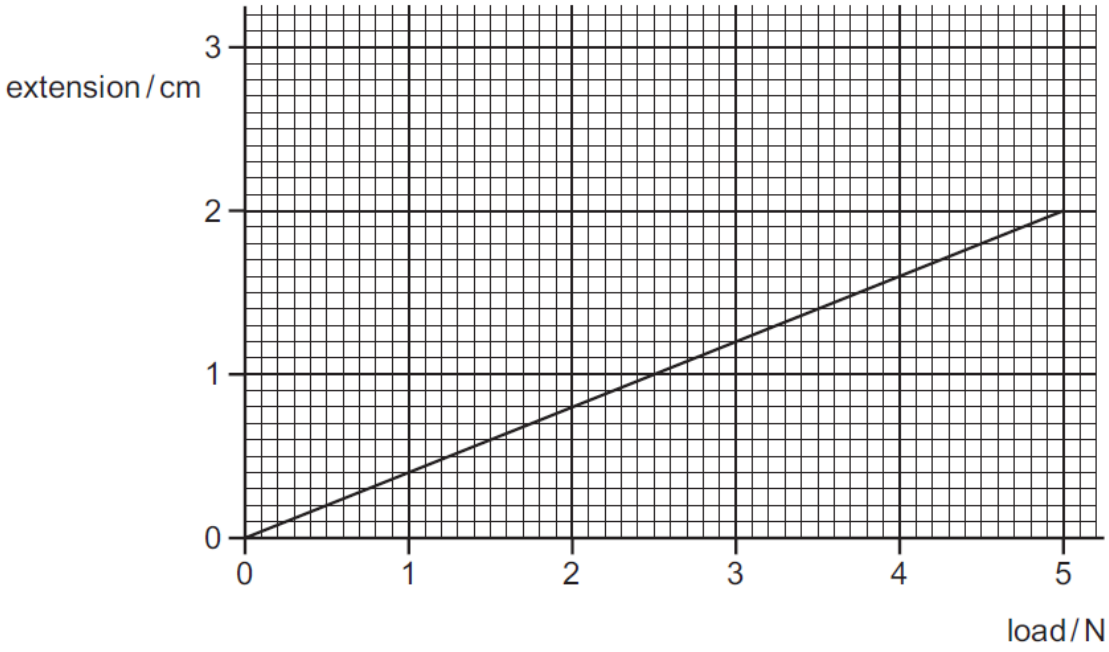
A a change in direction

B a change in mass

C a change in shape

D a change in speed

4. The extension / load graph for a spring is shown. The unloaded length of the spring is 15.0 cm.



When an object of unknown weight is hung on the spring, the length of the spring is 16.4 cm.

What is the weight of the object?

A 0.55 N **B** 0.67 N **C** 3.5 N **D** 4.1 N

5. Which statement about a moving object is correct?

A When an object is accelerating, the resultant force acting on it must equal zero.

B When an object is moving at a steady speed, the air resistance acting on it must equal zero.

C When an object is moving at a steady speed, the resultant force acting on it must equal zero.

D When an object is moving, there must be a resultant force acting on it.

6. An experiment is carried out to measure the extension of a rubber band for different loads.

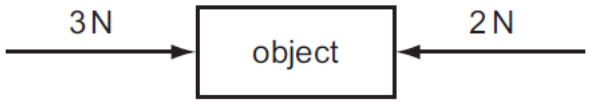
The results are shown below.

load / N	0	1	2	3
length / cm	15.2	16.2		18.6
extension / cm	0	1.0	2.1	3.4

Which figure is missing from the table?

A 17.2 **B** 17.3 **C** 17.4 **D** 17.6

7. The object in the diagram is acted upon by the two forces shown.



What is the effect of these forces?

A The object moves to the left with constant speed.

B The object moves to the left with constant acceleration.

C The object moves to the right with constant speed.

D The object moves to the right with constant acceleration.

8. Which property of an object **cannot** be changed by a force?

A its mass

B its motion

C its shape

D its size

9. Below are four statements about the effects of forces on objects.

Three of the statements are correct.

Which statement is **incorrect**?

A A force can change the length of an object.

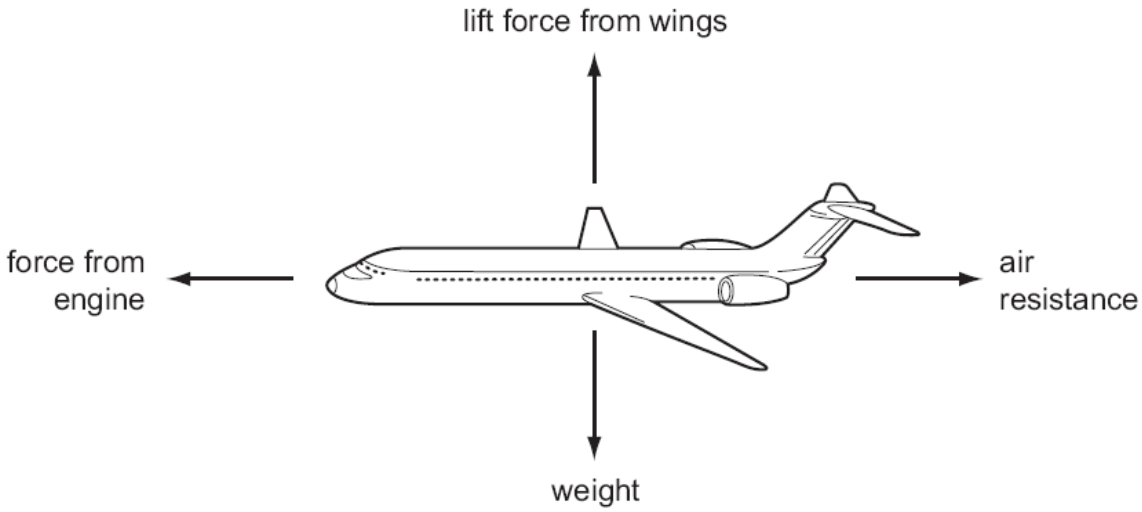
B A force can change the mass of an object.

C A force can change the shape of an object.

D A force can change the speed of an object.

10. An aeroplane is in equilibrium.

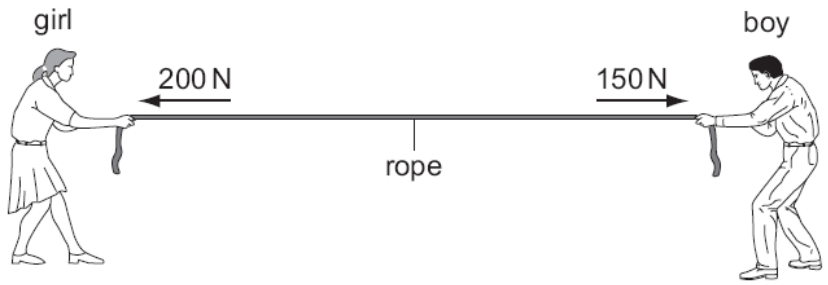
The diagram shows the forces acting on the aeroplane.



Which statement about the forces is correct?

	force from engine	lift force from wings
A	equal to air resistance	equal to weight
B	equal to air resistance	greater than weight
C	greater than air resistance	equal to weight
D	greater than air resistance	greater than weight

11. A girl and a boy are pulling in opposite directions on a rope. The forces acting on the rope are shown in the diagram.



Which single force has the same effect as the two forces shown?

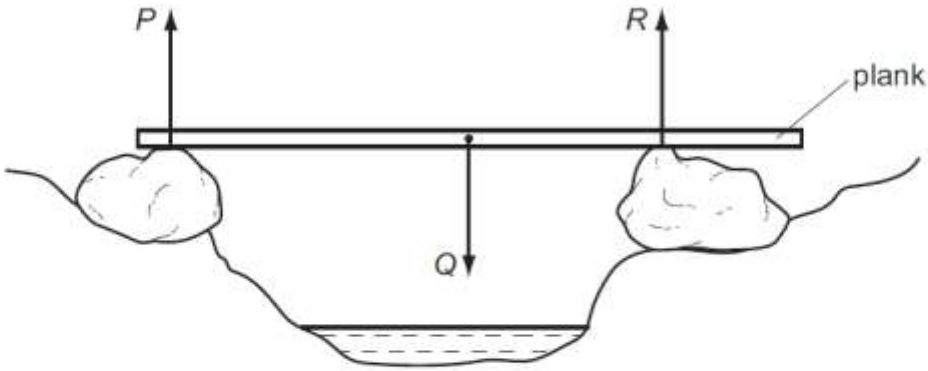
A 50 N acting towards the girl

B 350 N acting towards the girl

C 50 N acting towards the boy

D 350 N acting towards the boy

12. A wooden plank rests in equilibrium on two boulders on opposite sides of a narrow stream. Three forces of size *P*, *Q* and *R* act on the plank.



How are the sizes of the forces related?

A $P + Q = R$

B $P + R = Q$

C $P = Q = R$

D $P = Q + R$

13. A force acts on a moving rubber ball.

How many of the following changes could happen to the ball because of the force?

- a change in direction
- a change in shape
- a change in mass
- a change in speed

A 1 **B** 2 **C** 3 **D** 4

14. The table shows the length of a wire as the load on it is increased.

load / N	0	10	20	30
length / cm	50.0	52.1	54.1	56.3

Which subtraction should be made to find the extension caused by the 20 N load?

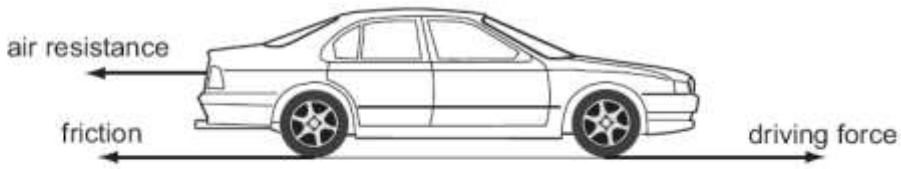
A 54.1 cm – 0 cm

B 54.1 cm – 50.0 cm

C 54.1 cm – 52.1 cm

D 56.3 cm – 54.1 cm

15. Three horizontal forces act on a car that is moving along a straight, level road.

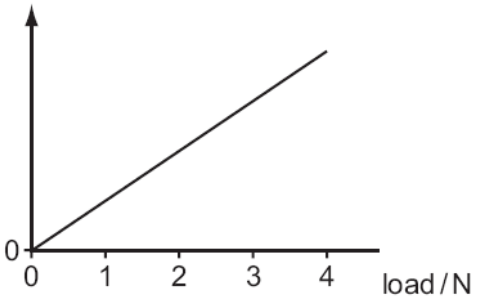


Which combination of forces would result in the car moving at constant speed?

	air resistance	friction	driving force
A	200 N	1000 N	800 N
B	800 N	1000 N	200 N
C	800 N	200 N	1000 N
D	1000 N	200 N	800 N

16. A student adds loads to an elastic cord. He measures the length of the cord for each load.

He then plots a graph from the results.



Which length is plotted on the vertical axis?

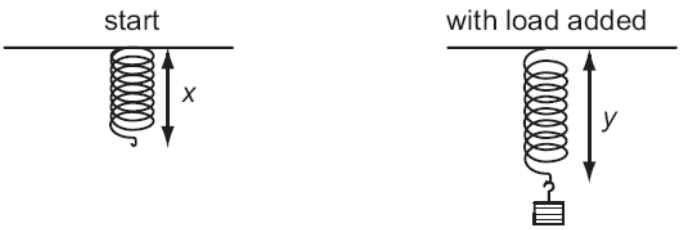
A measured length

B original length

C (measured length – original length)

D (measured length + original length)

17. A student carries out an experiment to plot an extension / load graph for a spring. The diagrams show the apparatus at the start of the experiment and with a load added.



What is the extension caused by the load?

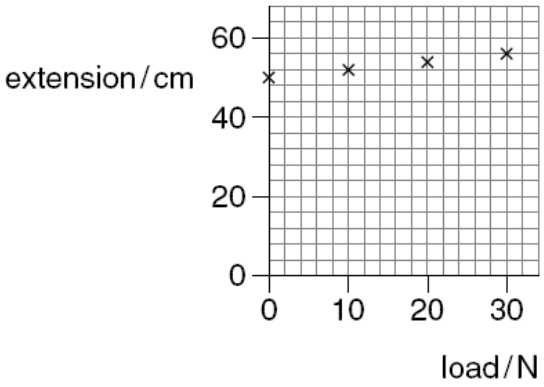
A x **B** y **C** $y + x$ **D** $y - x$

18. The table below shows the length of a wire as the load on it is increased.

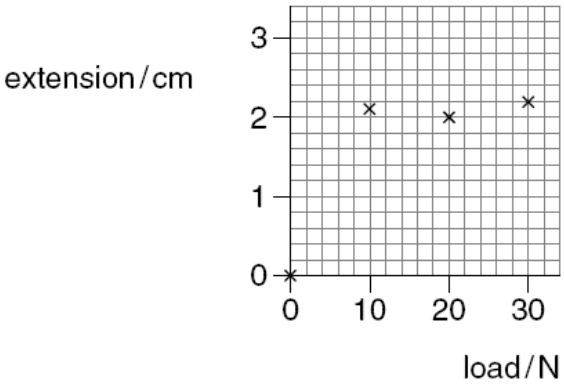
load / N	0	10	20	30
length / cm	50.0	52.1	54.1	56.3

Which graph correctly shows the extension of the wire plotted against load?

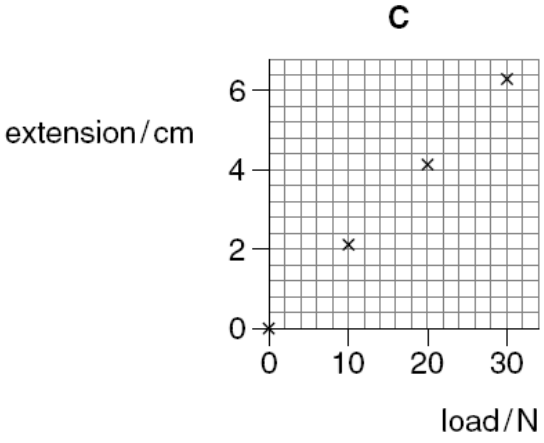
A



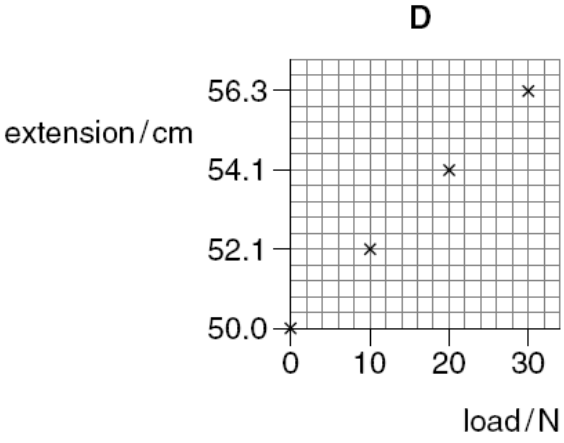
B



C



D



19. An experiment is carried out to measure the extension of a rubber band for different loads.

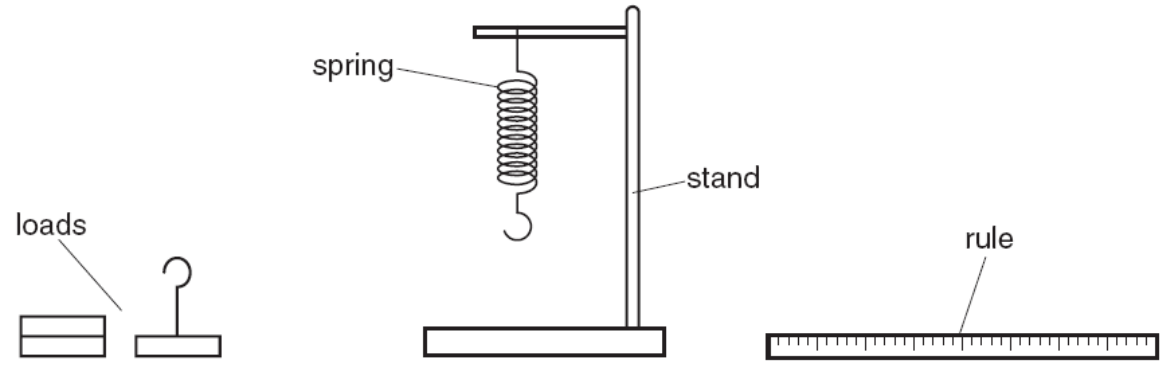
The results are shown below.

load / N	0	1	2	3
length / cm	15.2	16.2		18.6
extension / cm	0	1.0	2.1	3.4

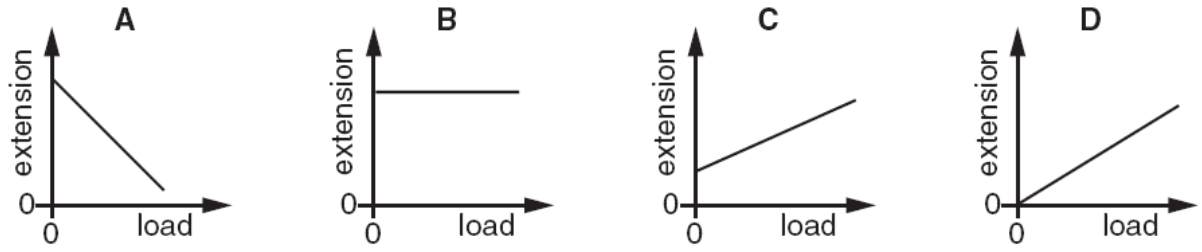
Which figure is missing from the table?

A 16.5 **B** 17.3 **C** 17.4 **D** 18.3

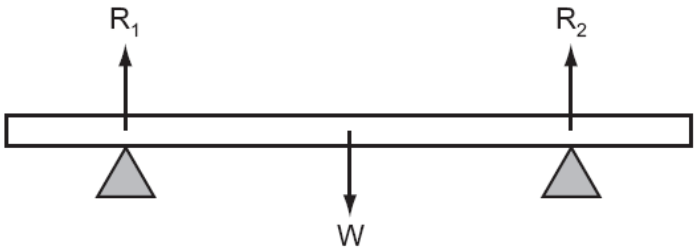
20. A spring is suspended from a stand. Loads are added and the extensions are measured.



Which graph shows the result of plotting extension against load?



21. A heavy beam is resting on two supports, so that there are three forces acting on it.



The beam is in equilibrium.

Which statement is correct?

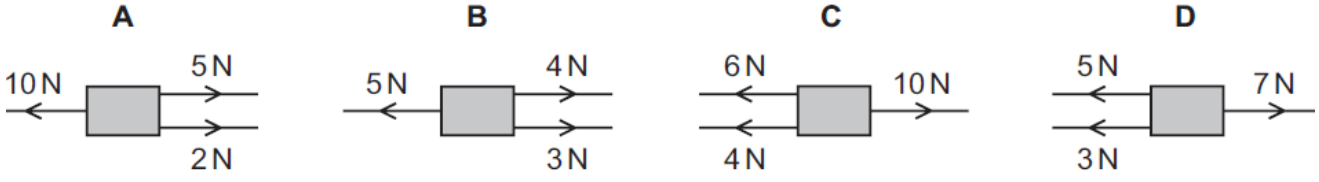
A All the forces are equal in value.

B The forces are in one direction and their turning effects are in the opposite direction.

C The resultant force is zero and the resultant turning effect is zero.

D The total upward force is twice the total downward force.

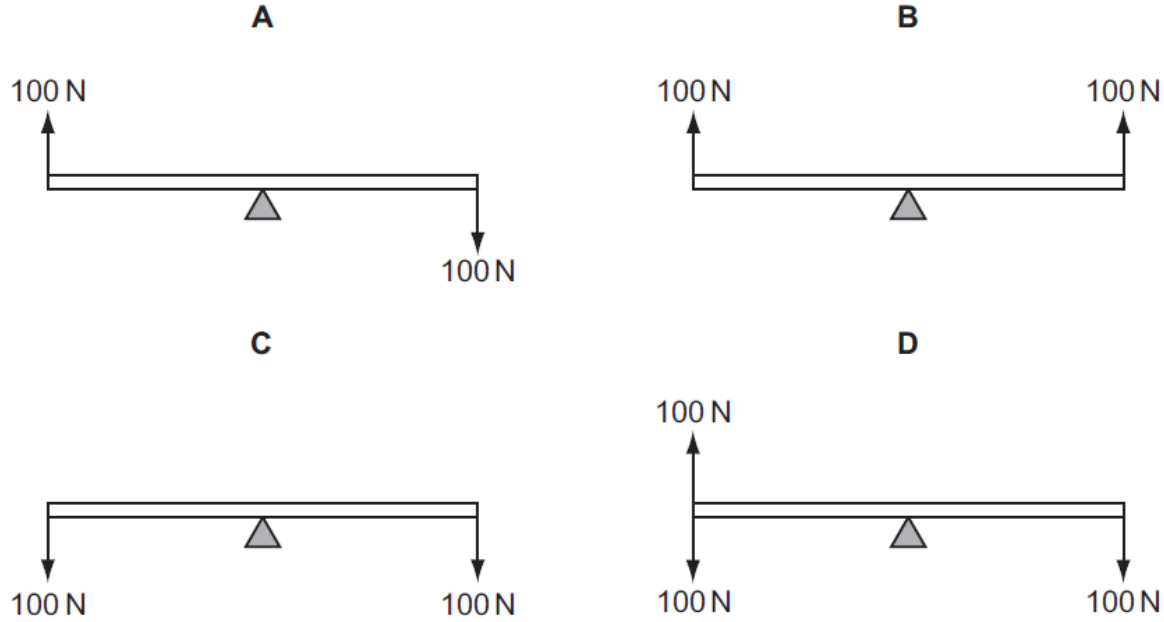
22. Which combination of forces produces a resultant force acting towards the right?



Forces and Moment: Turning Effect

1. A uniform rod rests on a pivot at its centre. The rod is not attached to the pivot. Forces are then applied to the rod in four different ways, as shown. The weight of the rod can be ignored.

Which diagram shows the rod in equilibrium?

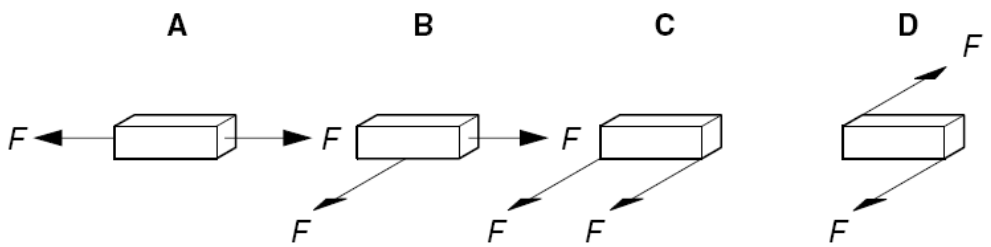


2. What are the conditions for equilibrium?

	resultant force acting	resultant turning effect acting
A	yes	yes
B	yes	no
C	no	yes
D	no	no

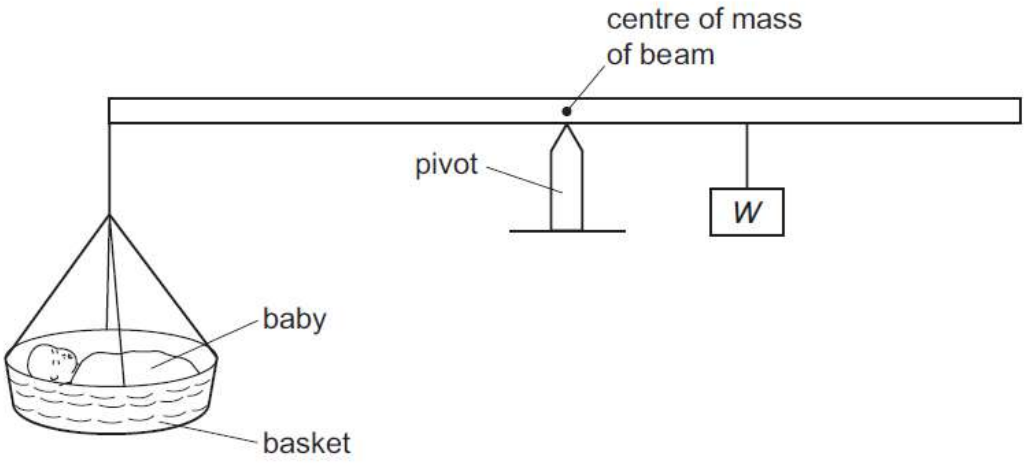
3. The diagrams show a brick resting on a smooth surface. Two equal forces *F* act on the brick.

In which diagram does the brick **not** move?



4. The diagram shows a balance being used to find the weight of a baby. The weight of the basket can be ignored.

At equilibrium, the pivot is nearer to the weight *W* than to the baby.



What is the weight of the baby?

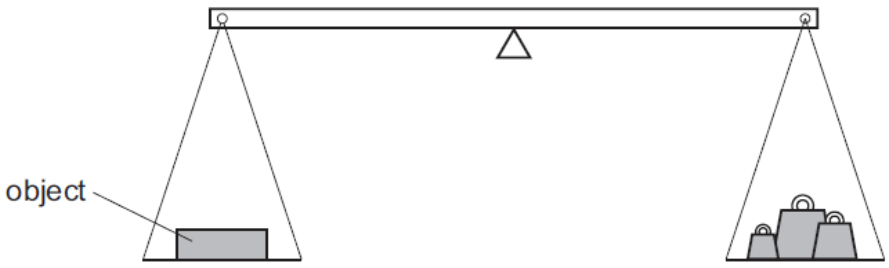
A less than *W*

B more than *W*

C *W*

D impossible to tell

5. The weight of an object is to be found using the balance shown in the diagram.



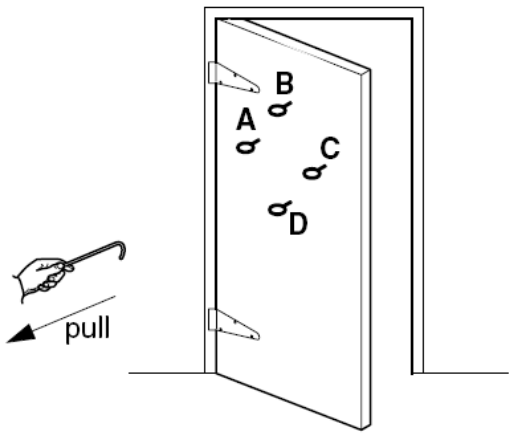
The object is put in the left-hand pan and various standard weights are put in the right-hand pan. These are the results.

weights in the right-hand pan	effect
0.1 N, 0.1 N, 0.05 N, 0.02 N	balance tips down slightly on the left-hand side
0.2 N, 0.1 N, 0.01 N	balance tips down slightly on the right-hand side

What is the best estimate of the weight of the object?

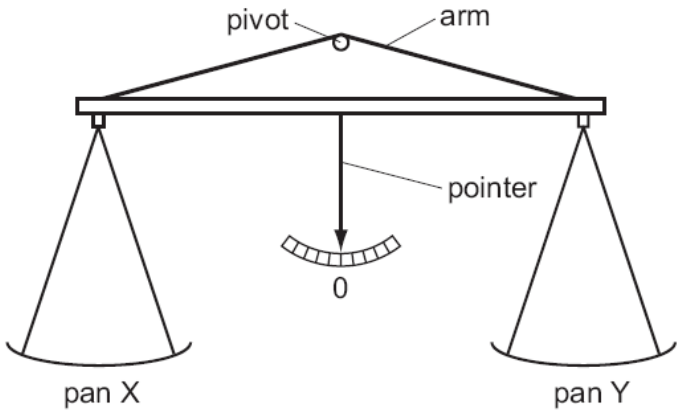
A 0.27 N **B** 0.29 N **C** 0.31 N **D** 0.58 N

6. Four rings are screwed into a door, as shown. The door can be opened by putting a hook into one of the rings and pulling.



Which ring should be used if the pulling force is to be as small as possible?

7. A simple balance has two pans suspended from the ends of arms of equal length. When it is balanced, the pointer is at 0.



Four masses (in total) are placed on the pans, with one or more on pan X and the rest on pan Y.

Which combination of masses can be used to balance the pans?

A 1 g, 1 g, 5 g, 10 g

B 1 g, 2 g, 2 g, 5 g

C 2 g, 5 g, 5 g, 10 g

D 2 g, 5 g, 10 g, 10 g

8. The weights of four objects, 1 to 4, are compared using a balance.

Which object is the lightest?

A object 1 **B** object 2 **C** object 3 **D** object 4

9. Two forces act on an object.

In which situation is it **impossible** for the object to be in equilibrium?

A The two forces act in the same direction.

B The two forces act through the same point.

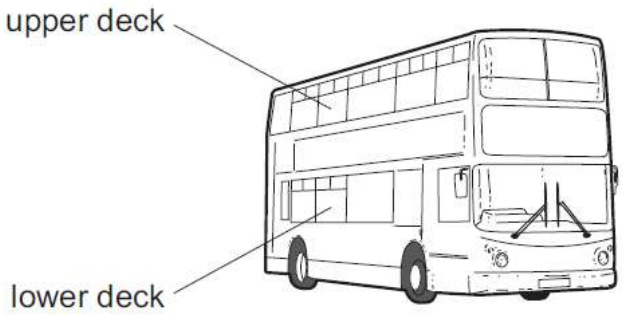
C The two forces are of the same type.

D The two forces are the same size.

Forces and Moment: Turning Effect

Forces and Moment: Centre of mass

1. Passengers are **not** allowed to stand on the upper deck of double-decker buses.



Why is this?

A They would cause the bus to become unstable.

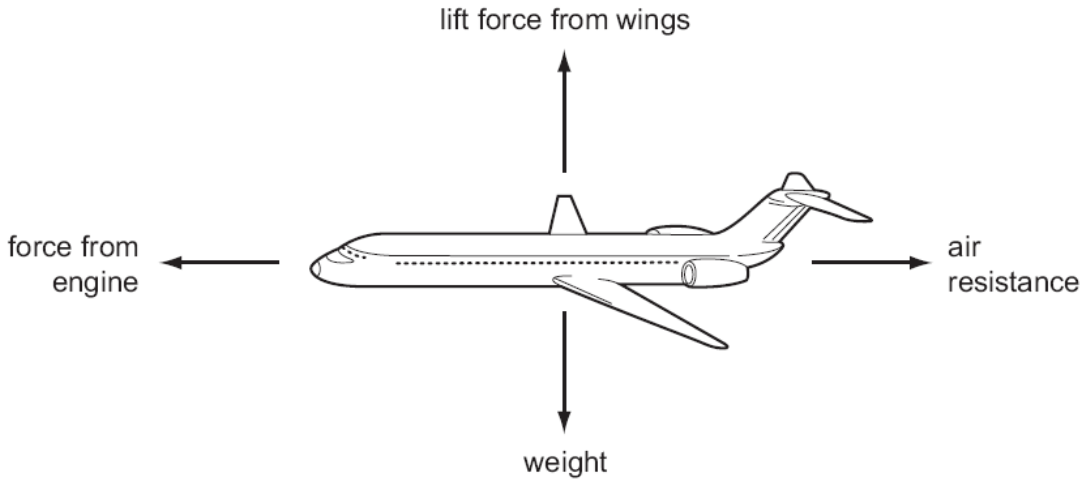
B They would cause the bus to slow down.

C They would increase the kinetic energy of the bus.

D They would lower the centre of mass of the bus.

2. An aeroplane is in equilibrium.

The diagram shows the forces acting on the aeroplane.

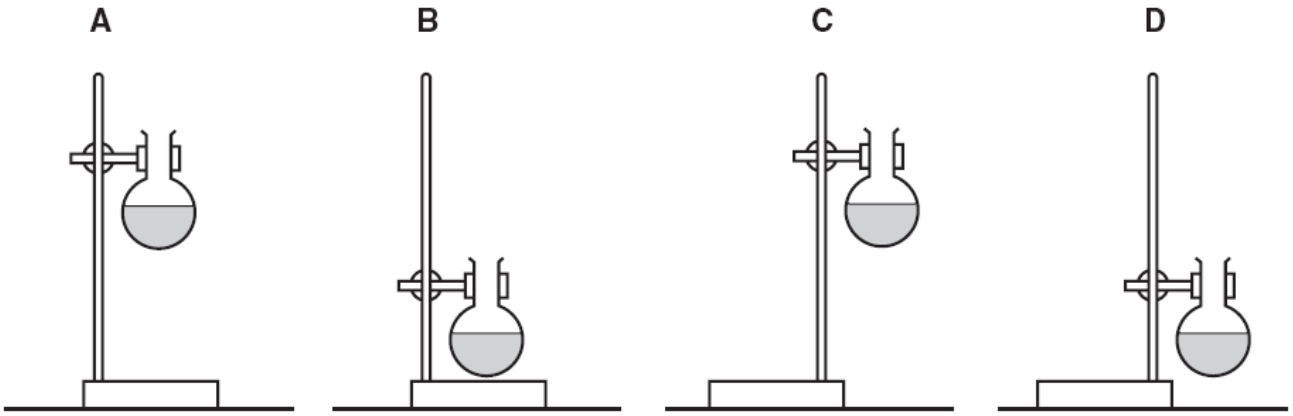


Which statement about the forces is correct?

	force from engine	lift force from wings
A	equal to air resistance	equal to weight
B	equal to air resistance	greater than weight
C	greater than air resistance	equal to weight
D	greater than air resistance	greater than weight

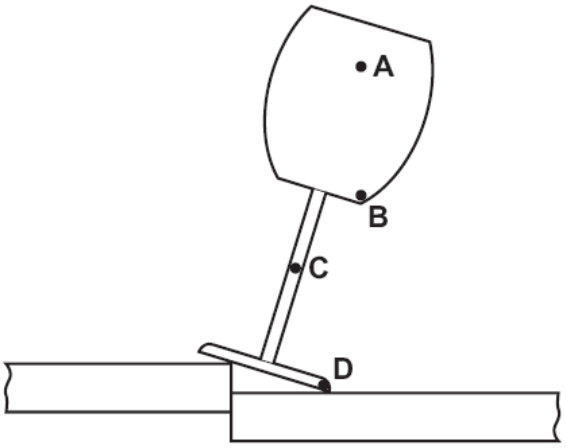
3. A student uses a stand and clamp to hold a flask of liquid.

Which diagram shows the most stable arrangement?



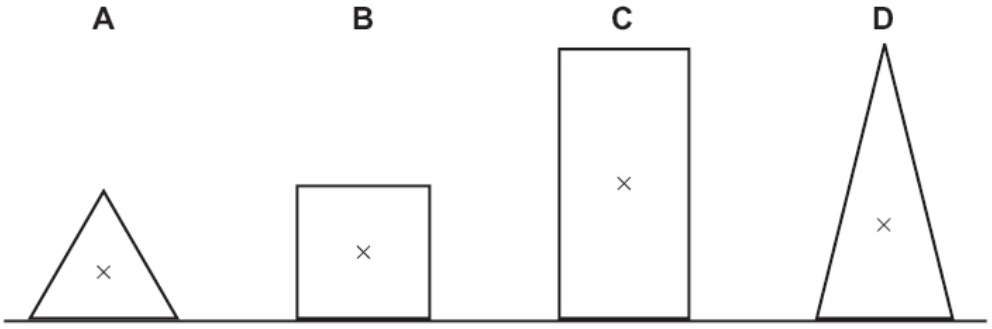
4. An empty glass is placed on a join between two tables as shown. The glass remains stable.

Which point is the centre of mass of the glass?

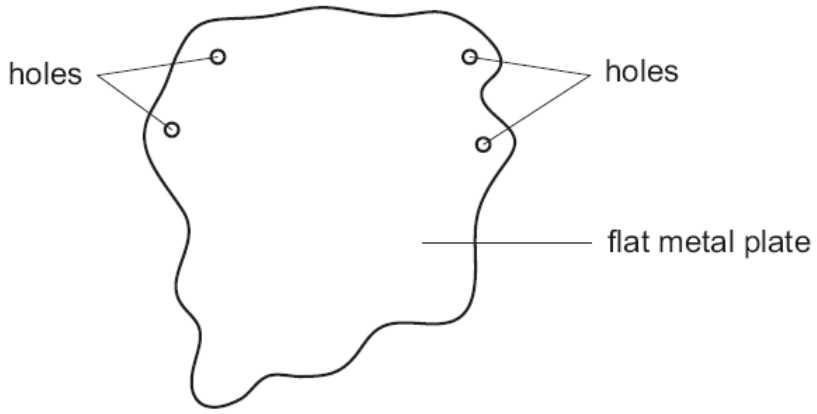


5. The diagram shows sections of four objects of equal mass. The position of the centre of mass of each object has been marked with a cross.

Which object is the most stable?



6. The diagram shows a flat metal plate that may be hung from a nail so that it can rotate about any of four holes.

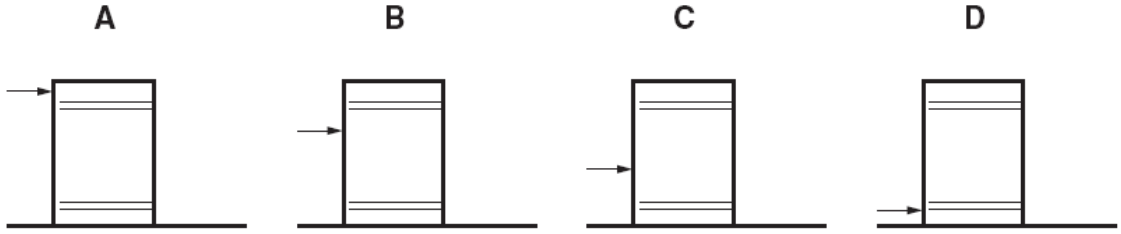


What is the smallest number of holes from which the flat metal plate should be hung in order to find its centre of gravity?

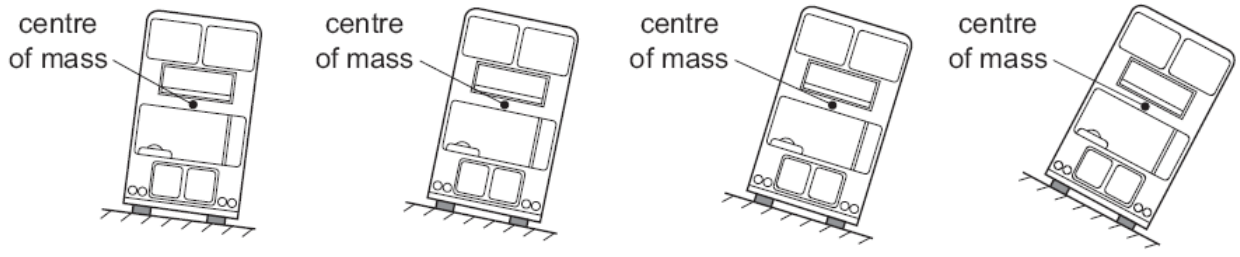
A 1 **B** 2 **C** 3 **D** 4

7. A child tries to push over a large empty oil drum.

Where should the drum be pushed to topple it over with least force?



8. The diagram shows four models of buses placed on different ramps.



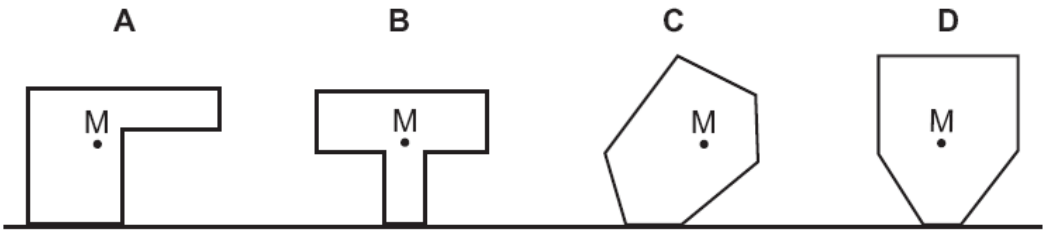
How many of these models will fall over?

A 1 **B** 2 **C** 3 **D** 4

9. The diagram shows four objects standing on a flat surface.

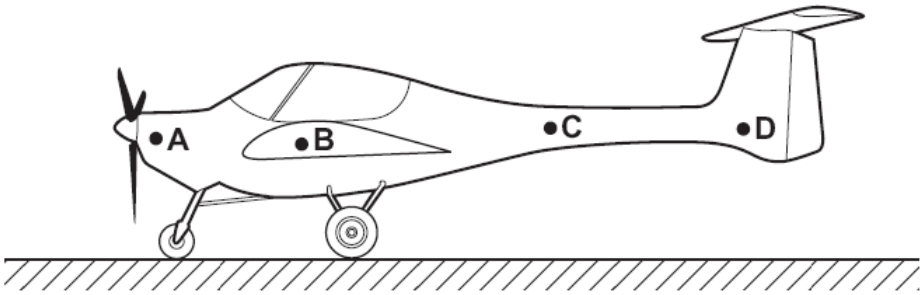
The centre of mass of each object is marked M.

Which object will fall over?



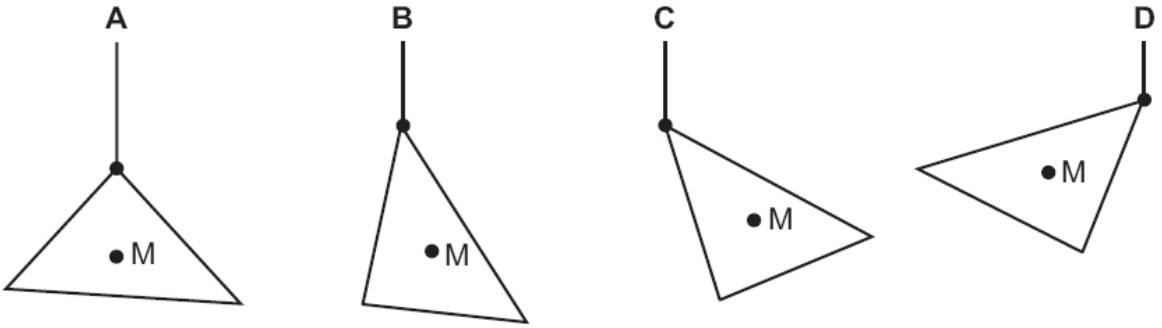
10. A light aircraft stands at rest on the ground. It stands on three wheels, one at the front and two further back.

Which point could be its centre of mass?



11. A piece of card has its centre of mass at M.

Which diagram shows how it hangs when suspended by a thread?



Energy, work and power

1. Which row gives an example of the stated form of energy?

	form of energy	example
A	gravitational	the energy due to the movement of a train along a level track
B	internal	the energy due to the flow of cathode rays in a cathode-ray tube
C	kinetic	the energy due to the position of a swimmer standing on a high diving board
D	strain	the energy due to the compression of springs in a car seat

2. Which energy resource is used to generate electricity by first boiling water?

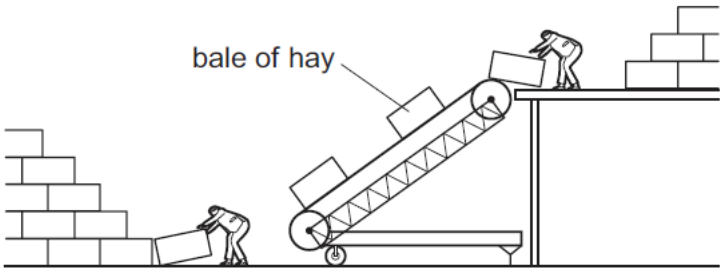
A hydroelectric

B nuclear fission

C tides

D waves

3. Two farmers use an electrically powered elevator to lift bales of hay. All the bales of hay have the same mass.

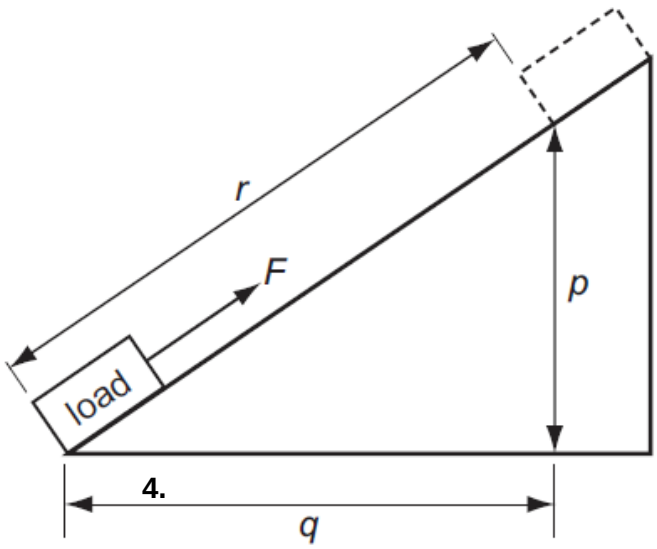


As sunset approaches, they increase the speed of the motor so that more bales are lifted up in a given time.

How does this affect the work done in lifting each bale and the useful output power of the motor?

	work done in lifting each bale	useful output power of the motor
A	increases	decreases
B	increases	increases
C	no change	decreases
D	no change	increases

4. A force *F* moves a load from the bottom of a slope to the top.



The work done by the force depends on the size of the force, and on a distance.

What is this distance?

A *p** **B** *q** **C** *r** **D** *p* + *q*

5. Which of these is designed to change electrical energy into kinetic energy?

A a capacitor

B a generator

C a motor

D a transformer

6. A car is driven on a long journey along a flat, horizontal road. The car stops several times on the journey and its engine becomes hot.

Which type of energy does **not** change during the journey?

A the chemical energy in the fuel tank

B the gravitational energy of the car

C the internal (thermal) energy of the engine

D the kinetic energy of the car

7. Energy is stored in a battery and in a box of matches.

Which type of energy is stored in each of them?

	a battery	a box of matches
A	chemical	chemical
B	chemical	internal (thermal)
C	electrical	chemical
D	electrical	internal (thermal)

8. A man lifts 20 bricks, each of weight 6 N.

What other information is needed to calculate the useful work done in lifting the bricks?

A the distance he lifts the bricks

B the mass of the bricks

C the time taken to lift the bricks

D the volume of the bricks

9. The diagram shows a microphone being used in an interview.

Which energy change takes place in the microphone?

	input energy	output energy
A	chemical	electrical
B	electrical	chemical
C	electrical	sound
D	sound	electrical

10. The table shows the times taken for four children to run up a set of stairs.

Which child's power is greatest?

	mass of child / kg	time / s
A	40	10
B	40	20
C	60	10
D	60	20

11.
Electricity can be obtained from different energy resources.

Which energy resource is used to obtain electricity without producing heat to boil water?

A coal

B geothermal

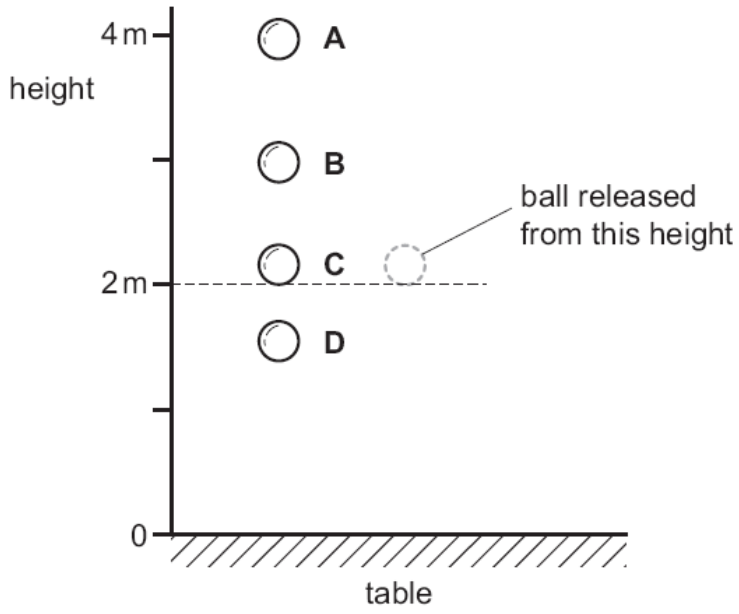
C hydroelectric

D nuclear

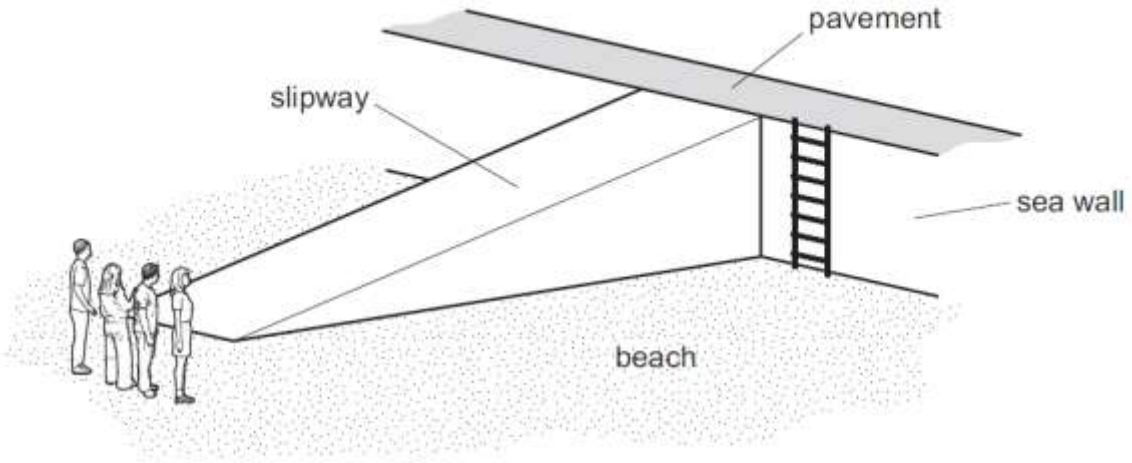
12.
A rubber ball is dropped from a height of 2 m on to a table.

Whilst in contact with the table, some of its energy is converted into internal energy.

What is the highest possible point the ball could reach after bouncing?



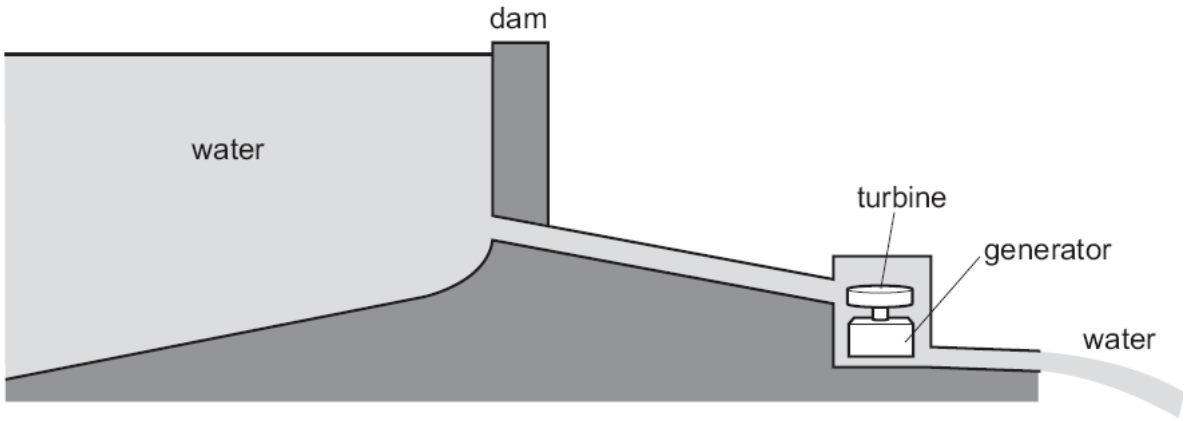
13. Four people of equal weight on a beach use different routes to get to the top of a sea wall.



Which person produces the **greatest** average power?

person	route	time taken
A	runs across the beach, then climbs the ladder	8 s
B	walks across the beach, then climbs the ladder	16 s
C	runs up the slipway	5 s
D	walks up the slipway	10 s

14. The diagram shows water stored behind a dam.



The water flows to a turbine and turns a generator.

Which sequence for the conversion of energy is correct?

A gravitational energy → kinetic energy → electrical energy

B kinetic energy → gravitational energy → electrical energy

C gravitational energy → electrical energy → kinetic energy

D kinetic energy → electrical energy → gravitational energy

15. Which source of energy uses the production of steam to generate electricity?

A hydroelectric

B nuclear

C tides

D waves

16. A worker is lifting boxes of identical weight from the ground onto a moving belt.

At first, it takes him 2 s to lift each box. Later in the day, it takes him 3 s.

Which statement is correct?

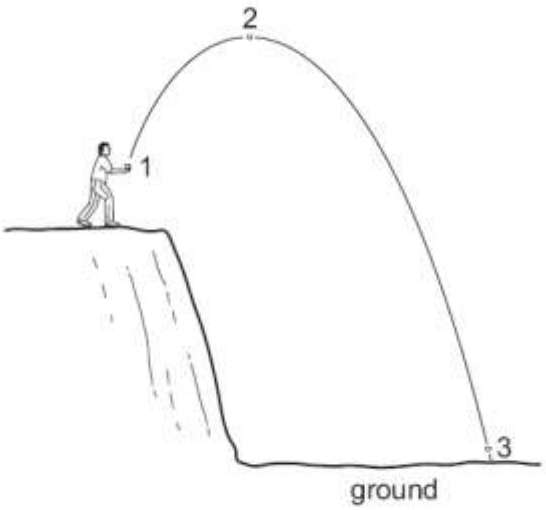
A Later in the day, less work is done in lifting each box.

B Later in the day, more work is done in lifting each box.

C Later in the day, less power is developed in lifting each box.

D Later in the day, more power is developed in lifting each box.

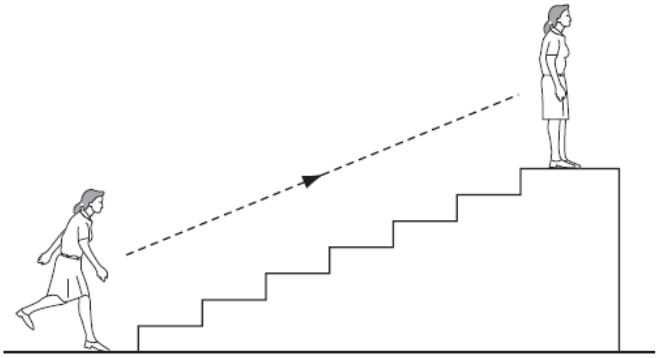
17. A stone is thrown from the edge of a cliff. Its path is shown in the diagram.



In which position does the stone have its greatest kinetic energy and in which position does it have its least gravitational energy?

	greatest kinetic energy	least gravitational energy
A	1	2
B	2	3
C	3	1
D	3	3

18. A person uses chemical energy to run up some stairs.



She stops at the top of the stairs.

What has the chemical energy been converted to when she is at the top of the stairs?

A kinetic energy and gravitational energy

B kinetic energy and strain energy

C gravitational energy and heat energy

D strain energy and heat energy

19. What is the source of the energy converted by a hydro-electric power station?

A hot rocks

B falling water

C oil

D waves

20. Electrical energy may be obtained from nuclear fission.

In what order is the energy transferred in this process?

A nuclear fuel → generator → reactor and boiler → turbines

B nuclear fuel → generator → turbines → reactor and boiler

C nuclear fuel → reactor and boiler → generator → turbines

D nuclear fuel → reactor and boiler → turbines → generator

21. Which form of energy is used to generate electrical energy in a tidal power station?

A chemical energy

B gravitational energy

C internal energy (thermal energy)

D nuclear energy

22. Which line in the table gives an example of the stated form of energy?

	form of energy	example
A	gravitational	the energy due to the movement of a train
B	internal	the energy due to the flow of cathode rays in a cathode ray tube
C	kinetic	the energy due to the position of a swimmer standing on a high diving board
D	strain	the energy due to the compression of springs in a car seat

23. Which type of power station does **not** use steam from boiling water to generate electricity?

A geothermal

B hydroelectric

C nuclear

D oil-fired

24. A cyclist travels down a hill from rest at point X without pedalling.

The cyclist applies his brakes and the cycle stops at point Y.

Which energy changes have taken place between X and Y?

A kinetic → internal (heat) → gravitational potential

B kinetic → gravitational potential → internal (heat)

C gravitational potential → internal (heat) → kinetic

D gravitational potential → kinetic → internal (heat)

25. Which form of energy do we receive directly from the Sun?

A chemical

B light

C nuclear

D sound

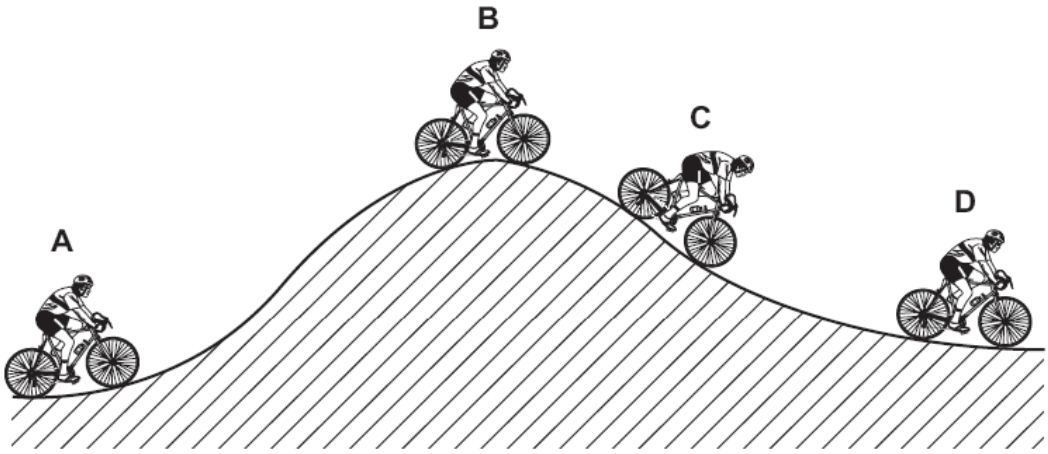
26. A labourer on a building site lifts a heavy concrete block onto a lorry. He then lifts a light block the same distance in the same time.

Which of the following is true?

	work done in lifting the blocks	power exerted by labourer
A	less for the light block	less for the light block
B	less for the light block	the same for both blocks
C	more for the light block	more for the light block
D	the same for both blocks	more for the light block

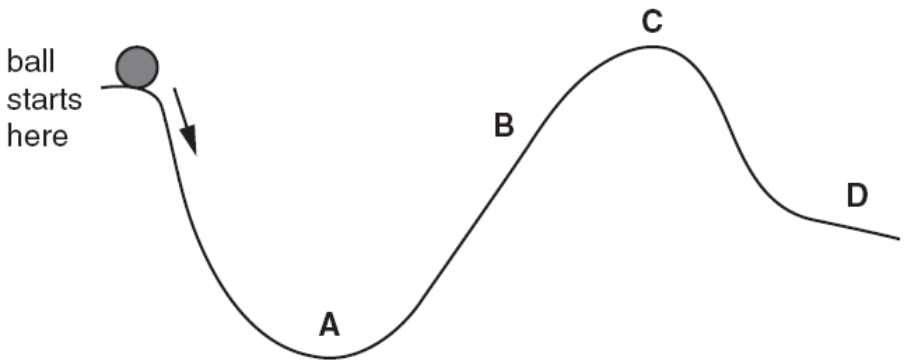
27. The diagram shows a cyclist riding along a hilly road.

At which position does the cyclist have the least gravitational (potential) energy?

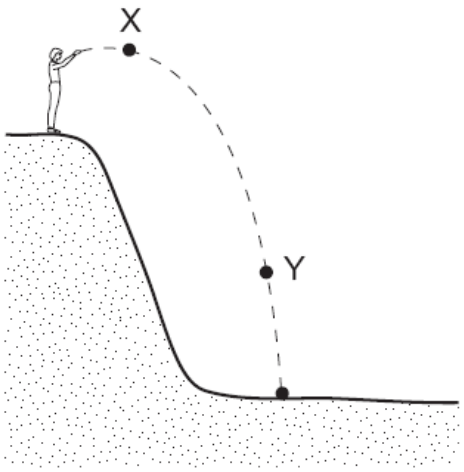


28. A ball is released from rest and rolls down a track from the position shown.

What is the furthest position the ball could reach?



29. A man standing at the top of a cliff throws a stone.



Which forms of energy does the stone have at X and at Y?

	energy at X	energy at Y
A	gravitational only	kinetic only
B	kinetic only	gravitational only
C	gravitational only	gravitational and kinetic
D	gravitational and kinetic	gravitational and kinetic

30. A child pushes a toy car along a level floor and then lets it go.

As the car slows down, what is the main energy change?

A from chemical to heat

B from chemical to kinetic

C from kinetic to gravitational (potential)

D from kinetic to heat

31. A large electric motor is used to lift a container off a ship.

Which of the following values are enough to allow the power of the motor to be calculated?

A the mass of the container and the distance moved

B the force used and the distance moved

C the current used and the work done

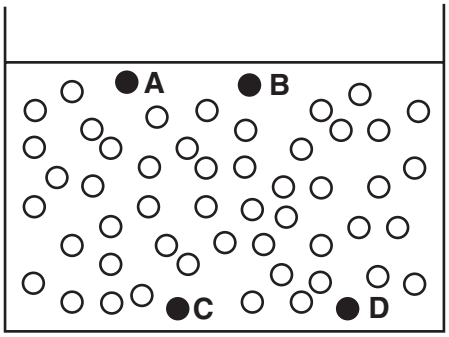
D the work done and the time taken

1 The diagram represents molecules in a liquid.

A and **C** are molecules with a high amount of energy.

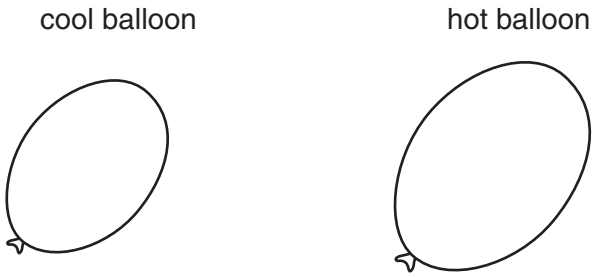
B and **D** are molecules with a low amount of energy.

Which molecule is most likely to be leaving the liquid by evaporation?



2 The size of a balloon increases when the pressure inside it increases.

The balloon gets bigger when it is left in the heat from the Sun.



Why does this happen?

A The air molecules inside the balloon all move outwards when it is heated.

B The air molecules inside the balloon are bigger when it is heated.

C The air molecules inside the balloon move more quickly when it is heated.

D The number of air molecules inside the balloon increases when it is heated.

3 Some gas in a sealed plastic bag is placed in a refrigerator to cool down.

How do the gas molecules behave when this happens?

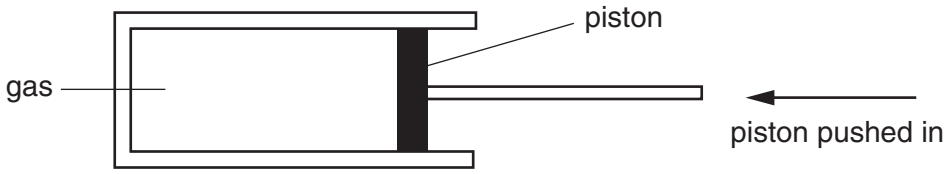
A They move more quickly and are closer together.

B They move more quickly and are further apart.

C They move more slowly and are closer together.

D They move more slowly and are further apart.

4 A measured mass of gas is placed in a cylinder at atmospheric pressure and is then slowly compressed.



If the temperature of the gas does not change, what happens to the pressure of the gas?

A It drops to zero.

B It decreases, but not to zero.

C It stays the same.

D It increases.

5 When water evaporates, some molecules escape.

Which molecules escape?

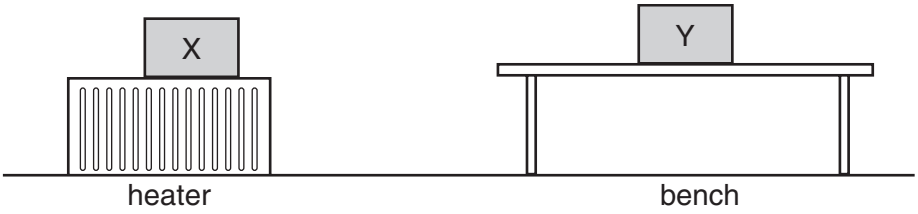
A the molecules at the bottom of the liquid with less energy than others

B the molecules at the bottom of the liquid with more energy than others

C the molecules at the surface with less energy than others

D the molecules at the surface with more energy than others

6 Two metal boxes containing air are standing in a room. Box X is on top of a heater. Box Y is on a bench. The boxes are left for a long time.



Which line in the table best describes the average speed of the molecules in the containers?

	box X	box Y
A	fast	zero
B	fast	slow
C	slow	fast
D	zero	fast

7 Which line in the table correctly describes whether the molecules of a solid, liquid and gas are moving or stationary?

	solid	liquid	gas
A	stationary	stationary	stationary
B	stationary	stationary	moving
C	stationary	moving	moving
D	moving	moving	moving

8 Driving a car raises the temperature of the tyres.

This causes the pressure of the air in the tyres to increase.

Why is this?

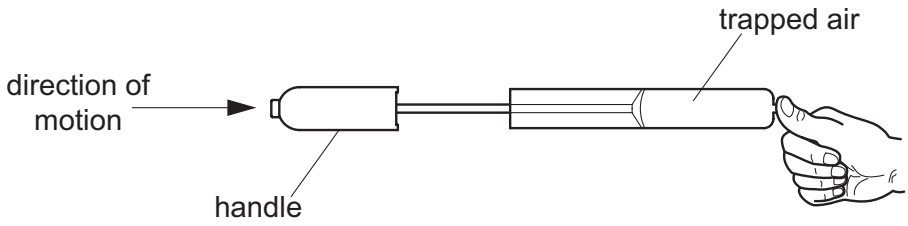
A Air molecules break up to form separate atoms.

B Air molecules expand with the rise in temperature.

C The force between the air molecules increases.

D The speed of the air molecules increases.

9 A student places his thumb firmly on the outlet of a bicycle pump, to stop the air coming out.



What happens to the pressure and to the volume of the trapped air as the pump handle is pushed in?

	pressure	volume
A	decreases	decreases
B	decreases	remains the same
C	increases	decreases
D	increases	remains the same

10 A balloon is inflated in a cold room. When the room becomes much warmer, the balloon becomes larger.

How does the behaviour of the air molecules in the balloon explain this?

A The molecules become larger.

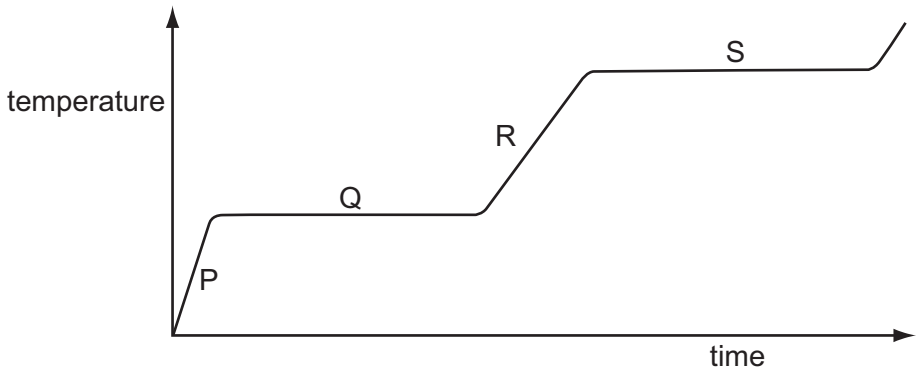
B The molecules evaporate.

C The molecules move more quickly.

D The molecules repel each other.

11 A substance is heated at a steady rate. It changes from a solid to a liquid, and then to a gas.

The graph shows how its temperature changes with time.



Which parts of the graph show a change of state taking place?

A P and R

B P and S

C Q and R

D Q and S

12 Some water molecules escape from the surface of a lake.

Which name is given to this process?

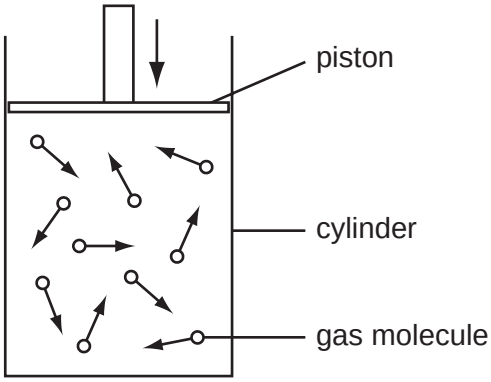
A boiling

B convection

C evaporation

D radiation

13 The diagram represents gas molecules contained in a cylinder. The piston is moved slowly downwards and the temperature of the gas stays the same.



Why does the pressure of the gas increase?

A The molecules collide harder with the walls.

B The molecules collide more often with the walls.

C The molecules move more quickly.

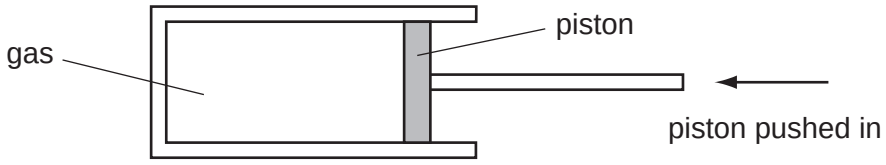
D The number of molecules increases.

14 Viewed through a microscope, very small particles can be seen moving with Brownian motion.

Which line in the table is correct?

	type of motion of particles	particles are suspended in
A	vibration	a liquid or a gas
B	vibration	a solid, a liquid or a gas
C	random	a liquid or a gas
D	random	a solid, a liquid or a gas

15 A measured mass of gas is placed in a cylinder at atmospheric pressure and is then slowly compressed.



The temperature of the gas does not change.

What happens to the pressure of the gas?

A It drops to zero.

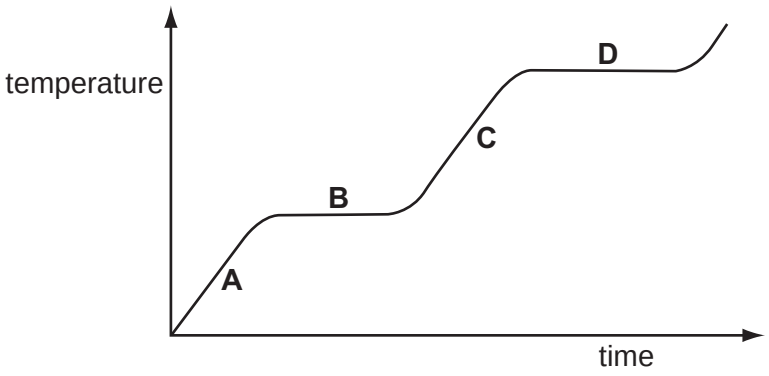
B It decreases, but not to zero.

C It stays the same.

D It increases.

16 The graph shows the change in temperature of a material as it is heated.

Which part on the graph shows when the material is boiling?



17 A drop of liquid falls on a student's skin and quickly evaporates.

What is the effect on the skin and the reason?

A The skin cools because the most energetic molecules escape from the liquid.

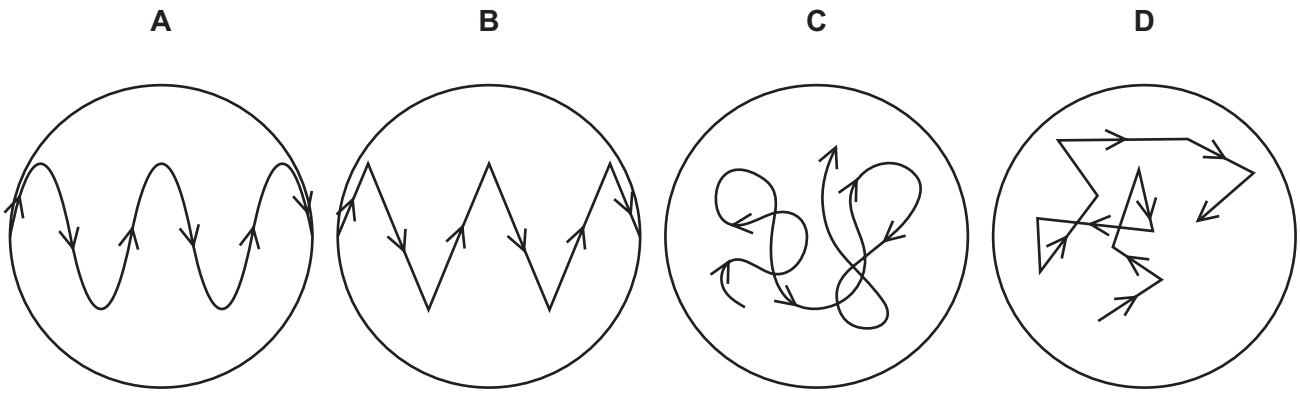
B The skin cools because the most energetic molecules remain in the liquid.

C The skin warms because the most energetic molecules escape from the liquid.

D The skin warms because the most energetic molecules remain in the liquid.

18 A suspension of pollen grains in water is observed under a microscope. The pollen grains are seen to be moving all the time.

Which diagram illustrates this motion?



19 Brownian motion is seen by looking at smoke particles through a microscope.

How do the smoke particles move in Brownian motion?

A all in the same direction

B at random

C in circles

D vibrating about fixed points

20 Driving a car raises the temperature of the tyres.

This causes the pressure of the air in the tyres to increase.

Why is this?

A Air molecules break up to form separate atoms.

B Air molecules expand with the rise in temperature.

C The force between the air molecules increases.

D The speed of the air molecules increases.

21 A gas cylinder is left outside on a sunny day.

The Sun heats the gas inside the cylinder.

What happens to the gas molecules?

A They collide less often.

B They expand.

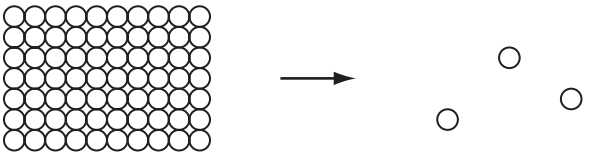
C They move closer together.

D They move more rapidly.

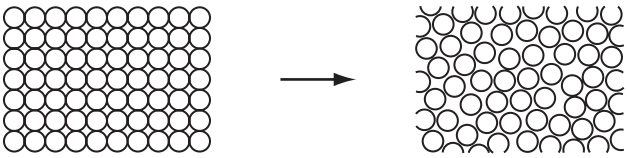
22 Water spilled on the ground on a hot day evaporates.

Which diagram represents the change in arrangement of the particles in the water as it evaporates?

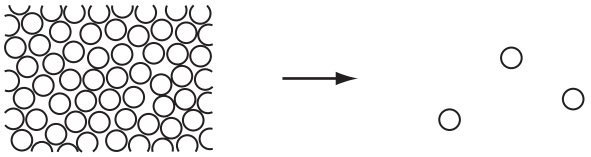
A



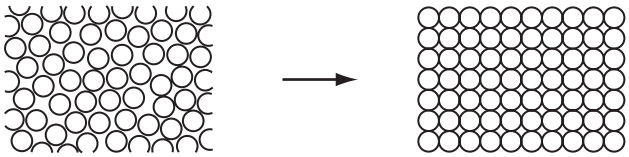
B



C



D



23 A cylinder is filled with a gas and then sealed, so that the gas has a fixed volume.

The gas molecules are given energy so that their average speed increases.

What happens to the pressure and to the temperature of the gas in the cylinder?

	pressure	temperature
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

24 Diagram 1 shows apparatus being used to observe smoke particles.

Diagram 2 shows how a smoke particle moves randomly.

diagram 1

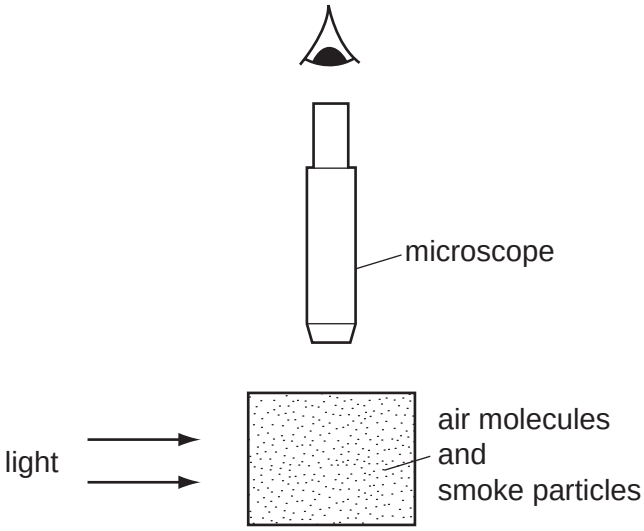
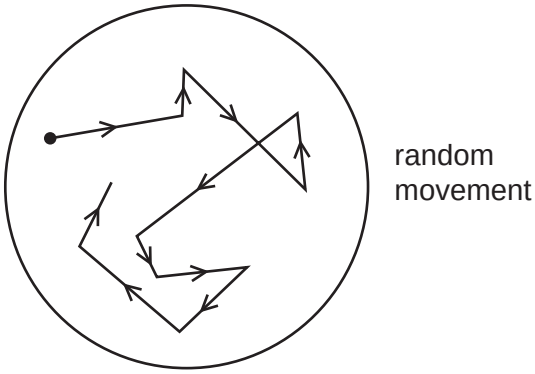


diagram 2



Why do the smoke particles move randomly?

A They are hit by air molecules.

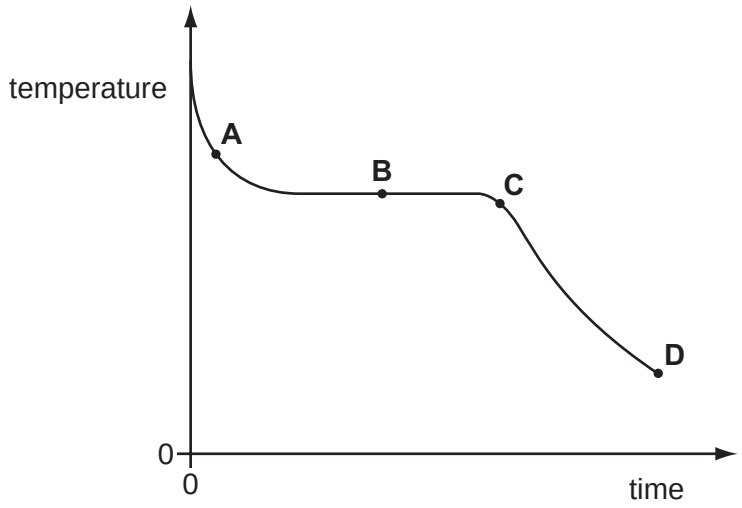
B They are less dense than air.

C They are moved by convection currents.

D They gain energy from the light.

25 The graph shows how the temperature of hot liquid wax changes with time as the wax is allowed to cool.

At which labelled point on the graph are both liquid wax and solid wax present?



26 The gas in a container is heated but is kept at constant volume.

Why does the gas pressure increase?

A The molecules expand.

B The molecules increase in mass.

C The molecules move further apart.

D The molecules move more rapidly.

27 Which line in the table describes the properties of solids and of liquids at a fixed temperature?

	solids	liquids
A	definite volume and definite shape	no definite volume but definite shape
B	no definite volume but definite shape	definite volume and definite shape
C	definite volume and definite shape	definite volume but no definite shape
D	no definite volume but definite shape	no definite volume and no definite shape

28 Air is pumped slowly into a car tyre to increase the pressure. The temperature of the air does not change.

Which line in the table is correct?

	number of molecules hitting 1 cm^2 of the tyre each second	average speed at which molecules hit the tyre
A	increases	increases
B	increases	unchanged
C	unchanged	increases
D	unchanged	unchanged

29 Viewed through a microscope, very small particles can be seen moving with Brownian motion.

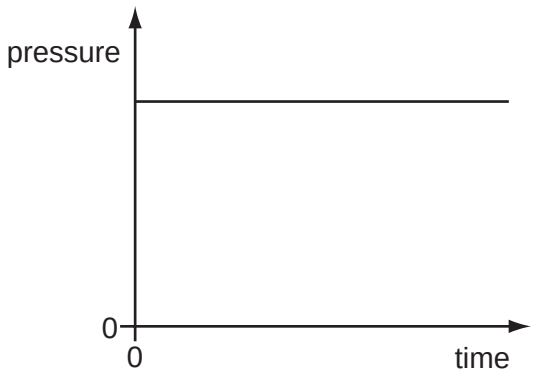
Which line in the table is correct?

	type of motion of particles	particles are suspended in
A	vibration	a liquid or a gas
B	vibration	a solid, a liquid or a gas
C	random	a liquid or a gas
D	random	a solid, a liquid or a gas

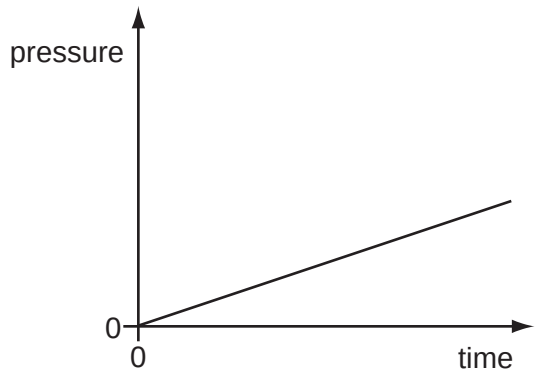
30 The pressure of a fixed mass of gas in a cylinder is measured. The volume of the gas in the cylinder is then slowly decreased.

Which graph could show the change of pressure of the gas during this process?

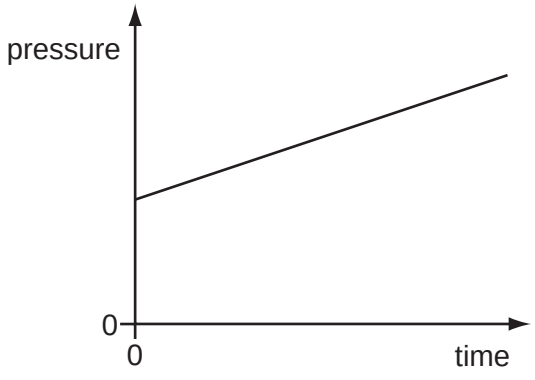
A



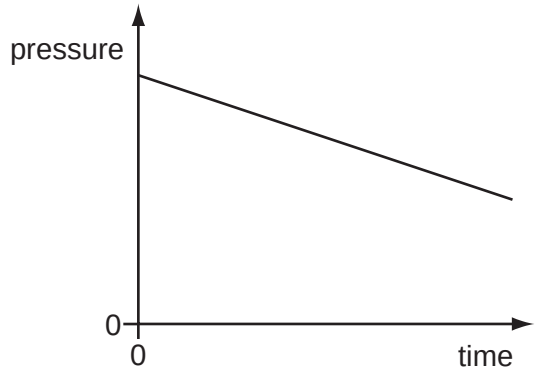
B



C



D



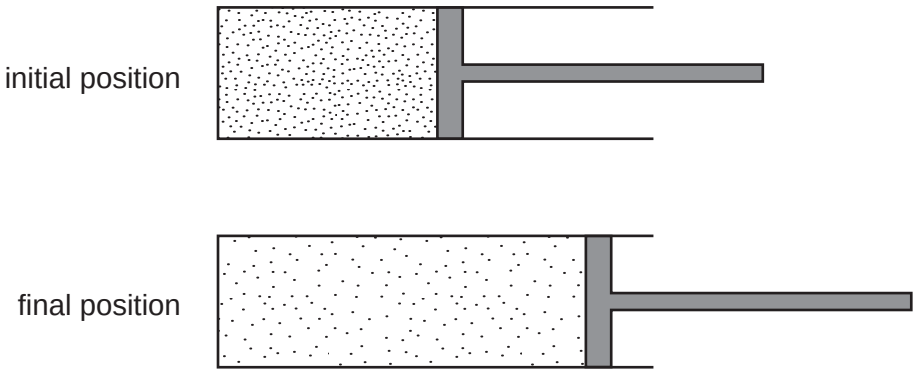
31 In an experiment, some of a substance changes from a liquid to a gas. The temperature of the remaining liquid changes because of this.

What is the name for this change of state and how does the temperature change?

	change of state	how temperature changes
A	condensation	decreases
B	condensation	increases
C	evaporation	decreases
D	evaporation	increases

32 A piston traps a certain mass of gas inside a cylinder. Initially the piston is halfway along the length of the cylinder.

The piston is now moved towards the open end of the cylinder. The temperature of the gas remains constant.

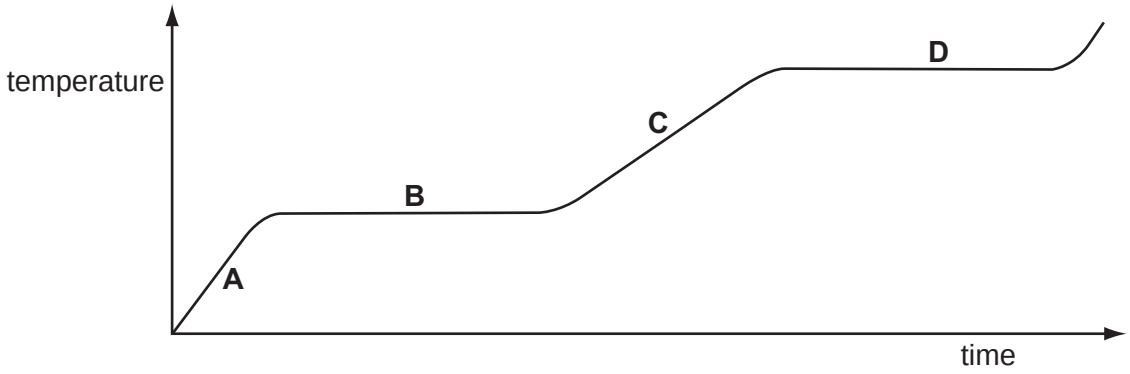


How are the density and the pressure of the gas affected by moving the piston?

	density	pressure
A	decreases	decreases
B	decreases	unchanged
C	increases	decreases
D	increases	unchanged

33 The graph shows the change in temperature of a substance as it is heated steadily.

Which part of the graph shows when the substance is boiling?



34 Brownian motion is observed by looking at smoke particles through a microscope.

How do the smoke particles move in Brownian motion?

A all in the same direction

B at random

C in circles

D vibrating about fixed points

35 A small amount of air is introduced into the vacuum above the mercury in a mercury barometer tube.

The mercury level goes down.

Why does the mercury level go down?

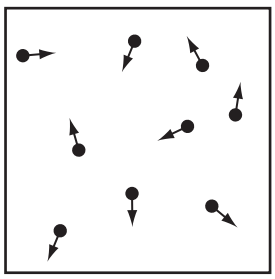
A The air molecules cool the mercury and make it contract.

B The air molecules decrease the pressure above the mercury.

C The air molecules heat the mercury and make it expand.

D The air molecules increase the pressure above the mercury.

36 The diagram represents the molecules of a gas in a closed container of constant volume.



What happens to the molecules when the gas is heated?

A They expand.

B They hit the walls less often.

C They move further apart.

D They move more quickly.

37 A liquid is left in an open dish. After several days there is less liquid in the dish.

Which statement explains this?

A The least energetic molecules leave the surface and escape into the air.

B The least energetic molecules leave the surface and return.

C The most energetic molecules leave the surface and escape into the air.

D The most energetic molecules leave the surface and return.

38 Some gas in a sealed plastic bag is cooled.

How do the gas molecules behave when this happens?

A They move more quickly and become closer together.

B They move more quickly and become further apart.

C They move more slowly and become closer together.

D They move more slowly and become further apart.

39 A block of ice cream is prevented from melting by wrapping it in newspaper soaked in water. The water evaporates from the newspaper.

Which molecules escape from the water and what happens to the average speed of the water molecules that remain in the newspaper?

	escaping molecules	average speed of the remaining water molecules
A	the more energetic ones	decreases
B	the more energetic ones	increases
C	the less energetic ones	decreases
D	the less energetic ones	increases

40 Which change is condensation?

41 A sealed gas cylinder is left outside on a hot, sunny day.

What happens to the average speed of the molecules and to the pressure of the gas in the cylinder as the temperature rises?

	average speed of the gas molecules	gas pressure
A	falls	falls
B	falls	rises
C	rises	falls
D	rises	rises

42 When a liquid evaporates, some molecules escape from it and its temperature changes.

From where do the molecules escape and what is the effect on the temperature of the liquid?

	molecules escape from	temperature of liquid
A	all parts of the liquid	decreases
B	all parts of the liquid	increases
C	only the liquid surface	decreases
D	only the liquid surface	increases

43 Evaporation occurs when molecules escape from a liquid surface into the air above it. During this process the temperature of the liquid falls.

Why does the temperature of the liquid fall?

A The molecules in the vapour expand because the pressure is less.

B The molecules left in the liquid have more space to move around.

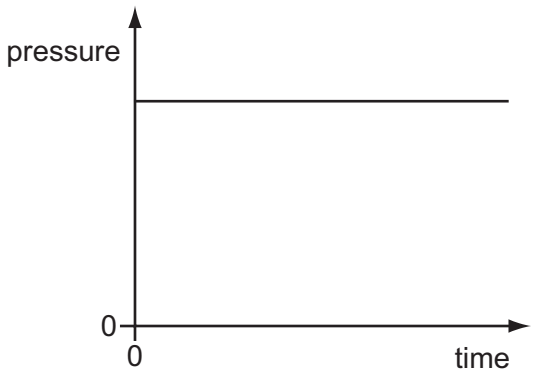
C The molecules move more slowly when they escape into the air.

D The molecules with the highest energies escape into the air.

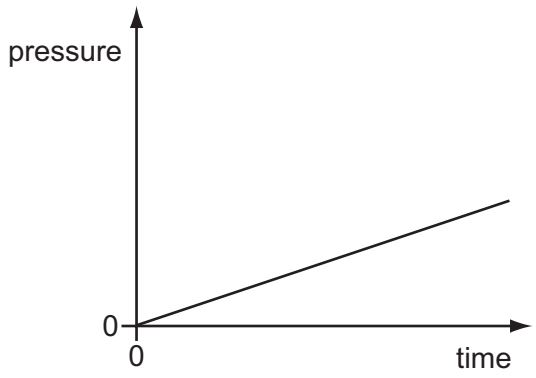
44 The pressure of a fixed mass of gas in a cylinder is measured. The volume of the gas in the cylinder is then slowly decreased. The temperature of the gas does not change.

Which graph could show the change of pressure of the gas during this process?

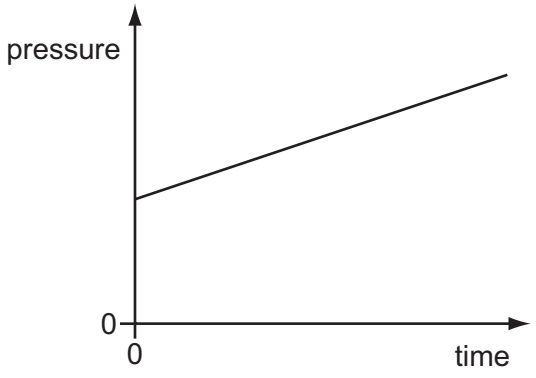
A



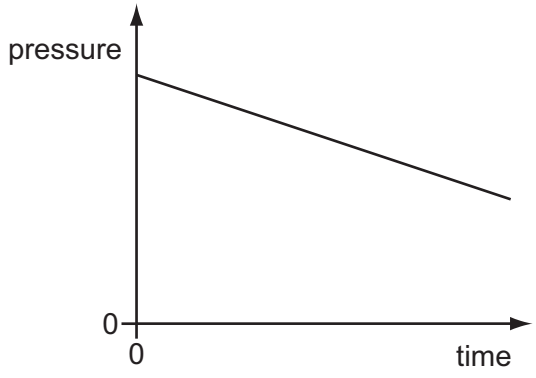
B



C



D



45 Brownian motion is observed when looking at smoke particles in air using a microscope.

What causes the smoke particles to move at random?

A Smoke particles are hit by air molecules.

B Smoke particles are moved by convection currents in the air.

C Smoke particles have different weights and fall at different speeds.

D Smoke particles hit the walls of the container.

46 The molecules of a substance become more closely packed and move more quickly.

What is happening to the substance?

A A gas is being heated and compressed.

B A gas is being heated and is expanding.

C A liquid is boiling.

D A liquid is evaporating at room temperature.

The Kinetic Model of Matter

1	A	11	D	21	D	31	C	41	D
2	C	12	C	22	C	32	A	42	C
3	C	13	B	23	D	33	D	43	D
4	D	14	C	24	A	34	B	44	C
5	D	15	D	25	B	35	D	45	A
6	B	16	D	26	D	36	D	46	A
7	D	17	A	27	C	37	C		
8	D	18	D	28	B	38	C		
9	C	19	B	29	C	39	A		
10	C	20	D	30	C	40	D		

1 What must expand in order to show the temperature rise in a mercury-in-glass thermometer?

A the glass bulb

B the glass stem

C the mercury

D the vacuum

2 The table shows the melting points and boiling points of four substances.

Which substance is a liquid at a room temperature of 20 °C?

substance	melting point / °C	boiling point / °C
A	–101	–35
B	–39	357
C	30	2100
D	327	1750

3 A mercury-in-glass thermometer is to be used to measure temperatures from 0 °C to 100 °C.

Why is mercury suitable?

A Mercury expands when heated.

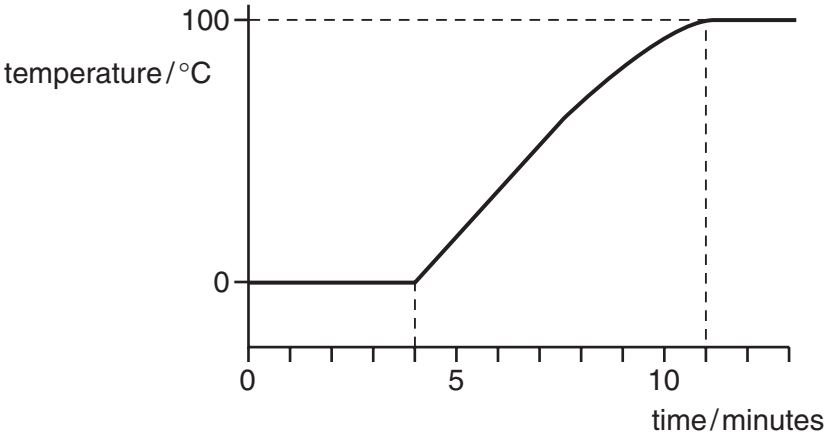
B Mercury has a boiling point below 100 °C.

C Mercury has a melting point above 0 °C.

D Mercury is a poor conductor.

4 A block of ice is heated at a constant rate. Eventually the melted ice boils.

The graph shows how the temperature changes with time.



How many minutes did it take to melt all the ice?

A 4 **B** 7 **C** 11 **D** 13

5 The top of the mercury thread in a mercury-in-glass thermometer reaches point X at 0 °C and point Z at 100 °C.

Where might it be at a temperature below the ice-point?

A point W

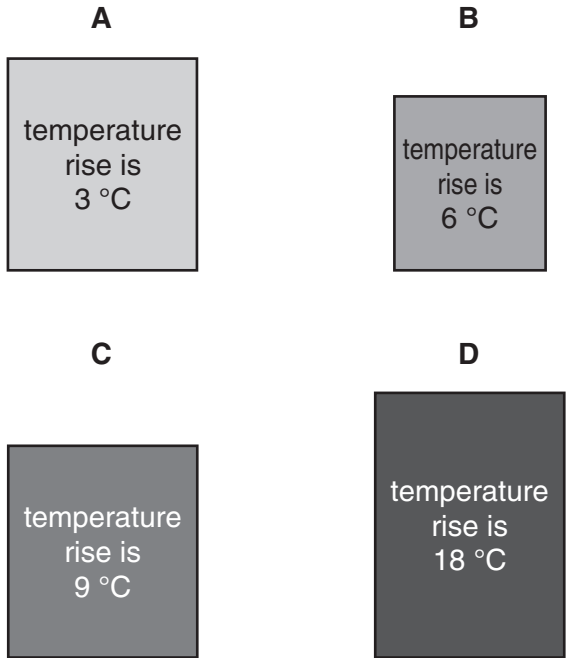
B point X

C point Y

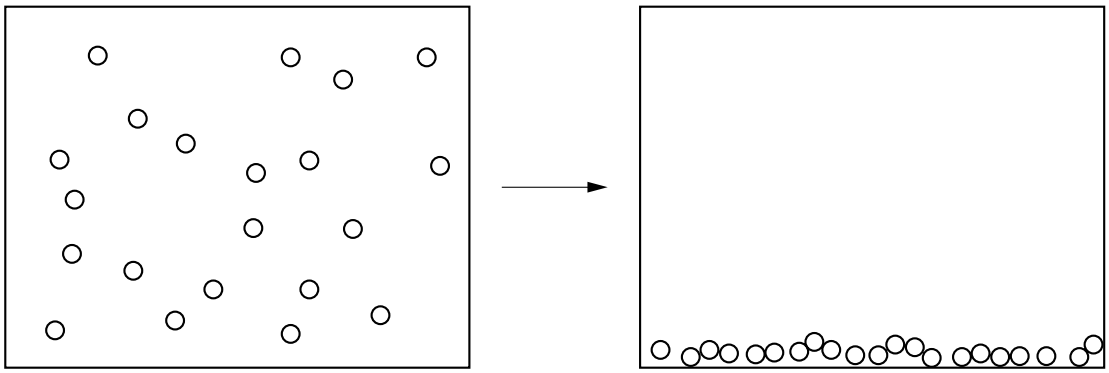
D point Z

6 The same quantity of heat energy is applied to four different blocks. The temperature rise produced is shown on each block.

Which block has the highest thermal capacity?



7 The diagram shows how the atoms in a substance rearrange themselves during a change of state.



Which change of state is shown?

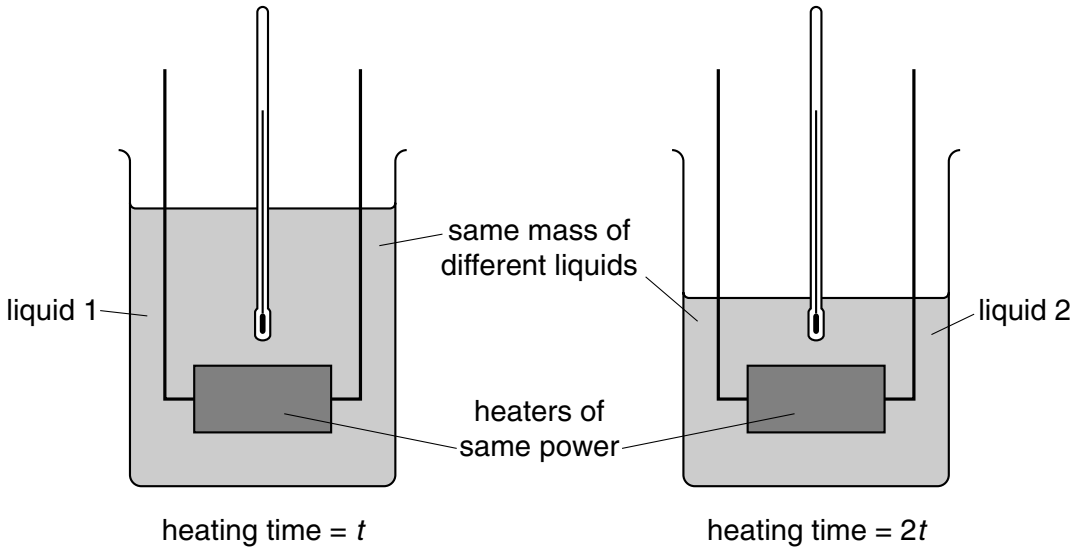
A gas to liquid

B liquid to gas

C liquid to solid

D solid to liquid

8 Equal masses of two different liquids are put into identical beakers. They are heated from 20 °C to 30 °C by heaters of the same power. Liquid 2 takes twice as long to heat as liquid 1.



Which statement is correct?

A Both liquids receive the same amount of energy.

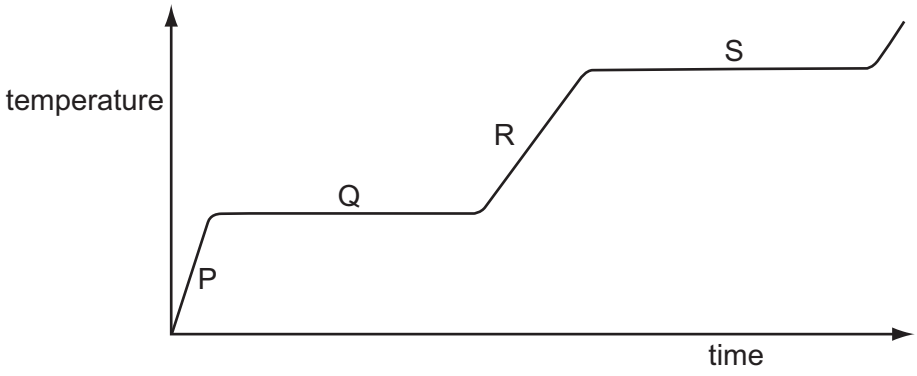
B Liquid 1 receives more energy than liquid 2.

C The thermal capacity of liquid 1 is equal to the thermal capacity of liquid 2.

D The thermal capacity of liquid 1 is less than the thermal capacity of liquid 2.

9 A substance is heated at a steady rate. It changes from a solid to a liquid, and then to a gas.

The graph shows how its temperature changes with time.



Which parts of the graph show a change of state taking place?

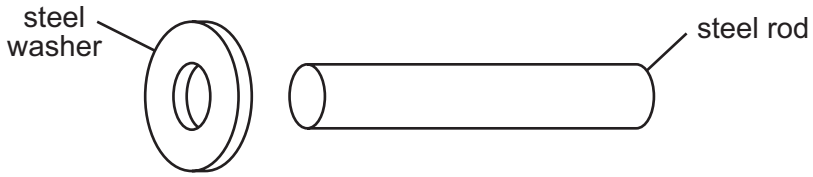
A P and R

B P and S

C Q and R

D Q and S

10 An engineer wants to fix a steel washer on to a steel rod. The rod is just too big to fit into the hole of the washer.



How can the engineer fit the washer onto the rod?

A cool the washer and put it over the rod

B cool the washer and rod to the same temperature and push them together

C heat the rod and then place it in the hole

D heat the washer and place it over the rod

11 To mark the lower fixed point of a Celsius scale on a thermometer, the thermometer should be placed in

A pure alcohol.

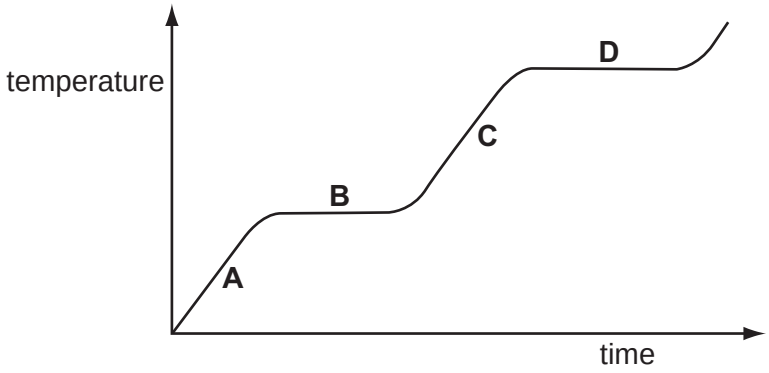
B pure distilled water.

C pure melting ice.

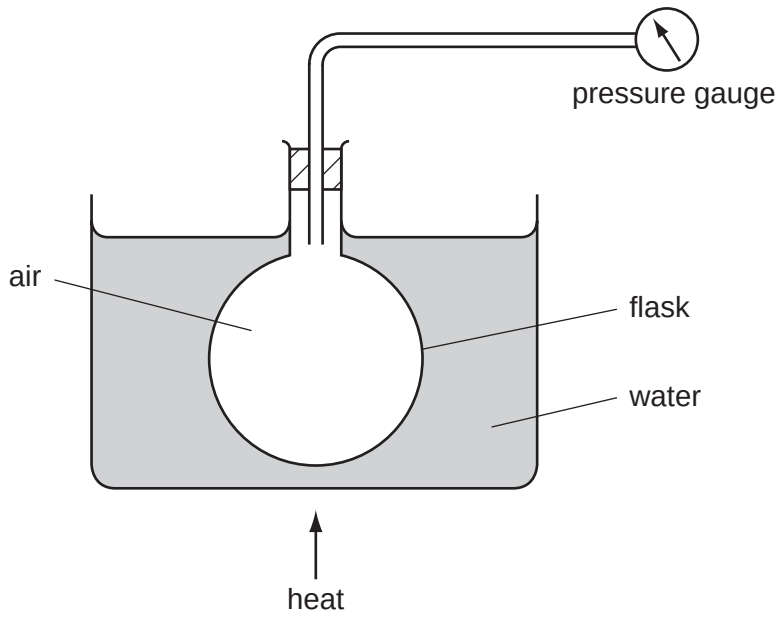
D pure mercury.

12 The graph shows the change in temperature of a material as it is heated.

Which part on the graph shows when the material is boiling?



13 An experiment is set up as shown.



What does the pressure gauge show as the air in the flask becomes hotter?

A a steady pressure

B a decrease in pressure

C an increase in pressure

D an increase and then a decrease in pressure

14 A knife is being sharpened on a rotating sharpening-stone. A spark flies off and lands on the operator's hand. The spark is a very hot, very small piece of metal. The operator feels nothing.

What does this show about the piece of metal?

A It has a high thermal capacity.

B It has a low thermal capacity.

C It is a good conductor of heat.

D It is a poor conductor of heat.

15 Which substance is a liquid at a room temperature of 25 °C?

substance	melting point / °C	boiling point / °C
A	–218	–183
B	–39	357
C	44	280
D	119	444

16 To mark a temperature scale on a thermometer, fixed points are needed.

Which is a fixed point?

A the bottom end of the thermometer tube

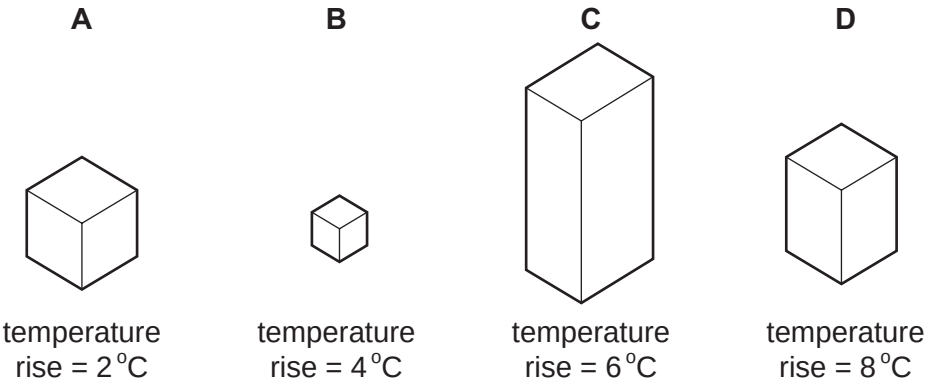
B the top end of the thermometer tube

C the temperature of pure melting ice

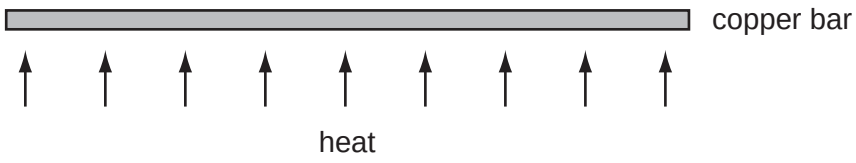
D the temperature of pure warm water

17 Four blocks, made of different materials, are each given the same quantity of internal (heat) energy.

Which block has the greatest thermal capacity?



18 A long thin bar of copper is heated evenly along its length.



What happens to the bar?

A It becomes lighter.

B It becomes longer.

C It becomes shorter.

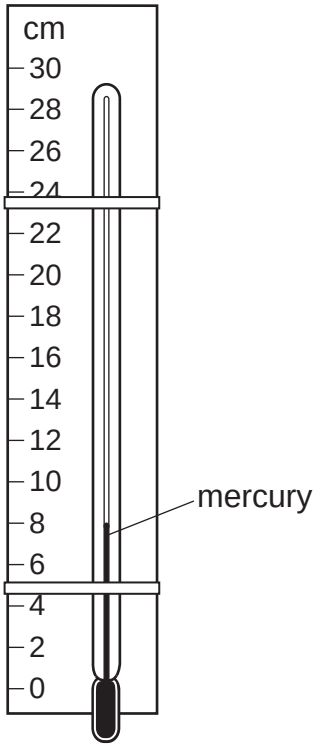
D It bends at the ends.

19 A block of ice is heated until it has all melted. The water that is produced is then heated until it boils.

Which line in the table states what happens to the temperature of the ice while it is melting, and to the temperature of the water while it is boiling?

	temperature of ice while it is melting	temperature of water while it is boiling
A	increases	increases
B	increases	stays the same
C	stays the same	increases
D	stays the same	stays the same

20 A thermometer with no scale is taped to a ruler as shown. When placed in steam, the mercury level rises to 22 cm. When placed in pure melting ice, the mercury level falls to 2 cm.

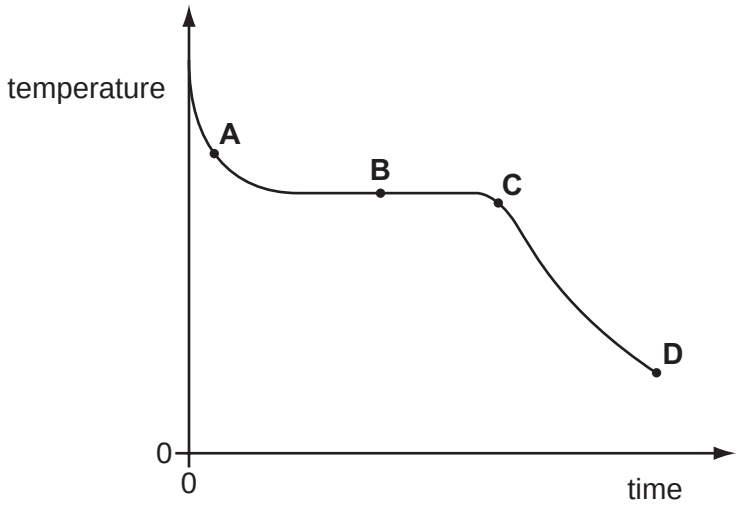


Which temperature is shown by the mercury level in the diagram?

A 6 °C **B** 8 °C **C** 30 °C **D** 40 °C

21 The graph shows how the temperature of hot liquid wax changes with time as the wax is allowed to cool.

At which labelled point on the graph are both liquid wax and solid wax present?



22 1 kg of water and 1 kg of aluminium are heated to the same temperature and then allowed to cool in a room.

Why does the aluminium cool more quickly than the water?

A Aluminium contracts more than water.

B Aluminium does not evaporate but water does.

C Aluminium has a higher thermal capacity than water.

D Aluminium has a lower thermal capacity than water.

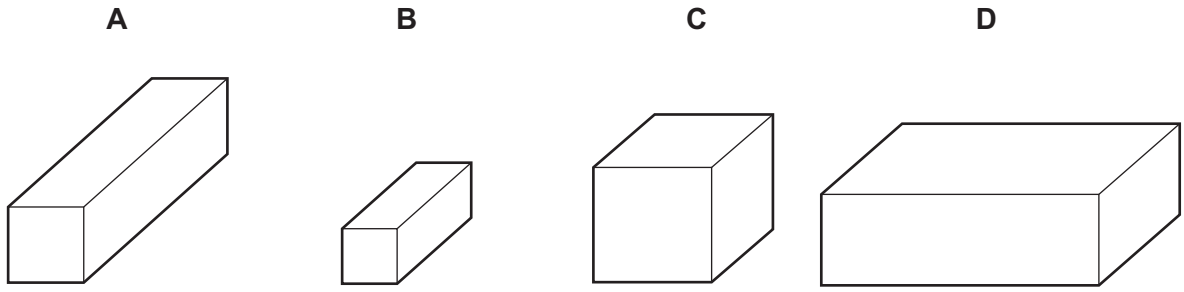
23 The table lists the melting points and the boiling points of four different substances **A**, **B**, **C** and **D**.

Which substance is a gas at 25 °C?

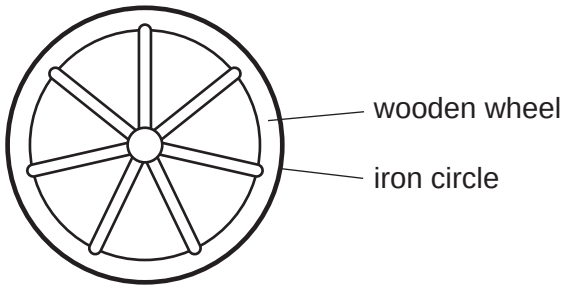
substance	melting point / °C	boiling point / °C
A	–219	–183
B	–7	58
C	98	890
D	1083	2582

24 The diagram shows four blocks of steel. The same quantity of heat is given to each block.

Which block shows the greatest rise in temperature?



25 A wooden wheel can be strengthened by putting a tight circle of iron around it.



Which action would make it easier to fit the circle over the wood?

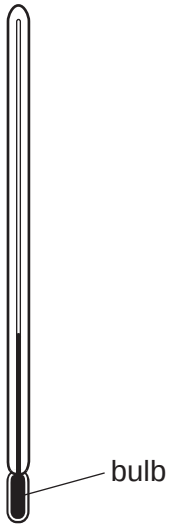
A cooling the iron circle

B heating the iron circle

C heating the wooden wheel

D heating the wooden wheel and cooling the iron circle

26 The thermometer in the diagram has no scale.



Where must the bulb be placed so that 0 °C can be marked on the stem?

A in boiling water

B in cold water

C in a freezer

D in melting ice

27 A sample of a solid is heated for 12 minutes and its temperature noted every minute.

The results are shown in the table.

time / min	0	1	2	3	4	5	6	7	8	9	10	11	12
temperature / °C	11.5	16.1	22.1	31.0	31.1	31.1	31.1	31.3	45.0	65.2	66.2	66.3	66.3

How should the sample be described at the end of the 12 minutes?

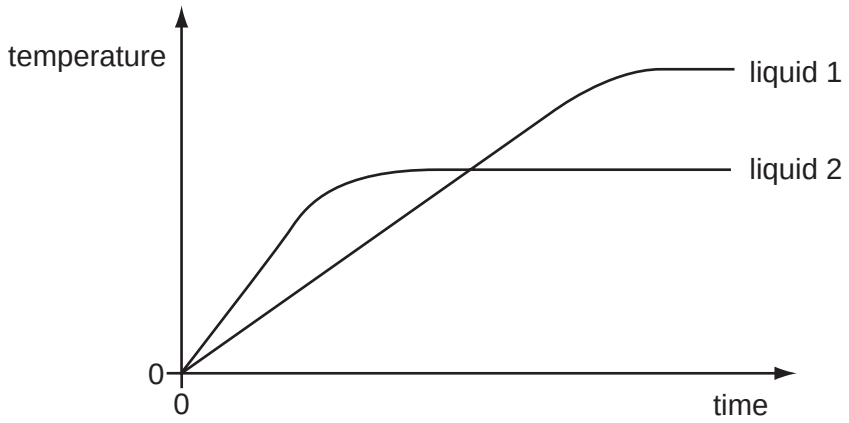
A all solid

B in the process of melting

C all liquid

D in the process of boiling

28 Equal masses of two different liquids are heated using the same heater. The graph shows how the temperature of each liquid changes with time.



What does the graph tell us about the liquids?

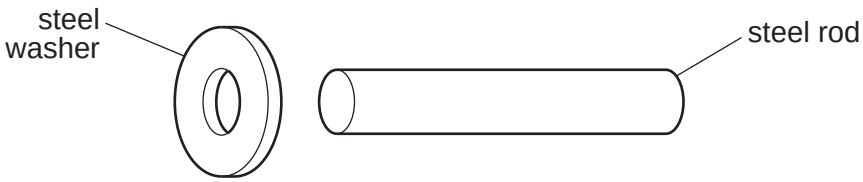
A Liquid 1 has a higher melting point than liquid 2.

B Liquid 1 has a higher boiling point than liquid 2.

C Liquid 1 starts to melt sooner than liquid 2.

D Liquid 1 starts to boil sooner than liquid 2.

29 An engineer wants to fix a steel washer on to a steel rod. The rod is just too big to fit into the hole of the washer.



How can the engineer fit the washer on to the rod?

A Cool the washer and put it over the rod.

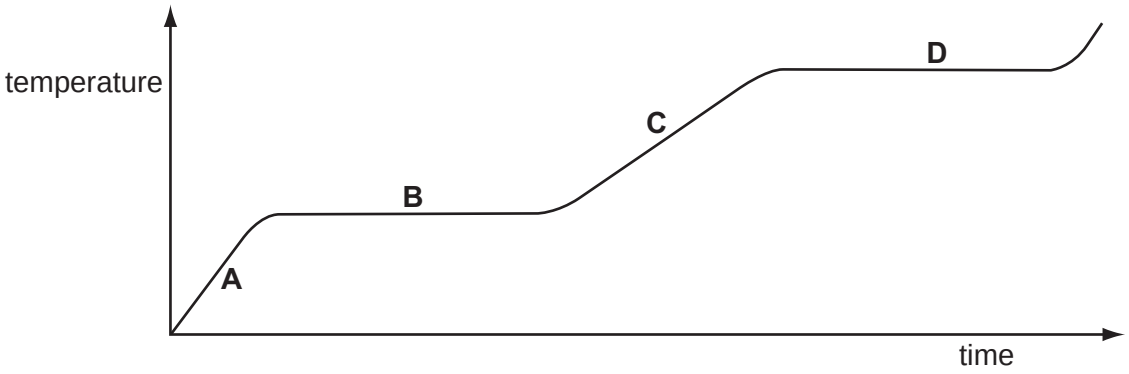
B Cool the washer and rod to the same temperature and push them together.

C Heat the rod and then place it in the hole.

D Heat the washer and then place it over the rod.

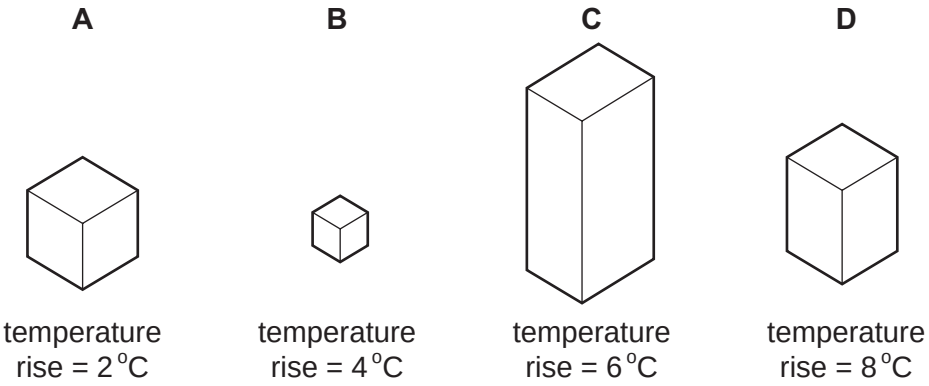
30 The graph shows the change in temperature of a substance as it is heated steadily.

Which part of the graph shows when the substance is boiling?



31 Four blocks, made of different materials, are each given the same quantity of internal energy (heat).

Which block has the greatest thermal capacity?



32 To mark a temperature scale on a thermometer, standard temperatures known as fixed points are needed.

Which of these is a fixed point?

A room temperature

B the temperature inside a freezer

C the temperature of pure melting ice

D the temperature of pure warm water

33 The table gives the melting points and boiling points of glycerine and benzene.

	melting point	boiling point
glycerine	18 °C	290 °C
benzene	5.4 °C	80 °C

At which temperature will both glycerine and benzene be liquid?

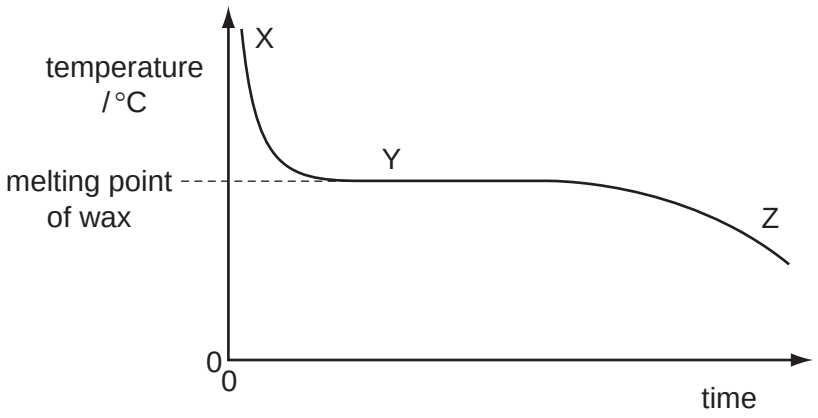
A 0 °C **B** 50 °C **C** 100 °C **D** 150 °C

34 A thermometer has a scale which starts at –10 °C and ends at 110 °C.

What is the value of the lower fixed point and of the upper fixed point of the scale?

	lower fixed point / °C	upper fixed point / °C
A	–10	100
B	–10	110
C	0	100
D	0	110

35 A student carries out an experiment to find the melting point of wax. The graph shows how the temperature of the wax changes as it cools.



Which statement is correct?

A At X the temperature drops more slowly than at Z.

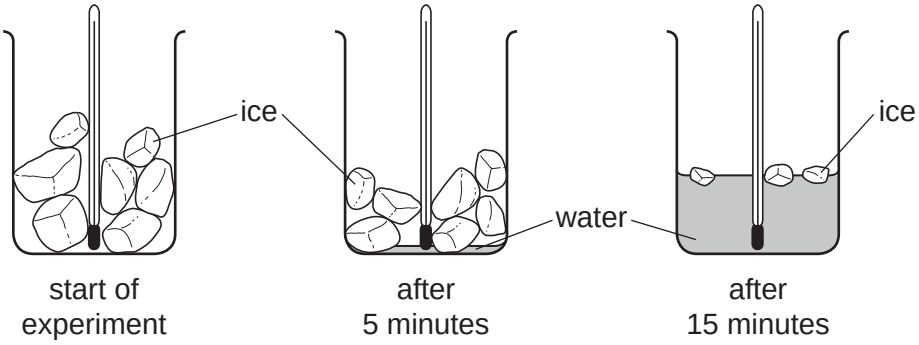
B At Y all the wax is solid.

C At Y thermal energy is being given out by the wax.

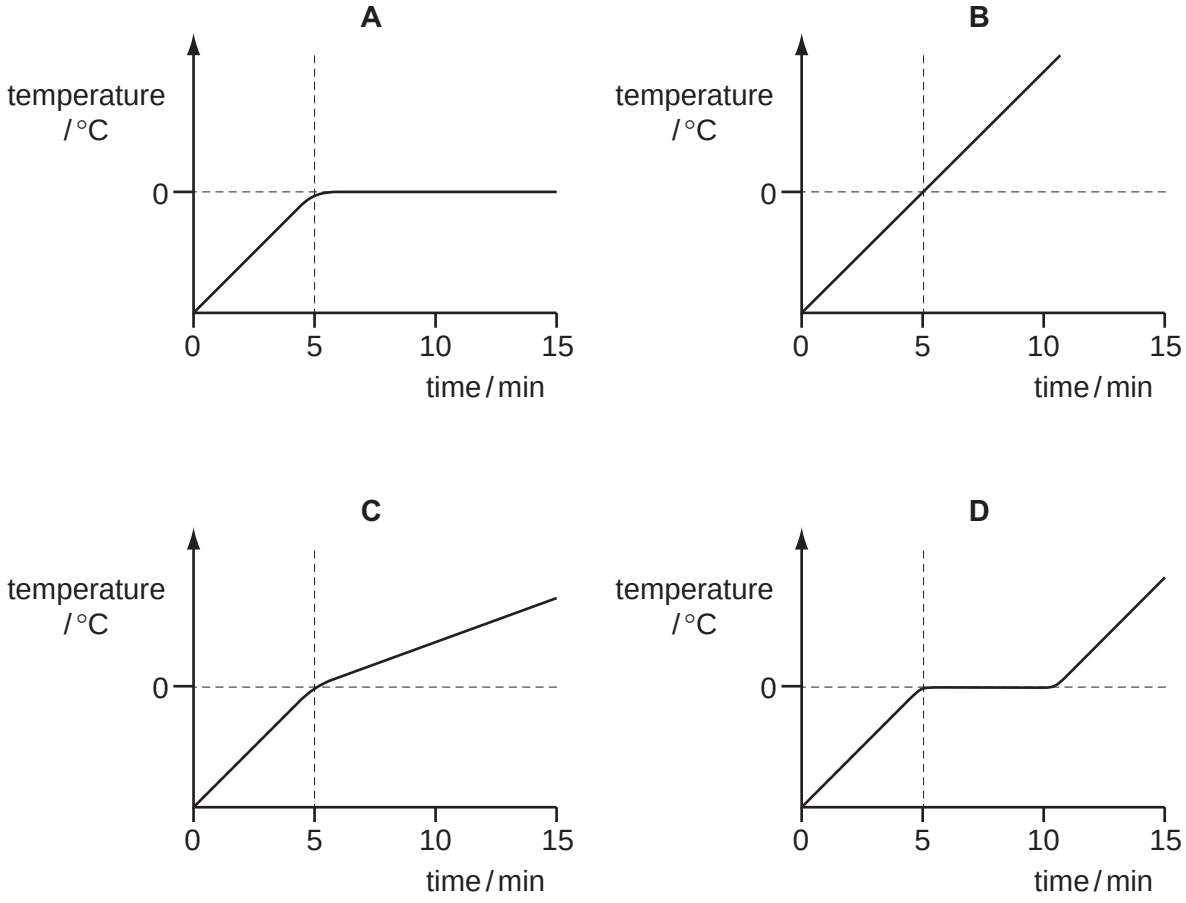
D At Z the wax molecules are not moving.

36 A beaker containing ice and a thermometer is left in a warm room for 15 minutes.

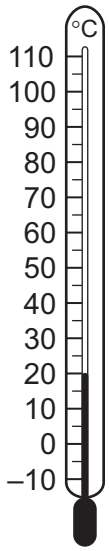
No water is visible in the beaker until 5 minutes has passed. After 15 minutes some ice is still visible.



Which graph shows how the thermometer reading changes?



37 The diagram shows a thermometer calibrated in degrees Celsius.



What are the values of the lower fixed point and of the upper fixed point on the Celsius scale?

	lower fixed point / °C	upper fixed point / °C
A	–10	110
B	0	20
C	0	100
D	20	100

38 An ice cube at a temperature of 0 °C is put into a drink at a temperature of 10 °C.

After a short time, some of the ice has melted and the drink has cooled to a temperature of 8 °C.

What is the temperature of the remaining ice?

A 0 °C **B** 2 °C **C** 4 °C **D** 8 °C

39 To mark the lower fixed point of a Celsius scale on a thermometer, the thermometer should be placed in

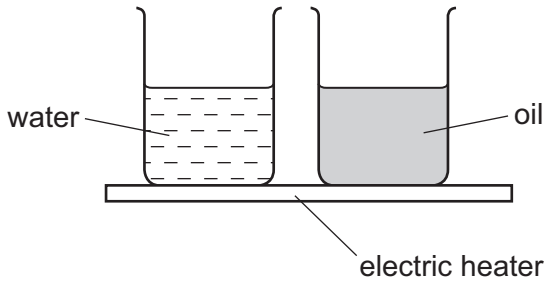
A pure alcohol.

B pure distilled water.

C pure melting ice.

D pure mercury.

40 The diagram shows an electric heater being used to heat a beaker of water and an identical beaker of oil for several minutes.



The temperature of the water and the temperature of the oil increase constantly. The rise in temperature of the oil is much greater than that of the water.

Why is this?

A The oil has a higher boiling point than water.

B The oil has a higher thermal capacity than water.

C The oil has a lower boiling point than water.

D The oil has a lower thermal capacity than water.

41 Which pair contains **only** physical quantities that vary with temperature and so could be used in making a thermometer?

A activity of a radioactive source, volume of a gas

B mass of a liquid, volume of a liquid

C activity of a radioactive source, mass of a solid

D volume of a gas, volume of a liquid

42 A heater supplies 80 J of energy to a block of metal. The temperature of the block rises by 20 °C.

What happens to the block of metal when its temperature falls by 10 °C?

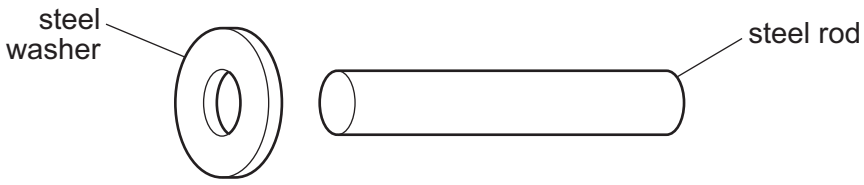
A Its internal energy decreases by 40 J.

B Its internal energy decreases by 160 J.

C Its internal energy increases by 40 J.

D Its internal energy increases by 160 J.

43 An engineer wants to fix a steel washer on to a steel rod. The rod is just too big to fit into the hole of the washer.



How can the engineer fit the washer on to the rod?

A Cool the washer and put it over the rod.

B Cool the washer and rod to the same temperature and push them together.

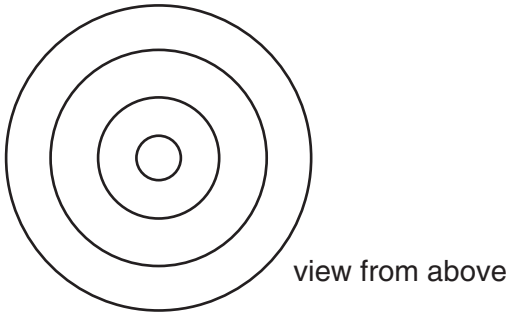
C Heat the rod and then place it in the hole.

D Heat the washer and then place it over the rod.

Thermal Properties

1	C	11	C	21	B	31	A	41	D
2	B	12	D	22	D	32	C	42	A
3	A	13	C	23	A	33	B	43	D
4	A	14	B	24	B	34	C		
5	A	15	B	25	B	35	C		
6	A	16	C	26	D	36	A		
7	A	17	A	27	D	37	C		
8	D	18	B	28	B	38	A		
9	D	19	D	29	D	39	C		
10	D	20	C	30	D	40	D		

1 A drop of water from a tap falls onto the surface of some water of constant depth.



Water waves spread out on the surface of the water.

Which statement is true?

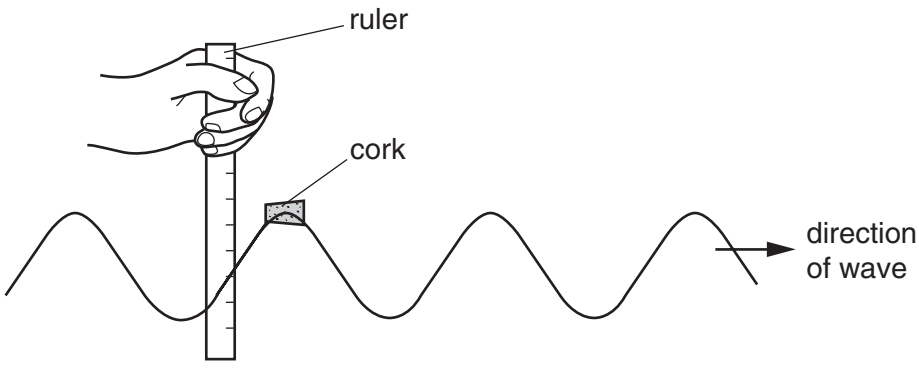
A The waves are longitudinal and travel at the same speed in all directions.

B The waves are longitudinal and travel more quickly in one direction than in others.

C The waves are transverse and travel at the same speed in all directions.

D The waves are transverse and travel more quickly in one direction than in others.

2 A student measures how far a cork moves up and down on a wave in a tank of water.



Which quantity can he obtain from his measurement?

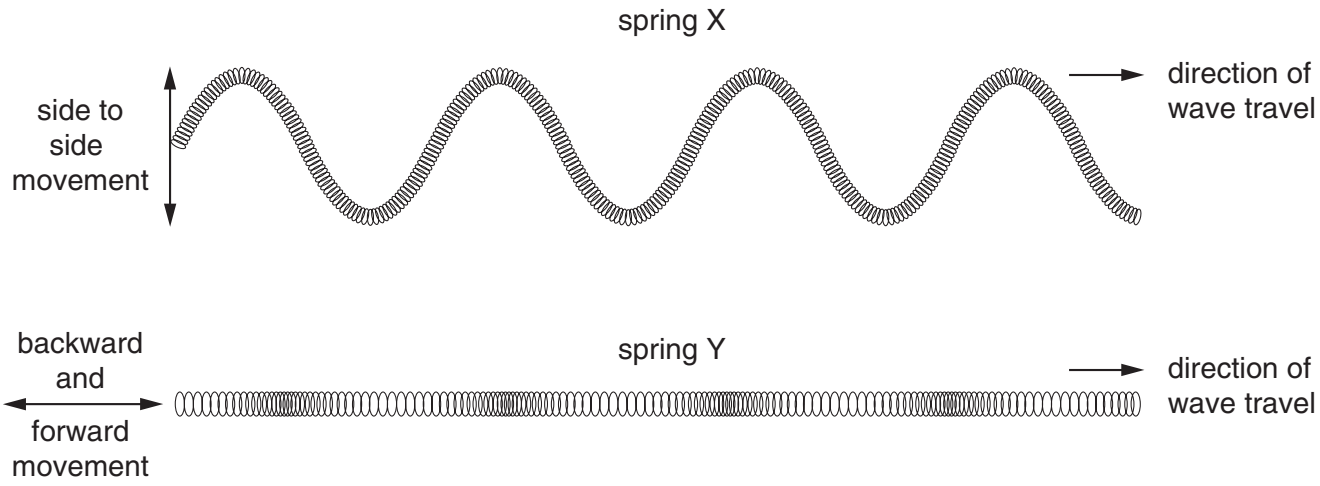
A amplitude

B frequency

C speed

D wavelength

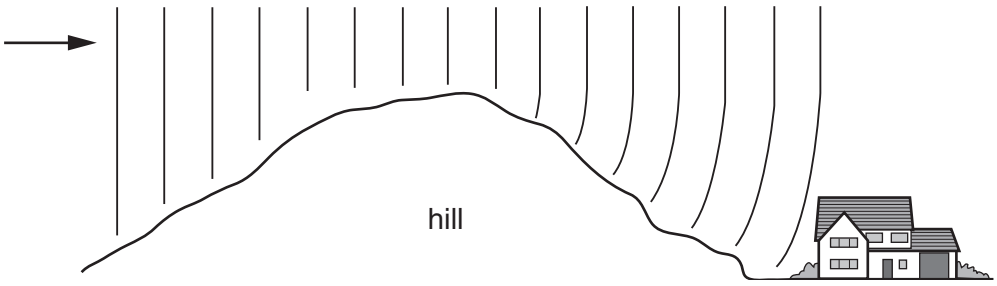
3 Waves are sent along two long springs X and Y as shown.



How should the wave motions in X and Y be described?

	spring X	spring Y
A	longitudinal	longitudinal
B	longitudinal	transverse
C	transverse	longitudinal
D	transverse	transverse

4 Radio waves are received at a house at the bottom of a hill.



The waves reach the house because the hill has caused them to be

A diffracted.

B radiated.

C reflected.

D refracted.

5 What causes refraction when light travels from air into glass?

A The amplitude of the light waves changes.

B The colour of the light changes.

C The frequency of the light waves changes.

D The speed of the light changes.

6 A woman tunes her radio to a station broadcasting on 200 m.

What does the 200 m tell her about the radio wave?

A its amplitude

B its frequency

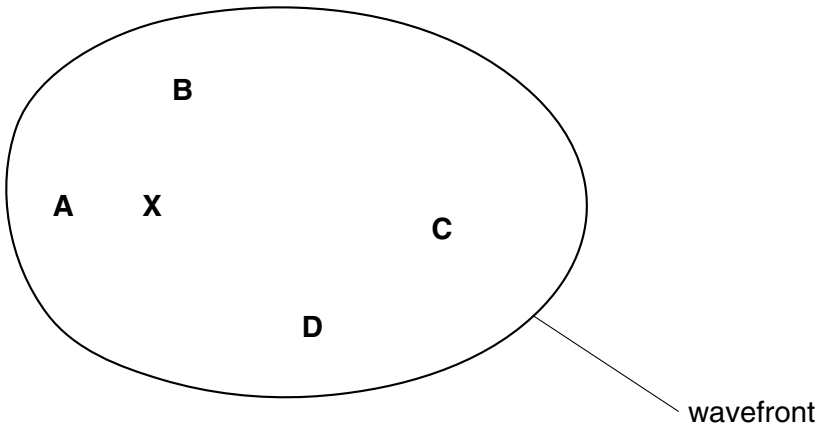
C its speed

D its wavelength

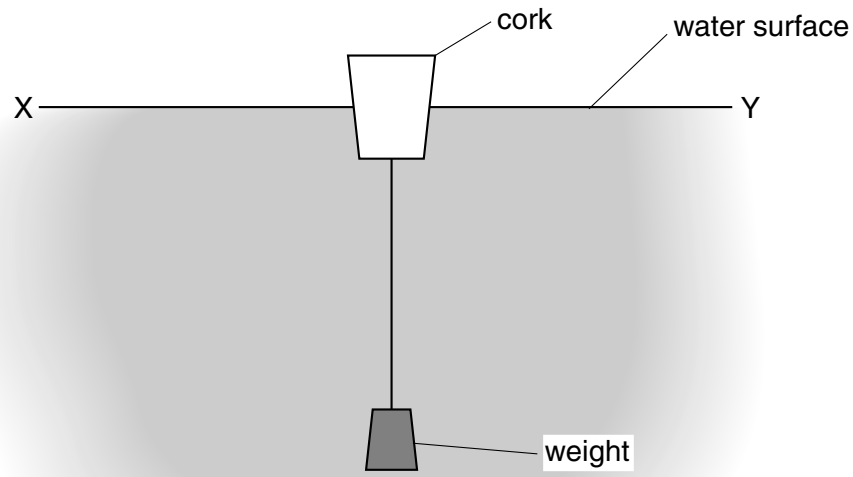
7 Waves travel more slowly on the surface of water when the water is shallow.

A person drops a stone into a pool at **X**. The diagram shows the first wavefront on the surface of the pool.

Which region of the pool is likely to be most shallow?



8 The diagram shows a cork with a weight attached so that the cork floats upright.



Transverse waves travel across the water from X to Y.

Which way do the waves make the cork move?

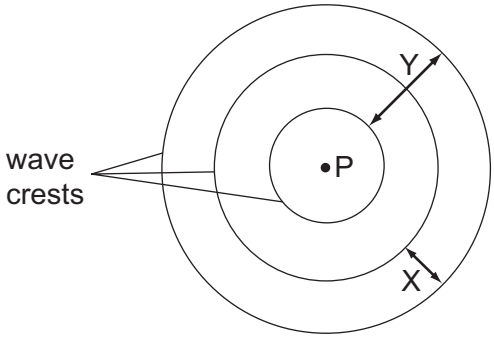
A → ← right and left

B ↑ ↓ up and down

C → only to the right

D ← only to the left

9 A vertical stick is dipped up and down in water at P. In two seconds, three wave crests are produced on the surface of the water.



Which statement is true?

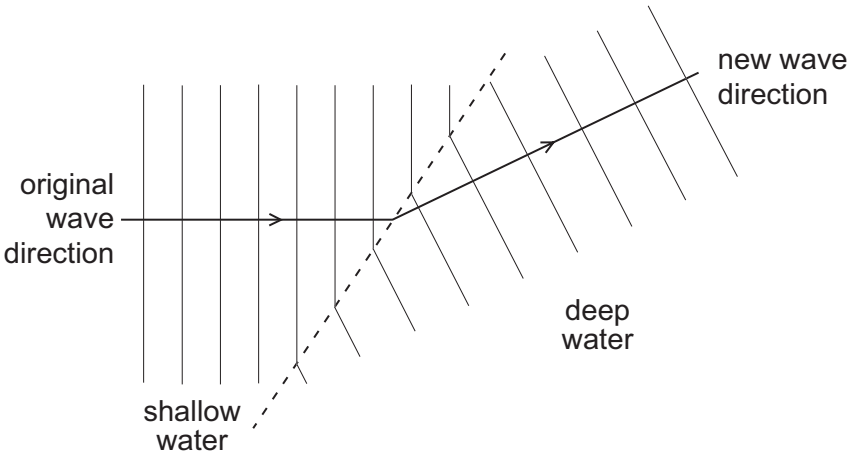
A Distance X is the amplitude of the waves.

B Distance Y is the wavelength of the waves.

C Each circle represents a wavefront.

D The frequency of the waves is 3 Hz.

10 Water waves change direction when they move from shallow water to deep water.



What is the name of this effect?

A diffraction

B dispersion

C reflection

D refraction

11 Which of these waves is longitudinal?

A light waves

B sound waves

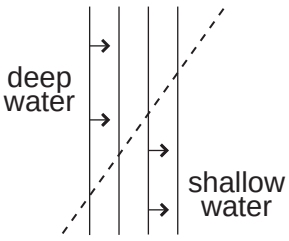
C water waves

D X-ray waves

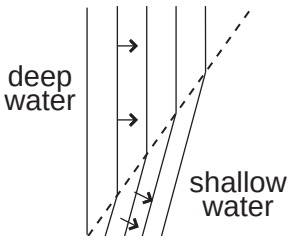
12 Waves move from deep water to shallow water where they are slower.

Which diagram shows what happens to the waves?

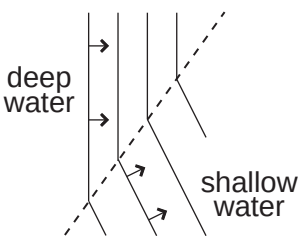
A



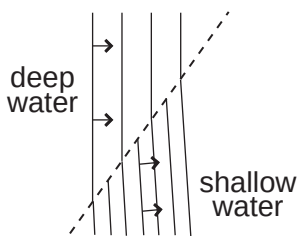
B



C

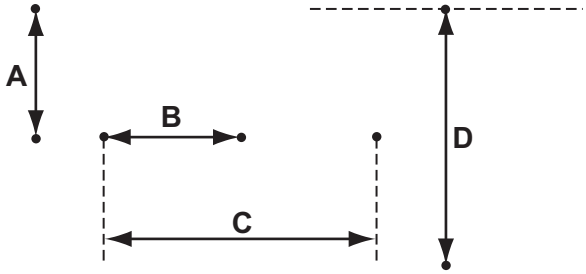


D

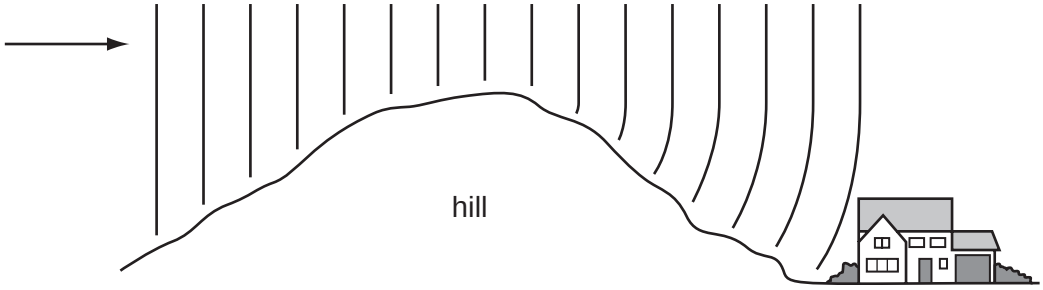


13 The drawing shows a wave.

Which labelled distance is the wavelength?



14 Radio waves are received at a house at the bottom of a hill.



The waves reach the house because the hill has caused them to be

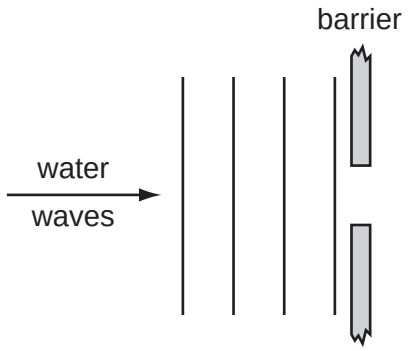
A diffracted.

B radiated.

C reflected.

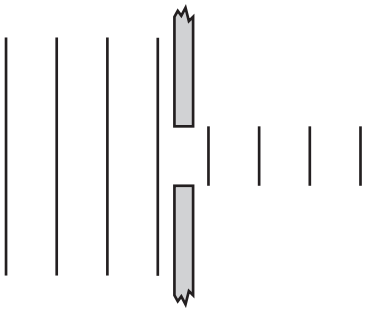
D refracted.

15 In a ripple tank, water waves move towards a barrier with a narrow gap.

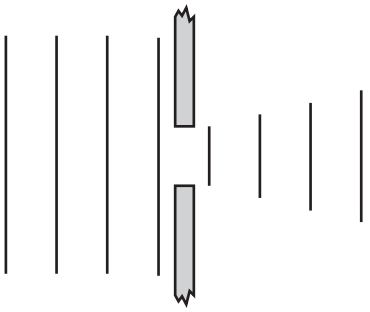


Which diagram best shows the waves beyond the barrier?

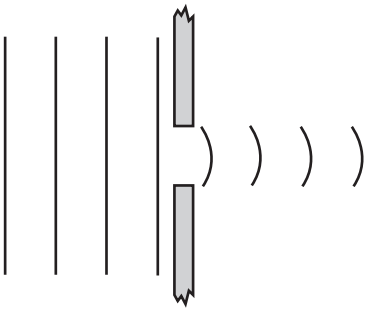
A



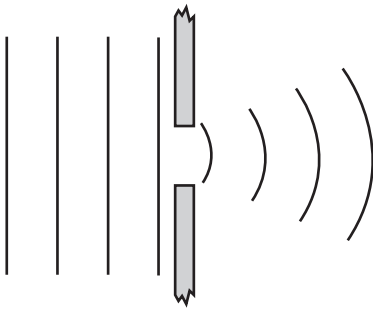
B



C



D



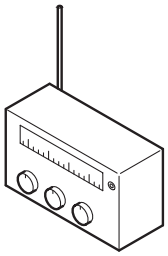
16 The diagrams show four sources of waves.

Which source generates longitudinal waves?

A

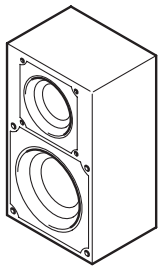
stick pushed up and down in water

B



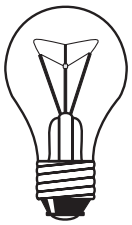
radio transmitter

C



loudspeaker

D

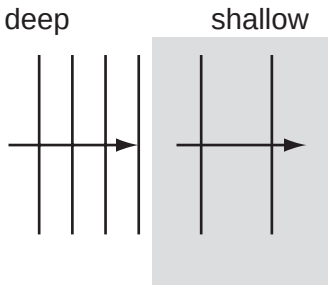


lamp

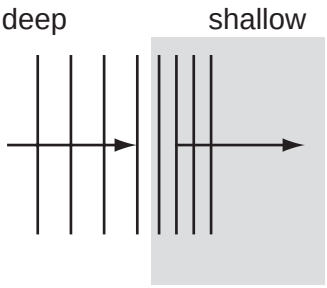
17 Water waves travel more slowly in shallow water than in deep water.

Which diagram shows what will happen to plane waves in deep water when they enter shallow water?

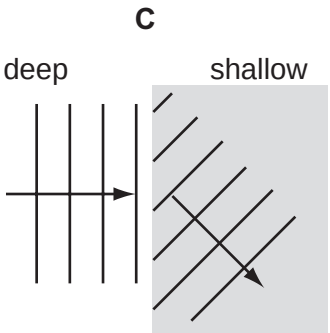
A



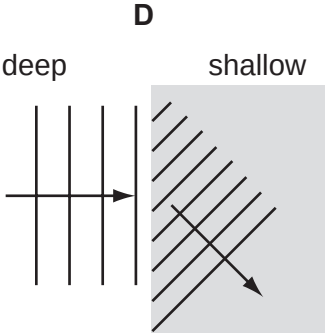
B



C



D



18 Which is the best description of the speed of a water wave?

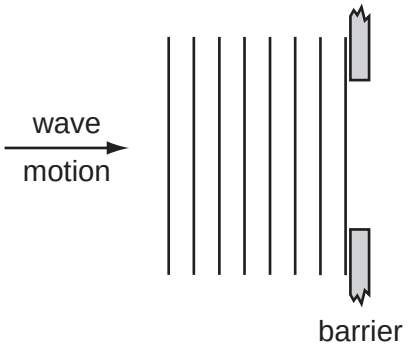
A the distance between one wave crest and the next

B the distance between the crest of a wave and a trough

C the distance that a particle of water moves up and down in one second

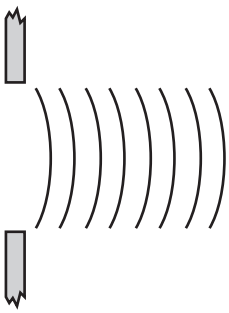
D the distance that a wavefront moves along the surface in one second

19 In a ripple tank experiment, plane water-waves meet a straight barrier with a wide gap in it.

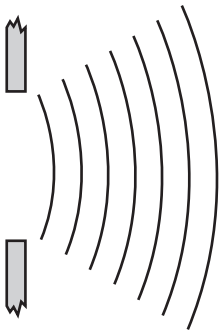


Which diagram shows the wave pattern beyond the barrier?

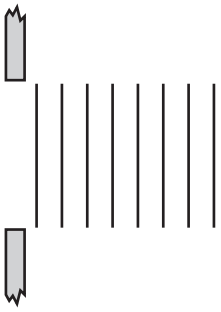
A



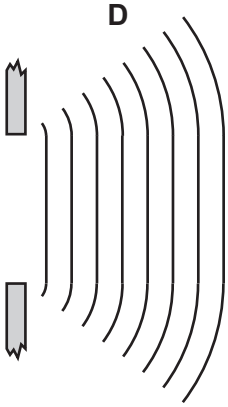
B



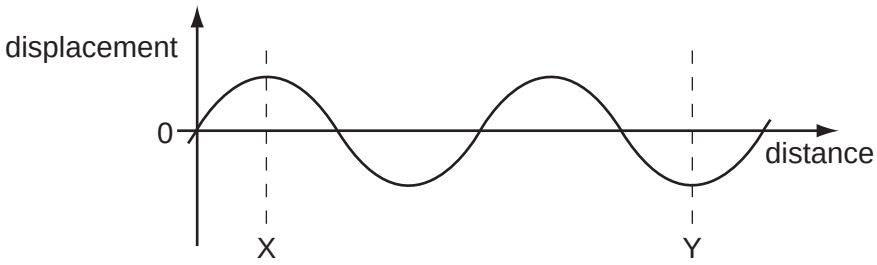
C



D



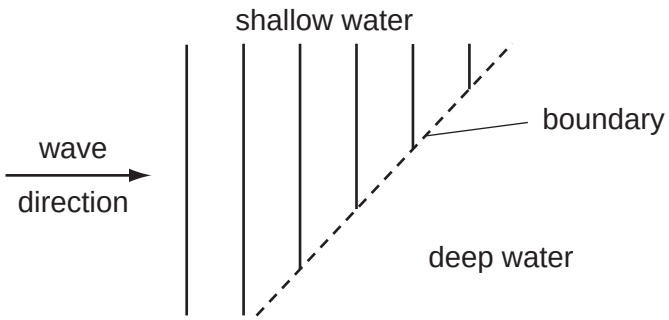
20 The diagram shows a wave.



How many wavelengths are there between X and Y?

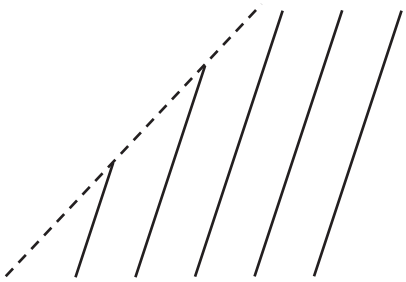
A $\frac{2}{3}$ **B** 1 **C** $1\frac{1}{2}$ **D** 3

21 Plane water waves travel from a shallow region into a deeper region. They travel more quickly in the deeper water.

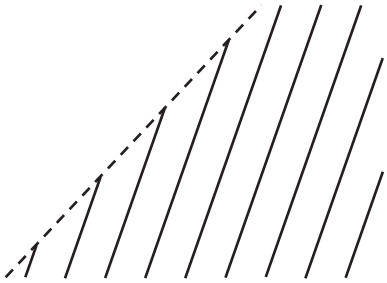


Which diagram shows the wave pattern in the deeper water?

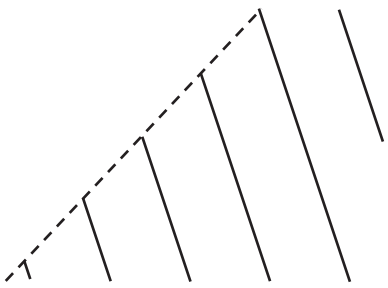
A



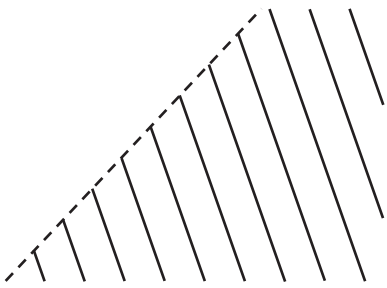
B



C



D



22 Water waves are reflected at a plane surface.

Which property of the waves is changed by the reflection?

A direction

B frequency

C speed

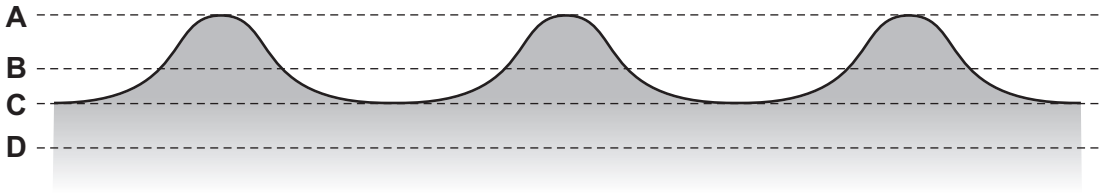
D wavelength

23 Which line gives an example of a longitudinal wave and describes its vibrations?

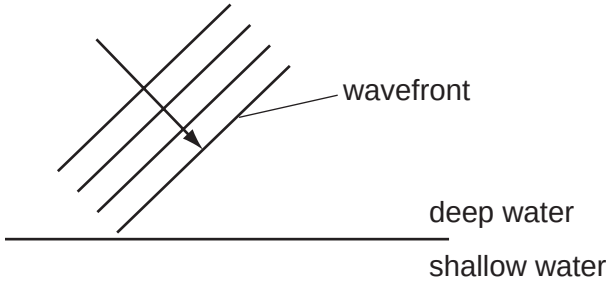
	example of a longitudinal wave	vibrations
A	light wave	at right angles to the direction the wave travels
B	light wave	in the same direction as the wave travels
C	sound wave	at right angles to the direction the wave travels
D	sound wave	in the same direction as the wave travels

24 The diagram shows a section through a series of waves on water.

Which dotted line shows the position of the still water surface after the waves have passed?



25 The diagram represents water waves about to move into shallow water from deep water.



Which property of the waves remains the same after the waves move into shallow water?

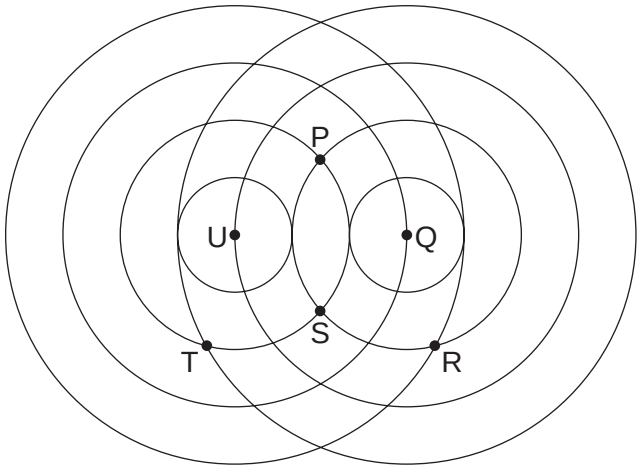
A frequency

B speed

C wavefront direction

D wavelength

26 Two sets of water waves overlap as shown in the diagram.

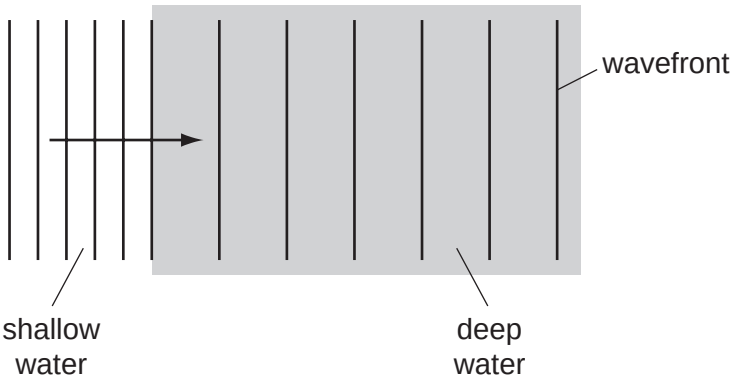


From which two points are the sets of waves coming?

A P and S **B** T and R **C** Q and T **D** U and Q

27 Waves in a tank pass from shallow to deep water.

The wavefront diagram is shown.



Which quantity increases as the waves enter the deep water?

A amplitude

B frequency

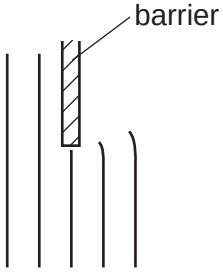
C wave energy

D wavelength

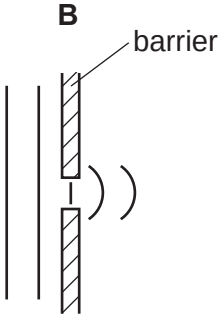
28 The diagrams represent water waves in a tank.

Which diagram represents waves that change speed?

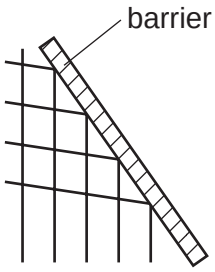
A



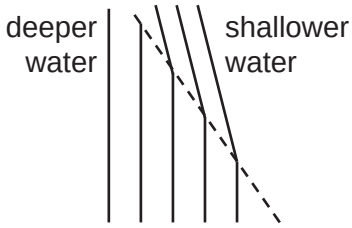
B



C



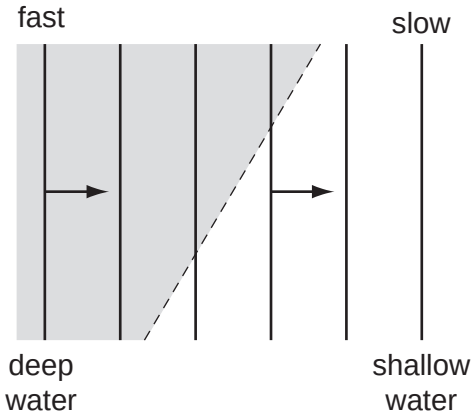
D



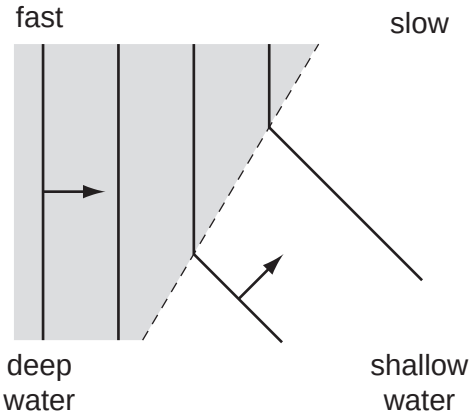
29 The diagrams show water waves that move more slowly after passing into shallow water at the broken line.

Which diagram shows what happens to the waves?

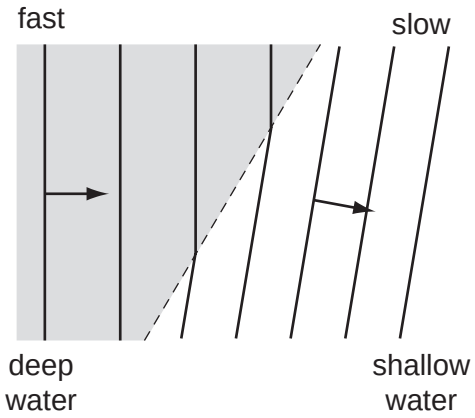
A



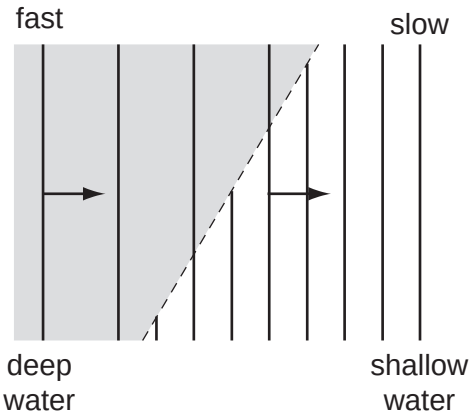
B



C

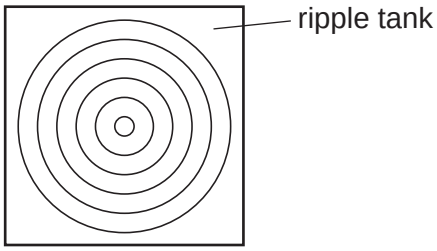


D



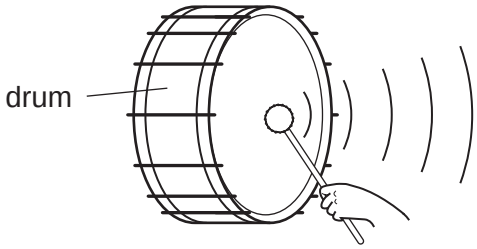
30 The diagrams show examples of wave motion.

1



waves on water

2



waves in air

3

waves on a rope

4

waves in a spring
(as shown)

Which are longitudinal waves?

A 1 only

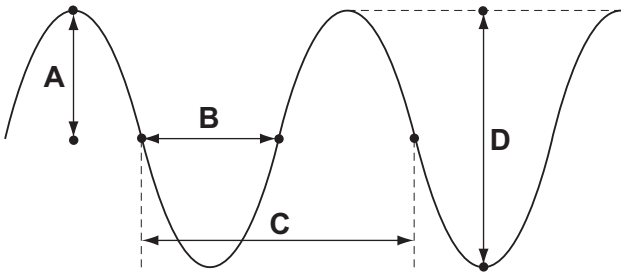
B 1, 2 and 4

C 2 and 3 only

D 2 and 4 only

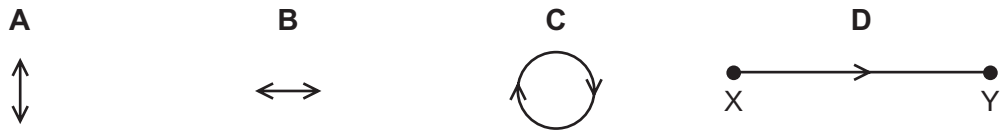
31 The drawing shows a wave.

Which labelled distance is the wavelength?

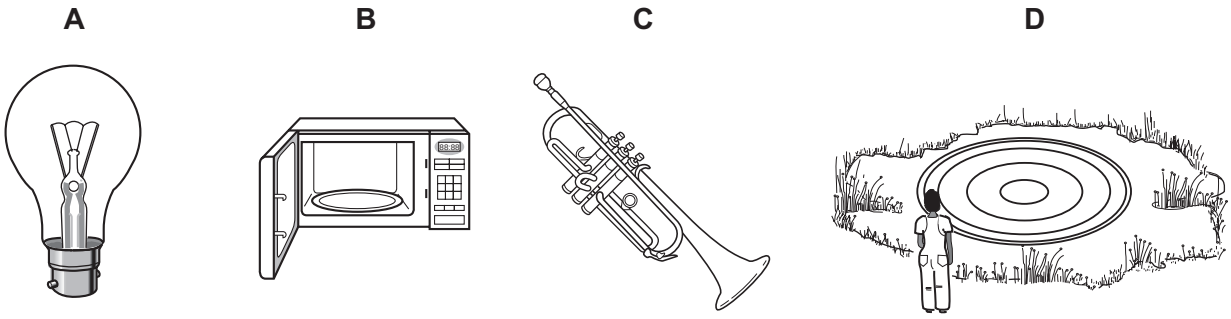


32 Sound waves travel from a point X to another point Y.

Which diagram represents the movement of the air molecules, caused by the sound waves, in the region between X and Y.

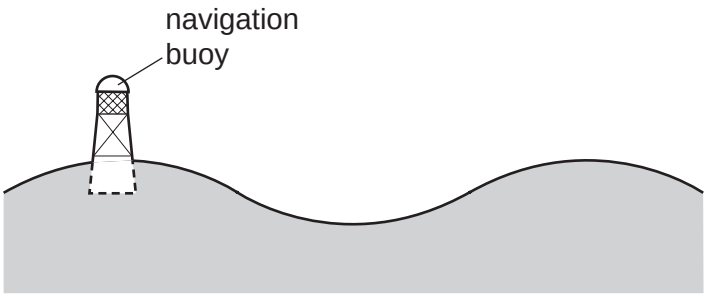


33 Which waves are longitudinal?



A	B	C	D
light waves from a lamp	microwaves in an oven	sound waves from a trumpet	water waves on a pond

34 A navigation buoy floating on the sea oscillates up and down as a wave passes.



In exactly two minutes, six complete wavelengths pass the buoy.

What is the frequency of the waves?

A 0.050 Hz **B** 0.33 Hz **C** 3.0 Hz **D** 20 Hz

35 Which group contains only transverse waves?

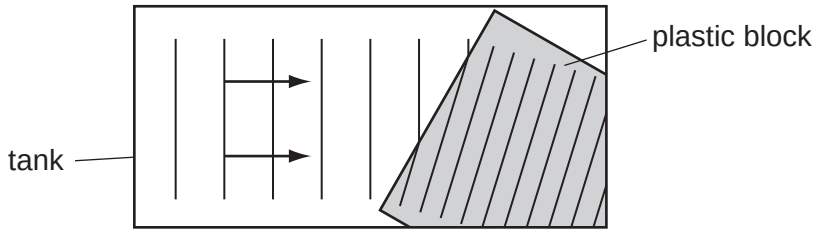
A infra-red waves, light waves, sound waves

B infra-red waves, light waves, ultra-violet waves

C infra-red waves, ultra-violet waves, sound waves

D light waves, sound waves, ultra-violet waves

36 Water waves in a tank pass over a thin plastic block as shown.



What happens to the waves as they reach the plastic block?

A They are diffracted because they slow down.

B They are diffracted because they speed up.

C They are refracted because they slow down.

D They are refracted because they speed up.

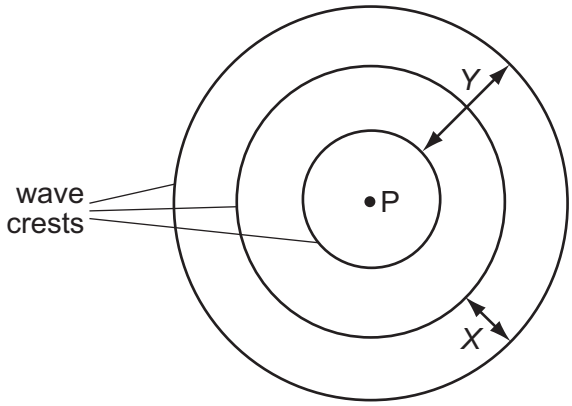
37 Water waves can be used to show reflection, refraction and diffraction.

For each of these, which row shows whether or not the speed of the water waves changes?

	reflection	refraction	diffraction
A	no	no	yes
B	no	yes	no
C	yes	no	no
D	yes	yes	yes

38 A vertical stick is dipped up and down in water at P.

In two seconds, three wave crests are produced on the surface of the water.



Which statement is correct?

A Distance *X* is the amplitude of the waves.

B Distance *Y* is the wavelength of the waves.

C Each circle represents a wavefront.

D The frequency of the waves is 3 Hz.

39 Which of these waves is longitudinal?

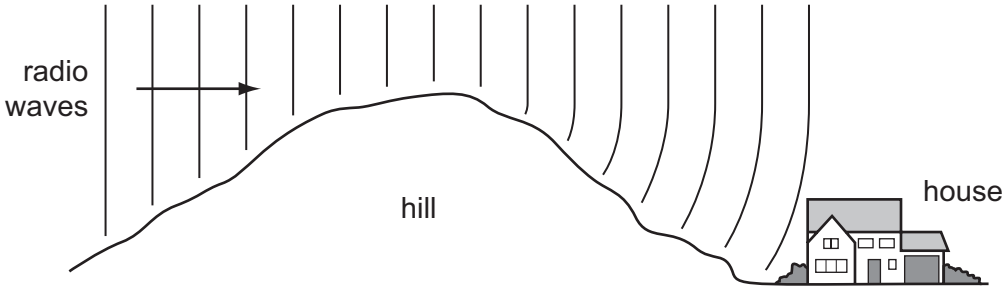
A infra-red

B radio

C sound

D water

40 Radio waves are received at a house at the bottom of a hill.



The waves reach the house because the hill has caused them to be

A diffracted.

B radiated.

C reflected.

D refracted.

41 What is the unit of wavelength?

A hertz

B metre

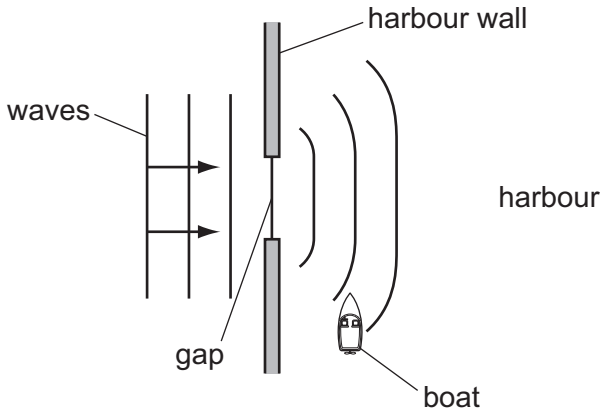
C metre per second

D second

42 Which row correctly describes light waves and radio waves?

	light waves	radio waves
A	longitudinal	longitudinal
B	longitudinal	transverse
C	transverse	longitudinal
D	transverse	transverse

43 The diagram shows water waves passing through a gap in a harbour wall. The waves curve round the wall and reach a small boat in the harbour.



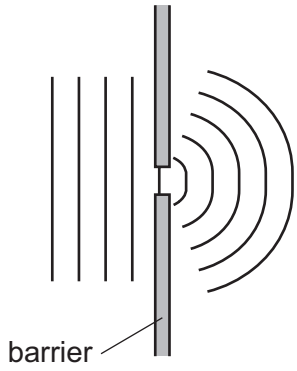
What is the name of this curving effect, and how can the gap be changed so that the waves are less likely to reach the boat?

	name of effect	change to the gap
A	diffraction	make the gap slightly bigger
B	diffraction	make the gap slightly smaller
C	refraction	make the gap slightly bigger
D	refraction	make the gap slightly smaller

44 Which row shows the nature of light waves, sound waves and X-rays?

	light waves	sound waves	X-rays
A	longitudinal	longitudinal	transverse
B	longitudinal	transverse	longitudinal
C	transverse	longitudinal	transverse
D	transverse	transverse	longitudinal

45 The diagram shows plane water waves passing through a narrow gap in a barrier.



The waves spread out on the far side of the barrier.

Which property of waves does this illustrate?

A diffraction

B reflection

C refraction

D vibration

Properties of Waves

1	C	11	B	21	C	31	C	41	B
2	A	12	B	22	A	32	B	42	D
3	C	13	C	23	D	33	C	43	A
4	A	14	A	24	B	34	A	44	C
5	D	15	D	25	A	35	B	45	A
6	D	16	C	26	D	36	C		
7	A	17	B	27	D	37	B		
8	B	18	D	28	D	38	C		
9	C	19	D	29	C	39	C		
10	D	20	C	30	D	40	A		

1 Alpha-particles, beta-particles, gamma-rays and infra-red radiation may all be emitted from a solid.

Which of these are included in the electromagnetic spectrum?

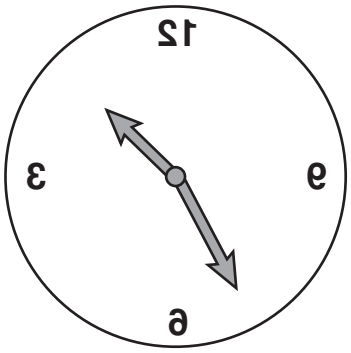
A alpha-particles and beta-particles

B alpha-particles and gamma-rays

C beta-particles and infra-red radiation

D gamma-rays and infra-red radiation

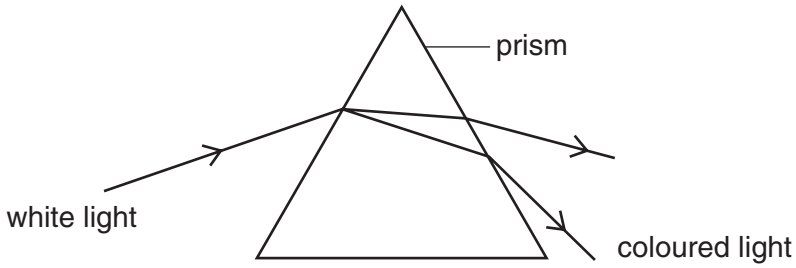
2 The image of a clock face as seen in a plane mirror is shown.



What is the actual time on the clock?

A 1.25 **B** 1.35 **C** 10.25 **D** 10.35

3 One of the effects of passing a ray of white light through a prism is to split the light into colours.



What is the name given to this effect?

A deviation

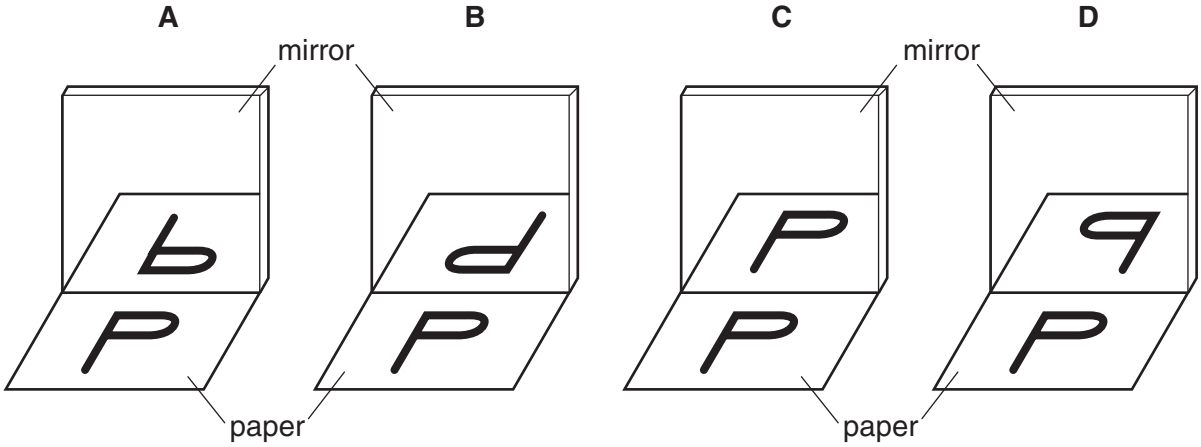
B dispersion

C reflection

D refraction

4 A student looks at the letter P on a piece of paper, and at its reflection in a mirror.

What does he see?



5 Which statement is correct about the speed of electromagnetic waves in a vacuum?

A Ultra-violet waves have the greatest speed.

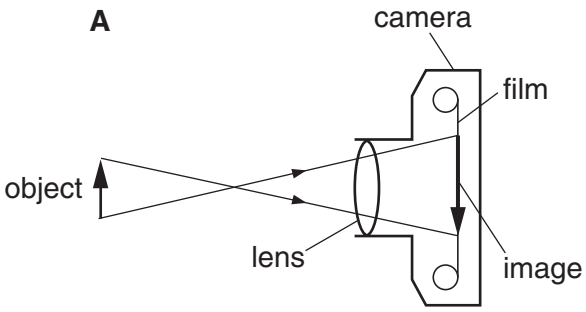
B Visible light waves have the greatest speed.

C Infra-red waves have the greatest speed.

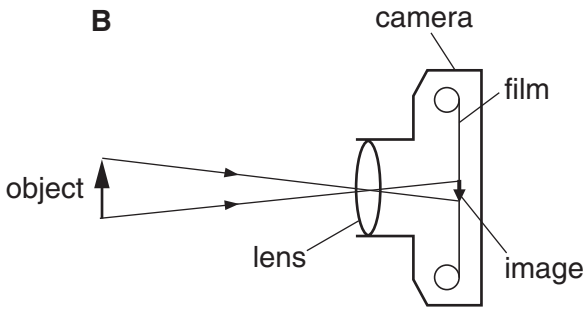
D All electromagnetic waves have the same speed.

6 Which diagram correctly shows rays passing through a camera lens?

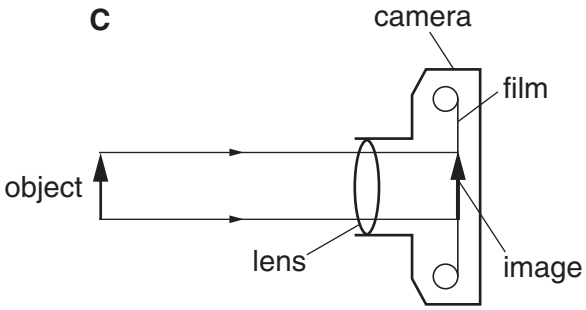
A



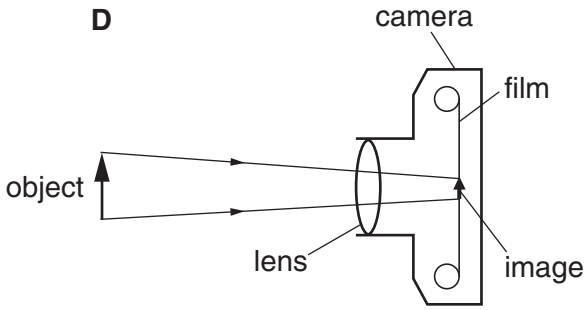
B



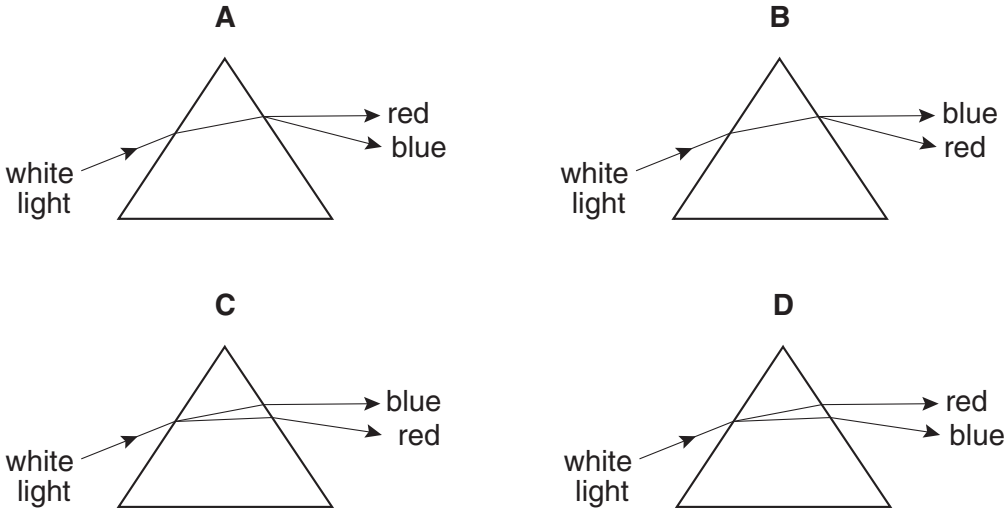
C



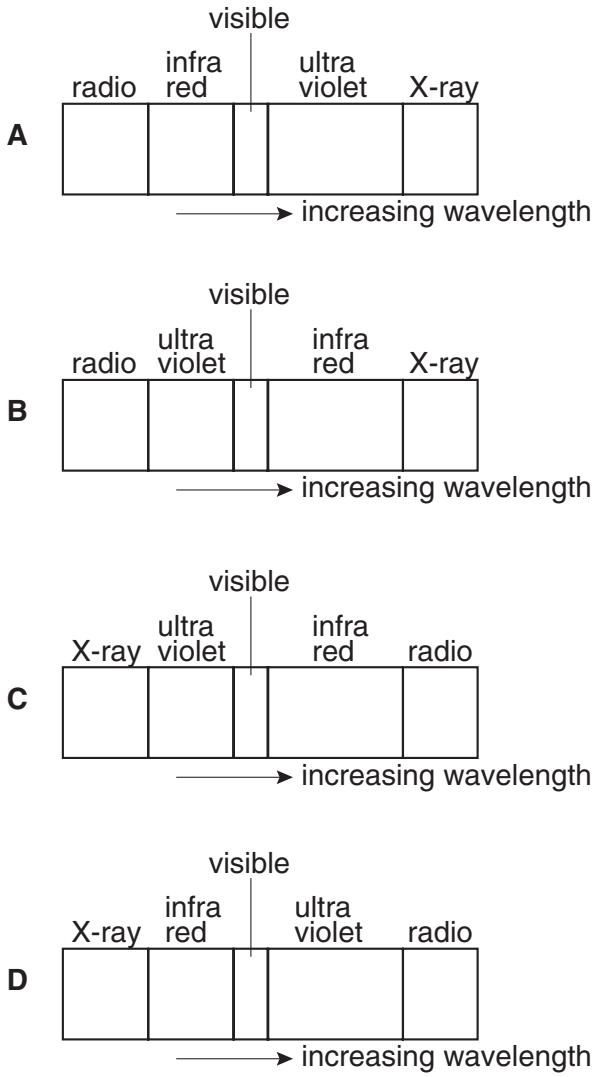
D



7 Which diagram correctly shows the paths taken by red and blue light when a beam of white light enters a glass prism?



8 Which diagram shows the correct order of the waves in the electromagnetic spectrum?



9 A plane mirror is on a wall.

Which is a correct description of the image formed by the mirror?

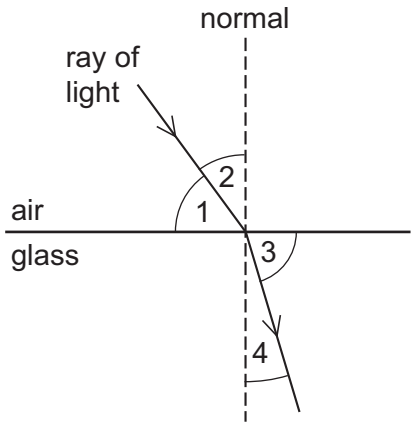
A the right way up and smaller than the object

B the right way up and the same size as the object

C upside down and smaller than the object

D upside down and the same size as the object

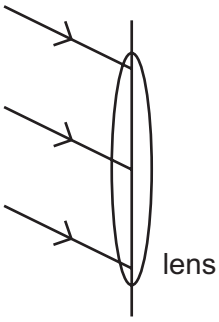
10 The diagram shows a ray of light entering a block of glass.



Which numbered angles are the angles of incidence and of refraction?

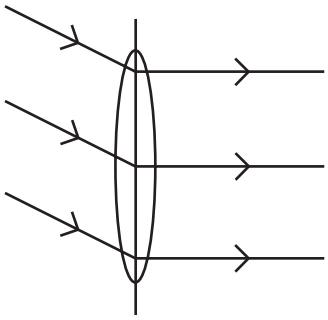
	angle of incidence	angle of refraction
A	1	3
B	1	4
C	2	3
D	2	4

11 Three rays of light fall on a converging lens as shown.

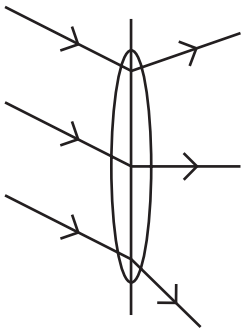


Which diagram shows the path of the rays after passing through the lens?

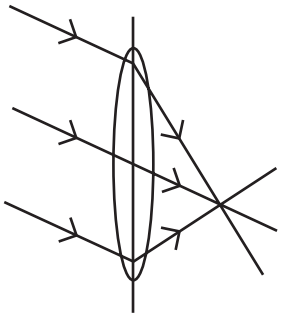
A



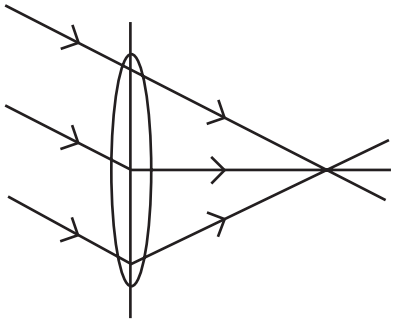
B



C



D



12 Which type of wave **cannot** travel through a vacuum?

A infra-red radiation

B microwaves

C sound waves

D X-rays

13 Which type of radiation lies between visible light and microwaves in the electromagnetic spectrum?

A infra-red

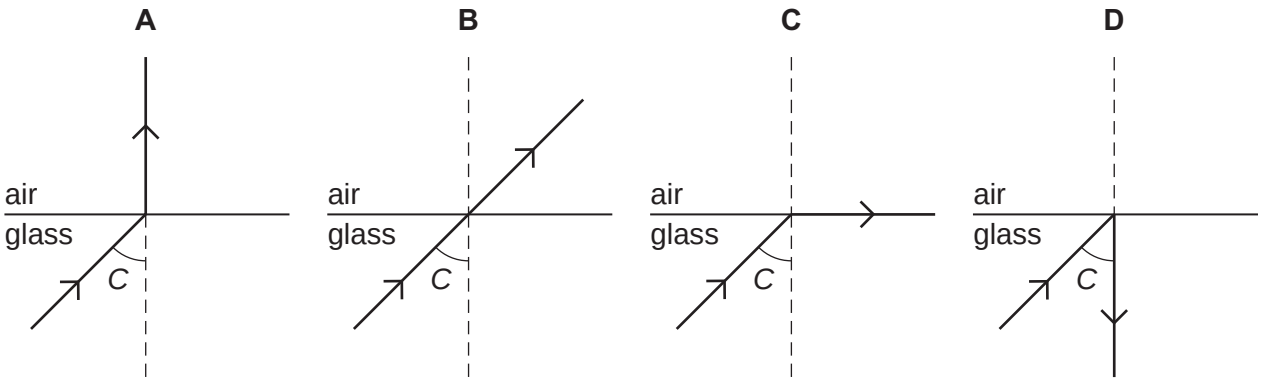
B radio waves

C ultra-violet

D X-rays

14 The critical angle for a glass / air boundary is *C*.

Which diagram shows the correct path of the light ray?

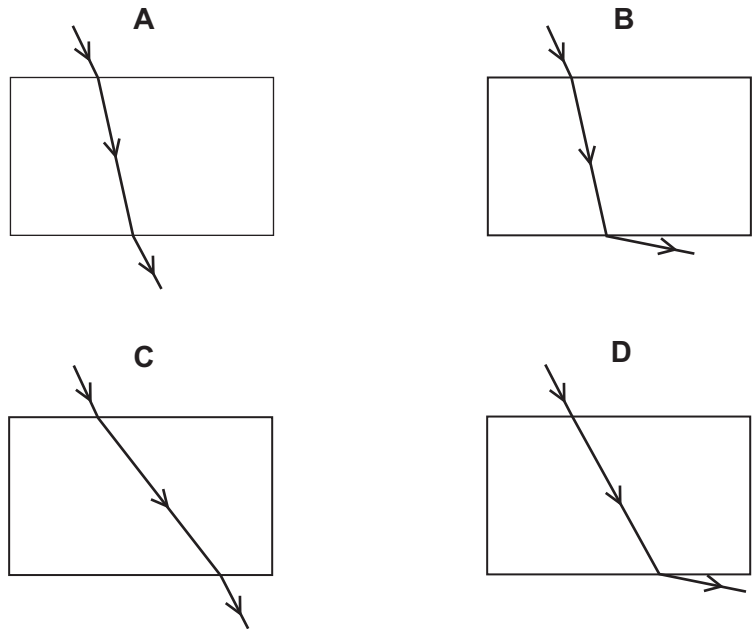


15 The diagram shows the image of a clockface in a plane mirror.

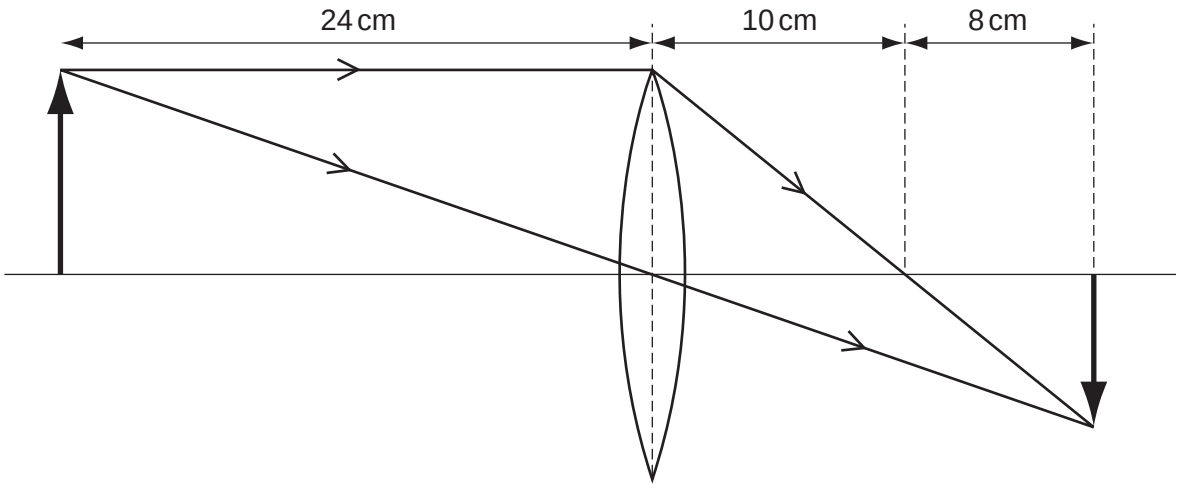
Which of these times is shown?

A 02.25 **B** 02.35 **C** 09.25 **D** 09.35

16 Which diagram correctly shows a ray of light passing through a rectangular glass block?



17 The ray diagram shows how an image is formed by a converging lens.



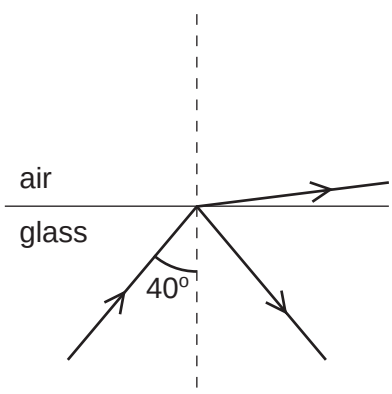
What is the focal length of this lens?

A 8 cm **B** 10 cm **C** 18 cm **D** 24 cm

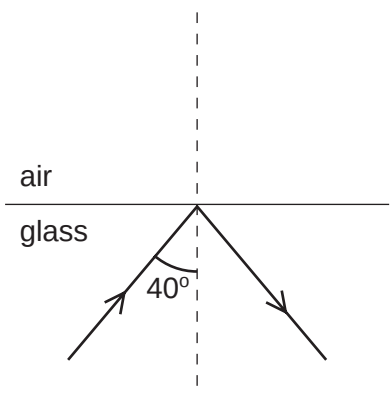
18 A ray of light passes from glass into air at an angle of incidence of 40°. The glass has a critical angle of 42°.

Which diagram shows what happens to the ray?

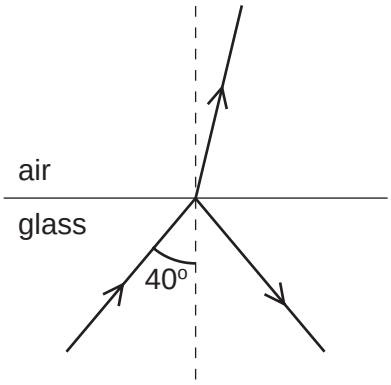
A



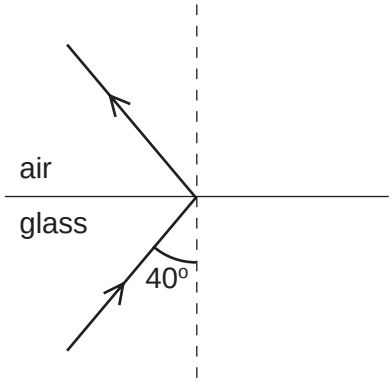
B



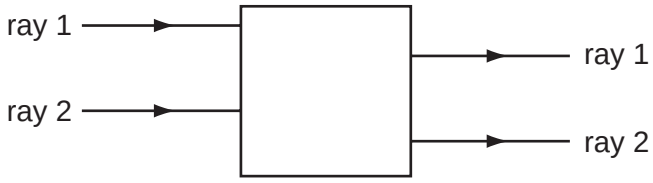
C



D



19 Rays of light enter and leave a box.



What could be inside the box to make the rays behave as shown?

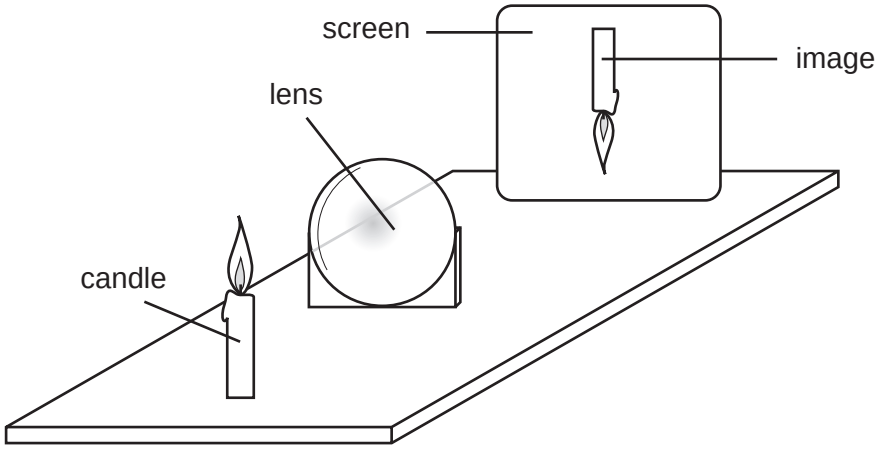
A a converging lens

B a parallel-sided glass block

C a plane mirror

D a triangular prism

20 A thin converging lens is used to produce, on a screen, a focused image of a candle.



The screen and the lens are moved back and forth and various focused images are produced on the screen.

Which statement is **always** true?

A The image is at the principal focus (focal point) of the lens.

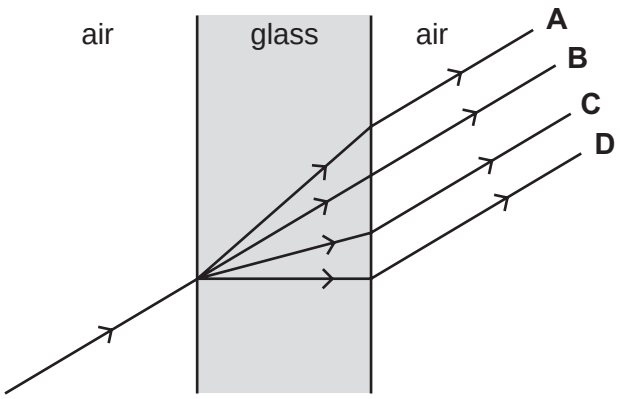
B The image is bigger than the object.

C The image is closer to the lens than the object is.

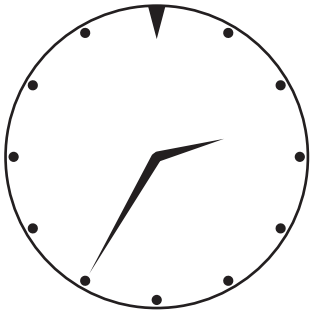
D The image is inverted.

21 A ray of light passes through a window.

Which path does it take?



22 The diagram shows the image of a clock in a plane mirror.



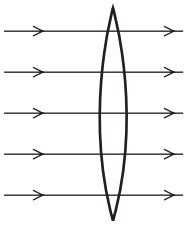
What time is shown?

A 02:25 **B** 02:35 **C** 09:25 **D** 09:35

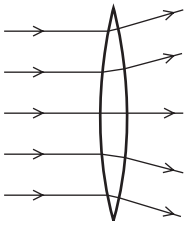
23 A parallel beam of light falls on a converging lens.

Which diagram shows what happens to the beam of light?

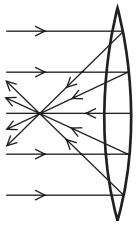
A



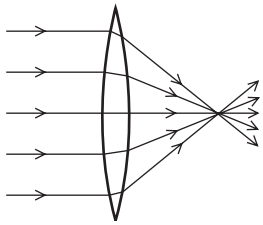
B



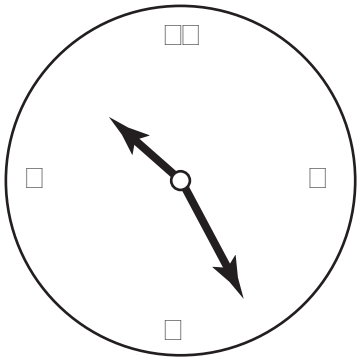
C



D



24 The image of a clock face as seen in a plane mirror is shown.

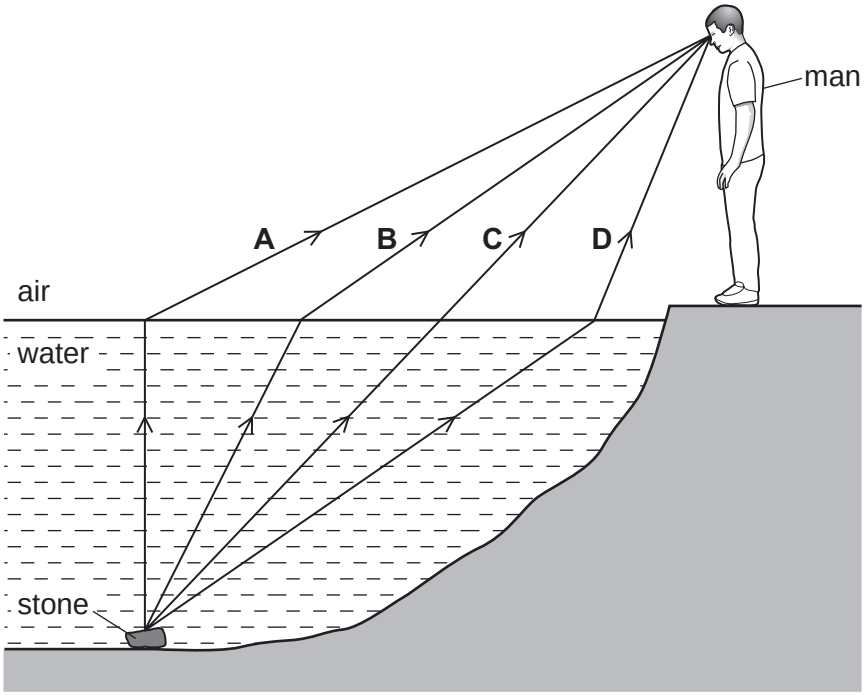


What is the time on the clock?

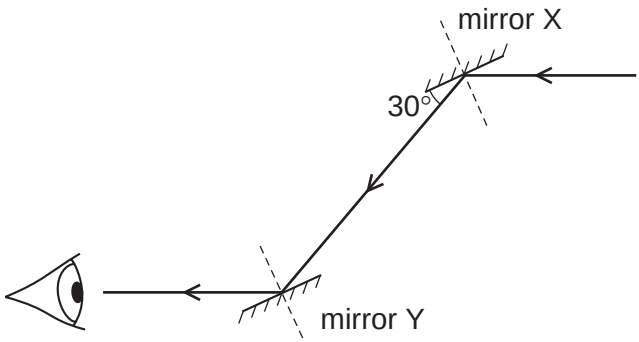
A 1.25 **B** 1.35 **C** 10.25 **D** 10.35

25 A man sees a stone at the bottom of a pool of water.

Which path could be taken by light from the stone to the man?



26 A ray of light is reflected by two parallel plane mirrors X and Y.



Which statement is correct?

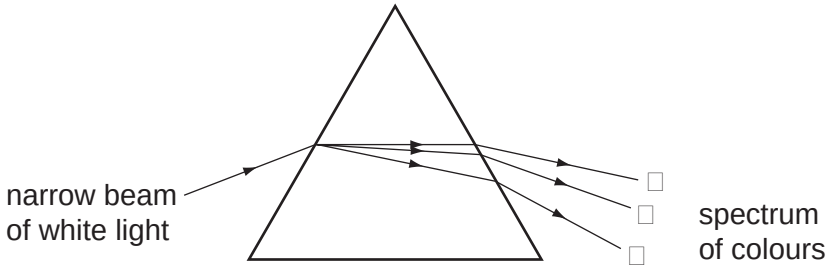
A The angle of incidence at mirror X is 30°.

B The angle of incidence at mirror Y is 60°.

C The angle of reflection at mirror X is 120°.

D The angle of reflection at mirror Y is 0°.

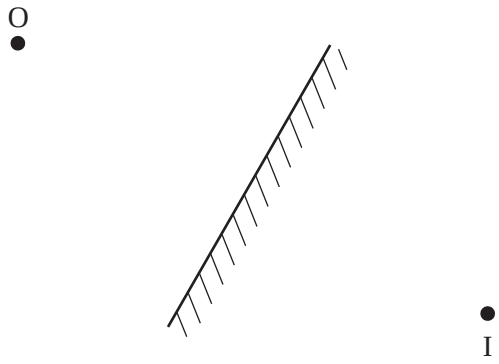
27 A student shines a narrow beam of white light into a prism as shown in the diagram. He sees a spectrum of colours emerging from the prism.



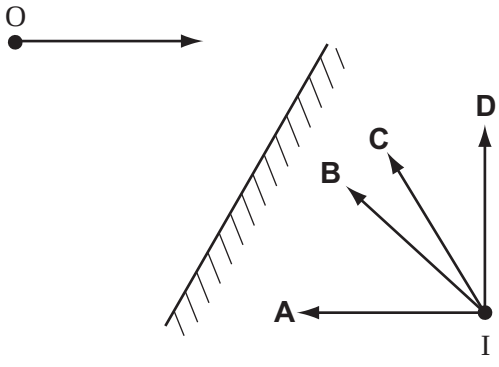
Which three colours does he see at **X**, at **Y** and at **Z**?

	X	Y	Z
A	blue	yellow	red
B	red	blue	yellow
C	red	yellow	blue
D	yellow	red	blue

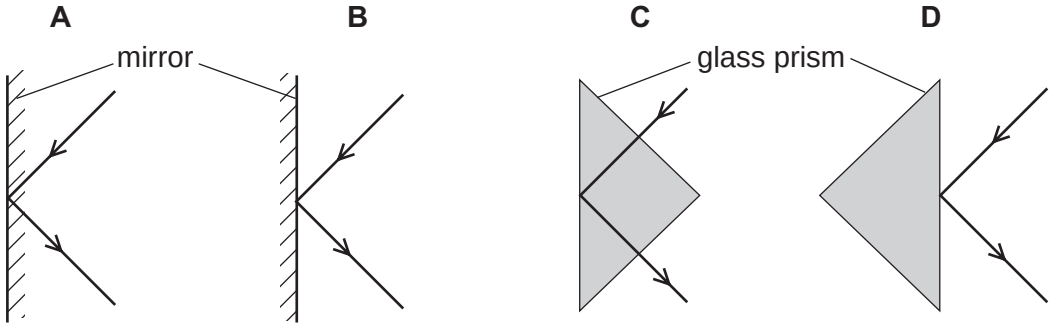
28 An object placed in front of a plane mirror at O produces an image at I.



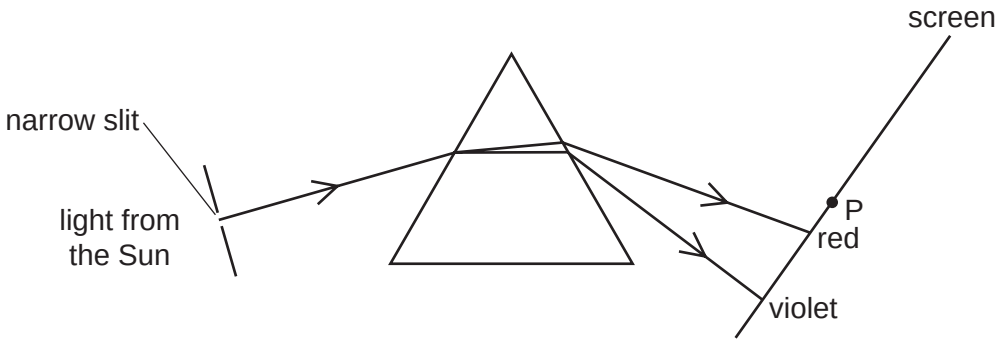
If the object moves towards the mirror in the direction shown by the arrow, in which direction does the image move?



29 Which diagram shows total internal reflection of light?



30 Light from the Sun passes through a prism and a spectrum is produced on a screen.



A thermometer placed at P shows a large temperature rise.

Which type of radiation causes this?

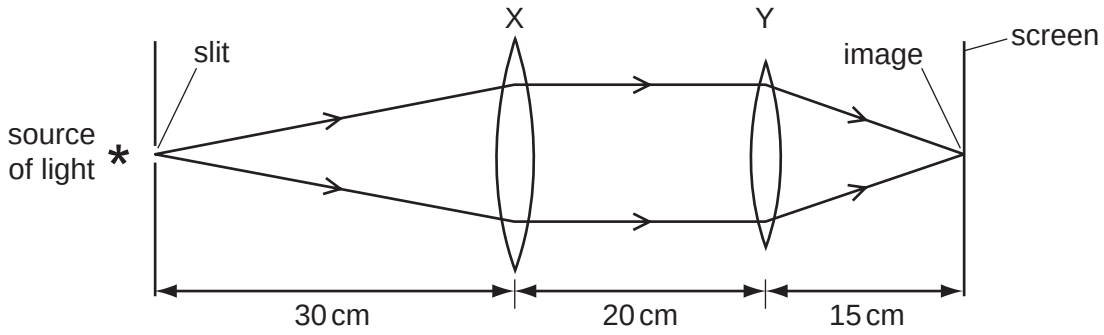
A infra-red

B microwave

C ultra-violet

D visible light

31 Two thin converging lenses X and Y are used as shown to give a focused image of an illuminated slit. The rays shown are parallel between X and Y.

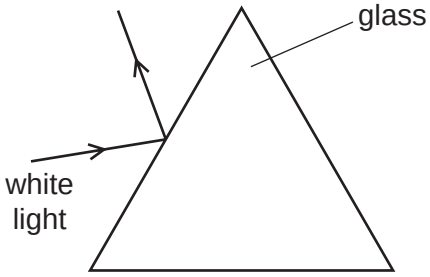


What are the correct values for the focal lengths of X and of Y?

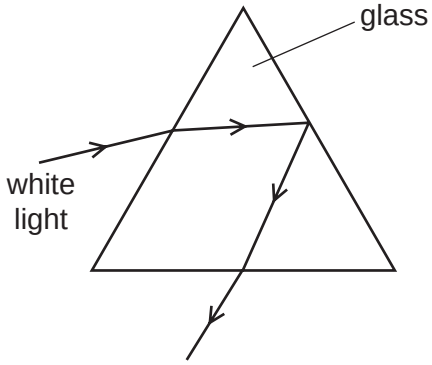
	focal length of X / cm	focal length of Y / cm
A	50	35
B	30	20
C	30	15
D	20	20

32 Which diagram shows the dispersion of white light?

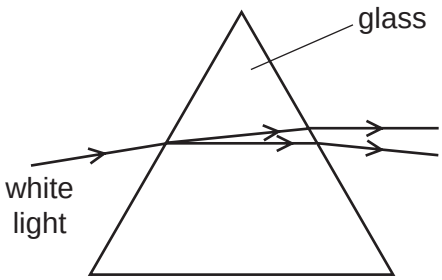
A



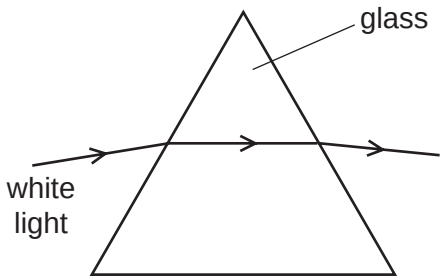
B



C

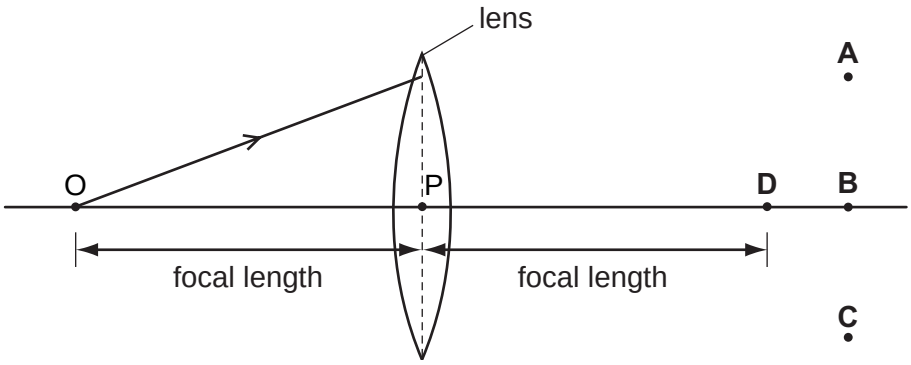


D



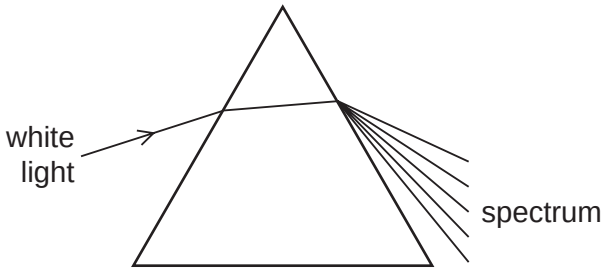
33 In the diagram, the distance OP is the focal length of the lens.

Through which point will the ray shown pass, after refraction by the lens?

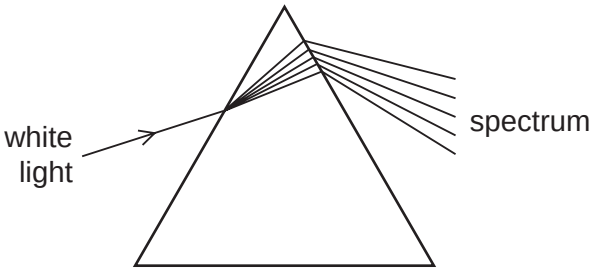


34 Which diagram shows what happens when a ray of white light passes through a prism?

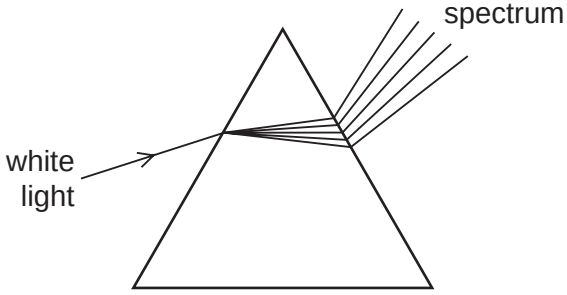
A



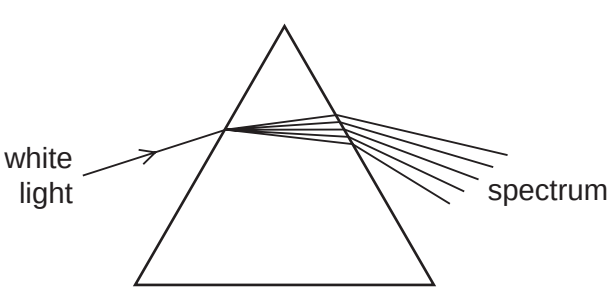
B



C

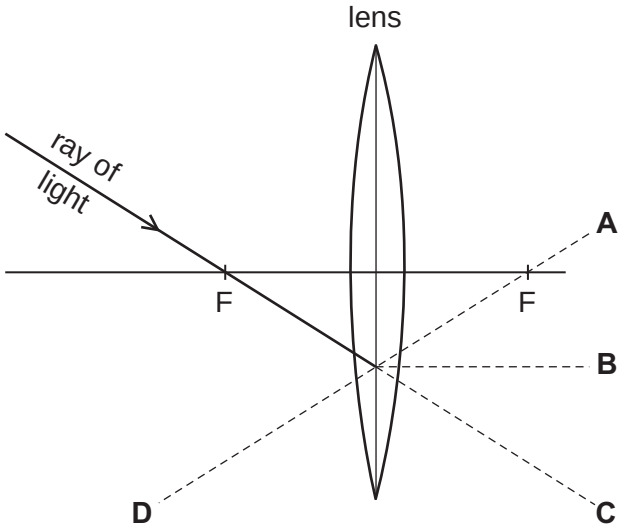


D



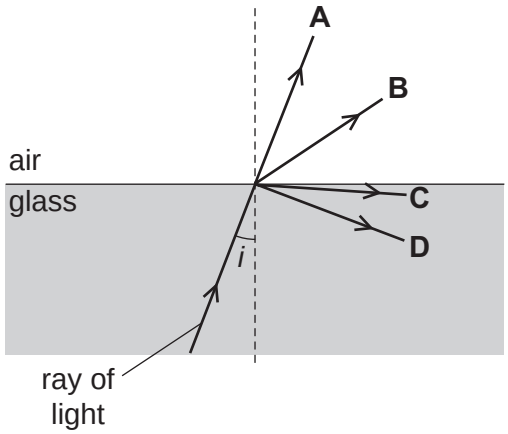
35 The diagram shows the path of a ray of light passing through a principal focus F of a lens.

Which broken line shows the direction of the ray after it leaves the lens?



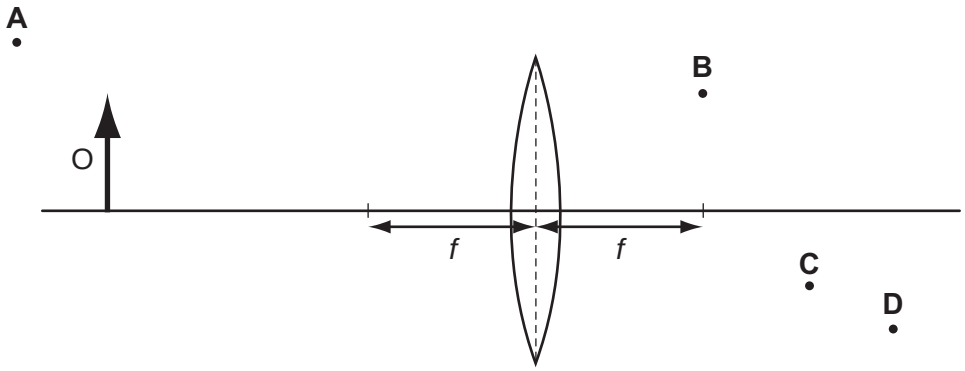
36 A ray of light in glass is incident on a boundary with air.

Which path does the ray of light take when the angle of incidence *i* is less than the critical angle?



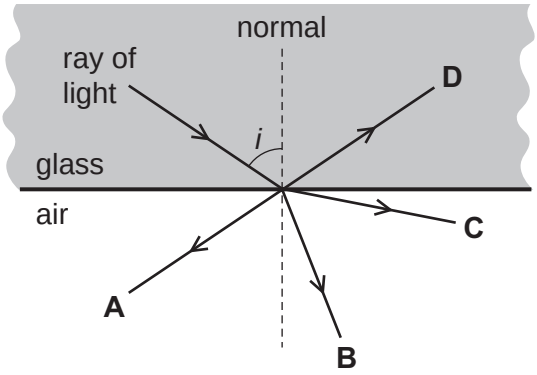
37 An object O is placed in front of a converging lens of focal length *f*.

At which point will the top of the image be seen?



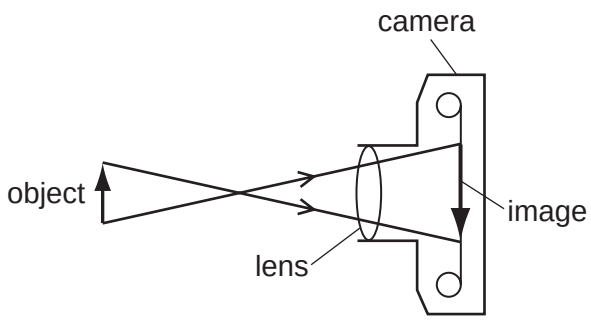
38 The diagram shows a ray of light incident on the edge of a piece of glass. The angle *i* is bigger than the critical angle.

Which arrow correctly shows the direction of the ray after it leaves the edge of the glass?

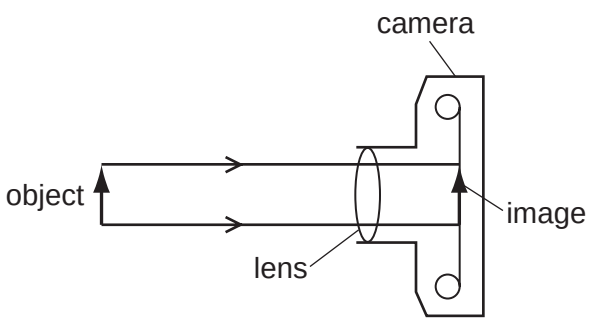


39 Which diagram correctly shows rays of light passing through a converging lens in a camera?

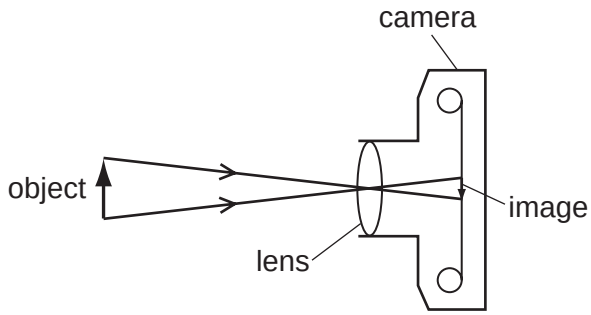
A



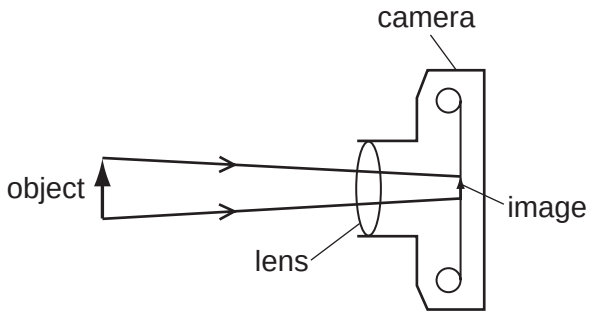
B



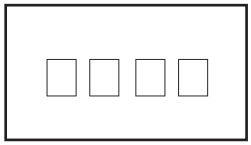
C



D



40 A girl writes the word **LEFT** on a piece of card.



She looks at the image of this card, made by reflection by a plane mirror.

What does she see?

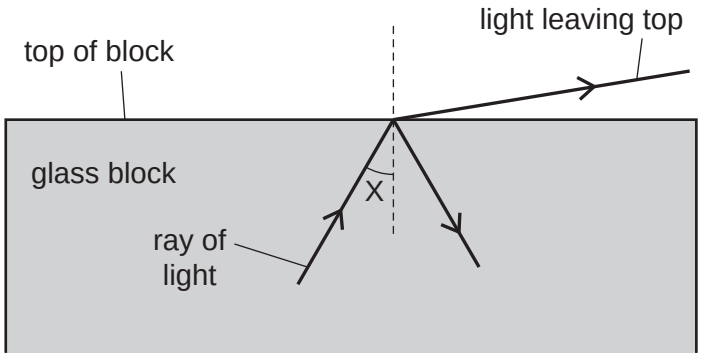
A

B

C

D

41 A scientist is trying to direct a ray of light through a glass block without any light leaving the top of the block. However, some light does leave the top.

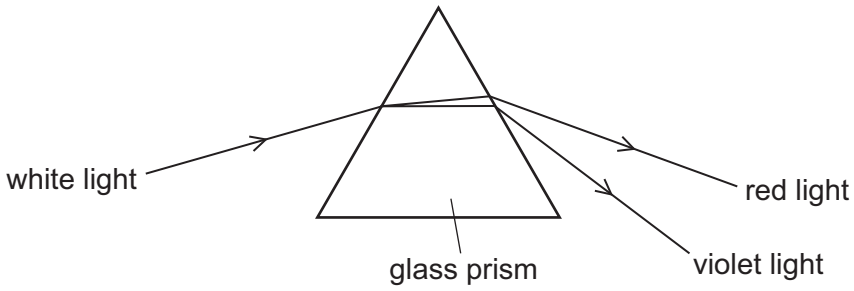


The scientist changes angle X and stops the ray of light leaving the top.

Which row in the table describes the change to angle X and the name of the effect produced?

	change to angle X	name of effect produced
A	decrease	total internal reflection
B	decrease	total internal refraction
C	increase	total internal reflection
D	increase	total internal refraction

42 The diagram shows the dispersion of white light by a glass prism.



Why does dispersion occur when white light enters the glass?

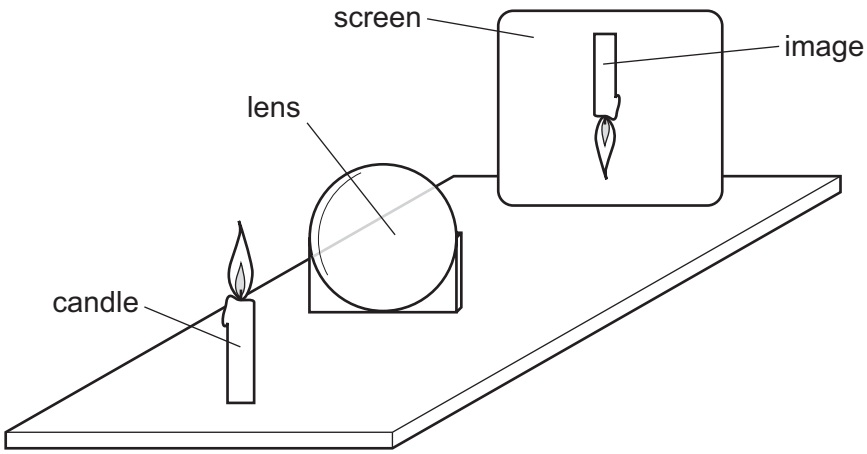
A The frequency of red light decreases more than that of violet light.

B The frequency of violet light decreases more than that of red light.

C The speed of red light decreases more than that of violet light.

D The speed of violet light decreases more than that of red light.

43 A thin converging lens is used to produce, on a screen, a focused image of a candle.



Various focused images are produced on the screen by moving the lens and the screen backwards and forwards.

Which statement is **always** correct?

A The image is at the principal focus (focal point) of the lens.

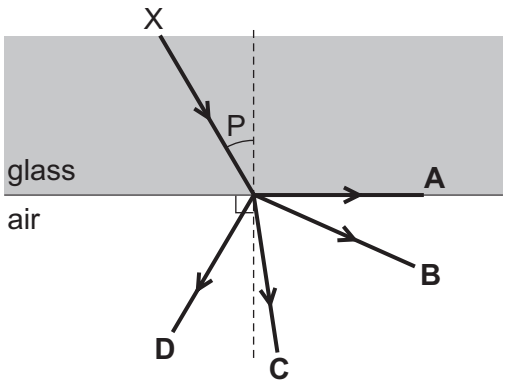
B The image is bigger than the object.

C The image is closer to the lens than the object is.

D The image is inverted.

44 The diagram shows a ray of light travelling from X. Angle P is less than the critical angle.

In which direction does the ray continue?

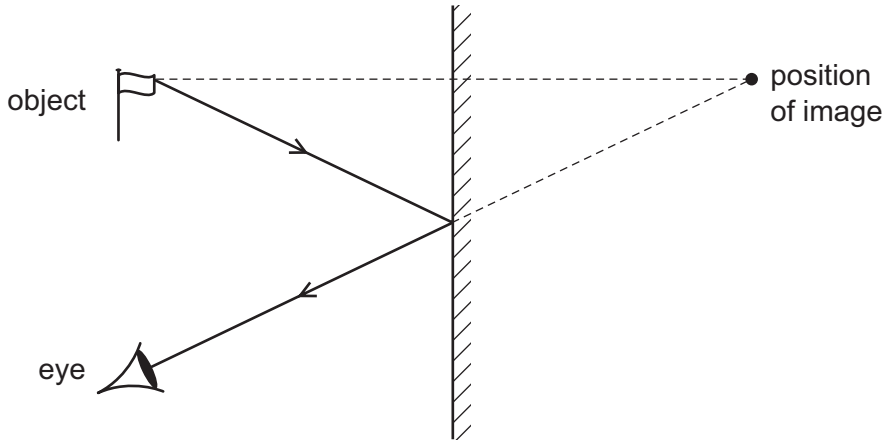


45 The diagram shows the image of a clock in a plane mirror.

What time is shown?

A 02:25 **B** 02:35 **C** 09:25 **D** 09:35

46 The image formed by a plane mirror is upright.

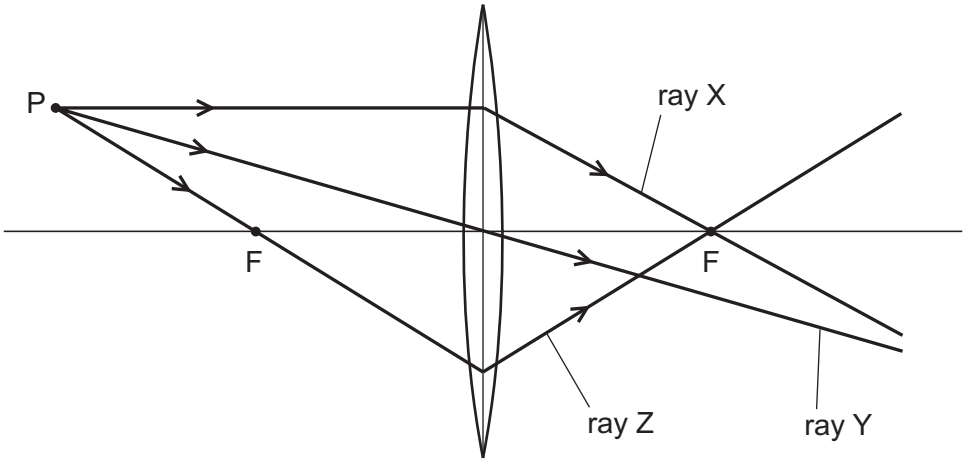


What are the other characteristics of the image?

	laterally inverted (left to right)	magnified (larger than the object)	virtual
A	no	yes	yes
B	yes	no	no
C	yes	no	yes
D	yes	yes	no

47 A student draws three rays of light from point P through a converging lens.

Each point labelled F is a principal focus of the lens.



Which of the rays are drawn correctly?

A ray Y only

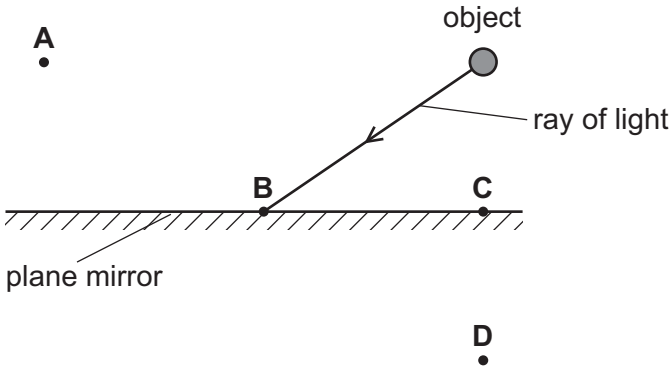
B ray Z only

C ray X and ray Y

D ray X and ray Z

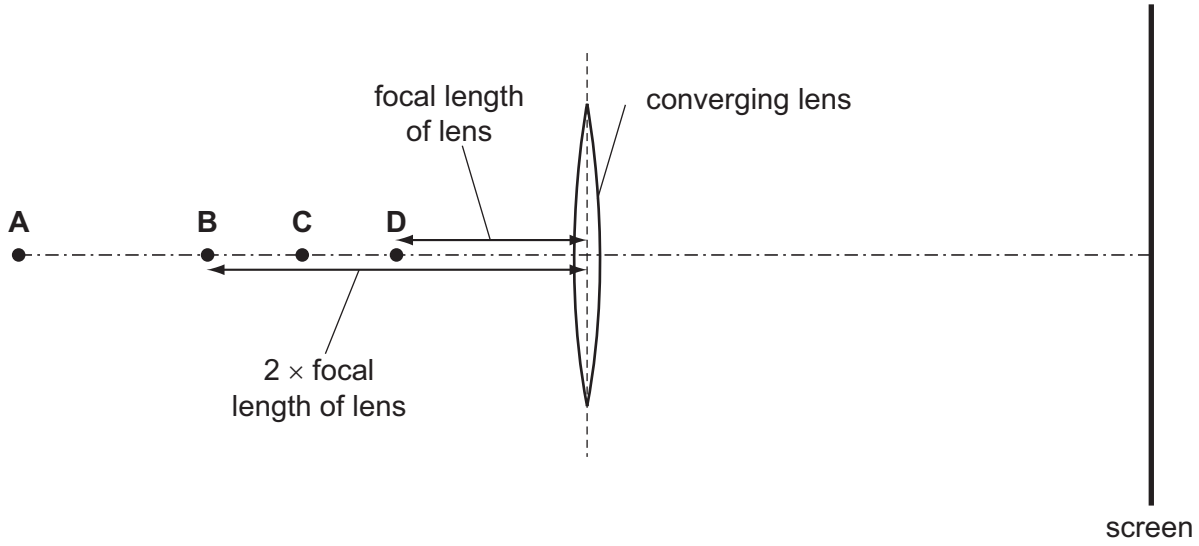
48 A plane mirror is used to form an image of an object.

At which labelled point is the image formed?



49 A converging lens in a projector is used to make an **enlarged** image of a small piece of film on a screen.

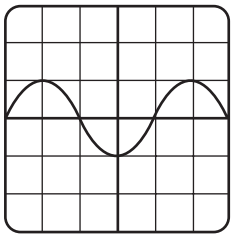
At which labelled point could the piece of film be placed so that the lens produces this image?



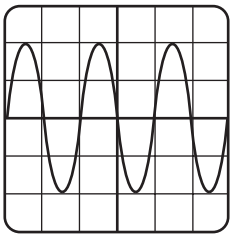
Light

1	D	11	C	21	C	31	C	41	C
2	B	12	C	22	C	32	C	42	D
3	B	13	A	23	D	33	A	43	D
4	A	14	C	24	B	34	D	44	B
5	D	15	C	25	B	35	B	45	C
6	B	16	A	26	B	36	B	46	C
7	D	17	B	27	C	37	C	47	C
8	C	18	A	28	C	38	D	48	D
9	B	19	B	29	C	39	C	49	C
10	D	20	D	30	A	40	B		

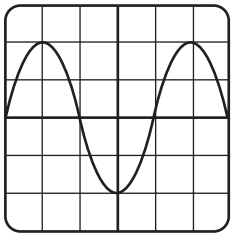
1 Four sound waves W, X, Y and Z are displayed by an oscilloscope screen. The oscilloscope settings are the same in each case.



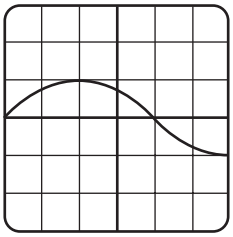
W



X



Y



Z

Which two sounds have the same pitch?

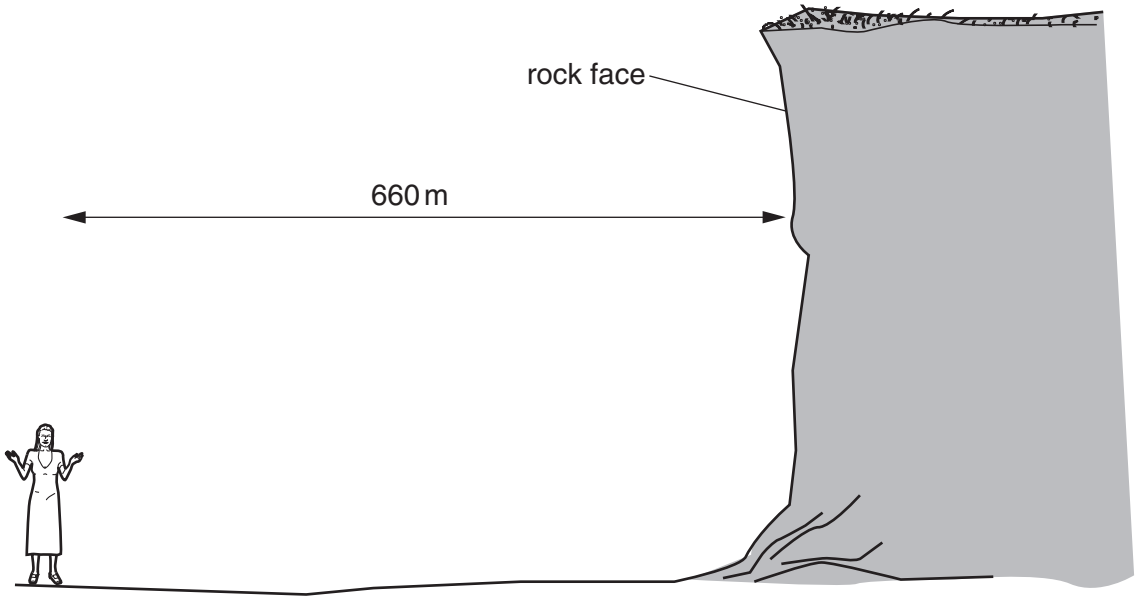
A W and X

B W and Y

C X and Y

D X and Z

2 A girl stands in front of a rock face.



The girl claps her hands once. The speed of sound in air is 330 m / s.

How long is it before she hears the echo?

A $\frac{2 \times 660}{330}$ s **B** $\frac{660}{330}$ s **C** $\frac{330}{660}$ s **D** $\frac{330}{2 \times 660}$ s

3 Which of the following can be heard by the human ear?

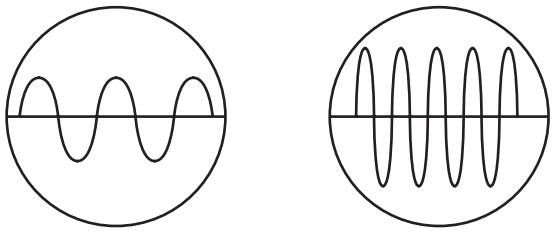
A A whistle emitting a wave of frequency 50 kHz.

B A bat emitting a wave of frequency of 30 kHz.

C An insect emitting a wave of 300 Hz.

D A vibrating spring emitting a wave of frequency of 5 Hz.

4 Two sound waves P and Q are displayed on an oscilloscope with the same time-base and Y-plate settings for each.



P Q

Which statement correctly describes the pitch and the loudness of the two sounds?

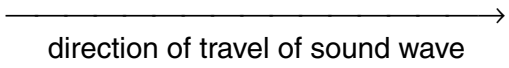
A P has a higher pitch and is louder than Q.

B P has a higher pitch and is quieter than Q.

C P has a lower pitch and is louder than Q.

D P has a lower pitch and is quieter than Q.

5 A sound wave passes through the air, in the direction shown.



direction of travel of sound wave

How does a particle of air move as the sound wave passes?

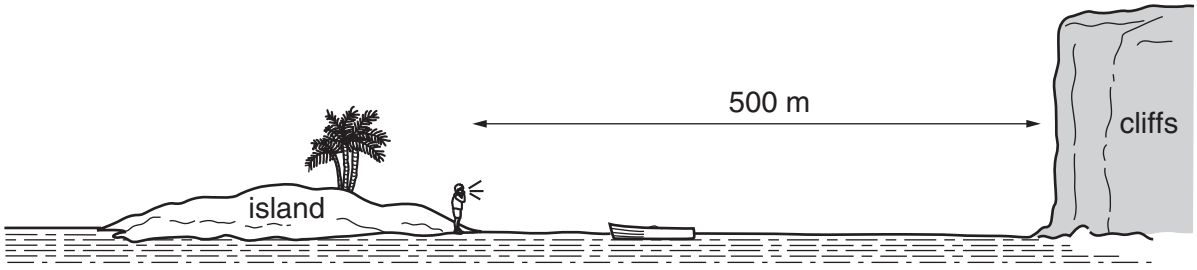
A moves to the right and stays there

B moves left and right

C moves up and stays there

D moves up and down

6 A boy is stranded on an island 500 m from the shore.



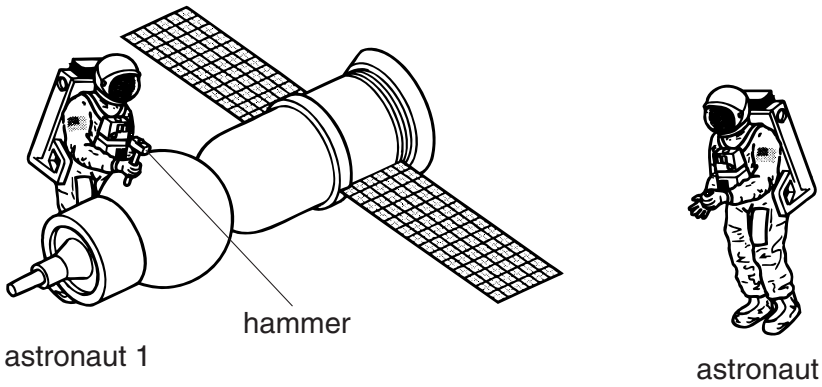
He shouts for help, but all he can hear in reply is the echo of his shout from some cliffs.

Sound travels at 340 m / s through the air.

What is the time interval between the boy shouting and hearing the echo?

A $\frac{500}{340}$ s **B** $\frac{2 \times 500}{340}$ s **C** $\frac{340}{500}$ s **D** $\frac{2 \times 340}{500}$ s

7 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. There is no atmosphere in space.



Compared with the sound heard if they were working on Earth, what does astronaut 2 hear?

A no sound at all

B a quieter sound

C a sound of the same loudness

D a louder sound

8 Which change will lower the pitch of a sound?

A decreasing its amplitude

B decreasing its frequency

C increasing its amplitude

D increasing its frequency

9 Which type of wave **cannot** travel through a vacuum?

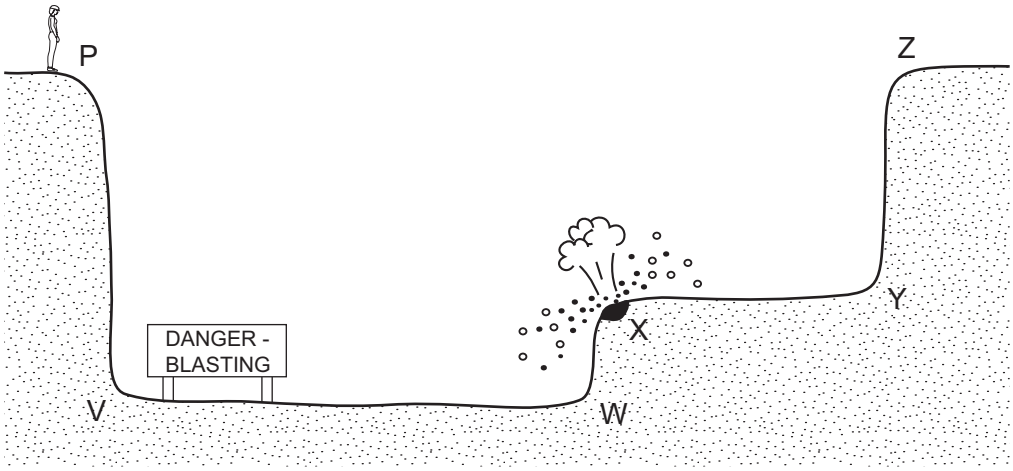
A infra-red radiation

B microwaves

C sound waves

D X-rays

10 An engineer standing at P hears the sound of an explosion at X.



After the explosion, she hears two bangs. One bang is heard a fraction of a second after the other.

The second bang is an echo from

A XY.

B PV.

C ZY.

D WX.

11 What is the approximate range of audible frequencies for most humans?

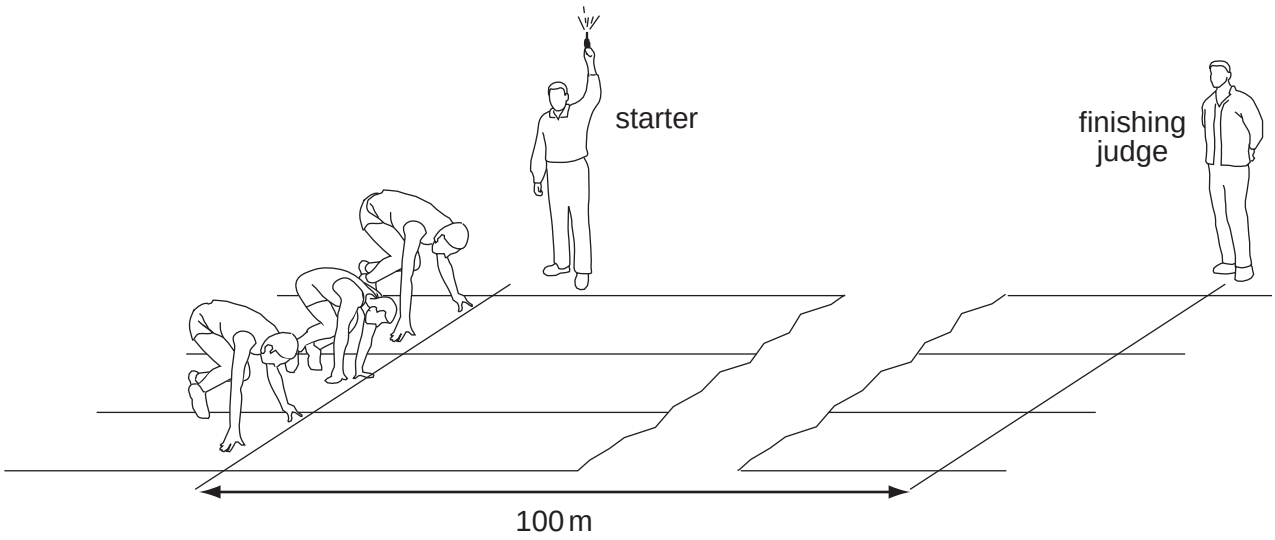
A 10 Hz to 10 000 Hz

B 20 Hz to 20 000 Hz

C 10 kHz to 10 000 kHz

D 20 kHz to 20 000 kHz

12 A 100 metre race is started by firing a gun. The gun makes a bang and a puff of smoke comes out of the gun as shown.



When does the finishing judge see the smoke and hear the bang?

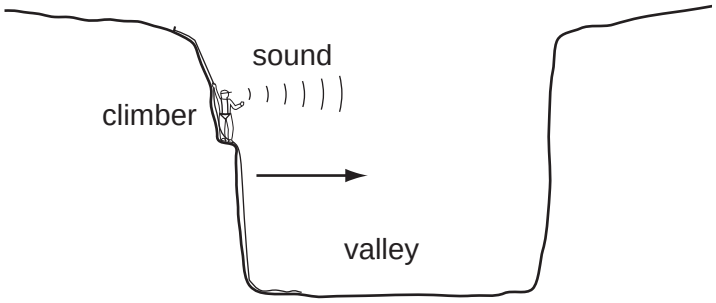
	sees the smoke	hears the bang
A	immediately	immediately
B	immediately	after about 0.3 s
C	after about 0.3 s	immediately
D	after about 0.3 s	after about 0.3 s

13 A fire alarm is not loud enough. An engineer adjusts it so that it produces a note of the same pitch which is louder.

What effect does this have on the amplitude and on the frequency of the sound?

	amplitude	frequency
A	larger	larger
B	larger	same
C	same	larger
D	same	same

14 To estimate the width of a valley, a climber starts a stopwatch as he shouts. He hears an echo from the opposite side of the valley after 1.0 s.

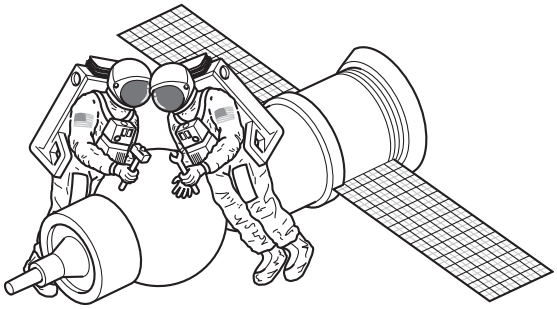


The sound travels at 340 m / s.

What is the width of the valley?

A 85 m **B** 170 m **C** 340 m **D** 680 m

15 Two astronauts without radios can only communicate in space if their helmets are touching. There is no air in space.



What does this show about sound?

	through a solid	through a vacuum
A	can travel	can travel
B	can travel	cannot travel
C	cannot travel	can travel
D	cannot travel	cannot travel

16 When the horn on a ship is sounded, the passengers hear an echo from a cliff after 4.0 s.

If the speed of sound is 340 m / s, how far away is the cliff?

A 170 m **B** 340 m **C** 680 m **D** 1360 m

17 Sounds are made by vibrating objects. A certain object vibrates but a person nearby cannot hear any sound.

Which statement might explain why nothing is heard?

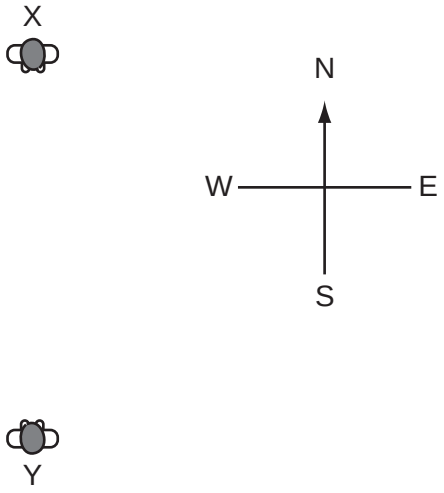
A The amplitude of the sound waves is too large.

B The frequency of the vibration is too high.

C The sound waves are transverse.

D The speed of the sound waves is too high.

18 The diagram shows a man standing at X who shouts to a man standing at Y.



The man's voice will be heard sooner and more clearly if the wind is blowing towards the

A north.

B south.

C east.

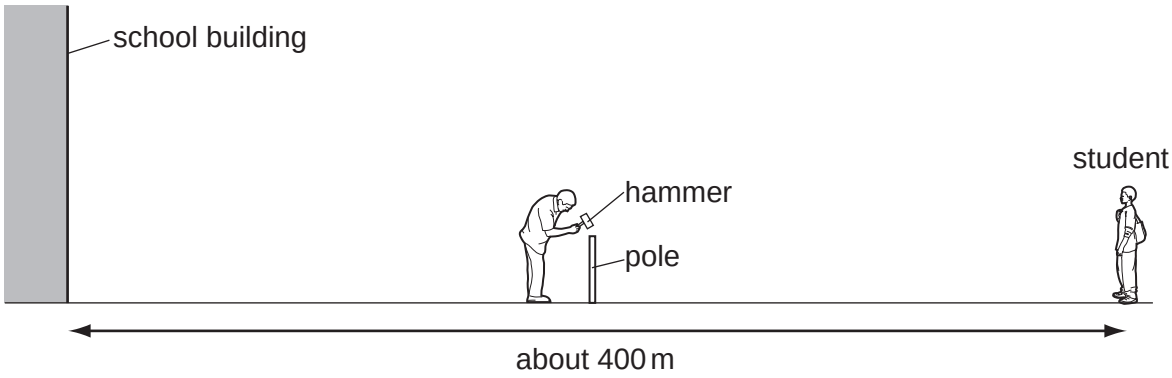
D west.

19 A police car with its siren sounding is stationary in heavy traffic. A pedestrian notices that, although the loudness of the sound produced does not change, the pitch varies.

Which line in the table describes the amplitude and the frequency of the sound?

	amplitude	frequency
A	constant	varying
B	constant	constant
C	varying	constant
D	varying	varying

20 A sports field is next to a large school building. At the far side of the sports field, a student sees a groundsman hammer a pole into the ground.



The student hears two bangs each time the hammer hits the pole.

Why does the student hear two bangs?

	first bang caused by	second bang caused by
A	sound of hammer hitting pole	sound of pole hitting hammer
B	sound reaching left ear	sound reaching right ear
C	sound reaching student directly	sound due to echo from school building
D	sound reflected back from school building	sound reaching student directly

21 Music is produced by the loudspeaker of a radio.

Which property of the sound wave increases when the music is made louder?

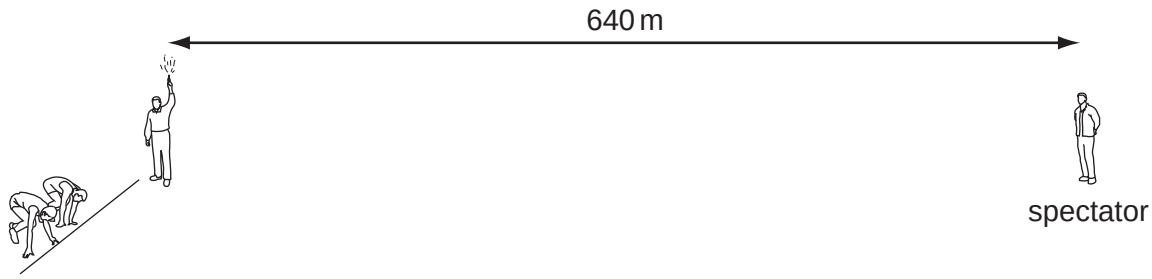
A amplitude

B frequency

C speed

D wavelength

22 A starting pistol is fired 640 m away from a spectator.



The spectator hears the sound of the starting pistol two seconds after seeing the flash from the gun.

What is the speed of sound in air?

A 160 m / s **B** 320 m / s **C** 640 m / s **D** 1280 m / s

23 A girl stands at a distance from a large building. She claps her hands and a short time later hears an echo.

Why is an echo produced when the sound waves hit the building?

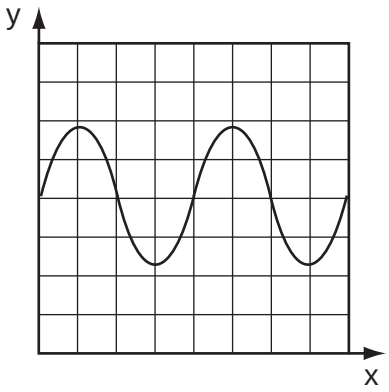
A The sound waves are absorbed.

B The sound waves are diffracted.

C The sound waves are reflected.

D The sound waves are refracted.

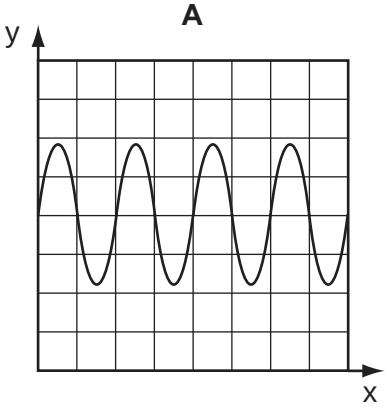
24 The graph represents a sound wave. The horizontal (x) axis represents time.



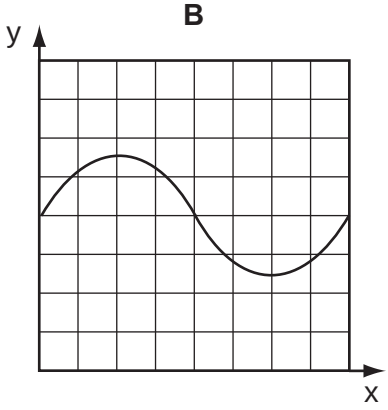
The frequency of the sound is increased.

The graphs below are shown to the same scale. Which graph represents the new sound wave?

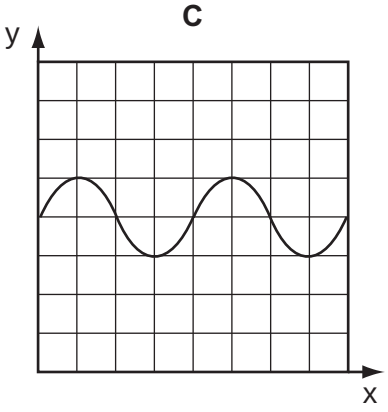
A



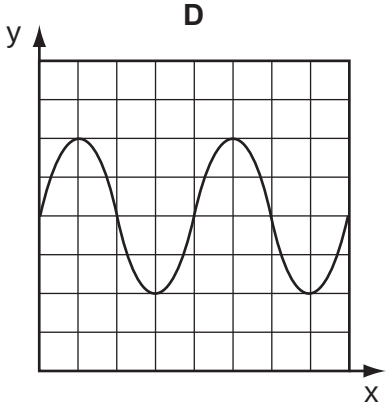
B



C



D



25 Which equation can be used to calculate the speed of sound?

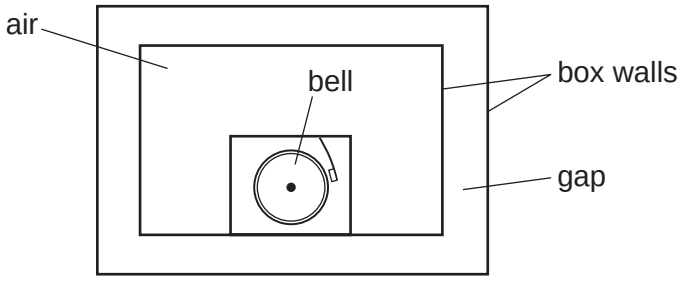
A $\text{speed} = \frac{\text{distance}}{\text{time}}$

B $\text{speed} = \text{distance} \times \text{time}$

C $\text{speed} = \frac{\text{time}}{\text{distance}}$

D speed = time + distance

26 A battery-operated bell is surrounded by a box with double walls.



The bell is ringing but no sound at all is heard outside the box.

What is in the gap?

A a solid

B a liquid

C a gas

D a vacuum

27 Which word correctly completes the sentence below?

An echo is a sound wave which is …… by a large obstacle.

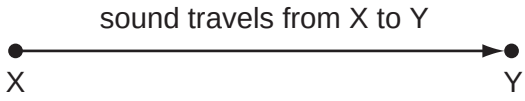
A absorbed

B dispersed

C reflected

D refracted

28 In an experiment to measure the speed of sound, a student uses a stopwatch to find how long a sound takes to travel from X to Y. She does this six times.



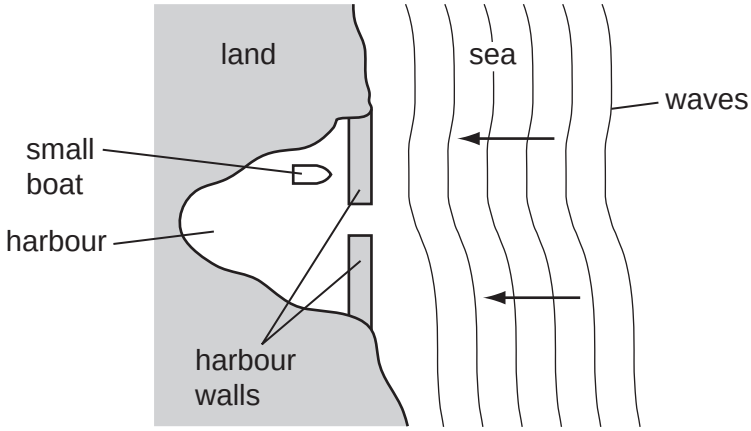
The table shows her results.

	time / s
first	0.5
second	0.7
third	0.6
fourth	0.4
fifth	0.9
sixth	0.5

What value for the time should be used to calculate the speed of sound?

A 0.4 s **B** 0.5 s **C** 0.6 s **D** 0.9 s

29 A small boat in a harbour is protected from waves on the sea by harbour walls.



Some waves can curve round the harbour walls and reach the boat.

What is the name for this effect?

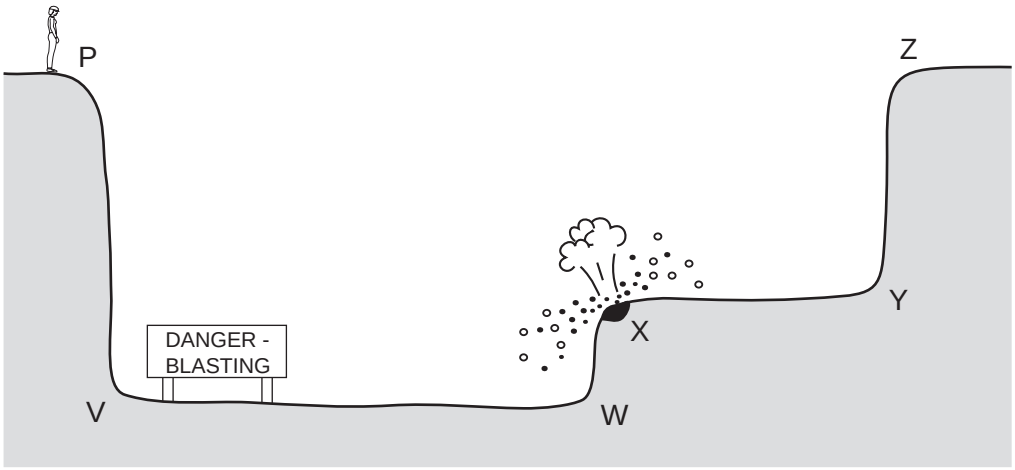
A diffraction

B dispersion

C reflection

D refraction

30 An engineer standing at P sees an explosion at X.



After the explosion, she hears two bangs. One bang is heard a fraction of a second after the other. The second bang is an echo.

From which surface has the sound reflected to cause this echo?

A XY **B** PV **C** ZY **D** WX

31 Which range of frequencies typically can be heard by a 10 year-old child?

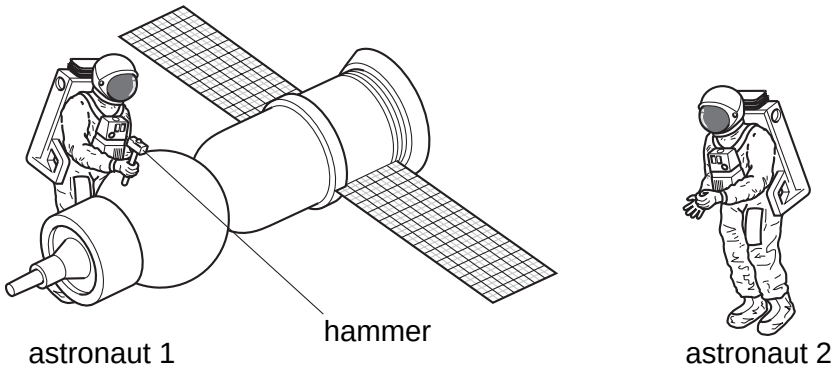
A 20 Hz – 2000 Hz

B 20 Hz – 20 000 Hz

C 200 Hz – 2000 Hz

D 200 Hz – 20 000 Hz

32 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. There is no air in space.



Compared with the sound heard if they were working on Earth, what does astronaut 2 hear?

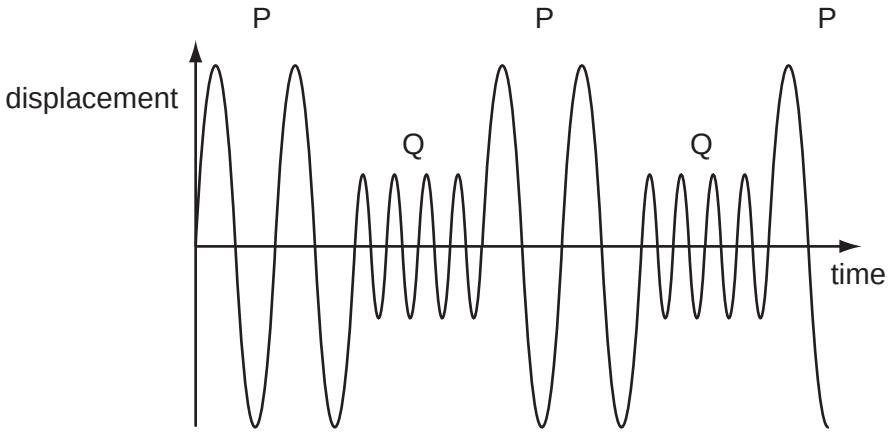
A a louder sound

B a quieter sound

C a sound of the same loudness

D no sound at all

33 A police car siren emits two different sounds P and Q. These are produced alternately. The diagram represents the sounds emitted.



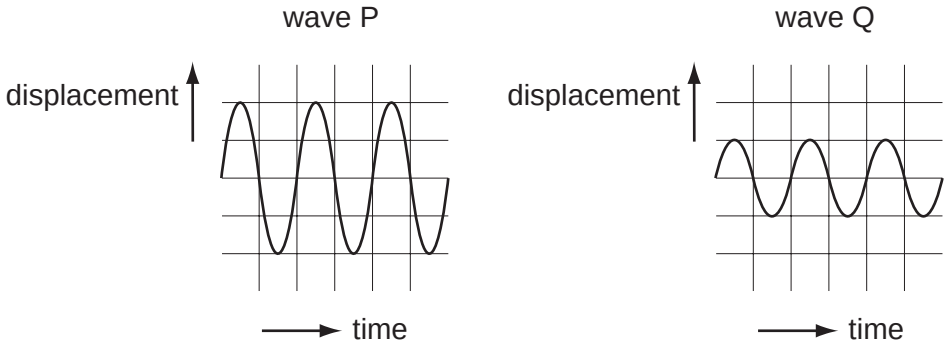
Which sound is the louder and which has the lower pitch?

	louder	lower pitch
A	P	P
B	P	Q
C	Q	P
D	Q	Q

34 What is the approximate value of the highest frequency that can be heard by a young person?

A 20 Hz **B** 200 Hz **C** 2000 Hz **D** 20 000 Hz

35 The diagrams represent two different sound waves.



How do the frequency and pitch of P compare with the frequency and pitch of Q?

	frequency of P	pitch of P
A	greater than Q	higher than Q
B	greater than Q	same as Q
C	same as Q	higher than Q
D	same as Q	same as Q

36 A ship sends a pulse of sound vertically downwards to the sea bed. An echo is heard 0.4 seconds later.

If the speed of sound in the water is 1200 m / s, how deep is the water below the ship?

A 240 m **B** 480 m **C** 1500 m **D** 3000 m

37 Sound travels by wave motion.

Which property of waves causes echoes?

A diffraction

B dispersion

C reflection

D refraction

38 A student listens to a machine that makes sounds of different frequencies. He can only hear one of the sounds.

Which frequency of sound is the student able to hear?

A 2 Hz **B** 10 Hz **C** 2 kHz **D** 30 kHz

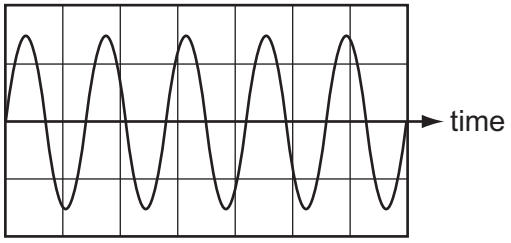
39 A student wishes to measure the speed of sound in air. She plans to measure the time between making a sound and hearing the echo from a cliff.

She will use the equation: speed = $\frac{\text{distance}}{\text{time}}$.

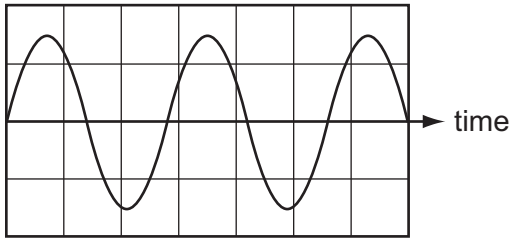
Which type of sound should she make and which distance should she use in her calculation?

	type of sound	distance to use
A	continuous sound	$\frac{\text{distance to cliff}}{2}$
B	continuous sound	distance to cliff × 2
C	short, sharp sound	$\frac{\text{distance to cliff}}{2}$
D	short, sharp sound	distance to cliff × 2

40 The diagrams show the wave shapes of two different sounds. The scales are the same in each diagram.



sound 1



sound 2

How does sound 2 compare with sound 1?

A Sound 2 is louder than sound 1.

B Sound 2 is quieter than sound 1.

C Sound 2 has a higher pitch than sound 1.

D Sound 2 has a lower pitch than sound 1.

41 A girl stands at a distance from a large building. She claps her hands and a short time later hears an echo.

Why is an echo produced when the sound waves hit the building?

A The sound waves are absorbed.

B The sound waves are diffracted.

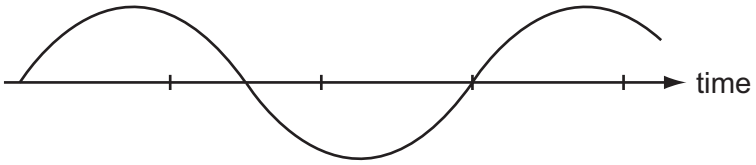
C The sound waves are reflected.

D The sound waves are refracted.

42 The diagrams represent the waves produced by four sources of sound. The scales are the same for all the diagrams.

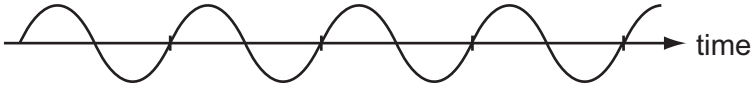
Which sound has the highest frequency?

A



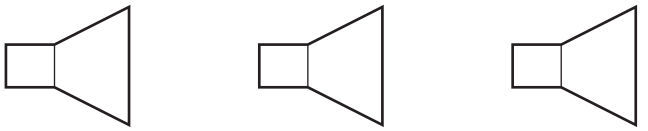
B

C



D

43 Three loudspeakers vibrate at different frequencies of 5 hertz, 25 kilohertz and 50 kilohertz.



5 hertz 25 kilohertz 50 kilohertz

Which row shows whether the vibrations from each loudspeaker can be heard by a human?

	5 hertz	25 kilohertz	50 kilohertz
A	no	no	no
B	no	yes	no
C	yes	no	yes
D	yes	yes	yes

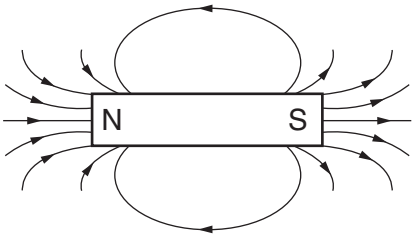
Sound

1	B	11	B	21	A	31	B	41	C
2	A	12	B	22	B	32	D	42	D
3	C	13	B	23	C	33	A	43	A
4	D	14	B	24	A	34	D		
5	B	15	B	25	A	35	D		
6	B	16	C	26	D	36	A		
7	A	17	B	27	C	37	C		
8	B	18	B	28	C	38	C		
9	C	19	A	29	A	39	D		
10	C	20	C	30	C	40	D		

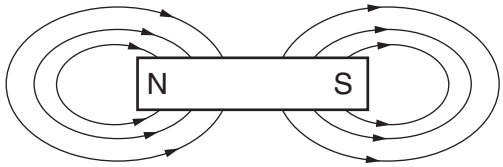
Magnetism

1 Which diagram best shows the pattern of field lines around a bar magnet?

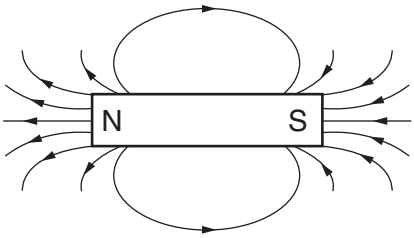
A



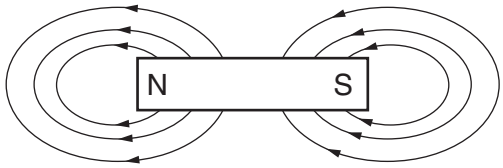
B



C



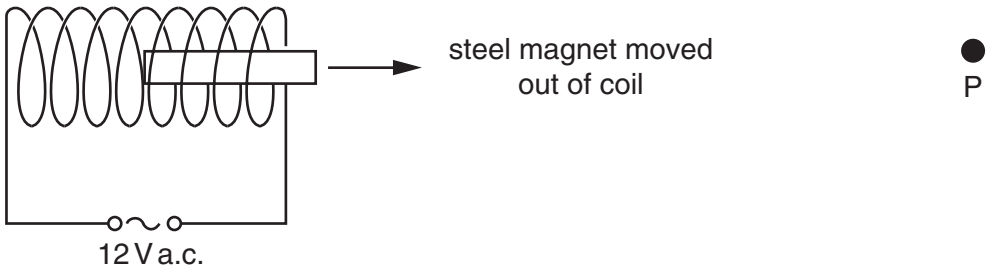
D



2 Which materials are suitable to make a permanent magnet and the core of an electromagnet?

	permanent magnet	core of an electromagnet
A	iron	iron
B	iron	steel
C	steel	iron
D	steel	steel

3 A piece of magnetised steel is placed inside a coil of wire that has a large alternating current passing through it. The magnet is slowly moved out of the coil to position P.



How has the steel changed when it reaches P?

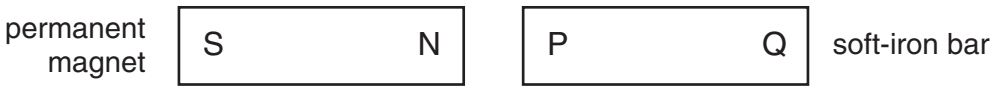
A It has become demagnetised.

B There has been no change.

C It has become a stronger magnet.

D The poles have changed ends.

4 A permanent magnet is placed close to a bar of soft iron PQ.



What happens?

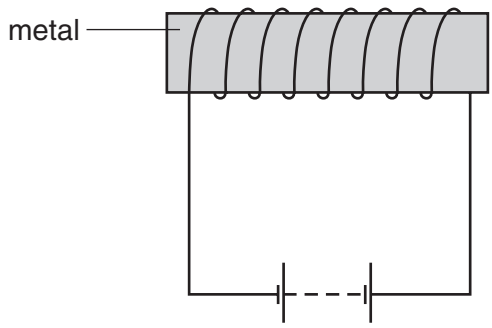
A P becomes a north pole.

B P becomes a south pole.

C PQ does not become magnetised.

D The poles of the magnet are reversed.

5 A student wishes to use a magnetising coil to make a permanent magnet from a piece of metal.



Which metal should she use?

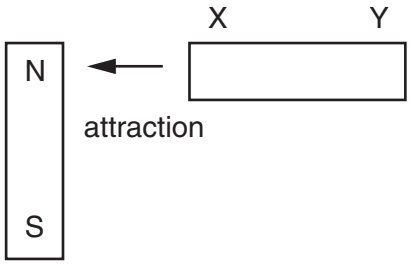
A aluminium

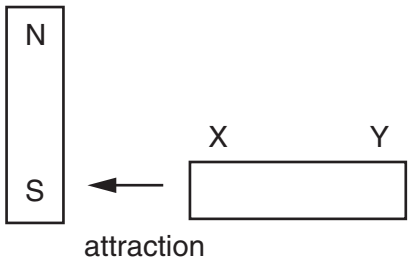
B copper

C iron

D steel

6 A metal rod XY is placed near a magnet. End X is attracted when it is placed near to the north pole of the magnet, and also when it is placed near to the south pole.

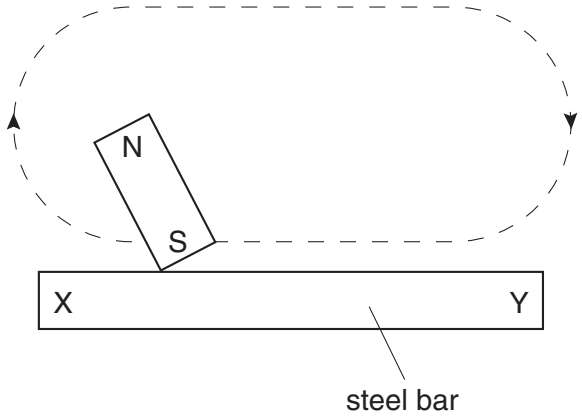




How does end Y behave when it is placed, in turn, near to the two poles of the magnet?

	Y near north pole	Y near south pole
A	attraction	attraction
B	attraction	repulsion
C	repulsion	attraction
D	repulsion	repulsion

7 A steel bar is magnetised by stroking it several times with the south pole of a magnet, as shown.



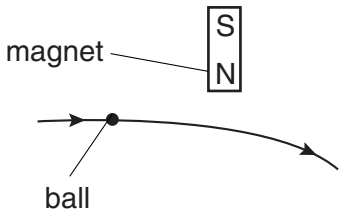
Which poles are formed at X and Y?

	X	Y
A	north	north
B	north	south
C	south	north
D	south	south

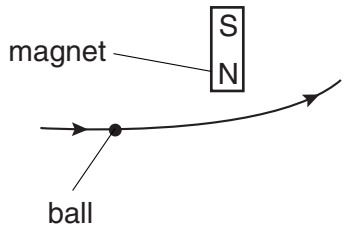
8 A steel ball on a horizontal wooden table rolls near the north pole of a bar magnet that is lying on the table.

Which diagram shows the most likely path of the ball, as seen from above the table?

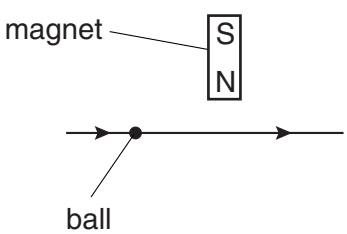
A



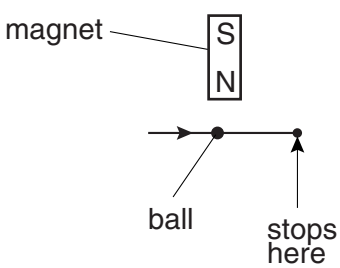
B



C



D



9 How can a permanent magnet be demagnetised?

A cool the magnet for a long time

B hit the magnet repeatedly with a hammer

C leave the magnet in a coil which carries direct current

D pass a small current through the magnet

10 An electromagnet is used to separate magnetic metals from non-magnetic metals.

Why is steel unsuitable as the core of the electromagnet?

A It is a good conductor of electricity.

B It forms a permanent magnet.

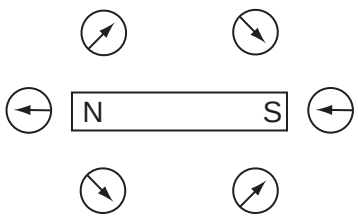
C It has a high density.

D It has a high thermal capacity.

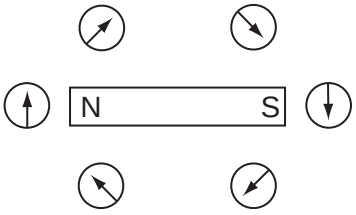
11 Six small compasses are placed around a bar magnet.

Which diagram shows the directions in which the compass needles point?

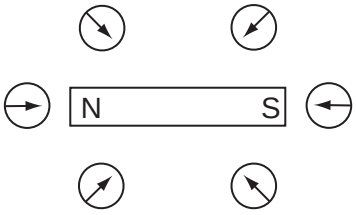
A



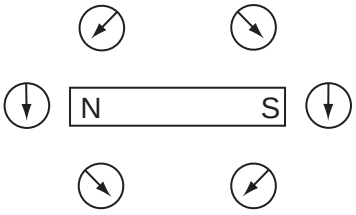
B



C



D



12 A student carries out four tests with a magnet.

Which result shown is **not** correct?

	arrangement	result
A	S magnet N | iron bar	attracts
B	S magnet N | S magnet N	attracts
C	N magnet S | copper bar	no effect
D	N magnet S | N magnet S	repels

13 Which material is used for the core of an electromagnet?

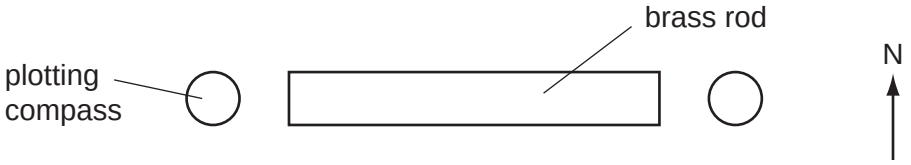
A aluminium

B copper

C iron

D steel

14 A brass rod is positioned in an east-west direction and a plotting compass is placed at each end.



Which diagram shows the positions of the needles of the plotting compasses?

A

B

C

D

15 How many of the following methods could be used to demagnetise a piece of steel?

heating it until it is red hot

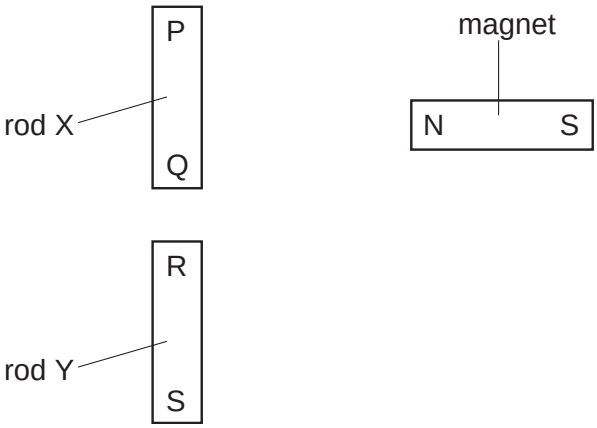
pulling it from a coil that is carrying an alternating current

placing it in an east-west direction and hammering it

putting it in a coil which is carrying a direct current

A 1 **B** 2 **C** 3 **D** 4

16 Two rods X and Y look the same.



The N pole of a magnet is brought close, in turn, to each end of both rods. The results of these four actions are shown in the table.

end tested	result
P	attraction
Q	attraction
R	attraction
S	repulsion

Which of the rods is a permanent magnet?

A neither of the rods

B both of the rods

C rod X only

D rod Y only

17 A student investigates which end of a magnetic compass needle is attracted to a bar magnet.

What does the investigation show?

A Both ends of the compass needle are attracted by the north pole of the magnet.

B Both ends of the compass needle are attracted by the south pole of the magnet.

C One end of the compass needle is attracted by the north pole and the other end by the south pole.

D The compass needle is not attracted by either end of the magnet.

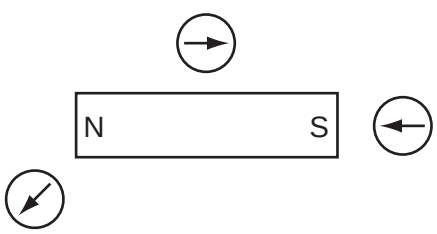
18 From which materials are the coil and the core of an electromagnet made?

	coil	core
A	copper	copper
B	copper	iron
C	iron	copper
D	iron	iron

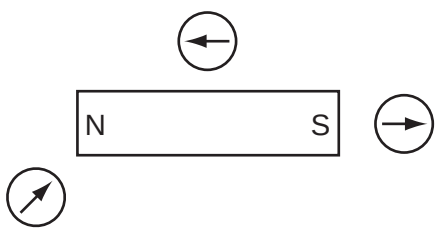
19 A student uses three small plotting compasses to investigate the magnetic field around a bar magnet.

Which diagram shows the directions in which the compass needles point?

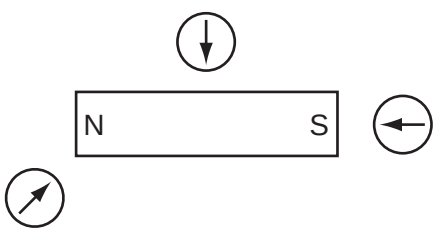
A



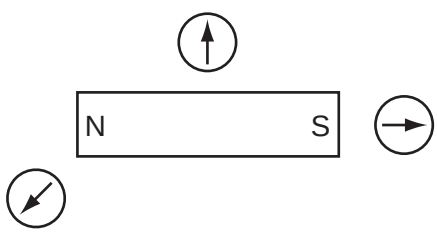
B



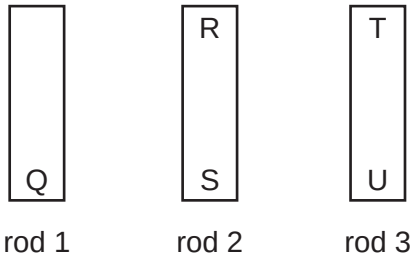
C



D



20 The ends of three metal rods are tested by holding end Q of rod 1 close to the others in turn.



The results are as follows.

End Q: attracts end R,
attracts end S,
attracts end T,
repels end U.

Which of the metal rods is a magnet?

A rod 1 only

B rod 1 and rod 2 only

C rod 1 and rod 3 only

D rod 3 only

21 Small particles of metal are scattered near a bar magnet to show the pattern of the magnetic field.

Which metal is suitable?

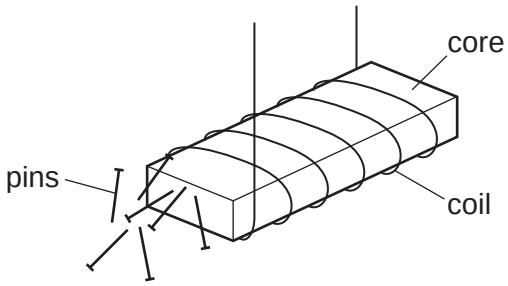
A aluminium

B brass

C copper

D iron

22 A strong electromagnet is used to attract pins.



What happens when the current in the coil is halved?

A No pins are attracted.

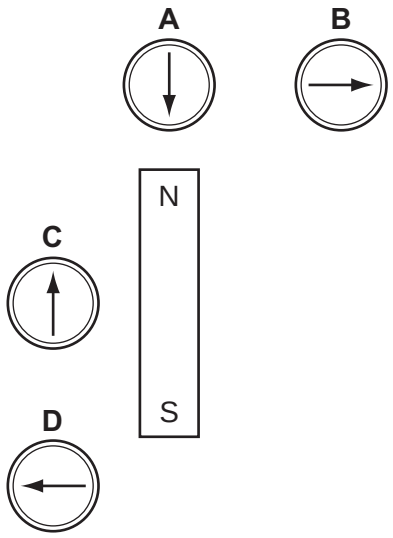
B Fewer pins are attracted.

C The same number of pins is attracted.

D Many more pins are attracted.

23 Four plotting compasses are placed near a bar magnet.

Which plotting compass is shown pointing in the correct direction?



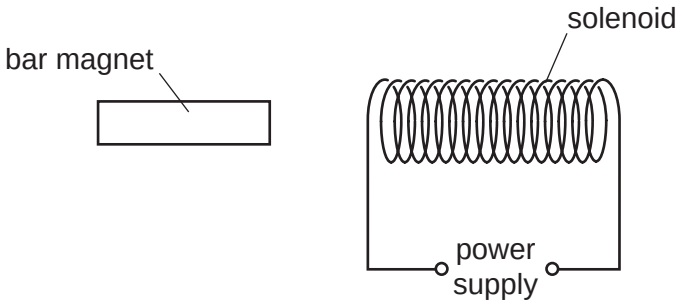
24 Which materials are suitable for making a permanent magnet and the core of an electromagnet?

	permanent magnet	core of an electromagnet
A	iron	iron
B	iron	steel
C	steel	iron
D	steel	steel

25 Which line in the table shows whether iron and steel are ferrous or non-ferrous materials?

	iron	steel
A	ferrous	ferrous
B	ferrous	non-ferrous
C	non-ferrous	ferrous
D	non-ferrous	non-ferrous

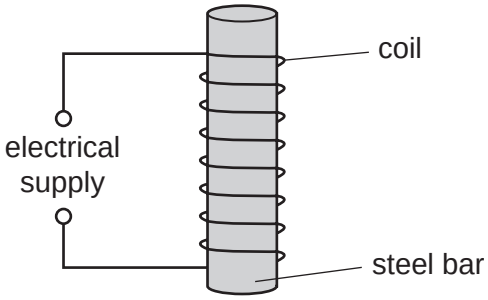
26 A solenoid carrying a current is used to demagnetise a bar magnet.



Which conditions achieve demagnetisation?

	current through solenoid	movement of bar magnet
A	a.c.	around the solenoid quickly
B	a.c.	through the solenoid slowly
C	d.c.	around the solenoid quickly
D	d.c.	through the solenoid slowly

27 A student wishes to demagnetise a steel bar. He uses the apparatus shown.



Which type of electrical supply should the student use and what should he do with the steel bar?

	supply	what to do with the steel bar
A	a.c.	keep it inside the coil
B	a.c.	slowly remove it from the coil
C	d.c.	keep it inside the coil
D	d.c.	slowly remove it from the coil

28 Two metal bars are held together. At least one of the bars is a magnet. The bars repel each other.

What does this show about the bars and why?

	what it shows	why
A	only one of the bars is a magnet	two magnets always attract each other
B	only one of the bars is a magnet	induced magnetism in the other bar makes it repel
C	they are both magnets	there must be like poles facing each other
D	they are both magnets	there must be opposite poles facing each other

29 An electromagnet is used to separate magnetic metals from non-magnetic metals.

Why is steel unsuitable as the core of the electromagnet?

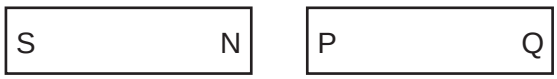
A It forms a permanent magnet.

B It has a high density.

C It has a high thermal capacity.

D It is a good conductor of electricity.

30 The north pole of a bar magnet is placed next to end P of an iron bar PQ, as shown. As a result, magnetic poles are induced in the iron bar.



magnet iron bar

What are the magnetic poles induced at P and at Q?

	magnetic pole at P	magnetic pole at Q
A	north	north
B	north	south
C	south	north
D	south	south

31 A permanent magnet is brought near to a piece of copper. The copper is not attracted by the magnet.

Why is there no attraction?

A Copper is ferrous but is only attracted by an electromagnet.

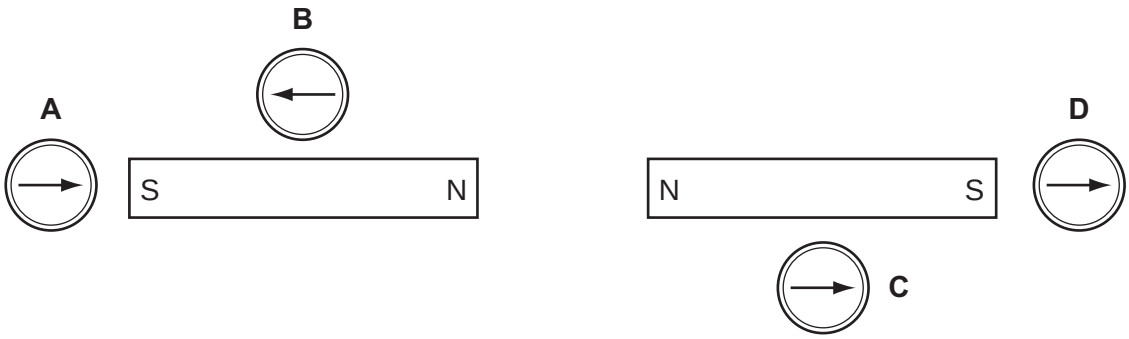
B Copper is ferrous but is not attracted by any type of magnet.

C Copper is not ferrous and is only attracted by an electromagnet.

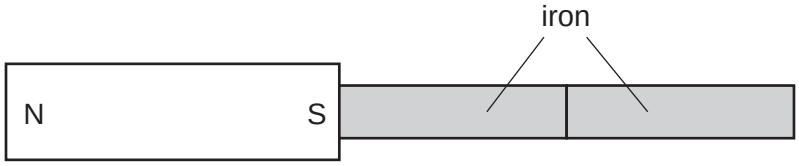
D Copper is not ferrous and is not attracted by any type of magnet.

32 Four plotting compasses are placed in the magnetic field of two identical bar magnets as shown in the diagram.

Which compass is shown pointing in the wrong direction?



33 A magnet attracts two pieces of iron.



What is the arrangement of the induced poles in the pieces of iron?

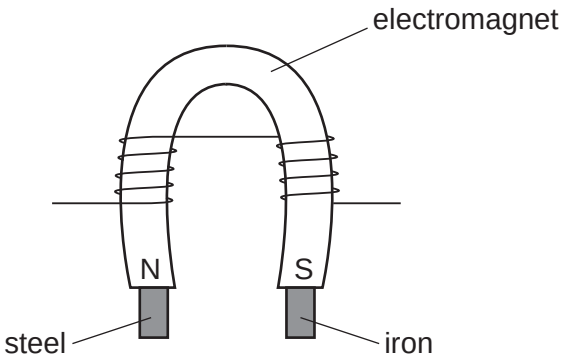
A

B

C

D

34 A piece of iron and a piece of steel are picked up by an electromagnet as shown.



The current to the electromagnet is switched off.

What happens?

A Both the iron and the steel remain magnetised.

B Neither the iron nor the steel remain magnetised.

C Only the iron remains magnetised.

D Only the steel remains magnetised.

35 Which statement about a magnet is **not** correct?

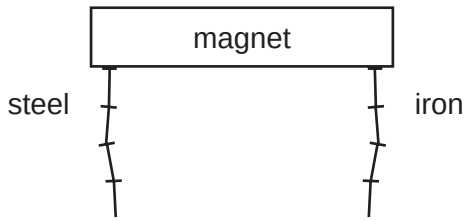
A It can attract another magnet.

B It can attract an unmagnetised piece of iron.

C It can repel another magnet.

D It can repel an unmagnetised piece of iron.

36 A chain of steel nails and a chain of iron nails hang from a strong magnet. The chains are then carefully removed from the magnet.



What happens to the chains?

A Both chains fall apart.

B Both chains stay together.

C Only the chain of iron nails falls apart.

D Only the chain of steel nails falls apart.

37 Which test could be used to find which end of a magnet is the north pole?

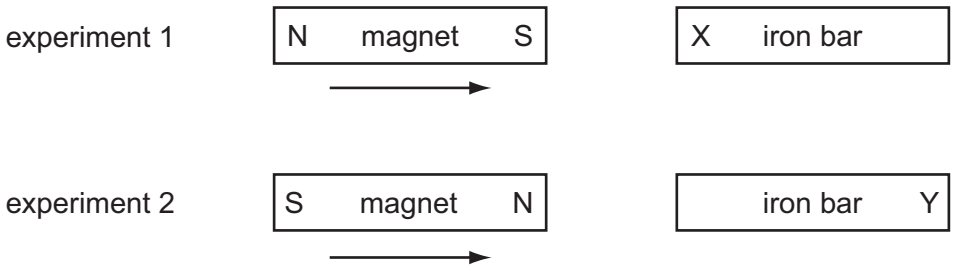
A putting it near a compass needle

B putting it near a ferrous metal

C putting it near a non-ferrous metal

D putting it near a steel spoon

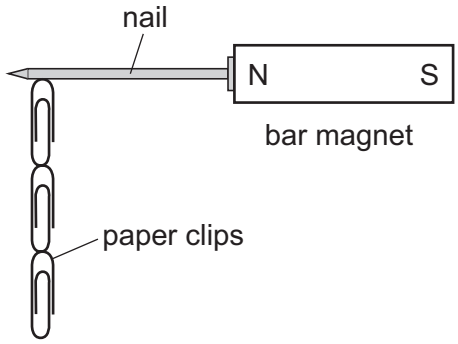
38 In two separate experiments, a magnet is brought near to an unmagnetised iron bar. This causes the bar to become magnetised.



Which magnetic poles are induced at X and at Y?

	pole induced at X	pole induced at Y
A	N	N
B	N	S
C	S	N
D	S	S

39 Four nails, **A**, **B**, **C** and **D**, are tested to find which makes the strongest permanent magnet.

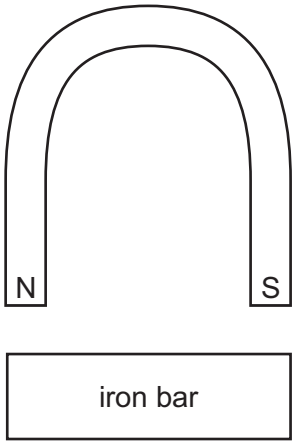


One of the nails is placed against a bar magnet and the number of paper clips which the nail can support is recorded. The bar magnet is then removed and the number of paper clips remaining attached to the nail is recorded. Each nail is tested in turn.

Which nail becomes the strongest permanent magnet?

nail	number of paper clips attached to the nail	
	bar magnet present	bar magnet removed
A	2	0
B	2	1
C	4	3
D	5	2

40 A horseshoe magnet is brought near to an unmagnetised iron bar.



Which row in the table shows the magnetic poles induced in the iron bar and the direction of the forces between the bar and the magnet?

	magnetic poles induced in iron bar	force between iron bar and magnet
A	N S	attraction
B	N S	repulsion
C	S N	attraction
D	S N	repulsion

41 Which statement describes a property of a magnet?

A It attracts ferrous materials.

B It could have only one pole (north or south).

C It points in a random direction when suspended.

D It repels non-ferrous materials.

42 Which procedure may be used to demagnetise a steel bar?

A cooling it in a freezer

B earthing it with a copper wire

C placing it in a solenoid carrying a large direct current (d.c.)

D striking it repeatedly with a hammer

43 The diagram shows a magnet being brought near to an unmagnetised iron bar. This causes the iron bar to become magnetised.

Which magnetic pole is induced at X and how is the iron bar affected?

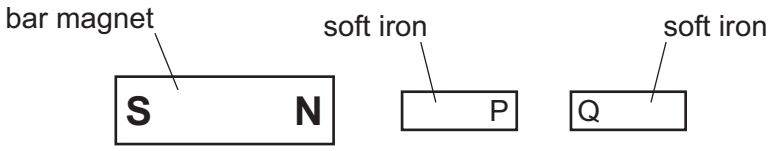
	pole induced	effect on iron bar
A	north	attracted
B	north	repelled
C	south	attracted
D	south	repelled

44 A student wishes to make a permanent magnet. She has an iron rod and a steel rod.

Which rod should she use to make the permanent magnet, and is this rod a hard magnetic material or a soft magnetic material?

	rod	type of magnetic material
A	iron	hard
B	iron	soft
C	steel	hard
D	steel	soft

45 Two bars of soft iron are placed near a bar magnet.



Which row states and explains the behaviour of poles P and Q of the soft iron bars?

	P and Q	reason
A	attract	P and Q are like poles
B	attract	P and Q are unlike poles
C	repel	P and Q are like poles
D	repel	P and Q are unlike poles

46 Some electrical devices require a magnet which may be switched on and off many times in a second.

Which type of magnet may be used?

A an electromagnet only

B a permanent magnet only

C either a permanent magnet or an electromagnet

D neither a permanent magnet nor an electromagnet

47 Which row shows whether iron and steel are ferrous or non-ferrous?

	iron	steel
A	ferrous	ferrous
B	ferrous	non-ferrous
C	non-ferrous	ferrous
D	non-ferrous	non-ferrous

48 The N pole of a magnet repels one end of bar X.

What happens when the **other** end of bar X is placed near to the poles of the magnet?

	other end near N pole	other end near S pole
A	attracts	attracts
B	attracts	repels
C	repels	attracts
D	repels	repels

Magnetism

1	C	11	A	21	D	31	D	41	A
2	C	12	D	22	B	32	D	42	D
3	A	13	C	23	B	33	B	43	A
4	B	14	A	24	C	34	D	44	C
5	D	15	C	25	A	35	D	45	B
6	A	16	D	26	B	36	C	46	A
7	B	17	C	27	B	37	A	47	A
8	B	18	B	28	C	38	A	48	B
9	B	19	A	29	C	39	C		
10	B	20	C	30	A	40	C		

Electrical Quantities

1 Which two electrical quantities are measured in volts?

A current and e.m.f.

B current and resistance

C e.m.f. and potential difference

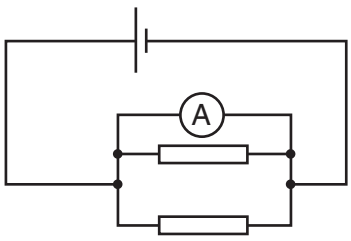
D potential difference and resistance

2 Which of the following pieces of copper wire has the greatest electrical resistance?

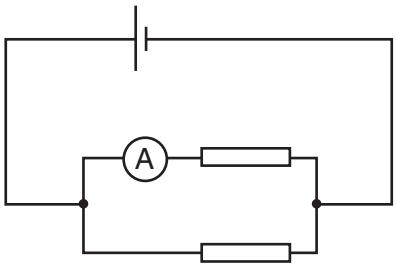
	length / m	diameter / mm
A	5.0	0.05
B	5.0	0.10
C	50	0.05
D	50	0.10

3 In which circuit does the ammeter read the total current through both resistors?

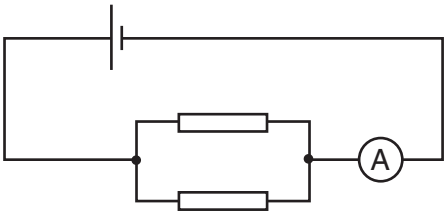
A



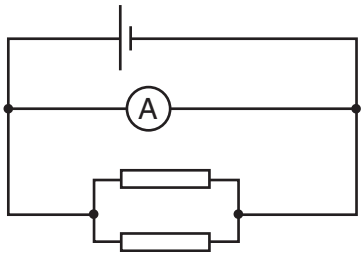
B



C



D



4 The table shows the voltage and current ratings for four light bulbs.

Which bulb has the greatest resistance when used normally?

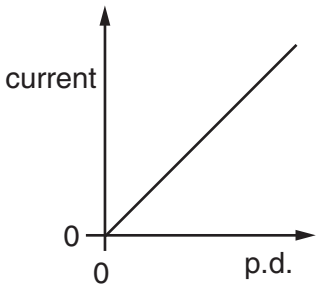
	voltage / V	current / A
A	2	0.5
B	3	0.2
C	6	12
D	12	1.0

5 When the potential difference (p.d.) across a piece of resistance wire is changed, the current through the wire also changes.

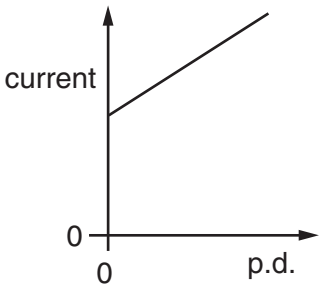
The temperature of the wire is kept the same.

Which graph shows how the p.d. and current are related?

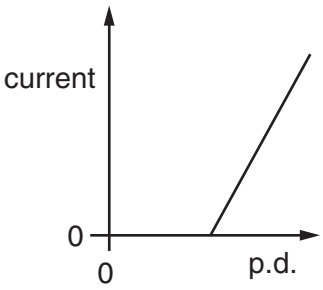
A



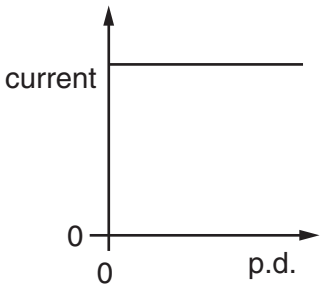
B



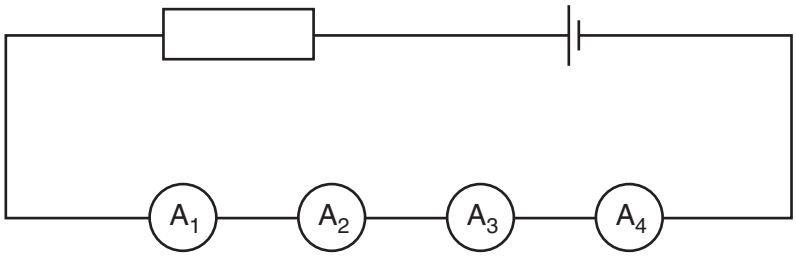
C



D



6 Two faulty ammeters and two perfect ammeters are connected in series in the circuit shown.



The readings on the ammeters are

A_1 2.9 A

A_2 3.1 A

A_3 3.1 A

A_4 3.3 A

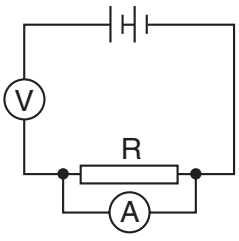
Which two ammeters are faulty?

A A_1 and A_2 **B** A_1 and A_4 **C** A_2 and A_3 **D** A_3 and A_4

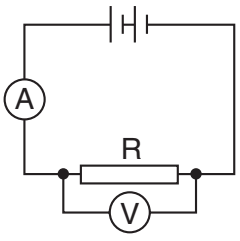
7 A student wants to find the resistance of resistor R using a voltmeter and an ammeter.

Which circuit should the student use?

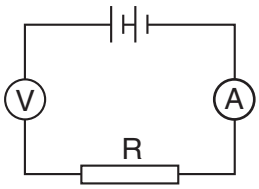
A



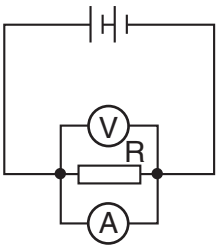
B



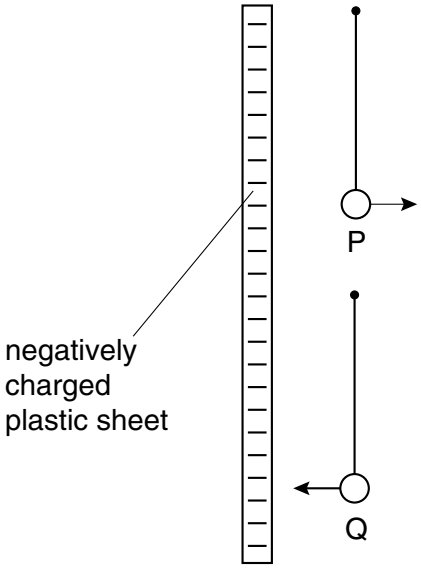
C



D



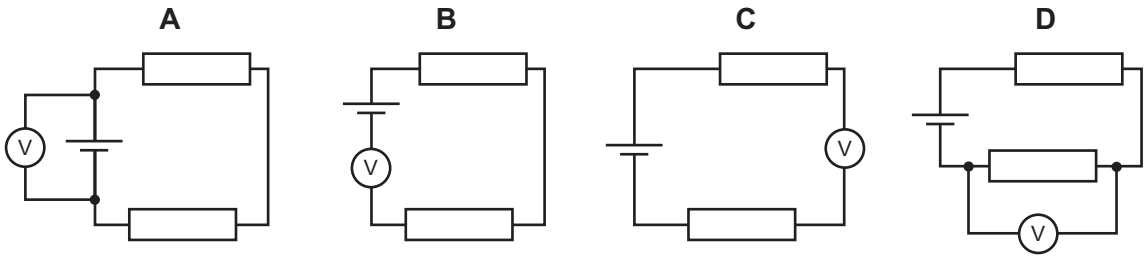
8 Two very light, charged balls P and Q are hung, one above the other, from nylon threads. When a negatively charged plastic sheet is placed alongside them, P is repelled and Q is attracted.



What are the original charges on P and on Q?

	charge on P	charge on Q
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

9 Which circuit shows how a voltmeter is connected to measure the potential difference across the cell?



10 A polythene rod repels an inflated balloon hanging from a nylon thread.

What charges must the rod and the balloon carry?

A The rod and the balloon carry opposite charges.

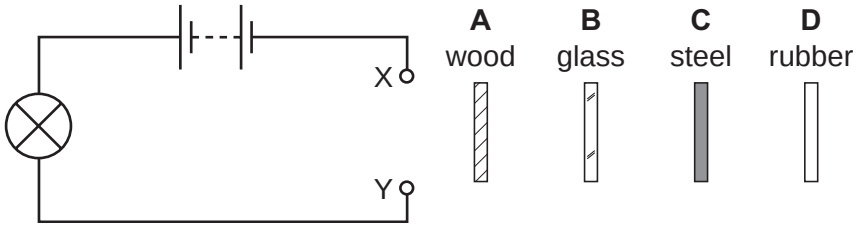
B The rod and the balloon carry like charges.

C The rod is charged but the balloon is not.

D The balloon is charged but the rod is not.

11 A circuit is set up with a gap between two terminals X and Y. The four strips of material shown in the diagram are connected in turn across the gap.

Which strip completes the circuit so that the lamp lights?



12 A pupil measures the potential difference across a device and the current in it.

Which calculation gives the resistance of the device?

A current + potential difference

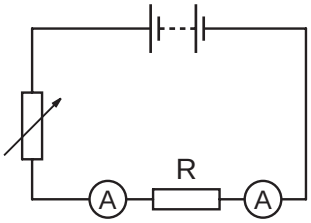
B current ÷ potential difference

C potential difference ÷ current

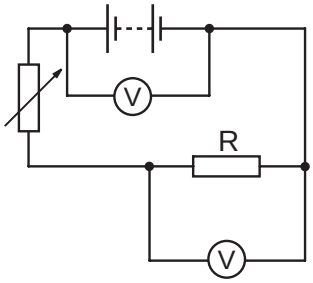
D potential difference x current

13 Which circuit could be used to find the resistance of resistor R?

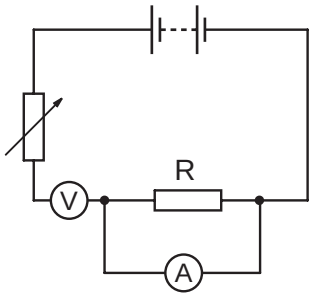
A



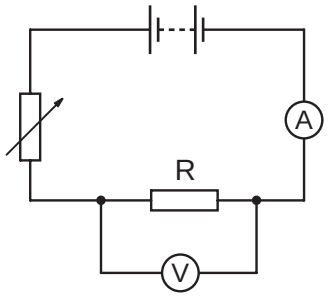
B



C



D



14 How many of the following materials conduct electricity?

aluminium

silver

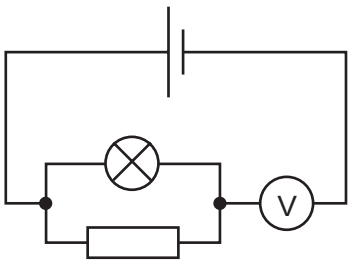
iron

plastic

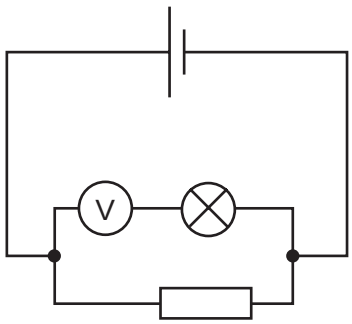
A 1 **B** 2 **C** 3 **D** 4

15 In which circuit does the voltmeter read the potential difference across the lamp?

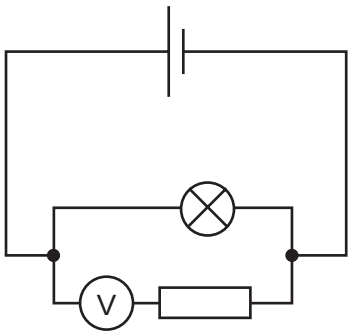
A



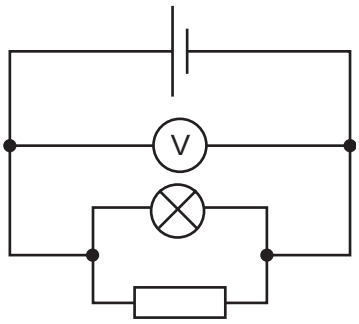
B



C

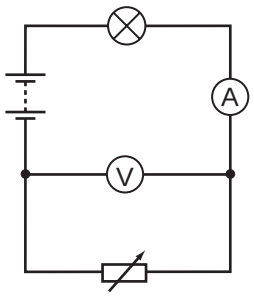


D

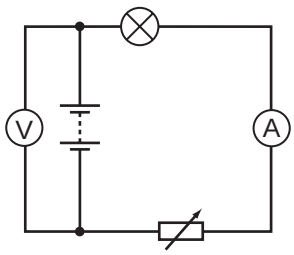


16 Which circuit should be used to find the resistance of a lamp?

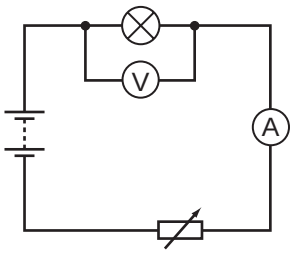
A



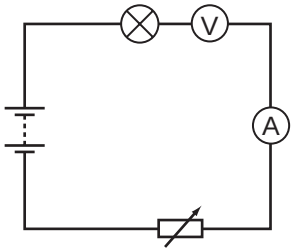
B



C



D



17 The table shows the voltage and current ratings for four electric heaters.

Which heater has the least resistance?

	voltage / V	current / A
A	110	5.0
B	110	10
C	230	5.0
D	230	10

18 What are the symbols used for the units of current and resistance?

	unit of current	unit of resistance
A	A	W
B	A	Ω
C	V	W
D	V	Ω

19 When a plastic comb is placed next to a small piece of aluminium foil hanging from a nylon thread, the foil is repelled by the comb.

Why is this?

A The comb is charged and the foil is uncharged.

B The comb is uncharged and the foil is charged.

C The comb and the foil have charge of opposite signs.

D The comb and the foil have charge of the same sign.

20 A student wishes to measure the electromotive force (e.m.f.) of a battery and the potential difference (p.d.) across a resistor.

She has the resistor, the battery and some connecting wires.

What else does she need?

A a voltmeter only

B an ammeter only

C an ammeter and a voltmeter

D a force meter (newton meter) and a voltmeter

21 A student uses a length of wire as a resistor. He discovers that the resistance of the wire is too small.

To be certain of making a resistor of higher value, he should use a piece of wire that is

A longer and thicker.

B longer and thinner.

C shorter and thicker.

D shorter and thinner.

22 Four wires are made from the same material.

Which wire has the greatest resistance?

	length of wire / cm	diameter of wire / mm
A	50	0.1
B	50	0.2
C	100	0.1
D	100	0.2

23 A plastic rod is rubbed with a dry cloth and becomes positively charged.

Why has the rod become positively charged?

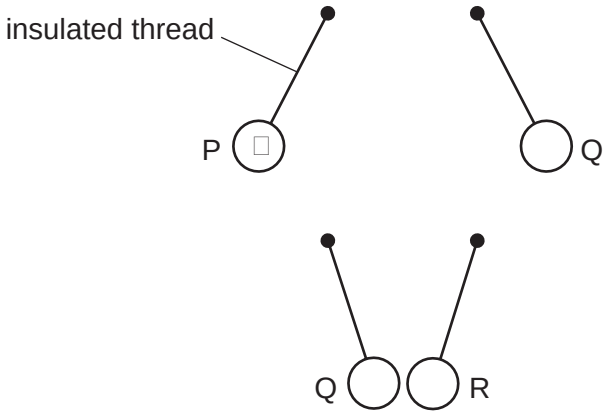
A It has gained electrons.

B It has gained neutrons.

C It has lost electrons.

D It has lost neutrons.

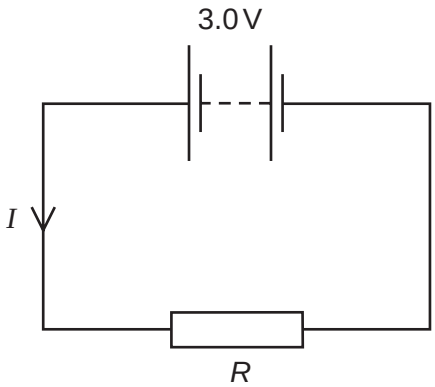
24 Three charged balls, P, Q and R, are suspended by insulated threads. Ball P is negatively charged.



What are the charges on Q and on R?

	Q	R
A	positive	positive
B	positive	negative
C	negative	positive
D	negative	negative

25 The circuit shows a current I in a resistor of resistance R.

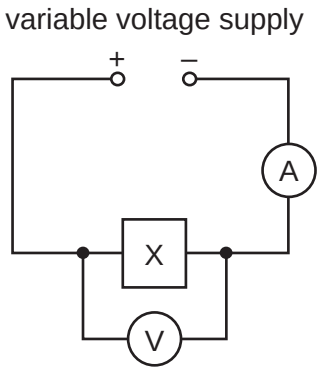


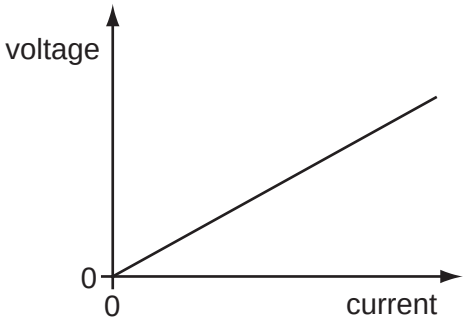
Which line gives possible values of I and of R?

	I / A	R / Ω
A	1.5	1.5
B	1.5	2.0
C	6.0	2.0
D	4.0	12.0

26 The circuit shown in the diagram contains an unknown component X, hidden in a box.

The voltage-current graph for X is as shown.





What is the component X?

A a capacitor

B a closed switch

C a metallic resistor

D an open switch

27 A polythene rod repels an inflated balloon hanging from a nylon thread.

What charges must the rod and the balloon carry?

A The rod and the balloon carry opposite charges.

B The rod and the balloon carry like charges.

C The rod is charged but the balloon is not.

D The balloon is charged but the rod is not.

28 When there is an electric current in a metal wire, what flows through the wire?

A atoms

B electrons

C neutrons

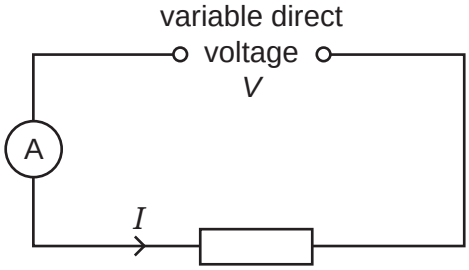
D protons

29 The table shows the voltage and current ratings for four electric heaters.

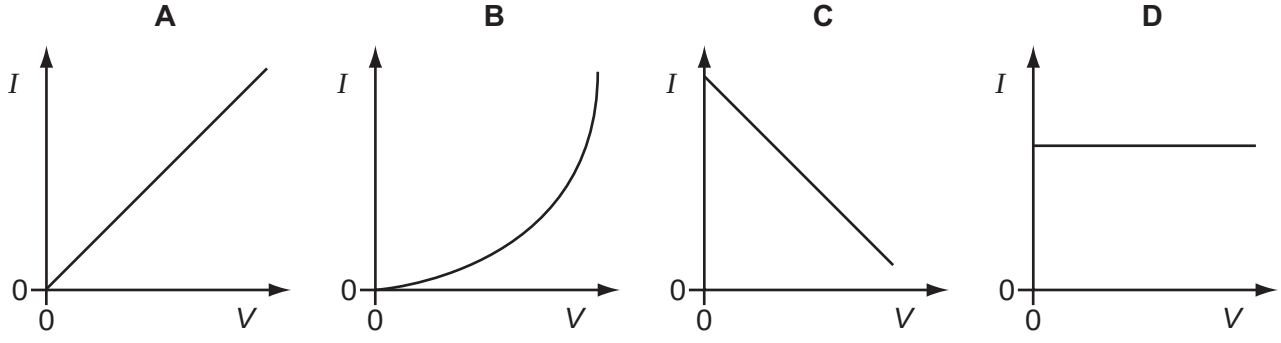
Which heater has the least resistance?

	voltage / V	current / A
A	110	5.0
B	110	10.0
C	230	5.0
D	230	10.0

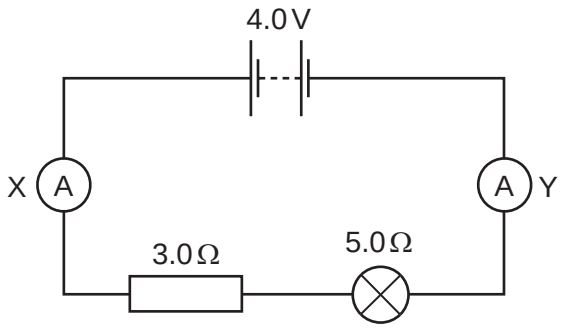
30 Using the circuit shown, the current I is found for various voltages V. The temperature of the resistor does not change.



Which graph shows the results obtained?



31 In the circuit shown, ammeter X reads 0.5 A.



What does ammeter Y read?

A 0 **B** 0.5 A **C** 3.5 A **D** 4.0 A

32 A pupil measures the potential difference across a device and the current in it.

Which calculation gives the resistance of the device?

A current + potential difference

B current ÷ potential difference

C potential difference ÷ current

D potential difference × current

33 A student uses a length of wire as a resistor. He discovers that the resistance of the wire is too small.

To be certain of making a resistor of higher value, he should use a piece of wire that is

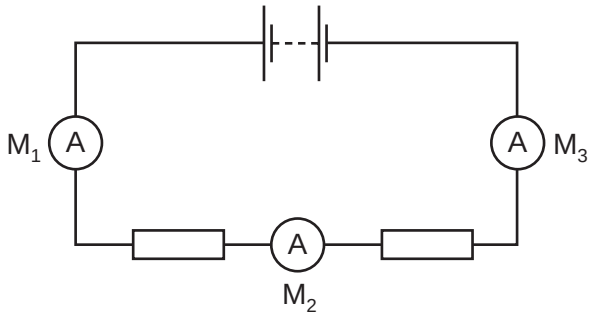
A longer and thicker.

B longer and thinner.

C shorter and thicker.

D shorter and thinner.

34 The diagram shows a battery connected to two identical resistors. Three ammeters M_1, M_2 and M_3 are connected in the circuit.



Meter M_1 reads 1.0 A.

What are the readings on M_2 and on M_3?

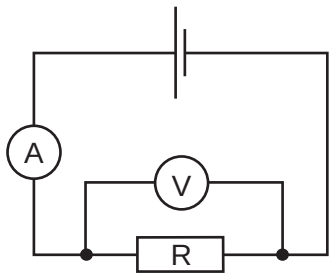
	reading on M_2 / A	reading on M_3 / A
A	0.5	0.0
B	0.5	0.5
C	0.5	1.0
D	1.0	1.0

35 The table shows the lengths and diameters of four copper wires.

Which wire has the **least** resistance?

	length / m	diameter / mm
A	0.50	1.0
B	0.50	2.5
C	0.75	1.0
D	0.75	2.5

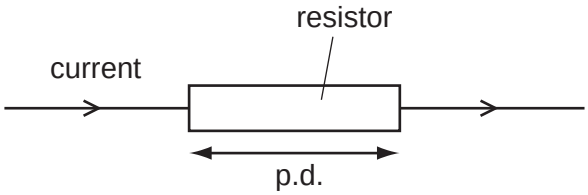
36 A circuit is set up to measure the resistance of a resistor R. The meter readings are 2.0 A and 3.0 V.



What is the resistance of the resistor R?

A 0.67 Ω **B** 1.5 Ω **C** 5.0 Ω **D** 6.0 Ω

37 A potential difference (p.d.) across a resistor causes a current in it.

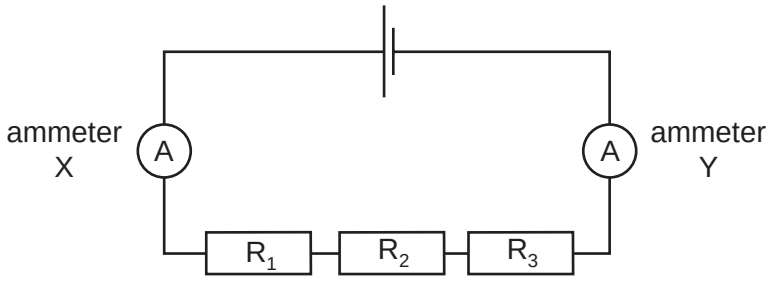


The p.d. and the resistance of the resistor can both be changed.

Which row shows two changes that will **both** increase the current in the resistor?

	change	change
A	decrease p.d.	decrease resistance
B	decrease p.d.	increase resistance
C	increase p.d.	decrease resistance
D	increase p.d.	increase resistance

38 The diagram shows a circuit containing two ammeters and three resistors.



Which of the ammeters will show the current in resistor R_2?

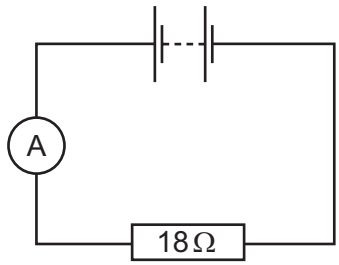
A ammeter X only

B ammeter Y only

C both ammeter X and ammeter Y

D neither ammeter X nor ammeter Y

39 An ammeter and an 18 Ω resistor are connected in series with a battery. The reading on the ammeter is 0.50 A. The resistance of the battery and the ammeter can be ignored.



What is the electromotive force (e.m.f.) of the battery?

A 9.0 N **B** 9.0 V **C** 36 N **D** 36 V

40 A polythene rod repels an inflated balloon hanging from a nylon thread.

What charges must the rod and the balloon carry?

A The rod and the balloon carry opposite charges.

B The rod and the balloon carry like charges.

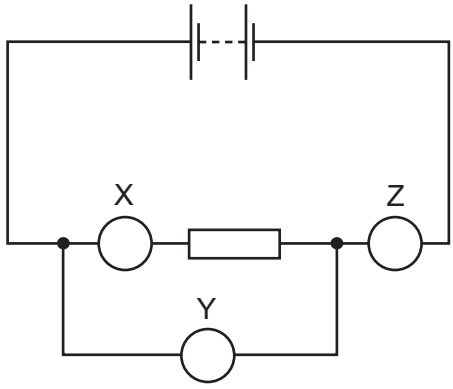
C The rod is charged but the balloon is not.

D The balloon is charged but the rod is not.

41 Which symbols are used for the units of current and of resistance?

	unit of current	unit of resistance
A	A	W
B	A	Ω
C	C	W
D	C	Ω

42 The diagram shows an electric circuit containing three meters, X, Y and Z, all connected correctly.



What are meters X, Y and Z?

	X	Y	Z
A	ammeter	ammeter	ammeter
B	ammeter	voltmeter	ammeter
C	voltmeter	ammeter	voltmeter
D	voltmeter	voltmeter	voltmeter

43 In which unit is potential difference measured?

A ampere

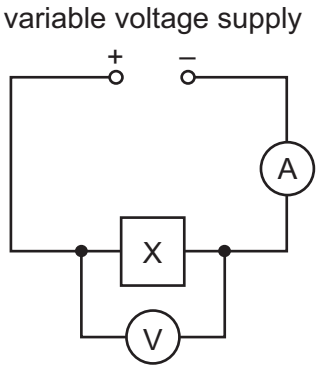
B ohm

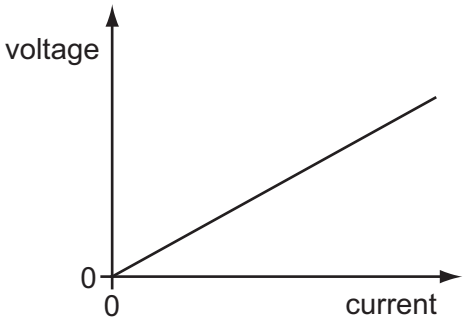
C volt

D watt

44 The circuit shown in the diagram contains an unknown component X, hidden in a box.

The voltage-current graph for X is as shown.





What is the component X?

A a capacitor

B a closed switch

C an open switch

D a resistor of constant resistance

Electrical Quantities

1	C	11	C	21	B	31	B	41	B
2	C	12	C	22	C	32	C	42	B
3	C	13	D	23	C	33	B	43	C
4	B	14	C	24	C	34	D	44	D
5	A	15	D	25	B	35	B		
6	B	16	C	26	C	36	B		
7	B	17	B	27	B	37	C		
8	B	18	B	28	B	38	C		
9	A	19	D	29	B	39	B		
10	B	20	A	30	A	40	B		

1 When electricity is transmitted over long distances, energy is wasted. How can the wasted energy be kept as small as possible?

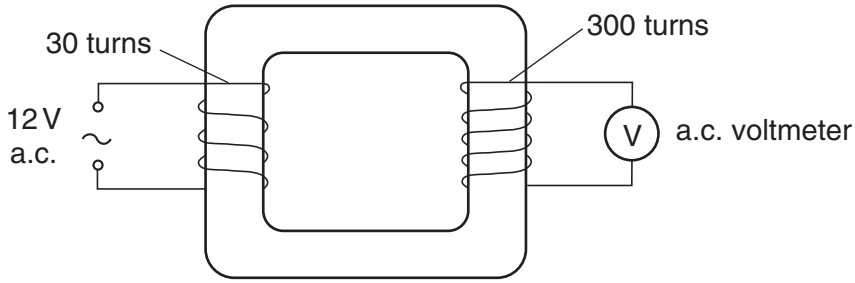
A Keep the current in the transmission lines as large as possible.

B Keep the power supplied to the transmission lines as large as possible.

C Keep the resistance of the transmission lines as large as possible.

D Keep the voltage supplied to the transmission lines as large as possible.

2 The diagram shows a transformer.

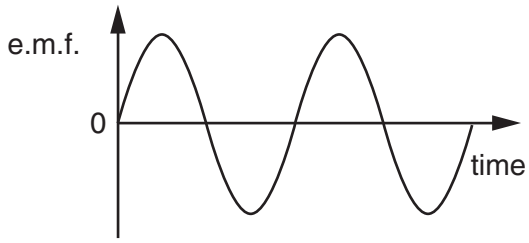


What is the voltmeter reading?

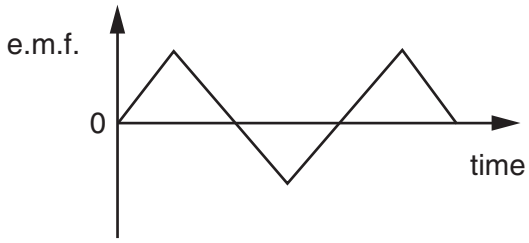
A 1.2 V **B** 12 V **C** 120 V **D** 1200 V

3 Which graph shows the output of a simple a.c. generator?

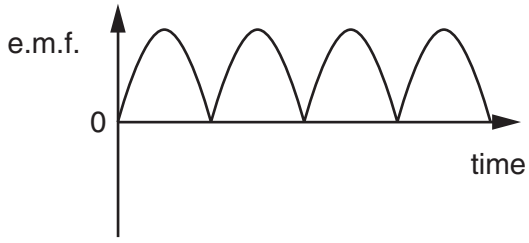
A



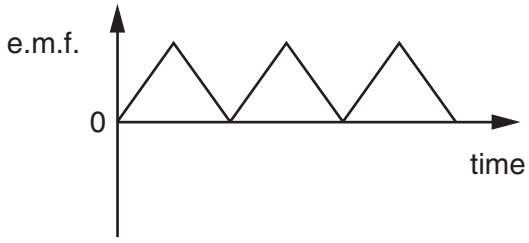
B



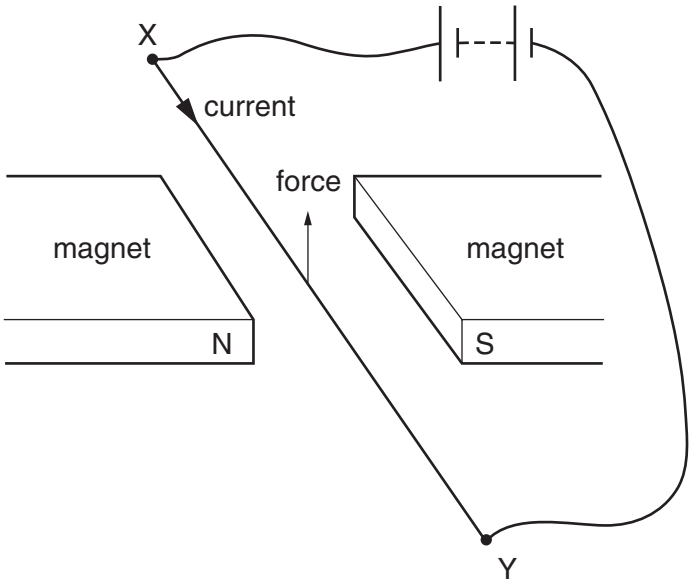
C



D



4 When the electric current in wire XY is in the direction shown, there is an upward force on the wire.



If the north and south poles of the magnet exchange positions, in which direction will the force on the wire act?

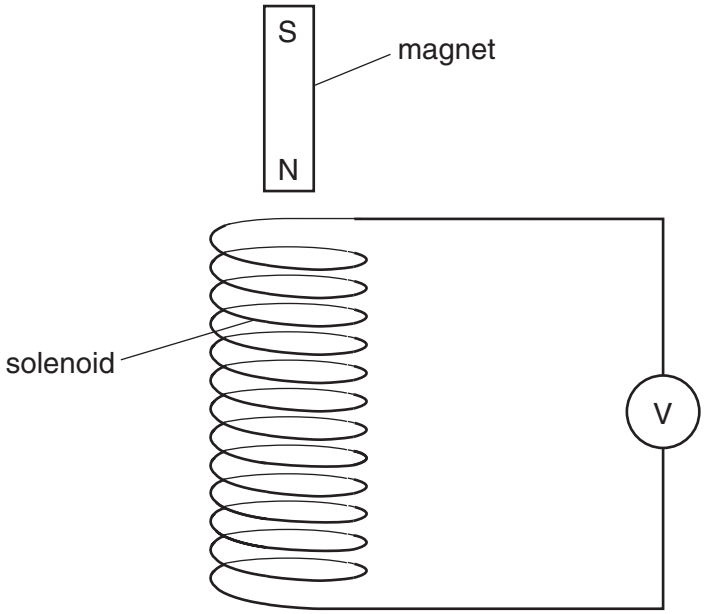
A downwards

B upwards

C to the left

D to the right

5 The diagram shows a solenoid connected to a sensitive voltmeter.



Which of the following would give a zero reading on the voltmeter?

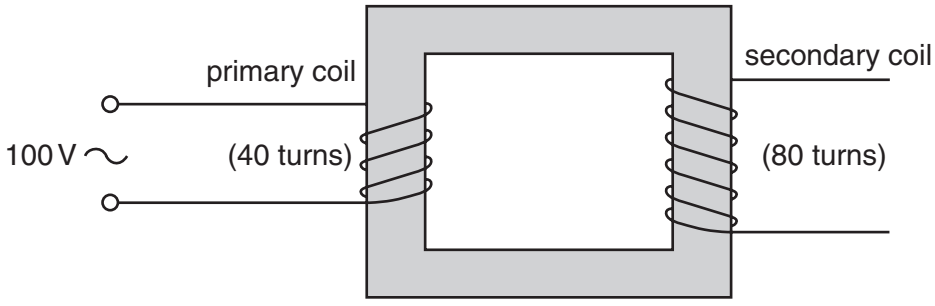
A holding the magnet stationary inside the solenoid

B moving the magnet away from the solenoid

C moving the magnet towards the solenoid

D moving the solenoid towards the magnet

6 The diagram shows a transformer with an alternating voltage of 100 V applied to the primary coil.



What is the voltage produced across the secondary coil?

A 50 V **B** 100 V **C** 200 V **D** 8000 V

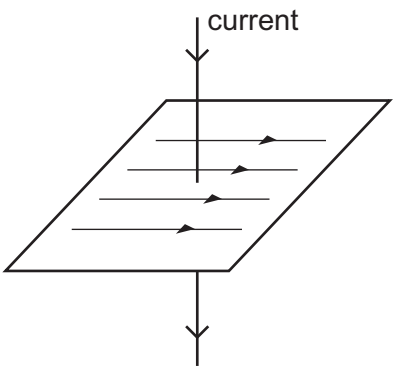
7 How is electricity transmitted over large distances and why is it transmitted in this way?

	how	why
A	at high voltage	for safety
B	at high voltage	to reduce energy loss
C	at low voltage	for safety
D	at low voltage	to reduce energy loss

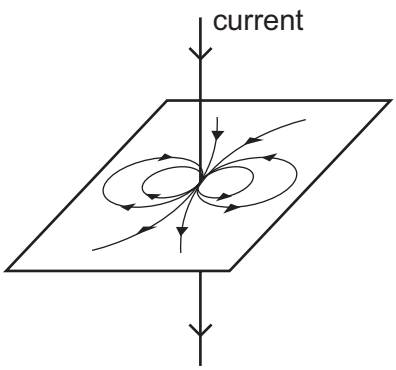
8 A straight wire carrying a current produces a magnetic field.

Which diagram shows the correct shape of the field?

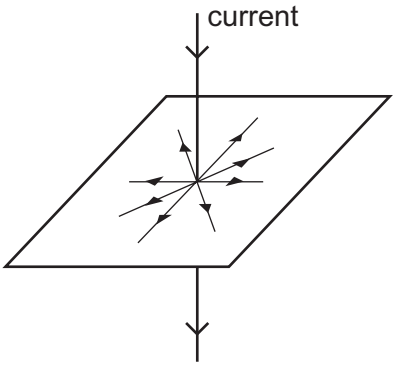
A



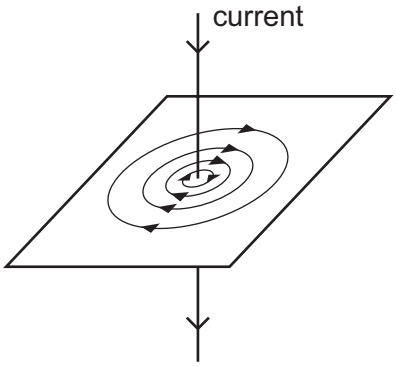
B



C

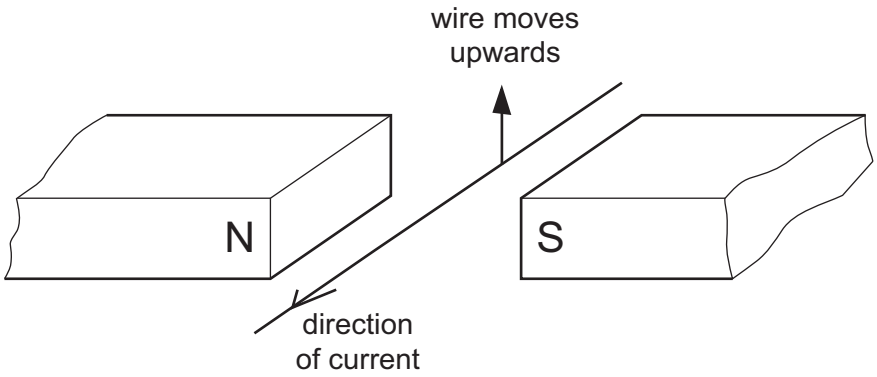


D



9 A student carries out an experiment to see the effect of a magnetic field on a wire carrying a current.

The wire moves upwards as shown.



What should the student do to make the wire move downwards?

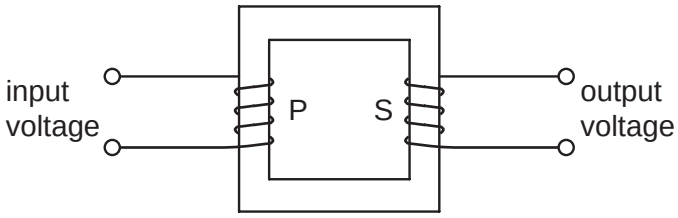
A change the direction of the current

B move the poles of the magnet closer together

C send a smaller current through the wire

D use a stronger magnet

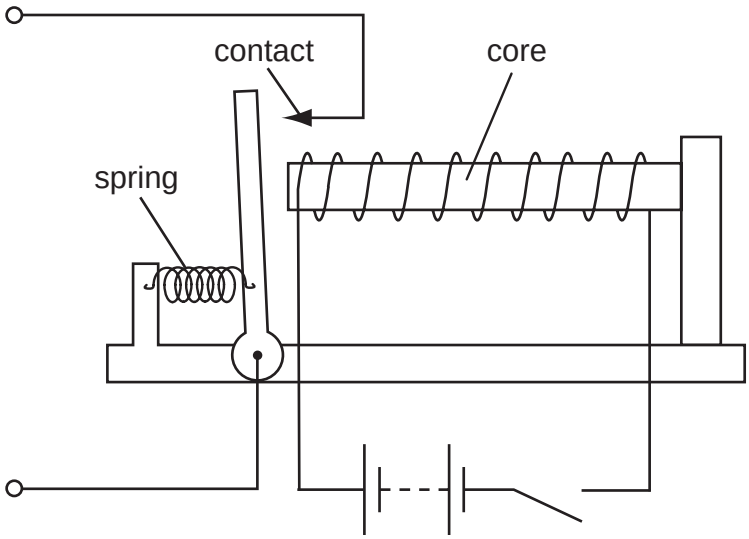
10 The diagram represents a transformer.



Which arrangement could be used to make the output voltage higher than the input voltage?

	number of turns on primary coil P	number of turns on secondary coil S	type of input
A	100	50	a.c.
B	100	50	d.c.
C	50	100	a.c.
D	50	100	d.c.

11 A student sets up the apparatus shown in order to make a relay.



Which metal should be used to make the core?

A aluminium

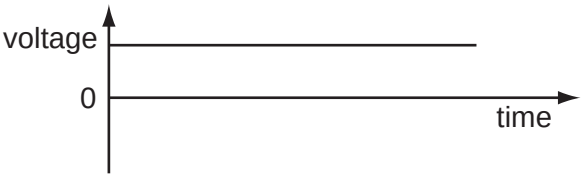
B copper

C iron

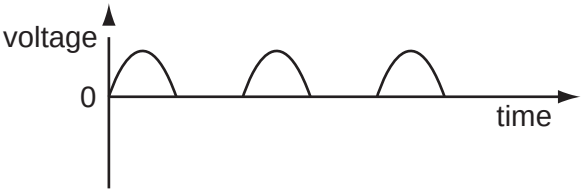
D steel

12 Which graph shows the output voltage from a simple a.c. generator?

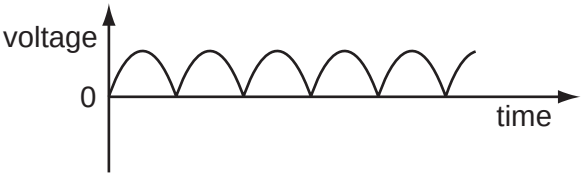
A



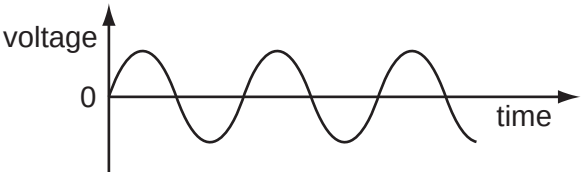
B



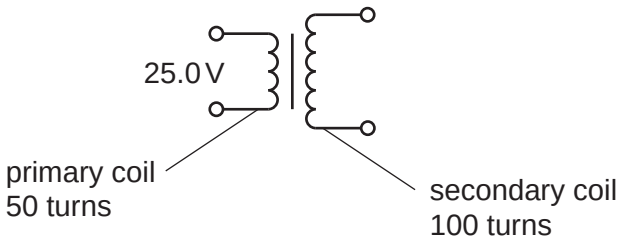
C



D



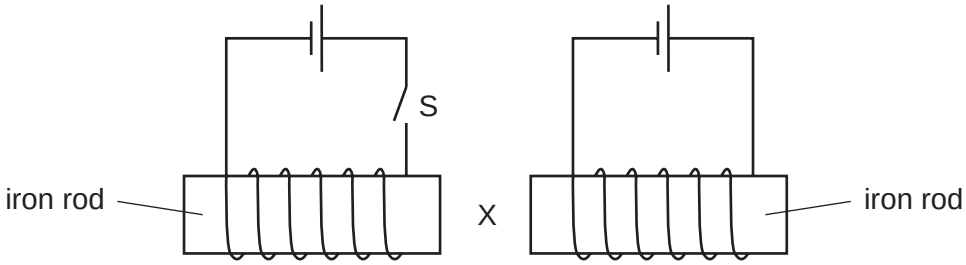
13 A transformer has 50 turns on its primary coil and 100 turns on its secondary coil. An a.c. voltage of 25.0 V is connected across the primary coil.



What is the voltage across the secondary coil?

A 12.5 V **B** 50.0 V **C** 175 V **D** 200 V

14 Two circuits are set up as shown. The iron rods are placed close together, and are free to move.



What happens to the size of the gap at X when switch S is closed?

A It decreases.

B It decreases then increases.

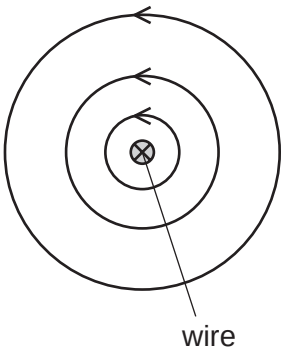
C It increases.

D It does not change.

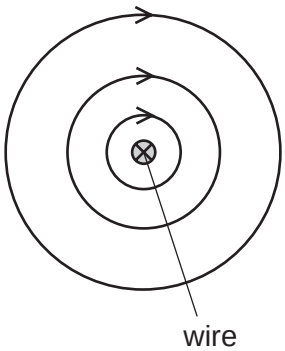
15 The diagrams show a straight wire carrying a current into the paper.

Which diagram shows the magnetic field pattern due to this current?

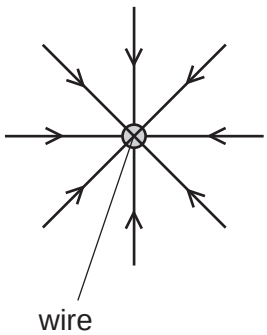
A



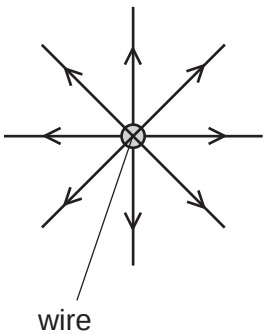
B



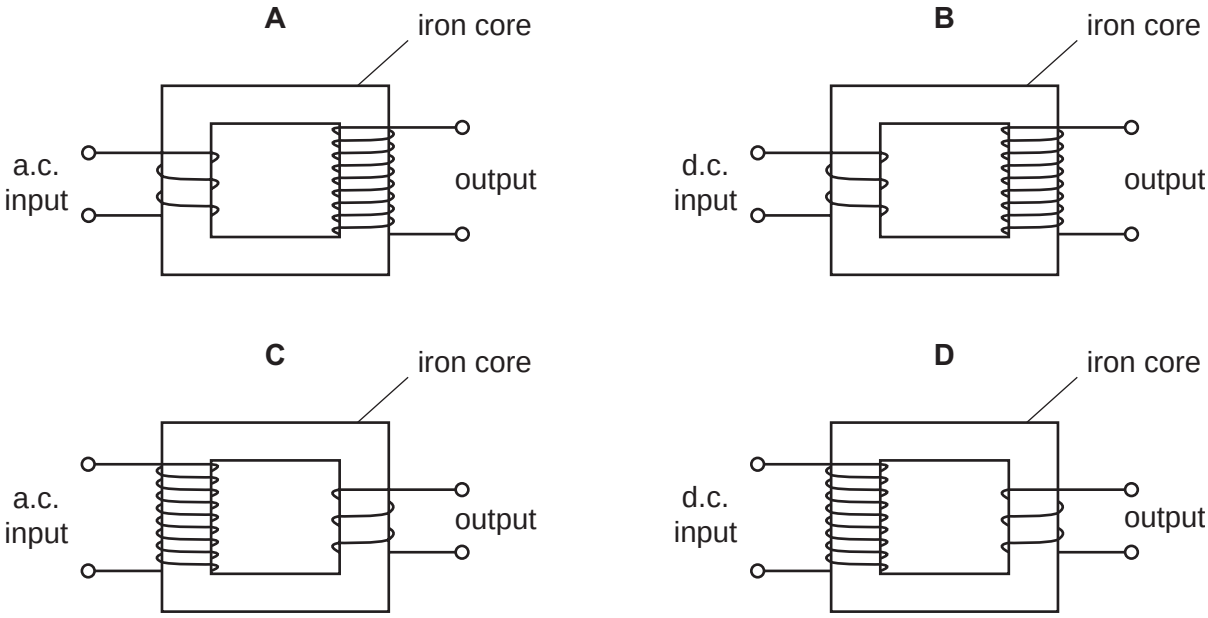
C



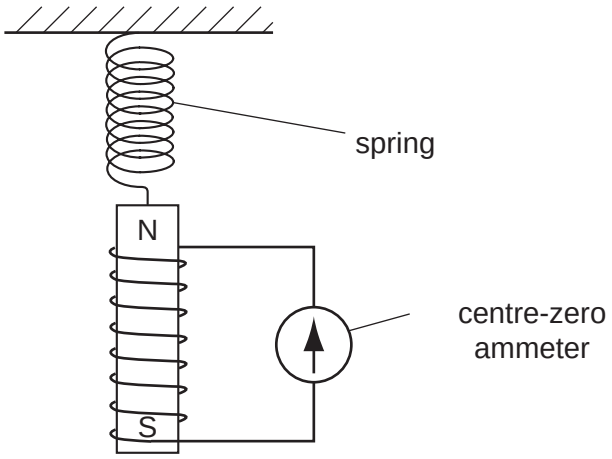
D



16 Which arrangement may be used to step up a voltage?



17 A magnet is suspended from a spring so that it can move freely inside a coil which is connected to a sensitive centre-zero ammeter.



What does the ammeter show when the magnet vibrates slowly up and down?

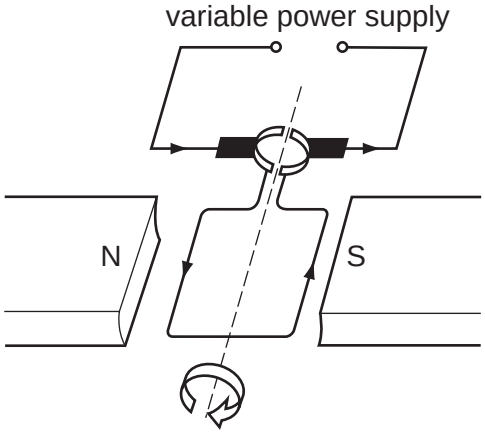
A a reading constantly changing from left to right and right to left

B a steady reading to the left

C a steady reading to the right

D a steady zero reading

18 A current-carrying coil in a magnetic field experiences a turning effect.



How can the turning effect be increased?

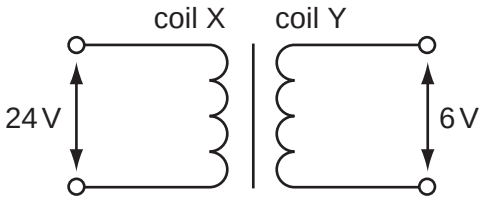
A increase the number of turns on the coil

B reduce the size of the current

C reverse the direction of the magnetic field

D use thinner wire for the coil

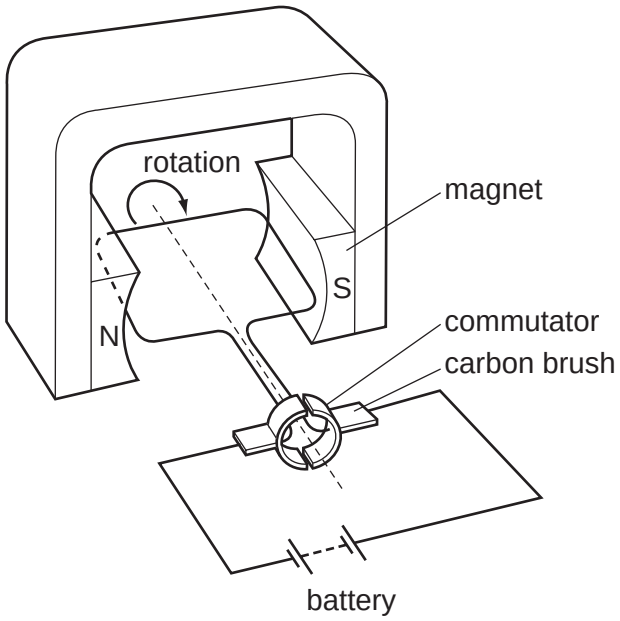
19 A transformer is to be used to produce a 6 V output from a 24 V input.



What are suitable numbers of turns for coil X and for coil Y?

	number of turns on coil X	number of turns on coil Y
A	240	60
B	240	240
C	240	960
D	960	60

20 The diagram shows an electrical device.



What is this electrical device?

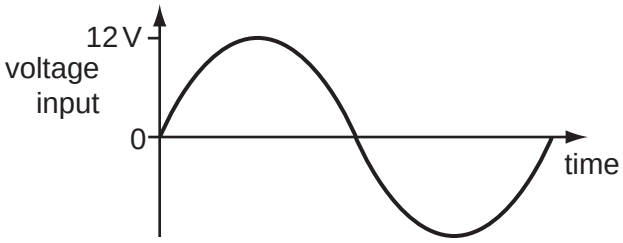
A a d.c. motor

B an a.c. generator

C a magnetising coil

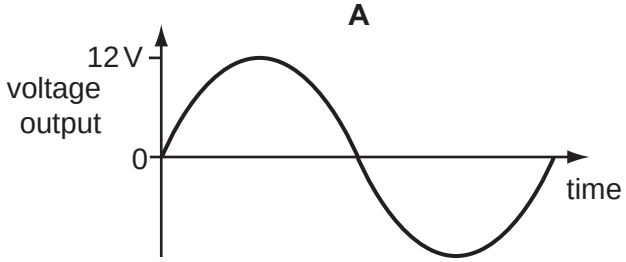
D a transformer

21 The graph shows the voltage input to a step-down transformer.

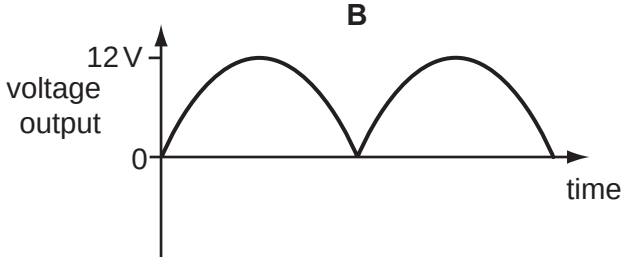


Which diagram shows the voltage output from the transformer?

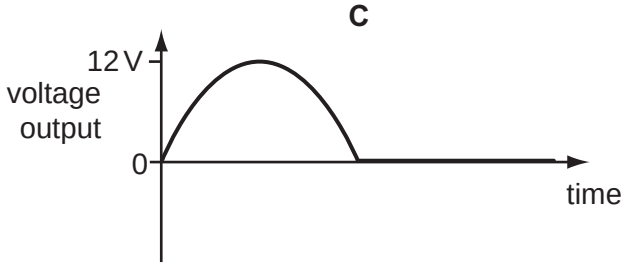
A



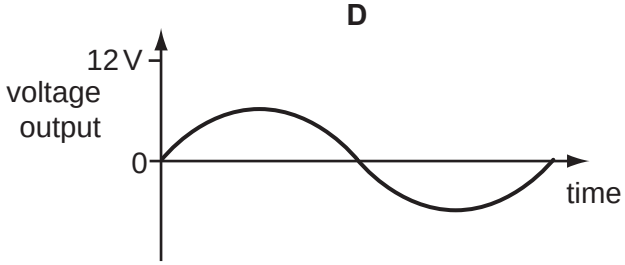
B



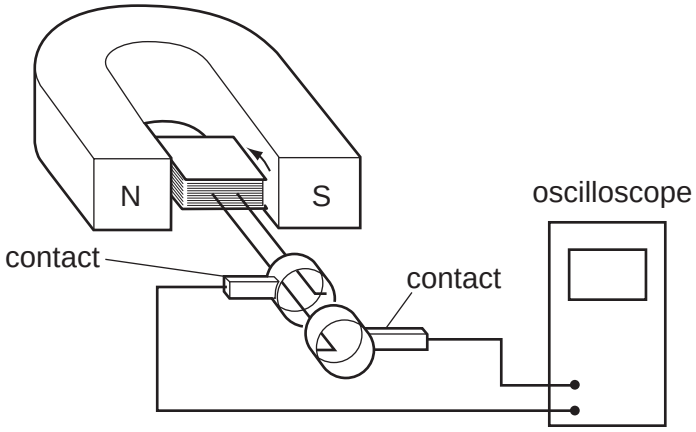
C



D

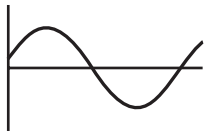


22 A coil is rotated steadily between the poles of a magnet. The coil is connected to an oscilloscope, which shows a graph of voltage output against time.

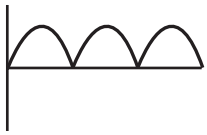


Which graph shows the voltage output against time?

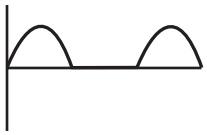
A



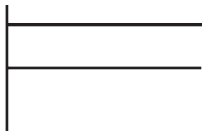
B



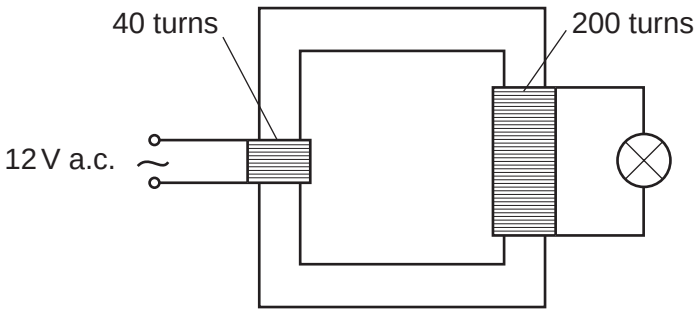
C



D



23 The diagram shows a lamp connected to a transformer.



What is the potential difference across the lamp?

A 2.4 V **B** 12 V **C** 60 V **D** 240 V

24 How is electricity transmitted over large distances and why is it transmitted in this way?

	how	why
A	at high voltage	for safety
B	at high voltage	to reduce energy loss
C	at low voltage	for safety
D	at low voltage	to reduce energy loss

25 Which parts of an a.c. generator slide past each other when the generator is working?

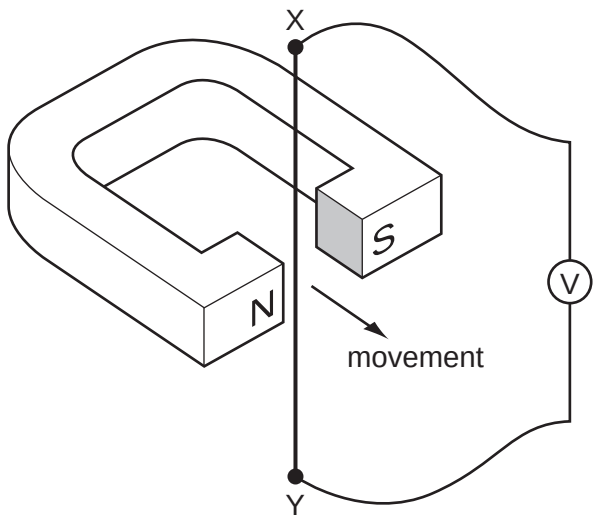
A brushes and coil

B coil and magnets

C magnets and slip rings

D slip rings and brushes

26 The wire XY shown in the diagram is connected to a sensitive voltmeter with a centre zero. XY is then moved quickly once through the magnetic field.



What is observed on the voltmeter?

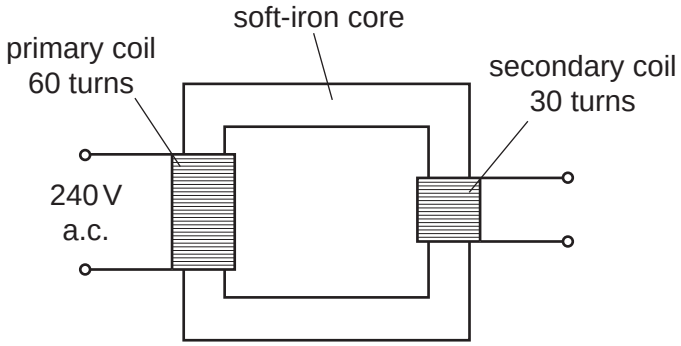
A The needle moves briefly in one direction and then returns to the centre.

B The needle moves quickly in one direction and stays deflected.

C The needle vibrates rapidly from side to side whilst XY is moving.

D The needle stays still.

27 The diagram shows a transformer connected to a 240 V a.c. supply.



What is the potential difference across the secondary coil of the transformer?

A 30 V **B** 120 V **C** 240 V **D** 480 V

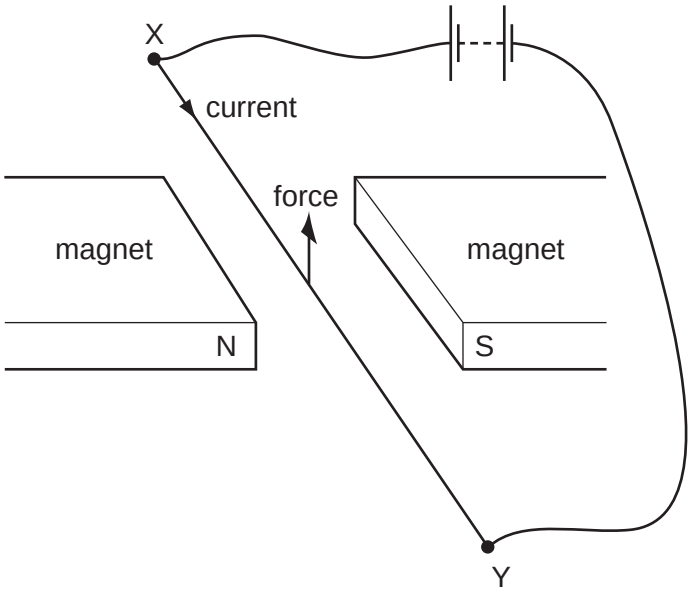
28 Two different systems are used to transmit equal amounts of electrical power from one building to another.

One system uses low voltage and the other uses high voltage. Both systems use identical wires.

Which line in the table is correct about which system wastes least energy and why?

	least energy wasted	why
A	high voltage system	the current in the wires is bigger
B	high voltage system	the current in the wires is smaller
C	low voltage system	the current in the wires is bigger
D	low voltage system	the current in the wires is smaller

29 When the electric current in wire XY is in the direction shown, there is an upward force on the wire.



If the north and south poles of the magnet exchange positions, in which direction will the force on the wire act?

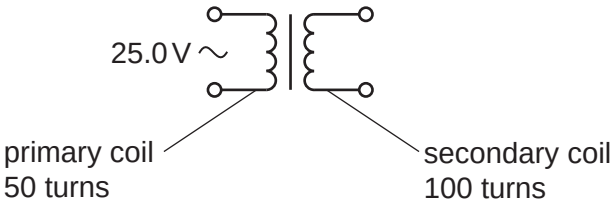
A downwards

B upwards

C to the left

D to the right

30 A transformer has 50 turns on its primary coil and 100 turns on its secondary coil. An alternating voltage of 25.0 V is connected across the primary coil.

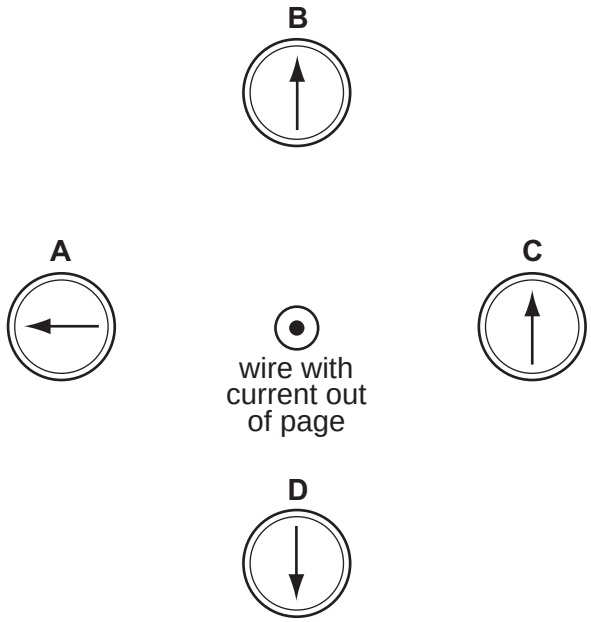


What is the voltage across the secondary coil?

A 12.5 V **B** 50.0 V **C** 175 V **D** 200 V

31 A wire perpendicular to the page carries an electric current in a direction out of the page. There are four compasses near the wire.

Which compass shows the direction of the magnetic field caused by the current?



32 Which device is designed to allow a small direct current (d.c.) to control a large direct current (d.c.)?

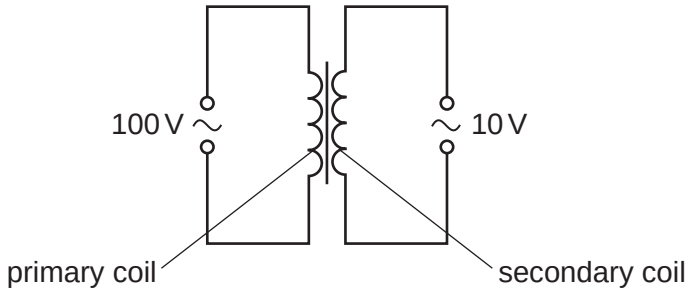
A a generator

B a motor

C a relay

D a transformer

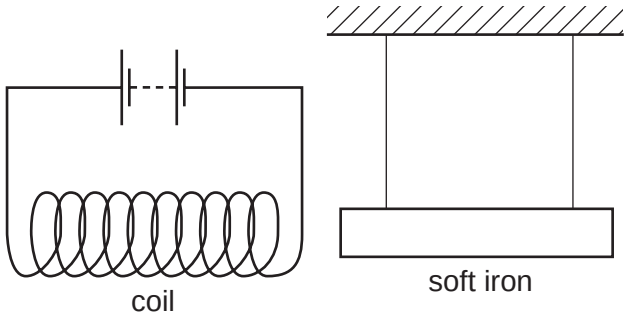
33 A transformer is to be used to provide a 10 V output from a 100 V supply.



What are suitable numbers of turns for the primary coil and for the secondary coil?

	number of turns on the primary coil	number of turns on the secondary coil
A	100	1000
B	200	110
C	400	490
D	800	80

34 A coil is connected to a battery and a soft iron bar is hung near to it.



The current is then reversed by reversing the battery connections.

How does the soft iron bar behave in the two cases?

	with the battery as shown	with the battery reversed
A	attracted to the coil	attracted to the coil
B	attracted to the coil	repelled from the coil
C	repelled from the coil	attracted to the coil
D	repelled from the coil	repelled from the coil

35 A transformer has 15 000 turns on its primary coil and 750 turns on its secondary coil.

Connected in this way, for what purpose could this transformer be used?

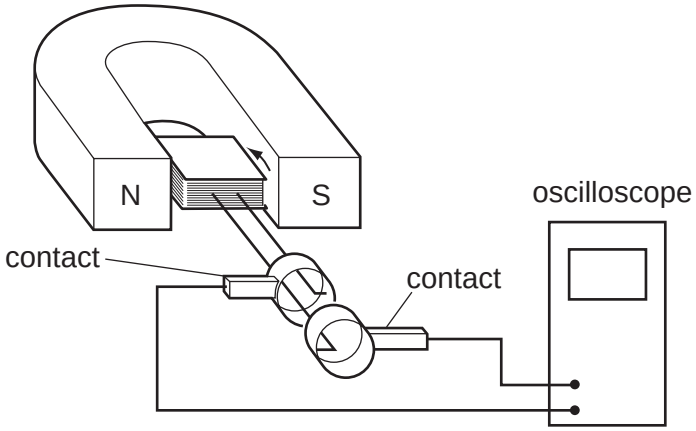
A to convert the 8000 V a.c. output of a power station to 160 000 V for long-distance power transmission

B to convert the 160 000 V d.c. supply from a power line to 8000 V for local power transmission

C to use a 12 V d.c. supply to operate a 240 V razor

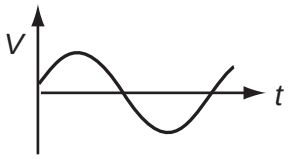
D to use a 240 V a.c. mains supply to operate a 12 V motor

36 A coil is rotated steadily between the poles of a magnet. The coil is connected to an oscilloscope.

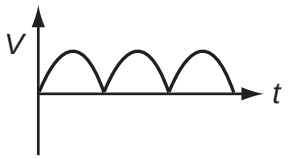


Which graph shows the output voltage *V* against time *t*?

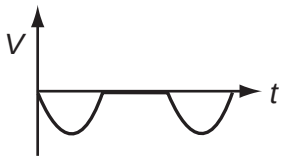
A



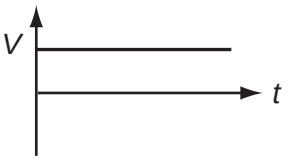
B



C



D

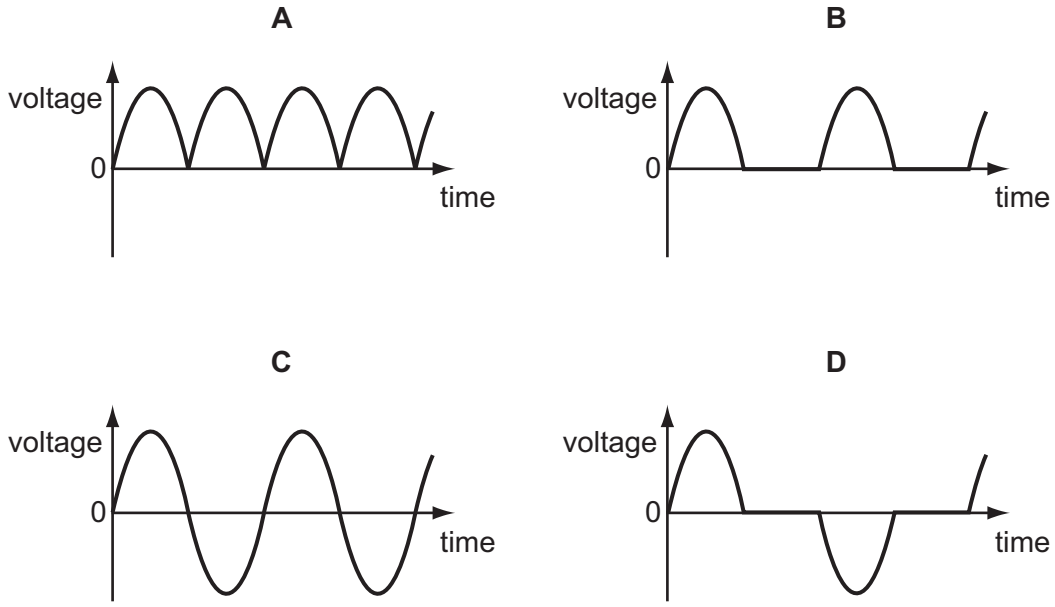


37 A village has to be supplied with electricity from a power station that is a long way from the village.

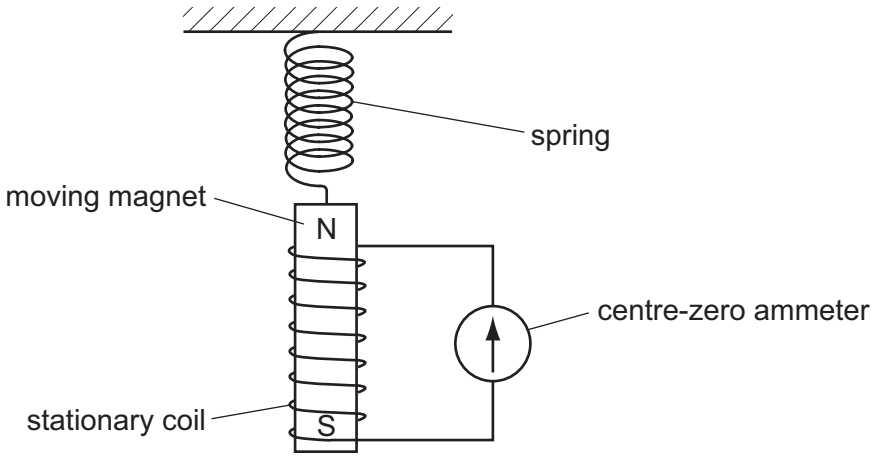
Which type of current should be used, and at which voltage?

	type of current	voltage
A	alternating current	high voltage
B	alternating current	low voltage
C	direct current	high voltage
D	direct current	low voltage

38 Which graph shows how the output voltage varies with time for a simple a.c. generator?



39 A magnet is suspended from a spring so that it can move freely inside a coil. The coil is connected to a sensitive centre-zero ammeter.



What does the ammeter show when the magnet repeatedly moves slowly up and down?

A a reading constantly changing from left to right and right to left

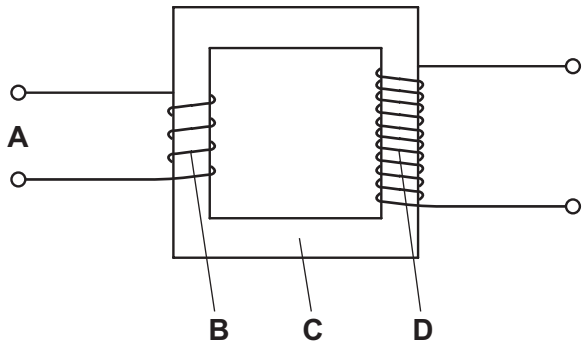
B a steady reading to the left

C a steady reading to the right

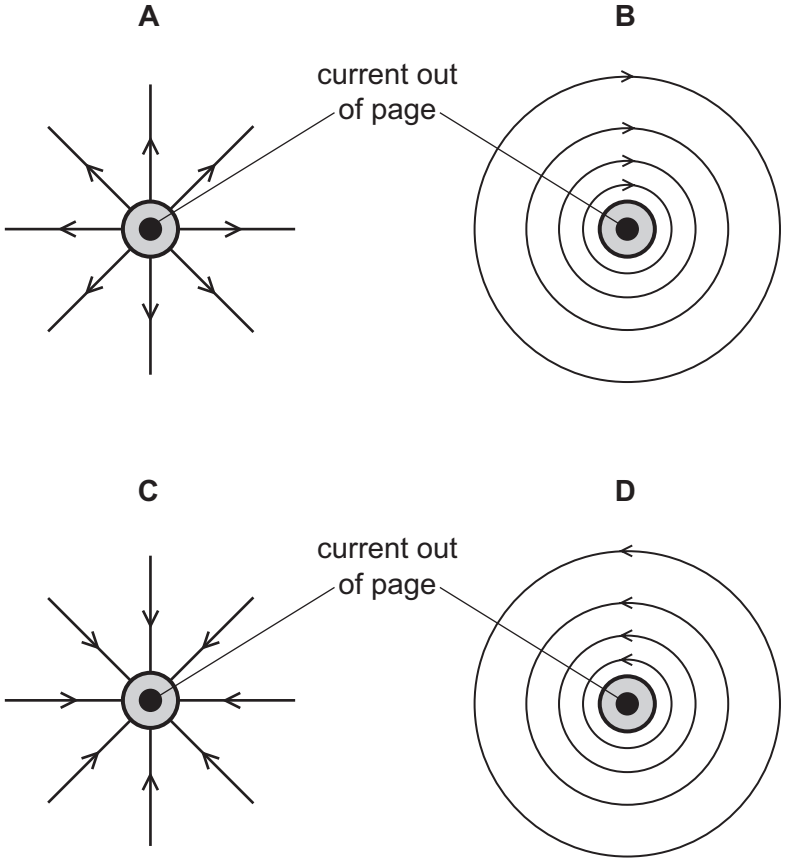
D a steady reading of zero

40 The diagram shows a simple step-down transformer used to decrease a voltage.

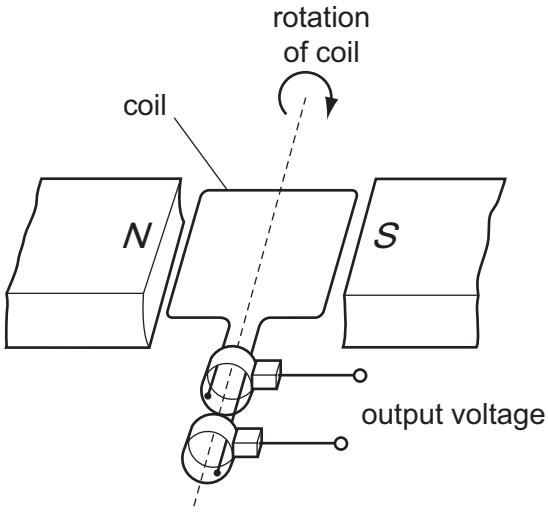
Which part is the primary coil?



41 Which diagram represents the direction of the magnetic field around a straight wire carrying a current out of the page?



42 The diagram shows an a.c. generator.



With the coil in the position shown, the output voltage is +10 V.

When does the output voltage become –10 V?

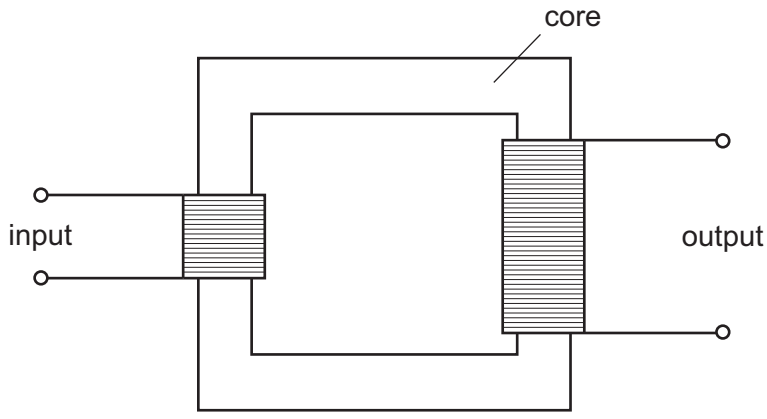
A when the coil has turned 90°

B when the coil has turned 180°

C when the coil has turned 270°

D when the coil has turned 360°

43 The diagram shows a simple transformer.



From which material should the core be made?

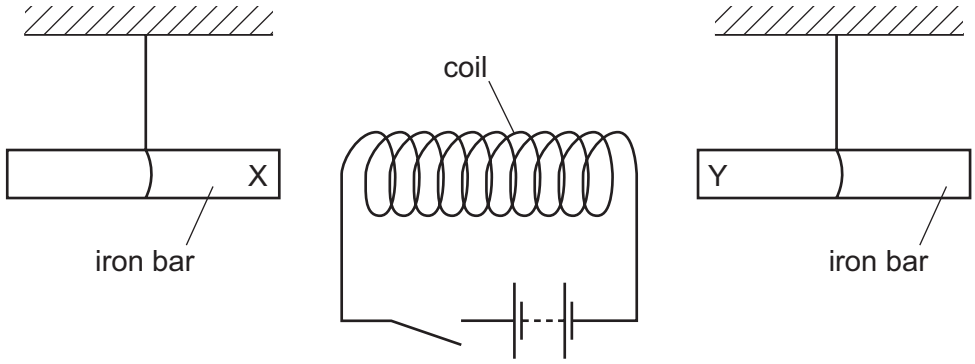
A aluminium

B copper

C iron

D steel

44 The diagram shows a coil connected to a battery and a switch. Two unmagnetised iron bars hang freely near opposite ends of the coil.



What happens to the iron bars when the switch is closed?

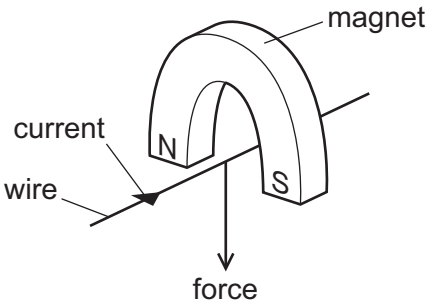
A Both X and Y move away from the coil.

B Both X and Y move towards the coil.

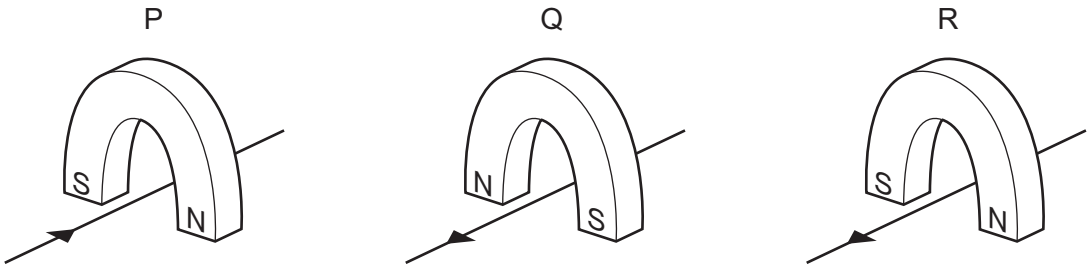
C X moves towards the coil, Y moves away from the coil.

D Y moves towards the coil, X moves away from the coil.

45 A wire passes between the poles of a horseshoe magnet. There is a current in the wire in the direction shown, and this causes a force to act on the wire.



Three other arrangements, P, Q and R, of the wire and magnet are set up as shown.



Which arrangement or arrangements will cause a force in the same direction as the original arrangement?

A P, Q and R **B** P and Q only **C** P only **D** R only

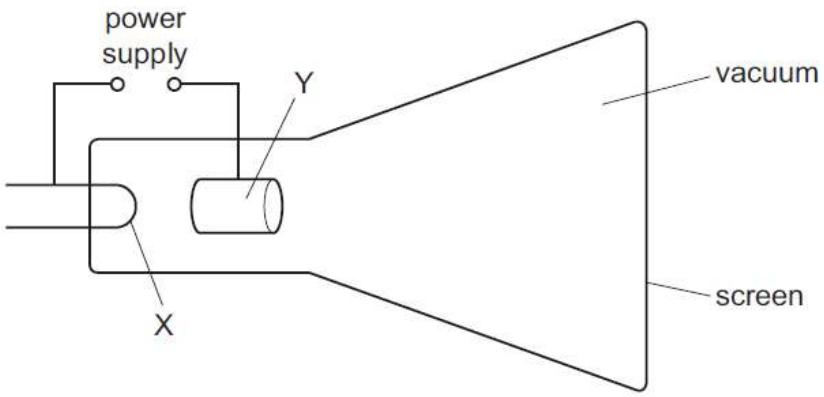
Electromagnetic Effects

1	D	11	C	21	D	31	B	41	D
2	C	12	D	22	A	32	C	42	B
3	A	13	B	23	C	33	D	43	C
4	A	14	A	24	B	34	A	44	B
5	A	15	B	25	D	35	D	45	D
6	C	16	A	26	A	36	A		
7	B	17	A	27	B	37	A		
8	D	18	A	28	B	38	C		
9	A	19	A	29	A	39	A		
10	C	20	A	30	B	40	D		

Cathode ray oscilloscope

1.

The diagram shows a cathode-ray tube.



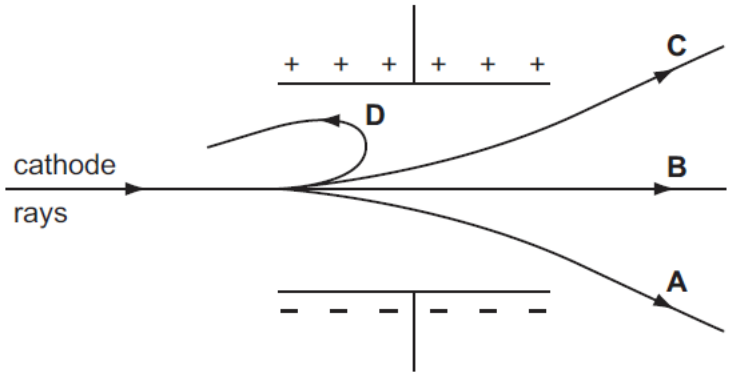
What are the correct labels for X and for Y?

	X	Y
A	negative anode	positive cathode
B	negative cathode	positive anode
C	positive anode	negative cathode
D	positive cathode	negative anode

2.

A beam of cathode rays passes between two parallel metal plates connected to a high-voltage d.c. power supply.

Which path does the beam follow?



3.

What are cathode rays?

A a beam of electrons

B a beam of neutrons

C a beam of protons

D electromagnetic waves

4.

Cathode rays are emitted in a vacuum tube. They consist of particles that are found in atoms.

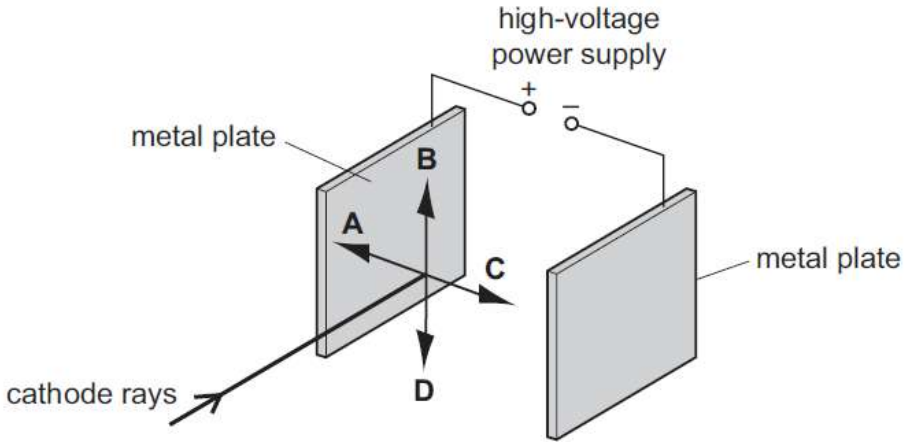
What is the name of the particles and how are the cathode rays produced?

	name of particles	how the cathode rays are produced
A	electrons	electromagnetic induction
B	electrons	thermionic emission
C	protons	electromagnetic induction
D	protons	thermionic emission

5.

Two parallel metal plates in a vacuum are connected to the terminals of a high-voltage power supply. A beam of cathode rays is passed into the space between the two plates, as shown.

In which direction does the beam of cathode rays deflect?



6.

A cathode-ray tube has an anode and an earthed cathode.

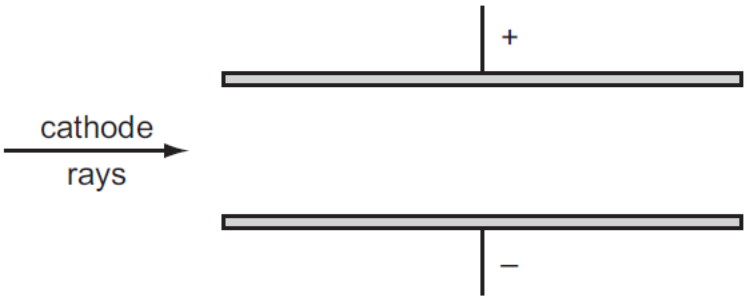
Which row shows the charge on the **anode** and the temperature of the **cathode**?

	anode charge	cathode temperature
A	negative	cool
B	negative	hot
C	positive	cool
D	positive	hot

7.

An electric field is set up between two parallel plates.

Cathode rays are directed into this field, parallel to the plates.



In which direction are the cathode rays deflected by the electric field?

A downwards

B upwards

C into the page

D out of the page

8.

To create cathode rays in a vacuum, what might be a suitable potential difference to connect between the cathode and anode?

A 6 V a.c.

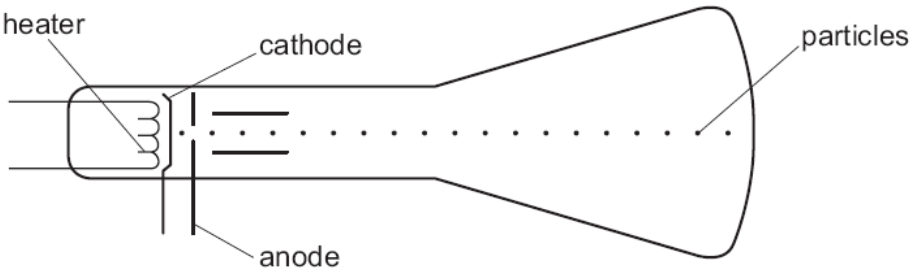
B 6 V d.c.

C 600 V a.c.

D 600 V d.c.

9.

Particles are emitted by a heated cathode in a cathode-ray tube.



What are these particles?

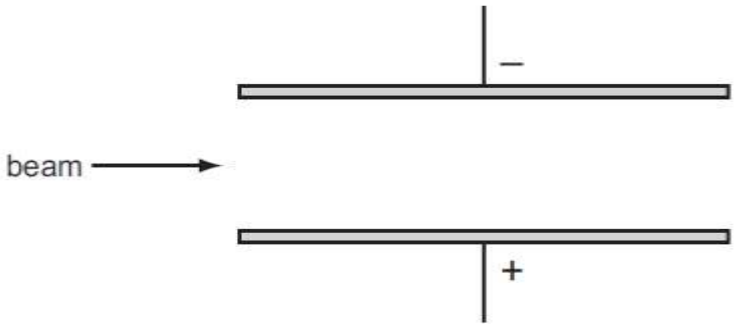
A atoms

B electrons

C neutrons

D protons

10.
The diagram shows a beam of cathode rays entering an electric field.



In which direction is the beam deflected by the field?

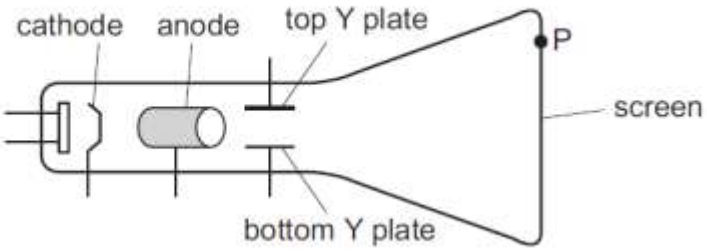
A downwards

B upwards

C into the page

D out of the page

11.
The diagram shows a cathode-ray tube.



A student wants the cathode rays to make a spot at P on the screen.

Which parts of the cathode-ray tube should be positive?

A anode and top Y plate

B anode and bottom Y plate

C cathode and top Y plate

D cathode and bottom Y plate

12.
In a cathode-ray tube, a hot tungsten cathode releases particles by thermionic emission.

What are these particles?

A α-particles

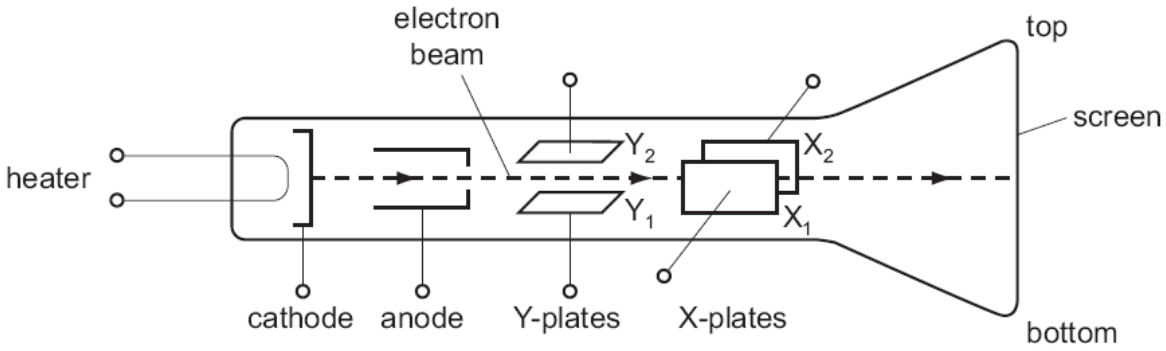
B electrons

C protons

D tungsten atoms

13.

The diagram shows a cathode-ray tube.



What must be done to deflect the electron beam upwards?

A make X_1 more positive than X_2

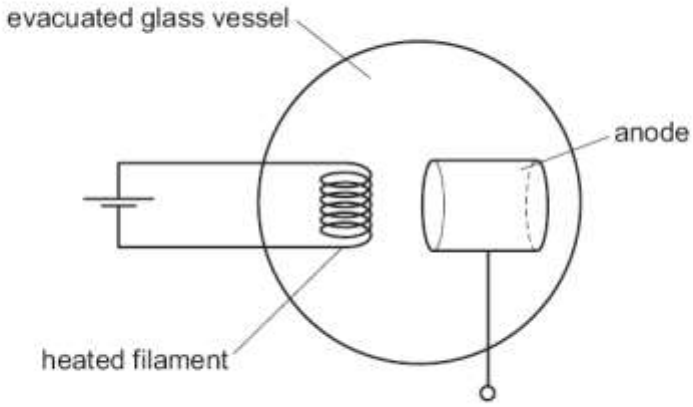
B make X_2 more positive than X_1

C make Y_1 more positive than Y_2

D make Y_2 more positive than Y_1

14.

In order to produce a beam of cathode rays, a heated filament is placed near to an anode in an evacuated glass vessel.



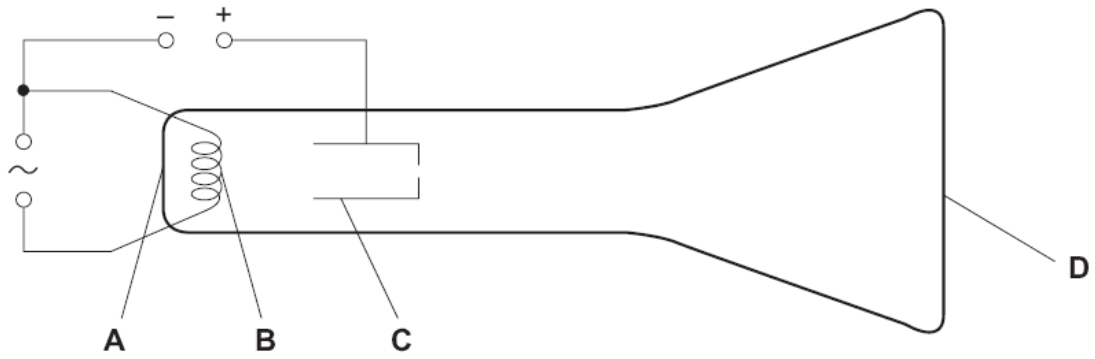
What is the type of charge on the anode and why is this charge chosen?

	charge	reason
A	negative	to attract electrons
B	negative	to repel electrons
C	positive	to attract electrons
D	positive	to repel electrons

15.

The diagram shows a simple cathode-ray tube.

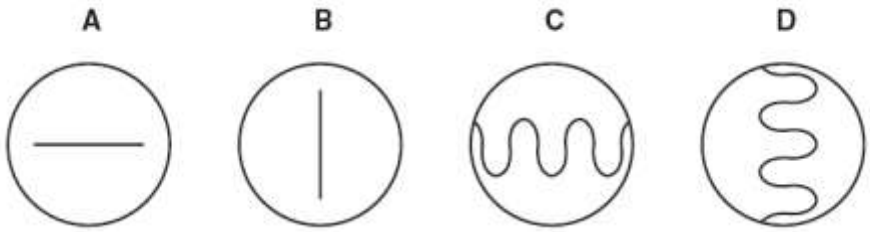
Which part emits the electrons?



16.

An alternating potential difference (p.d.) is applied to the Y-plates of a cathode-ray oscilloscope. The time-base is turned off.

Which of the following patterns would appear on the screen?



17.

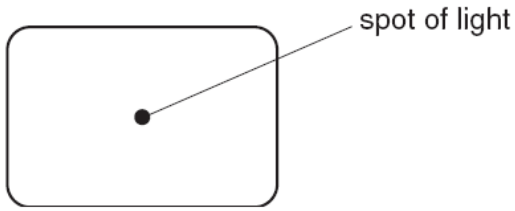
A cathode-ray tube has an anode and an earthed cathode.

Which line in the table shows the charge and the temperature of the **anode**?

	anode charge	anode temperature
A	negative	cool
B	negative	hot
C	positive	cool
D	positive	hot

18.

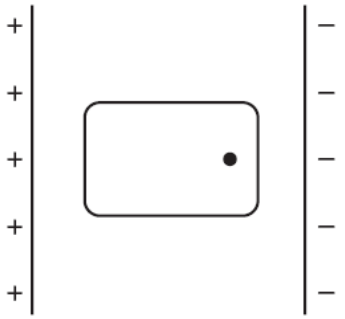
The diagram below shows the screen of a cathode-ray oscilloscope tube.



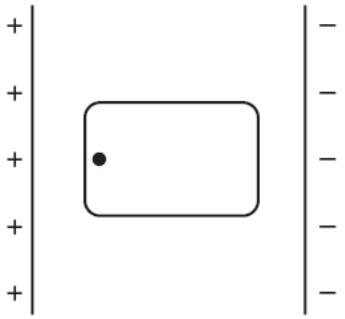
The tube is placed between a pair of charged plates.

Which diagram shows the new position of the spot?

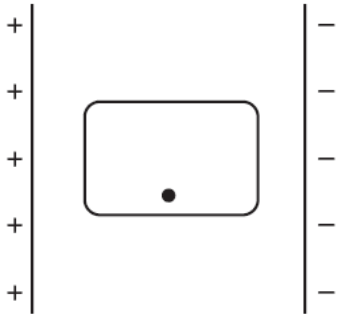
A



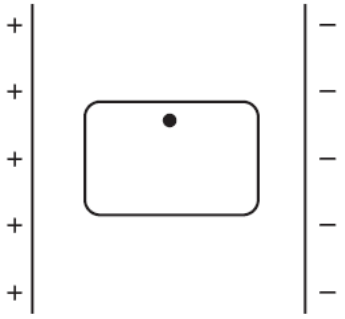
B



C



D



Radioactivity

1 What is a beta-particle?

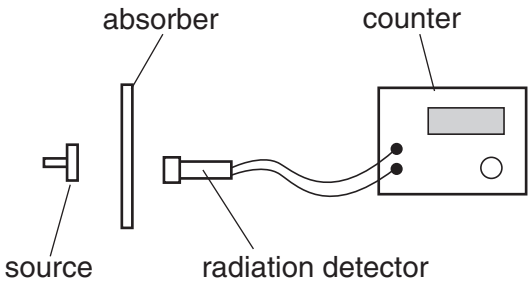
A a helium nucleus

B a high-energy electron

C four protons

D two neutrons

2 The diagram shows a radioactivity experiment.



When a piece of paper is used as the absorber, the count rate drops to the background count rate.

What radiation is the source emitting?

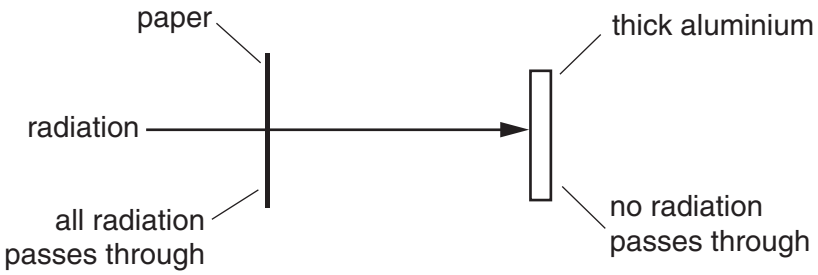
A alpha only

B beta only

C gamma only

D alpha, beta and gamma

3 A radioactive source emits radiation that can pass through a sheet of paper but not through thick aluminium.



What does this show about the radiation?

A It is alpha-particles.

B It is beta-particles.

C It is gamma-rays.

D It is a mixture of alpha-particles and gamma-rays.

4 A sample of a radioactive isotope is decaying.

Which atoms will decay first?

A impossible to know, because radioactive decay is random

B impossible to know, unless the age of the material is known

C atoms near the centre, because they are surrounded by more atoms

D atoms near the surface, because the radiation can escape more easily

5 Which type of radiation can be stopped by a sheet of paper?

A α-particles

B β-particles

C γ-rays

D X-rays

6 The half-life of a radioactive substance is 5 hours. A sample is tested and found to contain 0.48 g of the substance.

How much of the substance was present in the sample 20 hours before the sample was tested?

A 0.03 g

B 0.12 g

C 1.92 g

D 7.68 g

7 Which line in the table describes the nature of an α-particle and a γ-ray?

	α-particle	γ-ray
A	helium nucleus	electromagnetic radiation
B	helium nucleus	electron
C	proton	electromagnetic radiation
D	proton	electron

8 A radioactive nucleus R decays with the emission of a β-particle as shown.

$$^{x}_{y}R \longrightarrow {}^{p}_{q}S + \beta$$

Which equation is correct?

A x = p

B y = q

C p = x – 1

D q = y – 1

9 Which line correctly describes α-particles?

	electric charge	penetrates 1 cm of aluminium?
A	negative	yes
B	negative	no
C	positive	yes
D	positive	no

10 A small amount of a radioactive isotope contains 72 billion unstable nuclei. The half-life of the isotope is 4 hours.

How many unstable nuclei would remain after 12 hours?

A 6 billion

B 9 billion

C 18 billion

D 24 billion

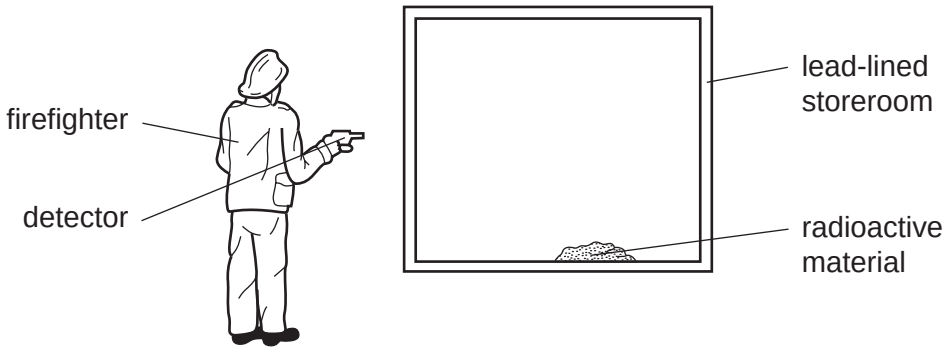
11 The equation shows the decay of the nuclide X.

$$^{226}_{88}\mathrm{X} \rightarrow {}^{P}_{Q}\mathrm{Y} + {}^{4}_{2}\alpha$$

What are the values of P and Q?

	P	Q
A	230	90
B	230	86
C	222	90
D	222	86

12 During a fire in a laboratory storeroom, some radioactive material was spilled. A firefighter detected radiation through the lead-lined walls of the storeroom. The radiation was emitted by the radioactive material.



Which type of radiation was being detected?

A α-particles

B β-particles

C γ-rays

D X-rays

13 Which type of radiation has the greatest ionising effect?

A α-particles

B β-particles

C γ-rays

D all have the same ionising effect

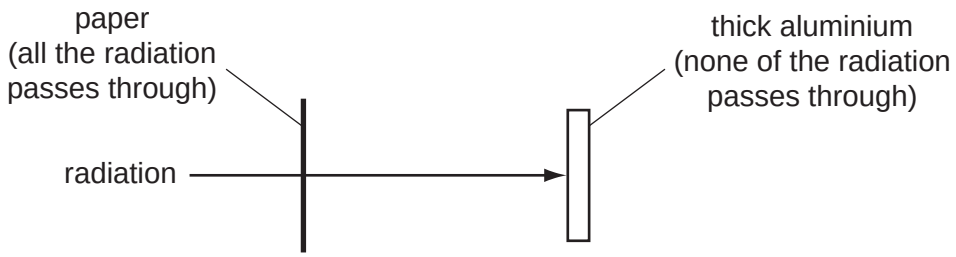
14 A powder contains 400 mg of a radioactive material that emits α-particles.

The half-life of the material is 5 days.

What mass of that material remains after 10 days?

A 0 mg **B** 40 mg **C** 100 mg **D** 200 mg

15 A radioactive source emits radiation that can pass through a sheet of paper but not through thick aluminium.



What does this show about the radiation?

A It is α-particles.

B It is β-particles.

C It is γ-rays.

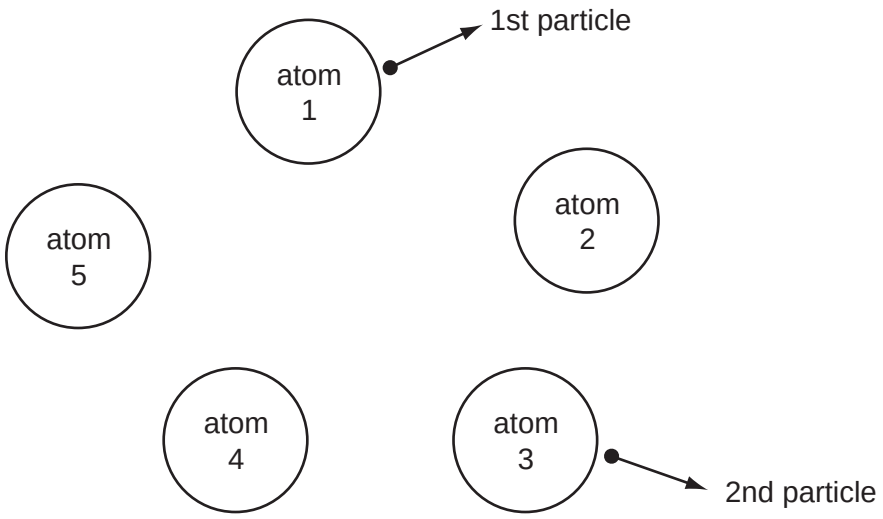
D It is a mixture of α-particles and γ-rays.

16 An unstable nucleus has 145 neutrons and 92 protons. It emits a β-particle.

How many neutrons and protons does the nucleus have after emitting the β-particle?

	neutrons	protons
A	144	92
B	144	93
C	145	91
D	145	93

17 The diagram shows five atoms in a radioactive substance. The atoms each give out an α-particle.



Atom 1 is the first to give out a particle. Atom 3 is the second to give out a particle.

Which atom will give out the next particle?

A atom 2

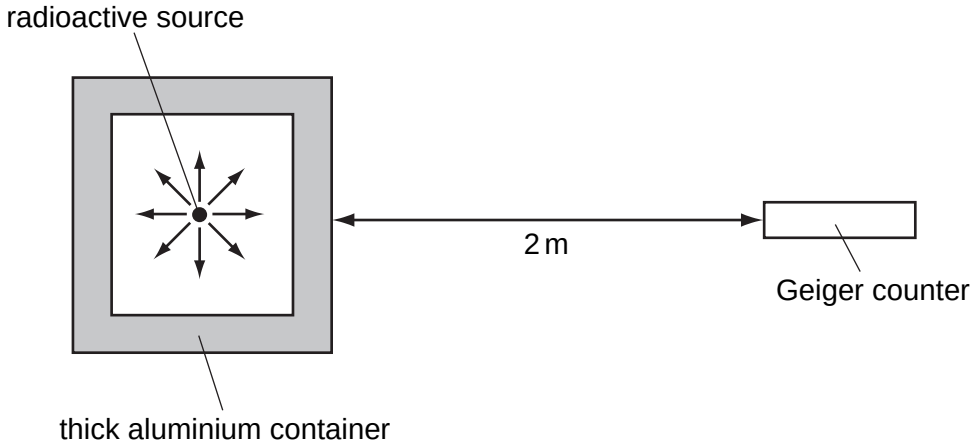
B atom 4

C atom 5

D impossible to tell

18 A Geiger counter detects radiation from radioactive sources.

A radioactive source is inside a thick aluminium container as shown.



Which type of radiation from this source is being detected?

A α-particles

B β-particles

C γ-rays

D radio waves

19 Which line in the table describes the nature of an α-particle and of a γ-ray?

	α-particle	γ-ray
A	helium nucleus	electromagnetic radiation
B	helium nucleus	electron
C	proton	electromagnetic radiation
D	proton	electron

20 The count rates of four radioactive sources were measured at the same time on three consecutive days.

Which source has a half-life of two days?

	Monday	Tuesday	Wednesday
A	100	50	25
B	200	140	100
C	300	300	300
D	400	200	100

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21 What are the most penetrating and the least penetrating types of radiation?

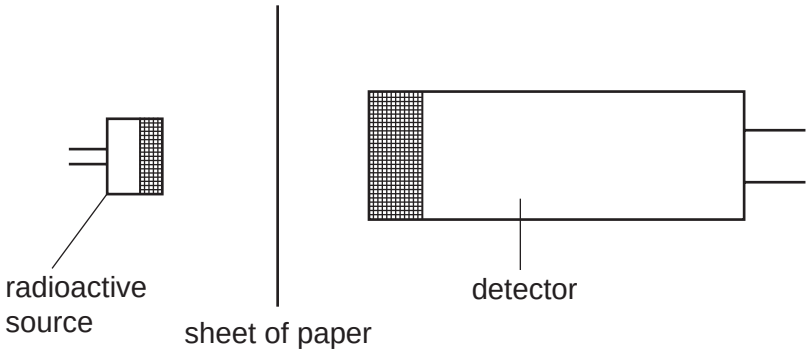
	most penetrating	least penetrating
A	α-particles	β-particles
B	β-particles	α-particles
C	γ-rays	α-particles
D	γ-rays	β-particles

22 The half-life of a radioactive substance is 5 hours. A sample is tested and found to contain 0.48 g of the substance.

How much of the substance was present in the sample 20 hours before the sample was tested?

A 0.03 g **B** 0.12 g **C** 1.92 g **D** 7.68 g

23 A sheet of paper is placed between a radioactive source and a detector.



Which types of radiation can pass through the paper?

A α-particles and β-particles only

B α-particles and γ-rays only

C β-particles and γ-rays only

D α-particles, β-particles and γ-rays

24 A sample of radioactive isotope is decaying.

The nuclei of which atoms will decay first?

A impossible to know, because radioactive decay is random

B impossible to know, unless the age of the material is known

C atoms near the centre, because they are surrounded by more atoms

D atoms near the surface, because the radiation can escape more easily

25 What is a β-particle and from which part of a radioactive atom is it emitted?

	β-particle	emitted from
A	electron	nucleus
B	electron	outer orbits
C	helium nucleus	nucleus
D	helium nucleus	outer orbits

26 A sample of radioactive uranium has mass 1 g. Another sample of the same material has mass 2 g.

Which property is the same for both samples?

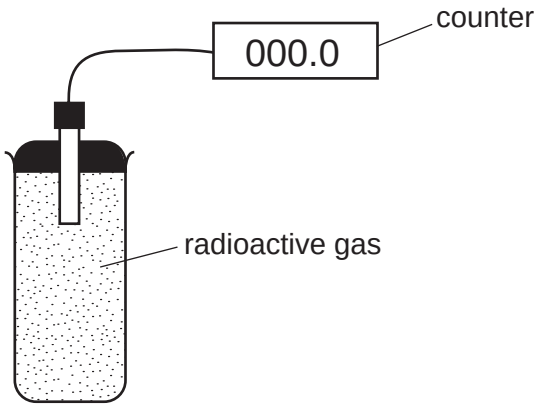
A the amount of radiation emitted per second

B the half-life

C the number of uranium atoms

D the volume

27 The diagram shows an experiment to monitor the radiation from a radioactive gas. The counter readings are corrected for background radiation.



The table shows how the counter reading varies with time.

time / seconds	0	20	40	60	80	100	120	140	160	180
counter reading / counts per minute	140	105	82	61	44	36	27	20	15	10

What is the half-life of the gas?

A between 20 and 40 seconds

B between 40 and 60 seconds

C between 60 and 140 seconds

D between 140 and 180 seconds

28 Which material is commonly used as a lining for a box for storing radioactive samples?

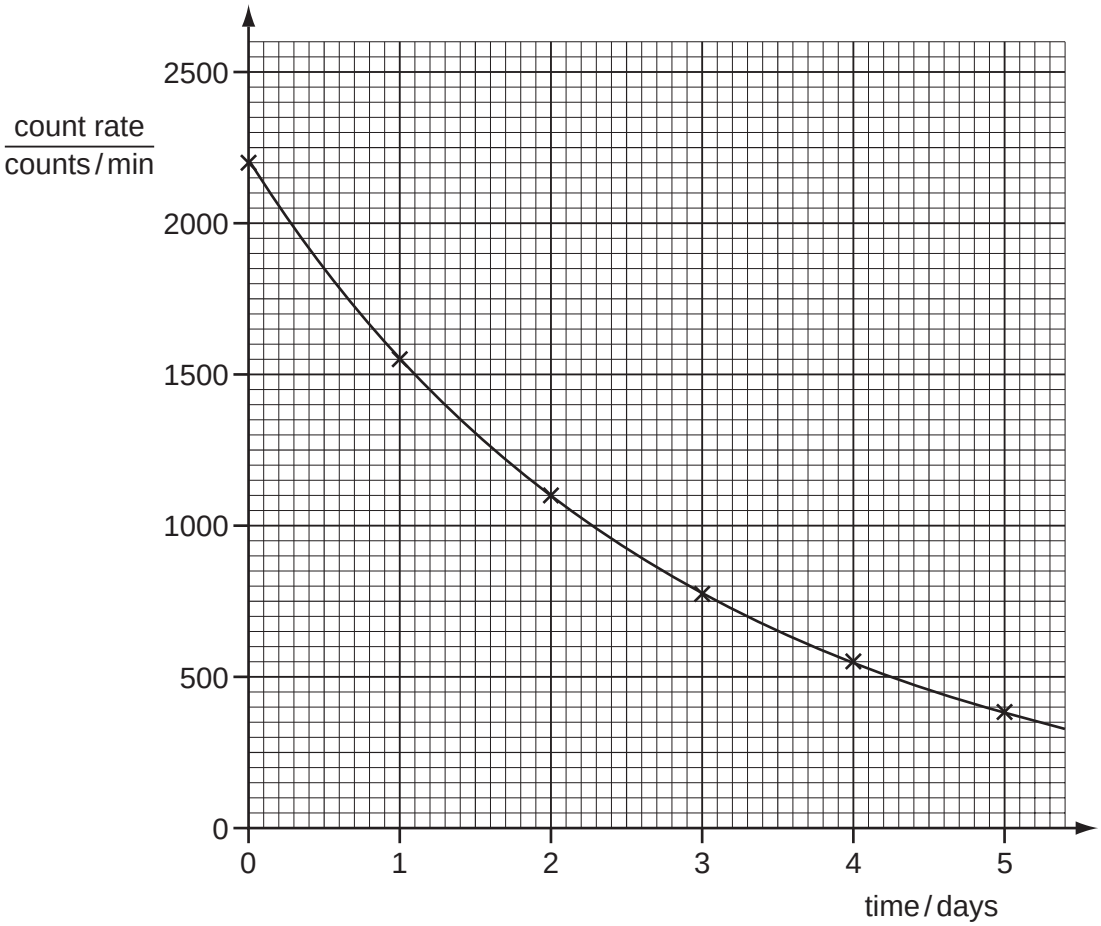
A aluminium

B copper

C lead

D uranium

29 The graph shows the decay curve for one particular radioactive nuclide.



What is the half-life of this nuclide?

A 1.0 day **B** 1.5 days **C** 2.0 days **D** 2.5 days

30 A radioactive nucleus contains 138 neutrons. The nucleus emits an α-particle.

How many neutrons are in the nucleus after it has emitted the α-particle?

A 134 **B** 136 **C** 138 **D** 139

31 Which statement explains the meaning of the half-life of a radioactive substance?

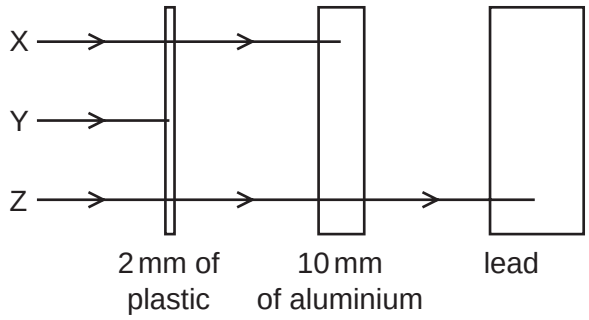
A half the time taken for half the substance to decay

B half the time taken for the substance to decay completely

C the time taken for half the substance to decay

D the time taken for the substance to decay completely

32 The diagram shows the paths of three different types of radiation, X, Y and Z.



Which row in the table correctly identifies X, Y and Z?

	X	Y	Z
A	α-particles	β-particles	γ-rays
B	β-particles	α-particles	γ-rays
C	β-particles	γ-rays	α-particles
D	γ-rays	α-particles	β-particles

33 Which row describes the properties of α-particles?

	ionizing effect	radiation stopped by aluminium?
A	large	no
B	large	yes
C	small	no
D	small	yes

34 A radioactive substance has a half-life of 2 weeks. At the beginning of an investigation the substance emits 3000 β-particles per minute.

How many β-particles will it emit per minute after 6 weeks?

A 0 **B** 375 **C** 500 **D** 1500

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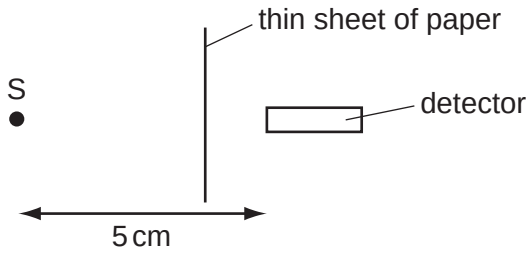
35 A radioactive element has a half-life of 70 s.

The number of emissions per second, *N*, of a sample of the element is measured at a certain time.

What was the number of emissions per second 70 s earlier?

A 0 **B** *N*/2 **C** *N* **D** 2*N*

36 S is a radioactive source emitting α-particles, β-particles and γ-rays. A detector is placed 5 cm away from S. A thin sheet of paper is placed as shown in the diagram.



Which radiations can be detected?

A α-particles and β-particles only

B α-particles and γ-rays only

C β-particles and γ-rays only

D α-particles, β-particles and γ-rays

37 Which row shows the relative ionising effects and penetrating abilities of α-particles and β-particles?

	ionising effect	penetrating ability
A	α greater than β	α greater than β
B	α greater than β	α less than β
C	α less than β	α greater than β
D	α less than β	α less than β

38 A powder contains 400 mg of a radioactive material that emits α-particles.

The half-life of the material is 5 days.

What mass of that material remains after 10 days?

A 0 mg **B** 40 mg **C** 100 mg **D** 200 mg

39 A scientist needs to use a source of γ-rays as safely as possible.

Which action will **not** reduce the amount of radiation that reaches the scientist?

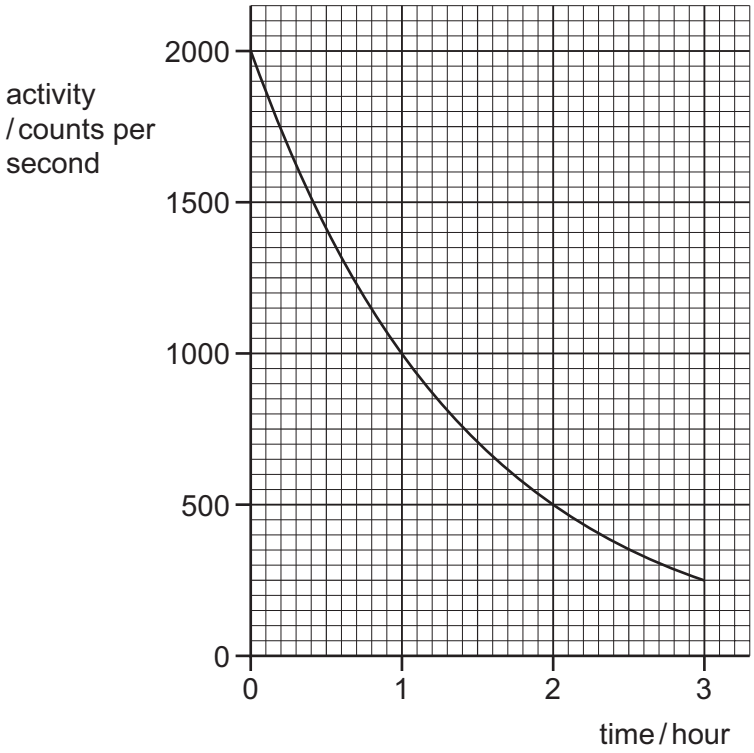
A keeping the distance between the source and the scientist as large as possible

B keeping the temperature of the source as low as possible

C keeping the time for which the scientist uses the source as small as possible

D placing a lead screen between the scientist and the source

40 The graph shows the activity of a radioactive source over a period of time.



What is the half-life of the source?

A $\frac{1}{2}$ hour **B** 1 hour **C** $1\frac{1}{2}$ hours **D** 3 hours

Radioactivity

1	B	11	D	21	C	31	C
2	A	12	C	22	D	32	B
3	B	13	A	23	C	33	B
4	A	14	C	24	A	34	B
5	A	15	B	25	A	35	D
6	D	16	B	26	B	36	C
7	A	17	D	27	B	37	B
8	A	18	C	28	C	38	C
9	D	19	A	29	C	39	B
10	B	20	B	30	B	40	B