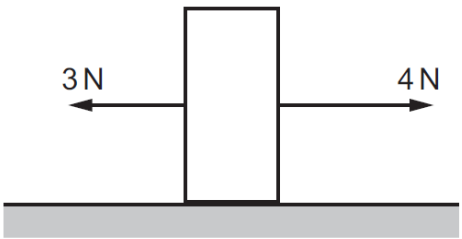
Forces – 2021 IGCSE 0625

1. June/2021/Paper_11/No.7

The diagram shows a solid object on a flat surface, with two forces acting on the object.



What is the resultant force on the object?

A 1 N to the left

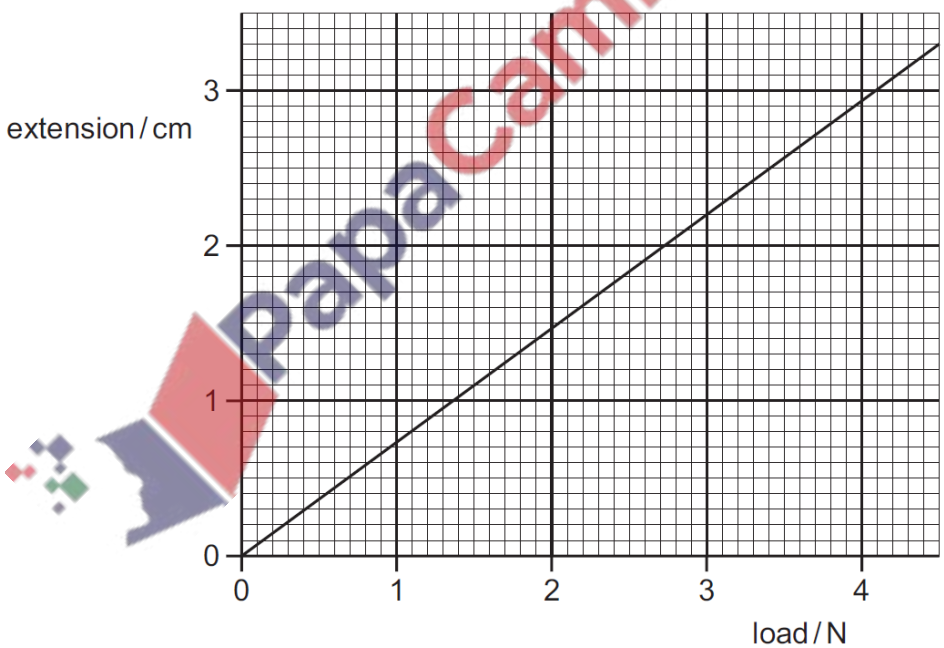
B 1 N to the right

C 7 N to the left

D 7 N to the right

2. June/2021/Paper_11,12,13,21,22&23/No.8,6

The extension–load graph for a spring is shown. The unstretched length of the spring is 17.0 cm.



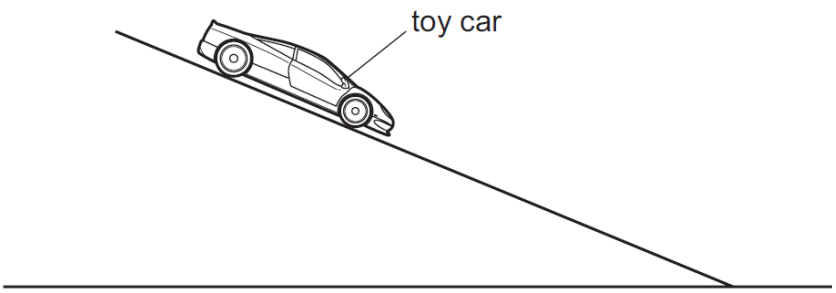
When an object is suspended from the spring, the length of the spring is 19.2 cm.

What is the weight of the object?

A 1.4 N **B** 1.6 N **C** 2.6 N **D** 3.0 N

3. June/2021/Paper_12/No.7

A toy car travels down a sloping ramp at constant speed.



Which statement about the forces acting on the car is correct?

A There are no forces acting on the car vertically.

B There is no resultant force acting on the car.

C There is no gravitational force acting on the car.

D There is no frictional force acting on the car.

4. June/2021/Paper_13/No.7

A train travels at a constant speed along a straight track.

Which statement about the resultant force on the train is correct?

A It is bigger than the thrust of the engine.

B It is constantly increasing.

C It is equal to the thrust of the engine.

D It is zero.

5. June/2021/Paper_21/No.7

A cart has a mass of 10 kg. A boy pushes on the cart horizontally with a force of 50 N. The cart accelerates at 0.50 m/s^2.

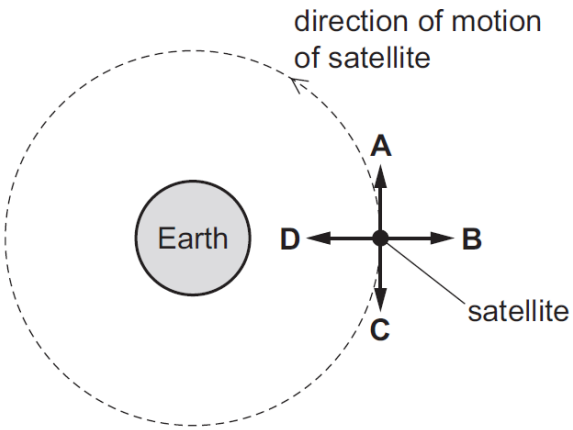
What is the frictional force acting on the cart?

A 5.0 N **B** 20 N **C** 30 N **D** 45 N

6. June/2021/Paper_22/No.7

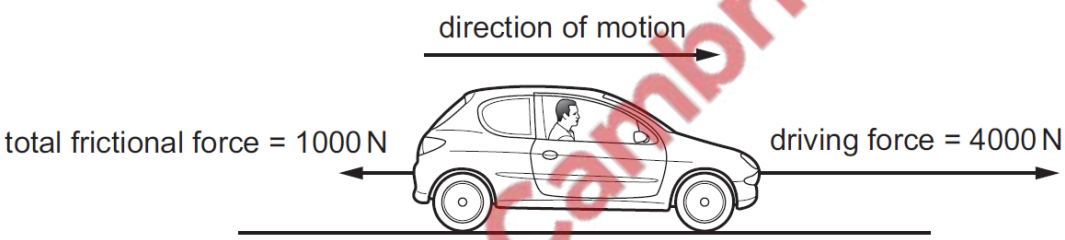
A satellite orbits the Earth in an anticlockwise direction at constant speed, as shown.

When the satellite is in the position shown, in which direction does the resultant force act upon it?



7. June/2021/Paper_23/No.7

A car of mass 1200 kg is travelling along a horizontal road.



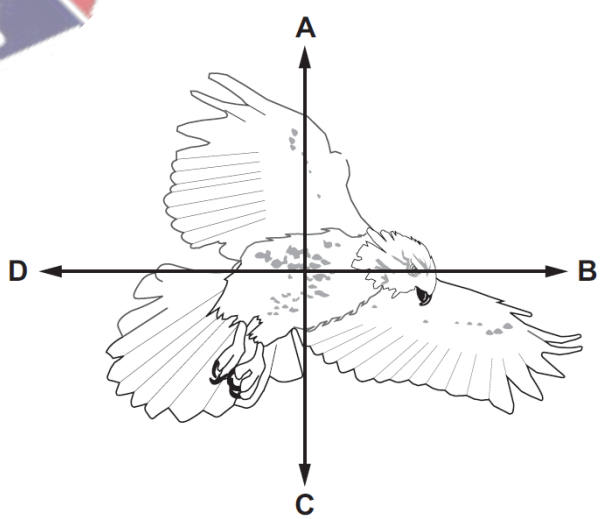
What is the acceleration of the car?

A $0.83\,m/s^2$ **B** $1.2\,m/s^2$ **C** $2.5\,m/s^2$ **D** $3.3\,m/s^2$

8. March/2021/Paper_12/No.5

The diagram shows a bird in flight. The bird is flying in a horizontal direction to the right.

In which direction does air resistance act on the bird?



9. March/2021/Paper_12/No.7

A rocket is travelling vertically upwards. Three vertical forces act on it.

The thrust acts upwards and is equal to 100 000 N.

The weight acts downwards and is equal to 80 000 N.

What is the air resistance force acting on the rocket when it is travelling upwards at constant speed?

A 20 000 N downwards

B 20 000 N upwards

C 180 000 N downwards

D 180 000 N upwards

10. March/2021/Paper_22/No.6

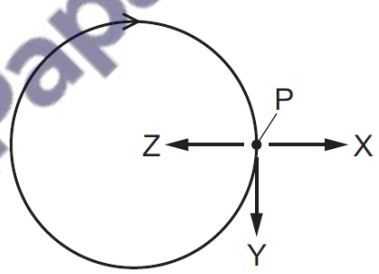
An object of mass 0.80 kg is moving in a straight line at a velocity of 2.0 m/s. A force is exerted on the object, in the direction of motion, for a period of 1.0 minute and the velocity of the object increases to 6.0 m/s.

What force is exerted on the object?

A 0.053 N **B** 0.080 N **C** 3.2 N **D** 4.8 N

11. March/2021/Paper_22/No.7

An object moves at constant speed in the circular path shown.



Which statement about the acceleration of the object when it is at point P is correct?

A The acceleration is in the direction of arrow X.

B The acceleration is in the direction of arrow Y.

C The acceleration is in the direction of arrow Z.

D The object is not accelerating.

12. June/2021/Paper_31/No.5

(a) A man starts pulling his suitcase across the floor.

Fig. 5.1 (not to scale)

(i) Fig. 5.1 shows the horizontal forces acting on the suitcase.

Calculate the resultant horizontal force on the suitcase.

size of force = ... N

direction .....

[2]

(ii) After a short time, the suitcase is moving at a constant speed.

Suggest values for the sizes of the two horizontal forces on the suitcase when it is moving at a constant speed.

pulling force = ... (N)

friction force = ... (N) [1]

(b) The total downward force of the suitcase on the ground is 150 N. The suitcase has two wheels. Each wheel has an area of 0.60 cm^2 touching the ground.

Calculate the pressure of the suitcase on the ground.

pressure on the ground = ... N/cm^2 [4]

[Total: 7]

13. June/2021/Paper_42/No.1

(a) Fig. 1.1 shows a sealed weather balloon which is stationary in still air.

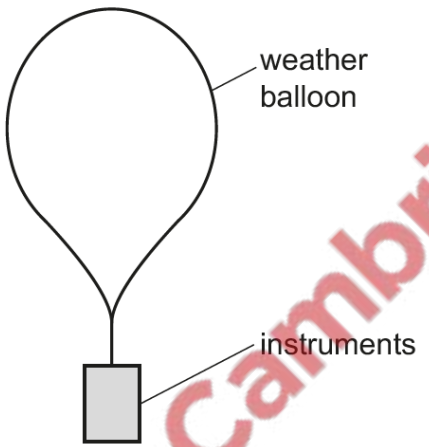


Fig. 1.1

State whether the overall density of the balloon and its instruments is greater than, less than, or the same as the density of the surrounding air.

..... [1]

(b) At night, the gas inside the balloon cools. The pressure of the air outside the balloon remains the same.

(i) State whether the balloon rises, falls or remains stationary.

..... [1]

(ii) Explain your answer.

.....

.....

..... [2]

(c) An object is released from the balloon. It starts at rest and eventually reaches a constant speed.

(i) On the axes of Fig. 1.2, sketch a speed–time graph to show this motion.

Fig. 1.2

[3]

(ii) State the values of the initial acceleration and the final acceleration of the object.

initial acceleration .....

final acceleration .....

[2]

[Total: 9]

14. June/2021/Paper_43/No.1

Fig. 1.1 shows a load suspended from a spring.

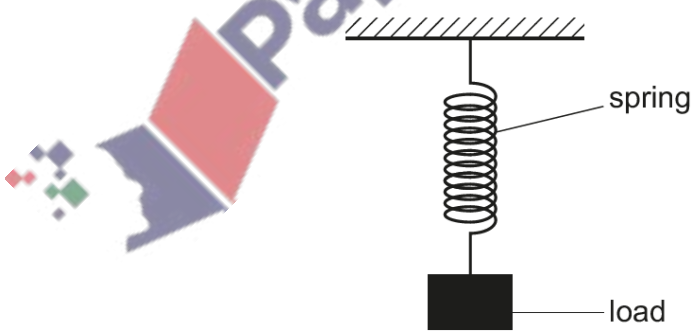


Fig. 1.1

The value of the spring constant k of the spring is 0.20 N/cm. The spring reaches its limit of proportionality when the load is 15 N.

(a) Calculate the extension of the spring when the load is 3.0 N.

extension = ... [2]

(b) Explain what is meant by the term *limit of proportionality* of the spring.

.....

.....

..... [2]

(c) On Fig. 1.2, sketch an extension–load graph for a spring. Label the limit of proportionality with the letter L on your graph.

Fig. 1.2

[2]

(d) The load is pulled down a small distance below its equilibrium position to position A, as shown in Fig. 1.3. The load then moves up and down between position A and position B in Fig. 1.3.

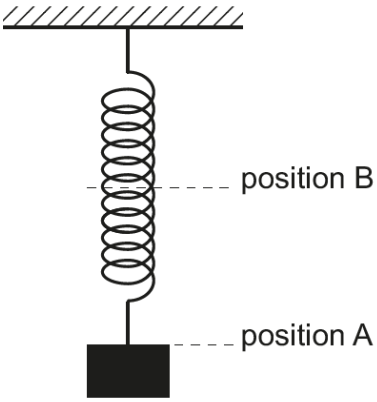


Fig. 1.3

Describe the energy transfers which occur as the load moves:

from position A to the equilibrium position

.....

.....

from the equilibrium position to position B.

.....

.....

[3]

[Total: 9]

15. March/2021/Paper_42/No.1

(a) Fig. 1.1 shows a piece of glass of thickness 2.0 cm and area 0.15 m^2.

The density of the glass is 2.6×10^3 kg / m^3.

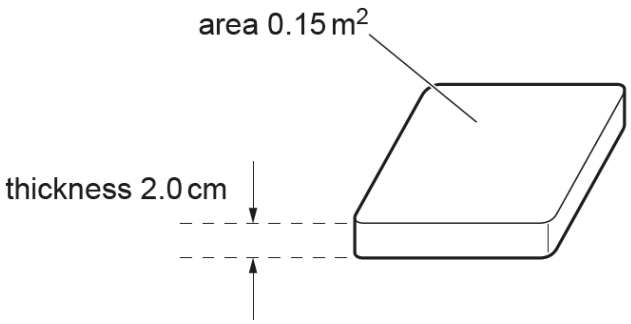


Fig. 1.1 (not to scale)

Calculate the weight of the piece of glass.

weight = ... [3]

(b) The piece of glass shown in Fig. 1.1 is used as the vertical viewing window of an aquarium. The atmospheric pressure outside the aquarium is 1.0×10^5 Pa. The average pressure on the inside of the aquarium window is 1.3×10^5 Pa.

Calculate the resultant force acting on the window due to these pressures and state the direction in which it acts.

force = ...

direction of force .....

[4]

(c) Fig. 1.2 shows a vacuum pump connected to the top of a vertical tube with its lower end immersed in a tank of liquid. The pump reduces the pressure above the column to zero and the pressure at point X is 9.6×10^4 Pa.

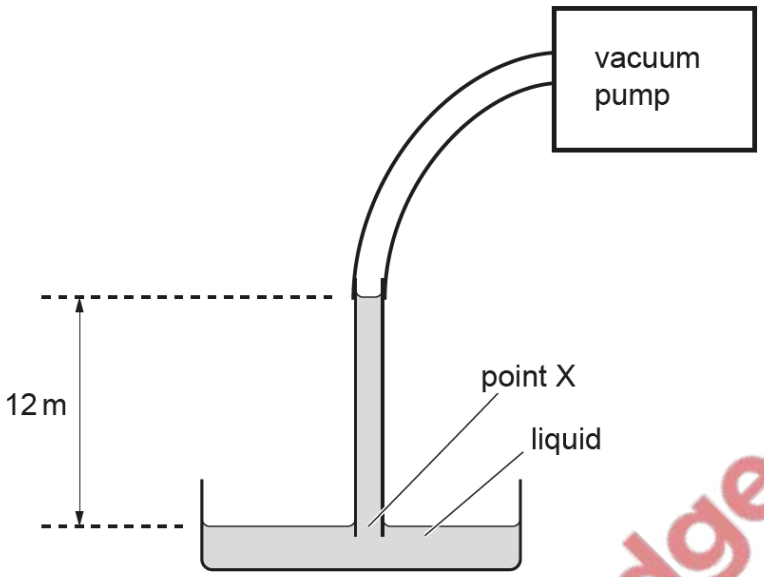


Fig. 1.2 (not to scale)

Calculate the density of the liquid.

density = ... [3]

[Total: 10]