Work, Energy and Power – 2021 IGCSE 0625

1. June/2021/Paper_11&21/No.9

Which situation involves no work being done and no energy being transferred?

A a car skidding to a stop on a road

B a crane lifting a load

C a heavy load hanging from a strong bar

D a student dragging a big box over a rough floor

2. June/2021/Paper_11&21/No.10

A student suggests that there are several ways of transferring energy to a small, stationary block of iron on a smooth table. He makes the following suggestions.

1 Heat it.

2 Shine light on it.

3 Pass a current through it.

Which suggestions are correct?

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

3. June/2021/Paper_12/No.9

An object is falling through a vacuum.

Which energy transfer is taking place?

A gravitational potential to kinetic

B gravitational potential to thermal

C kinetic to gravitational potential

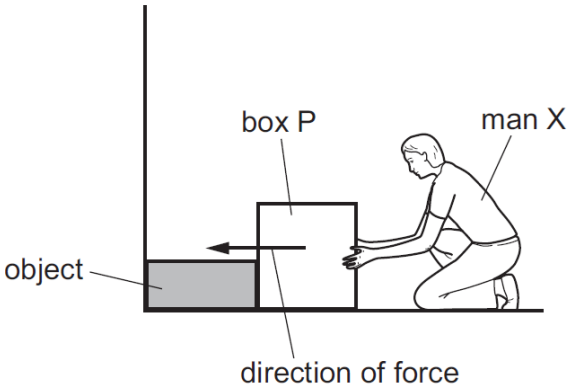
D kinetic to thermal

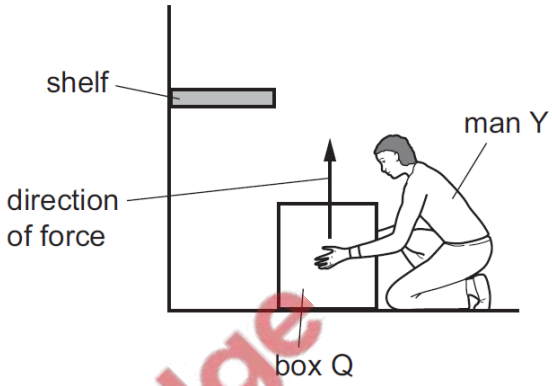
4. June/2021/Paper_11,12&13/No.11

Two men, X and Y, try to move identical heavy boxes, P and Q.

Man X tries to push box P along the floor. The box does not move because an object is in the way.

Man Y lifts box Q from the floor onto a shelf.





Which man does the most work on their box, and which box gains the most energy?

	man doing most work	box gaining most energy
A	X	P
B	X	Q
C	Y	P
D	Y	Q

5. June/2021/Paper_21/No.11

An engine produces 240 kJ of energy in 2.0 minutes.

What is the power output of the engine?

A 2.0 kW **B** 120 kW **C** 480 kW **D** 28 800 kW

6. June/2021/Paper_22/No.10

A stone is released from rest from a high building on Earth. Air resistance is negligible.

What is its velocity when it has fallen 5 m?

A 7.1 m/s **B** 10 m/s **C** 50 m/s **D** 100 m/s

7. June/2021/Paper_22/No.11

The power input to an electric motor is 400 W. The efficiency of the motor is 85%.

How much power is wasted?

A 60 W **B** 85 W **C** 340 W **D** 470 W

8. June/2021/Paper_23/No.10

The energy input to a device is *E*.

The amount of energy wasted by the device is *W*.

Which expression gives the efficiency of the device?

A $\frac{W-E}{W} \times 100\%$

B $\frac{W}{E} \times 100\%$

C $\frac{E-W}{E} \times 100\%$

D $\frac{E-W}{W} \times 100\%$

9. June/2021/Paper_23/No.11

A builder lifts 30 bricks from the ground onto a platform 2.0 m high.

Each brick has a mass of 4.0 kg.

What is the work done against gravity by the builder in lifting the bricks onto the platform?

A 80 J **B** 120 J **C** 240 J **D** 2400 J

10. March/2021/Paper_12&22/No.10

A horizontal force pulls a box along a horizontal surface.

The box gains 30 J of kinetic energy and 10 J of thermal energy is produced by the friction between the box and the surface.

How much work is done by the force?

A 10 J **B** 20 J **C** 30 J **D** 40 J

11. March/2021/Paper_12/No.11

The table shows the work done and the time taken by four machines.

Which machine is the most powerful?

	work done / kJ	time taken / s
A	100	10
B	100	20
C	200	10
D	200	20

12. March/2021/Paper_22/No.11

A crane is used to lift loads vertically.

The output power of the crane to lift a car is P.

The crane then lifts a lorry, which has 3.0 times the weight of the car, through 0.25 of the distance in 0.50 of the time.

What is the output power of the crane now?

A $\frac{3P}{8}$ **B** $\frac{3P}{2}$ **C** $\frac{8P}{3}$ **D** $6P$

13. June/2021/Paper_32/No.4

A student investigates energy changes when a ball rolls down a curved track.

The student holds the ball at a starting point on the curved track, as shown in Fig. 4.1.

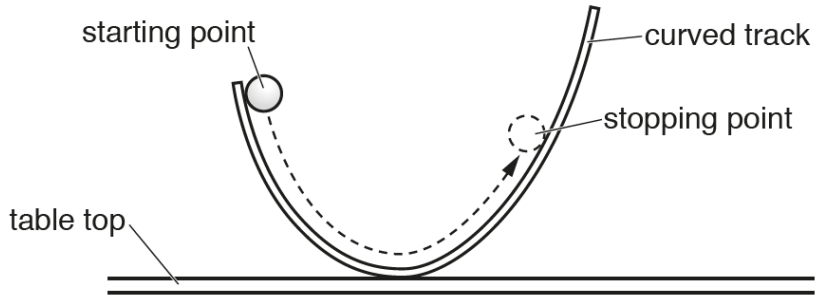


Fig. 4.1

The ball is released. It rolls down the track, up the other side to the stopping point and then back down again.

(a) Describe the energy changes that take place as the ball rolls from the starting point to the stopping point.

.....

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..... [4]

(b) The height of the stopping point is less than the height of the starting point.

Describe how the principle of conservation of energy explains the difference between the height of the stopping point and the height of the starting point.

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..... [2]

[Total: 6]

14. June/2021/Paper_42/No.3

Fig. 3.1 shows water flowing at very slow speed over a cliff edge.

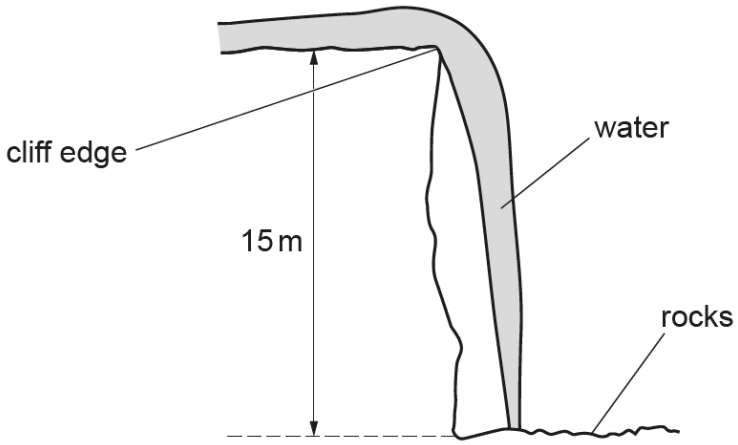

Fig. 3.1

The water falls 15 m onto the rocks below.

(a) Show that the velocity of the water when it strikes the rocks is 17 m/s.

[4]

(b) 30 kg of water flows over the cliff edge every second.

Calculate the force exerted by the rocks on the falling water. Ignore any splashing.

force = ... [3]

[Total: 7]

15. March/2021/Paper_32/No.1

Fig. 1.1 shows a box dropped from an aeroplane. The box contains supplies.
A parachute is attached to the box. The parachute is opened when the time is 6.0 s.

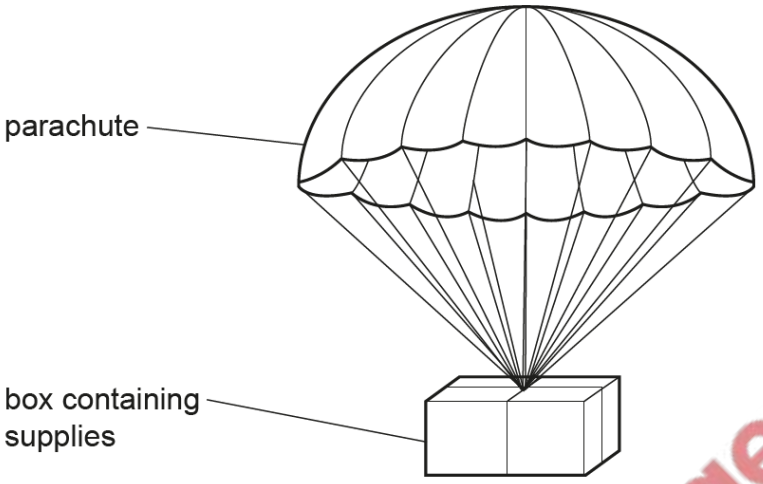

Fig. 1.1

The graph in Fig. 1.2 shows the vertical speed of the box as it falls.

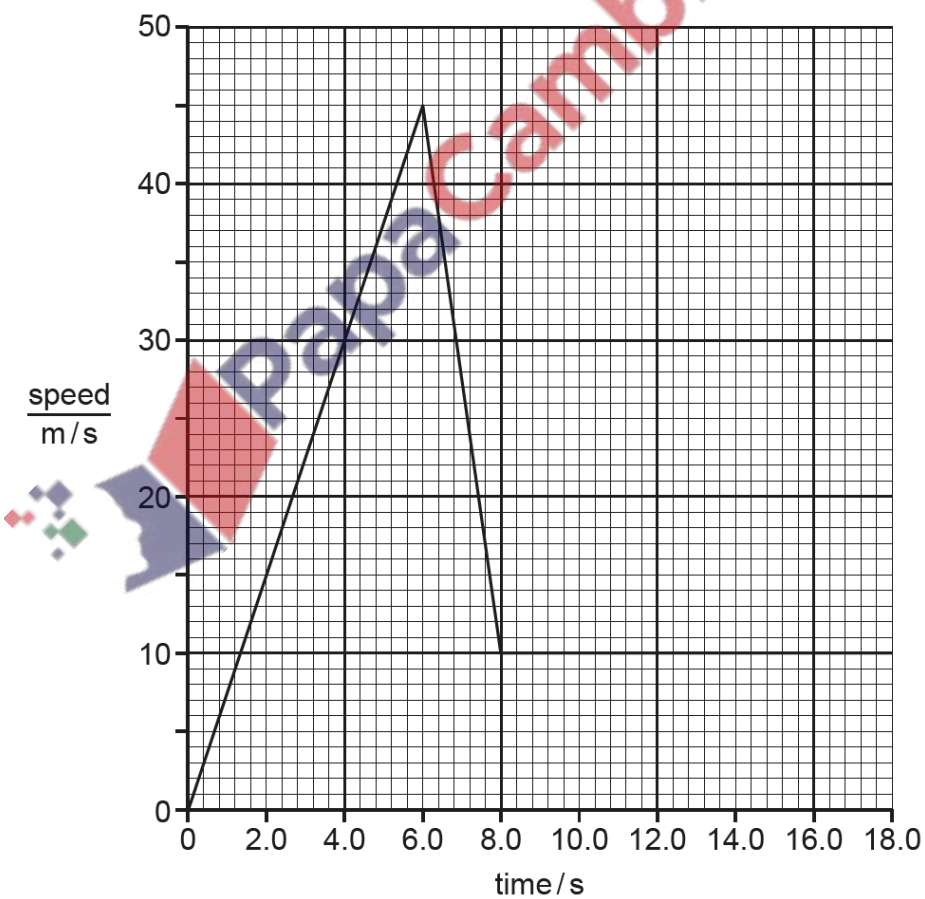

Fig. 1.2

(a) State and explain what happens to the kinetic energy of the box during the first 6.0 s of its descent.

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..... [2]

(b) State and explain what happens to the gravitational potential energy of the box during the first 6.0 s.

.....

.....

..... [2]

(c) **(i)** Use the graph in Fig. 1.2 to determine the speed of the object when the object is moving with a constant speed.

speed of the object at constant speed = ... m/s [2]

(ii) State the size of the resultant vertical force on the box when it is falling at a constant speed.

..... [1]

(d) Use the graph in Fig. 1.2 to determine the distance travelled by the box during the first 6.0 s.

distance travelled in first 6.0 s = ... m [3]

(e) Without calculation, describe how Fig. 1.2 shows that the deceleration of the box is greater than the acceleration of the box.

.....

..... [1]

[Total: 11]