Work, Energy and Power – 2022 June IGCSE 0625

1. June/2022/Paper_11/No.9

A mass hangs vertically from a spring.

The mass is raised to a point P and is then released.

The mass oscillates repeatedly between point P and a lower point Q.

Which energies alternately increase and decrease throughout the oscillations?

A gravitational potential energy, kinetic energy and elastic energy

B gravitational potential energy and kinetic energy only

C gravitational potential energy, kinetic energy and internal energy

D internal energy and elastic energy

2. June/2022/Paper_11/No.10

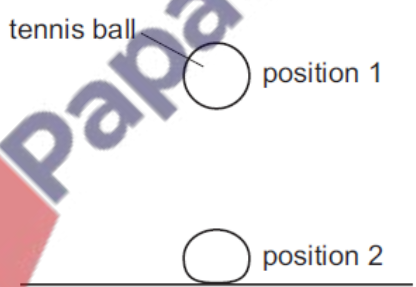
A force F acts on an object and the object moves a distance d in the direction of the force.

What is the work done on the object?

A $\frac{F}{d}$ **B** $\frac{d}{F}$ **C** $F \times d$ **D** $\frac{1}{(F \times d)}$

3. June/2022/Paper_12/No.9

A tennis ball is dropped from position 1. It falls vertically onto a hard surface at position 2.



Which energy changes have taken place between position 1 and position 2?

A gravitational potential → kinetic → chemical

B gravitational potential → kinetic → elastic (strain)

C kinetic → gravitational potential → chemical

D kinetic → gravitational potential → elastic (strain)

4. June/2022/Paper_12/No.10

A force does work moving an object in the direction of the force.

Which change in the force and distance **always** increases the work done?

	force	distance
A	greater	same
B	greater	smaller
C	same	smaller
D	smaller	smaller

5. June/2022/Paper_13/No.9

In which form is energy stored by stretching a spring?

A chemical energy

B elastic potential energy

C gravitational potential energy

D thermal energy

6. June/2022/Paper_13/No.10

What is meant by the power of an engine?

A the energy that the engine transfers per unit time

B the maximum force that the engine can exert

C the maximum weight that the engine can lift

D the total energy that the engine transfers

7. June/2022/Paper_21/No.11

A mass hangs vertically from a spring.

The mass is raised to a point P and is then released.

The mass oscillates repeatedly between point P and a lower point Q.

Which energies alternately increase and decrease throughout the oscillations?

A gravitational potential energy, kinetic energy and elastic energy

B gravitational potential energy and kinetic energy only

C gravitational potential energy, kinetic energy and internal energy

D internal energy and elastic energy

8. June/2022/Paper_21/No.12

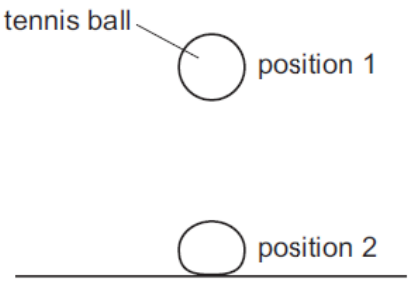
A car has 620 kJ of kinetic energy. The car brakes and stops in a distance of 91 m.

What is the average braking force acting on the car?

A 0.15 N **B** 6.8 N **C** 6800 N **D** 56 000 N

9. June/2022/Paper_22/No.11

A tennis ball is dropped from position 1. It falls vertically onto a hard surface at position 2.



Which energy changes have taken place between position 1 and position 2?

A gravitational potential → kinetic → chemical

B gravitational potential → kinetic → elastic (strain)

C kinetic → gravitational potential → chemical

D kinetic → gravitational potential → elastic (strain)

10. June/2022/Paper_22/No.12

A boy holds onto a bar and pulls himself up until his chin is level with the bar.

He raises himself through 40 cm in 0.5 s.

The weight of the boy is 500 N.

What is the average power he produces as he raises himself?

A 40 W **B** 400 W **C** 4000 W **D** 40 000 W

11. June/2022/Paper_23/No.11

In which form is energy stored by stretching a spring?

A chemical energy

B elastic potential energy

C gravitational potential energy

D thermal energy

12. June/2022/Paper_23/No.12

A car moves along a horizontal road. Its initial kinetic energy is 280 kJ. A constant resistive force of 200 N acts on the car. No other horizontal forces act on the car.

What is the kinetic energy of the car after it has travelled a distance of 300 m?

A 60 kJ **B** 80 kJ **C** 220 kJ **D** 340 kJ

13. June/2022/Paper_31/No.4(a)

Fig. 4.1 shows an electric motor and pulley wheel being used to raise a load M. The electric motor uses a belt to turn the pulley wheel.

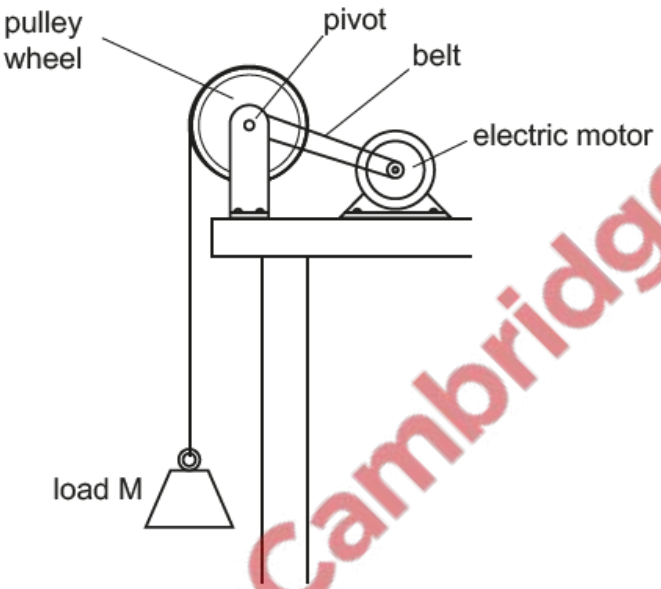


Fig. 4.1

(a) When the electric motor lifts the load, it transfers energy. Fig. 4.2 shows the energy transfers.

Write on Fig. 4.2 to complete the label in each box. The first label is done for you.

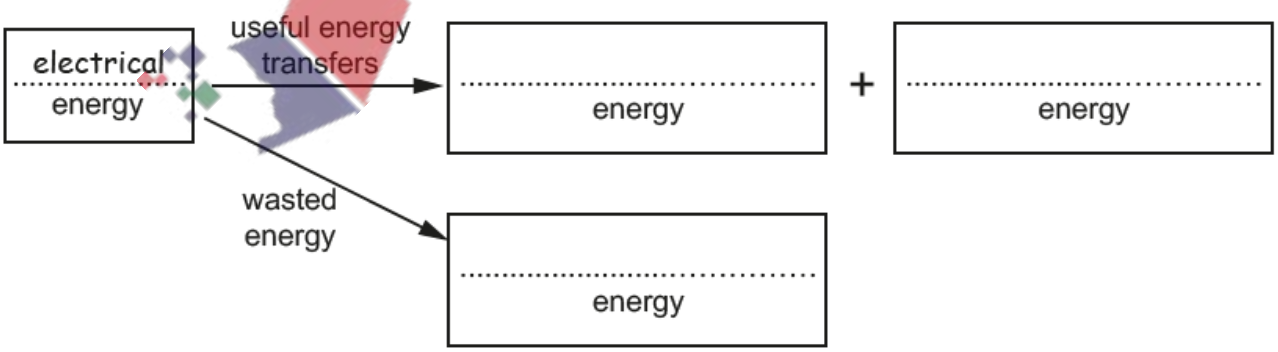


Fig. 4.2

[3]

14. June/2022/Paper_33/No.2(a, b)

Fig. 2.1 shows two identical metal blocks, A and B, being lifted 3.0 m from ground level.

Block A is lifted by a motor. Block B is lifted by a person.

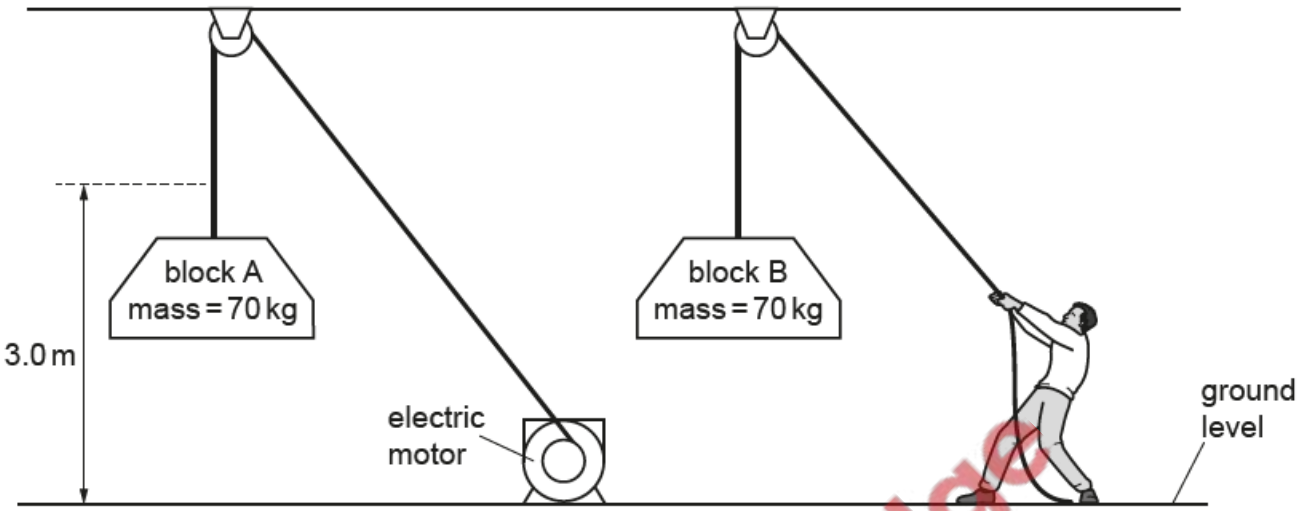


Fig. 2.1

(a) Complete the following sentences.

(i) As the motor starts turning, it usefully transfers ..... energy to ..... energy. [2]

(ii) Both blocks gain ..... energy. [1]

(b) Both blocks are lifted at the same steady speed. The blocks are then held at a height of 3.0 m.

(i) Compare the energy gained by block A with the energy gained by block B.

..... [1]

(ii) Explain why the energy input to the motor is more than the energy gained by block A.

.....

.....

..... [2]

15. June/2022/Paper_42/No.1

Fig. 1.1 shows an electrically powered bicycle.

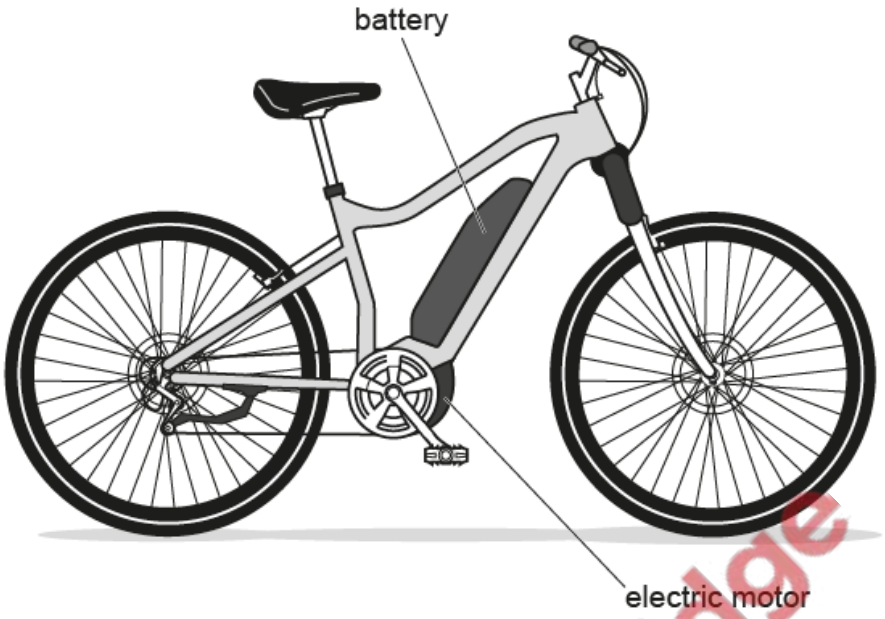


Fig. 1.1

When fully charged, the battery can deliver a power of 600 W for 60 min.

(a) (i) Calculate the energy, in joules, stored in the battery when fully charged.

energy = ... J [3]

(ii) State the form of energy stored by the battery.

..... [1]

(b) The bicycle has a motor with an electrical input power of 250 W.

Calculate the time for which the battery can power the bicycle.

time = ... [2]

(c) Consider this bicycle compared to a small motorcycle.

State **two** environmental benefits of the electrically powered bicycle.

1. .....

2. .....

[2]

[Total: 8]

16. June/2022/Paper_42/No.3(b)

(b) The mass of the canoeist is 65 kg.

Calculate her kinetic energy when travelling on still water at 2.5 m/s.

energy = ... [2]

17. June/2022/Paper_43/No.1

A battery provides energy to an electric car.

(a) The electric car has an acceleration of $2.9\,m/s^2$ when it moves from rest.
The combined mass of the car and its driver is 1600 kg.

(i) Calculate the time taken to reach a speed of 28 m/s.

time = ... [2]

(ii) Calculate the force required to produce this acceleration.

force = ... [2]

(iii) Calculate the kinetic energy of the car when its speed is 28 m/s.

kinetic energy = ... [2]

(b) The time taken for the car battery to be recharged from zero charge to full charge is 8.3 h.
The charge is delivered to the battery by a charger with a current of 32 A.

Calculate the charge supplied by the charger.

charge = ... [3]

(c) Under ideal conditions, the car can travel a maximum distance of 390 km when the battery is fully charged.

Suggest why, in normal use, the car needs to be recharged after travelling less than 390 km.

.....

..... [1]

[Total: 10]