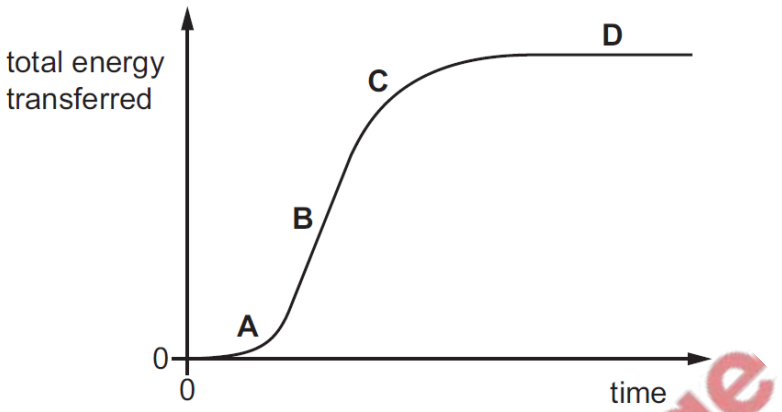
Work, Energy and Power – 2021 IGCSE 0625

1. Nov/2021/QPaper_11/No.7

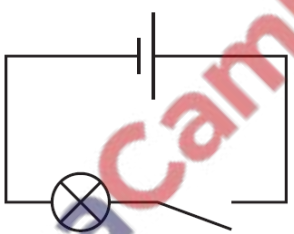
The graph shows the total energy transferred by an electric motor over a period of time.

In which region of the graph is the greatest power being developed by the motor?



2. Nov/2021/QPaper_11/No.9

The diagram shows an electric circuit. When the switch is closed, the lamp is lit.



Which row states the type of energy stored in the cell and how this energy is usefully transferred to the lamp?

	type of energy stored in the cell	how this energy is usefully transferred to the lamp
A	chemical	by electric current
B	chemical	by light
C	electrical	by electric current
D	electrical	by light

3. Nov/2021/QPaper_11/No.10

A scientist uses an electric motor to lift a load through a vertical distance of 2.0 m.

He then increases the input power to the motor and repeats the experiment. The efficiency of the motor does not change.

Which row correctly describes the effect that this has on the useful work done lifting the load and the time taken to lift it?

	work done	time taken
A	decreases	decreases
B	stays the same	decreases
C	decreases	stays the same
D	stays the same	stays the same

4. Nov/2021/QPaper_12/No.7

A student carries out an investigation by pulling four different boxes across the floor.

The results are shown in the table.

On which box is the most work done?

	frictional force needed to pull the box / N	distance moved across the floor / m
A	5	4
B	10	2
C	15	2
D	20	4

5. Nov/2021/QPaper_12/No.9

A stone falls.

Which row gives the energy changes?

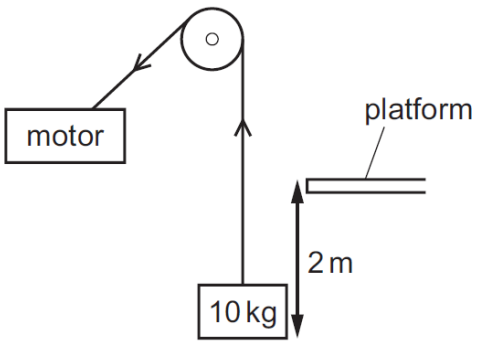
	gravitational potential energy	kinetic energy
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

6. Nov/2021/QPaper_12&22/No.10

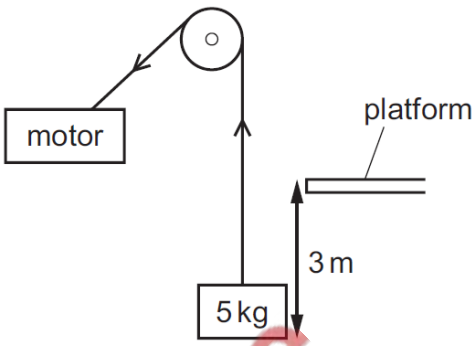
A rope, connected to a pulley system and motor, is used to lift different objects through different distances. The time taken to lift each object is the same. The diagrams are not to scale.

Which motor requires the greatest power?

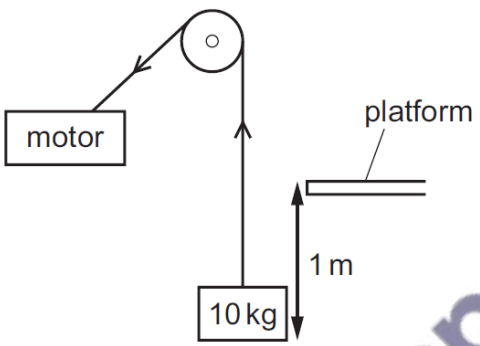
A



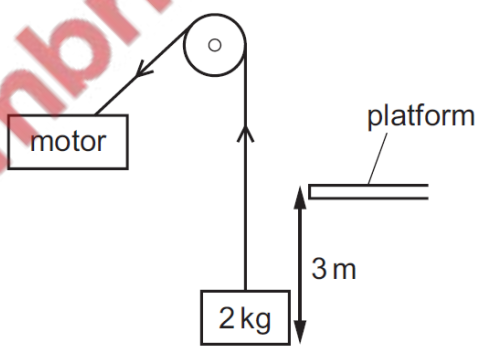
B



C



D

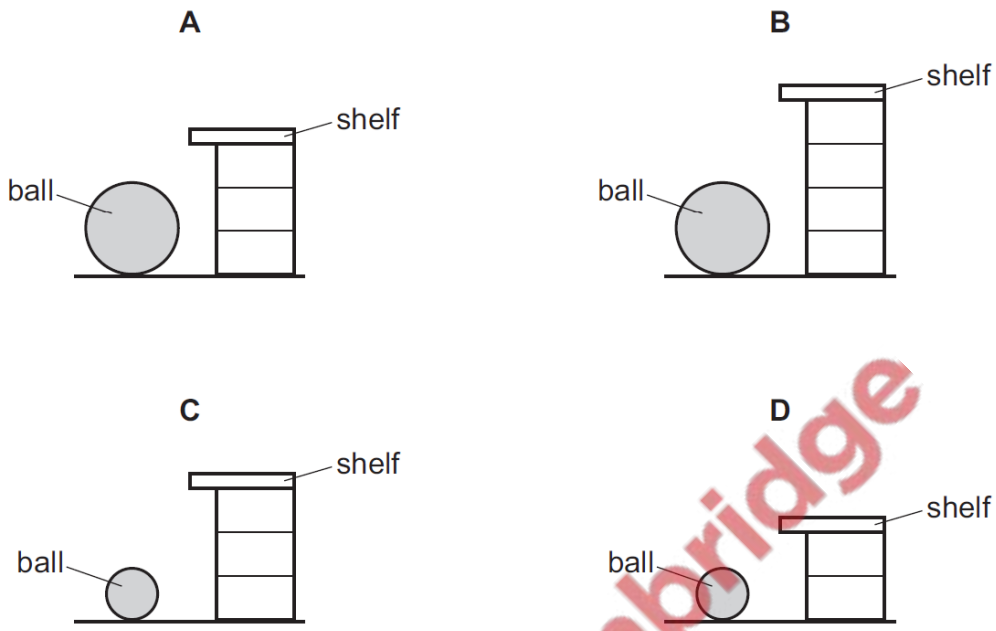


7. Nov/2021/QPaper_13/No.7

A weightlifter picks up a stone ball and places it on a shelf.

Each lift takes the same time.

Which situation requires the greatest power?



8. Nov/2021/QPaper_13/No.9

A person lifts a book from floor level to a shelf. It falls to the floor and a second person lifts it back up to the shelf.

Which statement **must** be correct?

A The second person does the same work on the book as the first person.

B The second person takes the same time as the first person.

C The second person develops the same power as the first person.

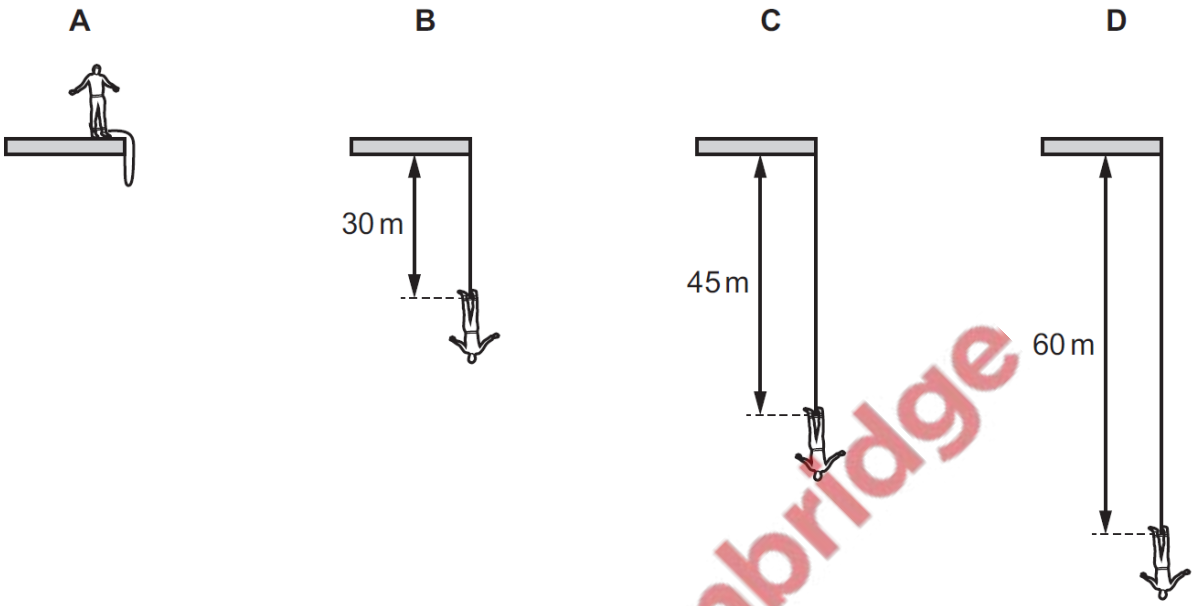
D The second person does the same work on the book as the first person, develops the same power and takes the same time.

9. Nov/2021/QPaper_13&23/No.10

A man, attached to an elastic cord, jumps from a platform. He falls 60 m before starting to rise. The length of the unextended cord is 30 m.

The diagrams show four successive stages in his fall.

In which position is elastic (strain) energy and kinetic energy present?



10. Nov/2021/QPaper_21/No.9

A motor of power P exerts a force F on an object. The object moves a distance d during the time t that the force acts.

Which equation is used to calculate the time t?

A $t = \frac{F}{Pd}$ **B** $t = \frac{Fd}{P}$ **C** $t = \frac{Pd}{F}$ **D** $t = \frac{P}{Fd}$

11. Nov/2021/QPaper_21/No.10

A scientist uses an electric motor to lift a load through a vertical distance of 2.0 m.

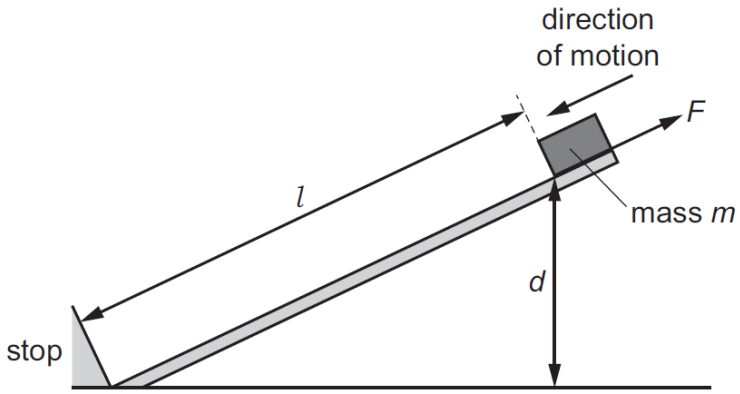
He then increases the input power to the motor and repeats the experiment. The efficiency of the motor does not change.

Which row correctly describes the effect that this has on the useful work done lifting the load and the time taken to lift it?

	work done	time taken
A	decreases	decreases
B	stays the same	decreases
C	decreases	stays the same
D	stays the same	stays the same

12. Nov/2021/QPaper_22/No.9

A box of mass m slides down a slope of length l against a frictional force F. It descends a vertical height d.



As the box slides down the slope, it loses gravitational potential energy and it does work against the friction.

Which row gives the loss in gravitational potential energy and the work done against friction?

	loss in gravitational potential energy	work done against friction
A	mgd	Fl
B	mgd	Fd
C	mgl	Fl
D	mgl	Fd

13. Nov/2021/QPaper_33/No.4

(a) **(i)** State the principle of conservation of energy.

.....

..... [1]

(ii) Fig. 4.1 shows a type of light bulb. Energy changes occur when electrical energy is supplied to the light bulb, as shown in Fig. 4.1.

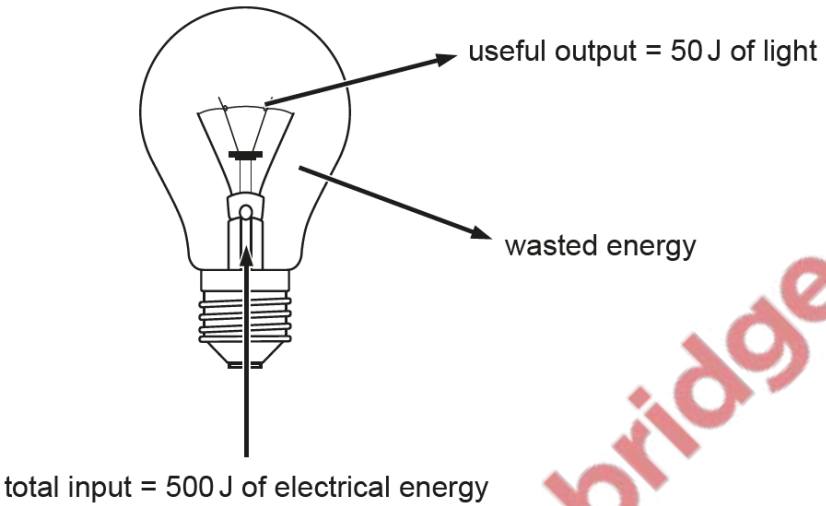


Fig. 4.1

Calculate the wasted energy when the total input energy is 500 J.
Use information from Fig. 4.1.

wasted energy = ... J [2]

(iii) Describe the effect of the wasted energy on the air surrounding the light bulb.

..... [1]

(b) Table 4.1 lists situations in which energy is stored.

Complete Table 4.1 by naming the form of energy stored in each situation.

Table 4.1

situation	form of energy stored
battery in a mobile phone	
coal in the ground	
a rotating turbine	
water stored behind a hydroelectric dam	

[4]

[Total: 8]

14. Nov/2021/QPaper_41/No.4

A train of mass 1.8×10^5 kg is at rest in a station. At time $t = 0$, the train begins to accelerate along a straight, horizontal track and reaches a speed of 20 m/s at $t = 15$ s. The train continues at a speed of 20 m/s for 10 s.

At $t = 25$ s, the driver applies the brakes and the resistive force on the train causes it to decelerate uniformly to rest in a further 24 s.

Fig. 4.1 is an incomplete distance–time graph for this journey.

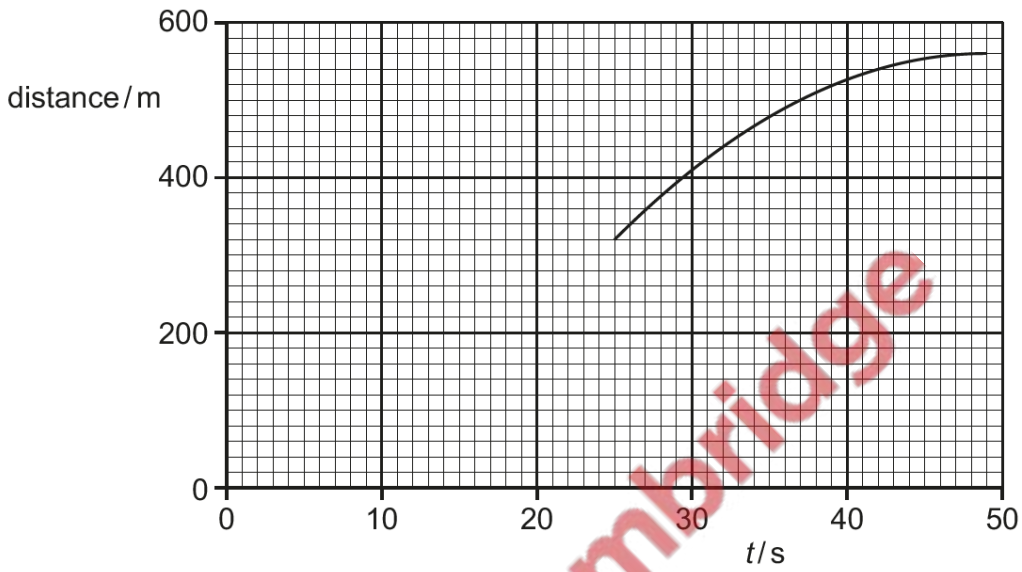


Fig. 4.1

(a) Complete Fig. 4.1 by drawing:

(i) a line to represent the motion of the train between $t = 15$ s and $t = 25$ s [1]

(ii) a curve to represent the motion of the train between $t = 0$ and $t = 15$ s. [1]

(b) Calculate the kinetic energy of the train between $t = 15$ s and $t = 25$ s.

kinetic energy = ... [3]

(c) While the train decelerates to rest, it does work against the resistive force and its kinetic energy decreases.

(i) Define *work done*.

.....

..... [2]

(ii) Using Fig. 4.1, determine the distance moved by the train while it decelerates.

distance moved = ... [1]

(iii) Calculate the resultant force acting on the train while it decelerates.

resultant force = ... [2]

[Total: 10]

15. Nov/2021/QPaper_43/No.2

Fig. 2.1 shows a simplified version of a 'gravity lamp'. This apparatus is used to light a light-emitting diode (LED) without mains electricity.

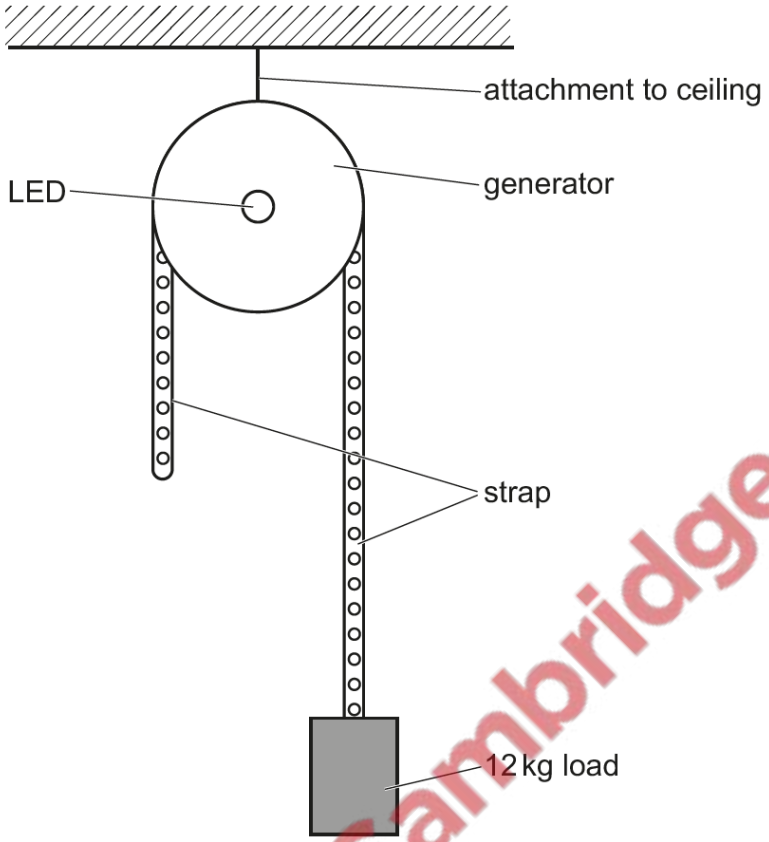


Fig. 2.1

The load of 12 kg is raised to a height of 1.7 m above the ground. The load is connected to a pulley system. The time taken for the load to fall to the ground is 1200 seconds. The load falls at constant speed. The generator is connected to an LED.

(a) Calculate the rate of transfer of gravitational potential energy as the load falls to the ground.

rate of transfer of gravitational potential energy = ... [4]

(b) The light output of the LED is 0.10 W.
Calculate the efficiency of the 'gravity lamp'.

efficiency = ... [2]

(c) Suggest a social or environmental advantage of using a 'gravity lamp'.

.....

..... [1]

[Total: 7]