

Energy, Work and Power

Question Paper 10

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	General Physics
Sub-Topic	Energy, Work and Power
Paper Type	(Extended) Theory Paper
Booklet	Question Paper 10

Time Allowed: 55 minutes

Score: /46

Percentage: /100

- 1 Fig. 3.1 shows an aeroplane of mass 3.4×10^5 kg accelerating uniformly from rest along a runway.

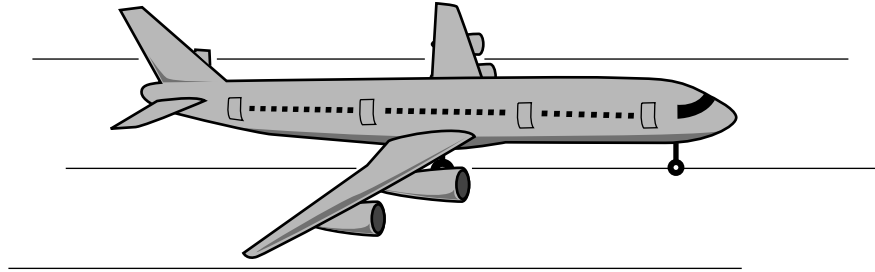


Fig. 3.1

After 26 s it reaches a speed of 65 m/s.

(a) Calculate

- (i) the acceleration of the aeroplane,

acceleration = [2]

- (ii) the resultant force on the aeroplane.

force = [2]

(b) Just after taking off, the aeroplane continues to accelerate as it gains height.

- (i) State **two** forms of energy that increase during this time.

1.

2. [2]

- (ii) State **one** form of energy that decreases during this time.

..... [1]

(iii) State why the total energy of the aeroplane decreases during this time.

.....
..... [1]

(c) When the aeroplane reaches its maximum height, it starts to follow a curved path at a constant speed.

State the direction of the resultant force on the aeroplane.

..... [1]

[Total: 9]

- 2 An ornamental garden includes a small pond, which contains a pumped system that causes water to go up a pipe and then to run down a heap of rocks.

Fig. 3.1 shows a section through this water feature.

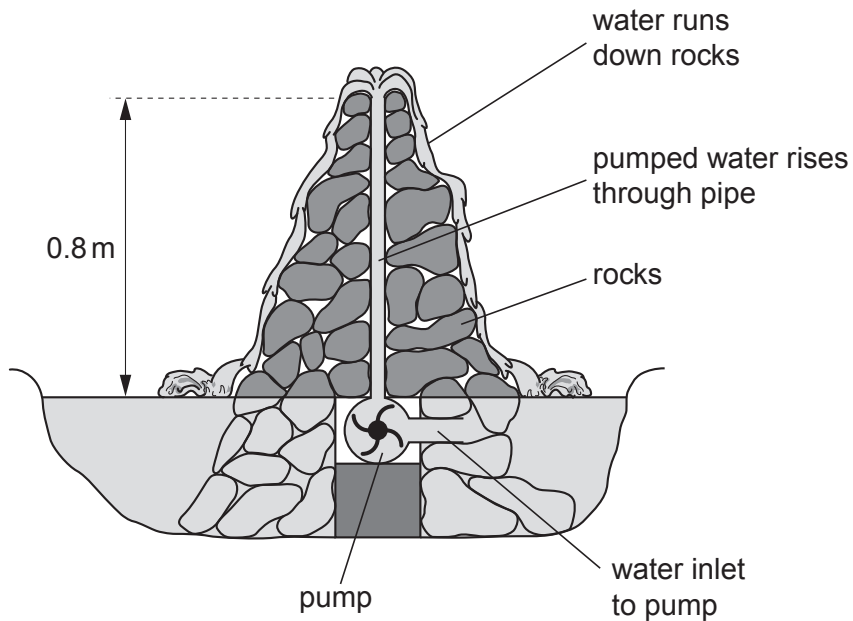


Fig. 3.1

The density of water is 1000 kg/m^3 . A volume of 1 litre is equal to 0.001 m^3 .

- (a) Calculate the mass of 1 litre of water.

mass = [2]

- (b) Calculate the work done raising 1 litre of water through a height of 0.8 m.

work = [2]

- (c) The pump lifts 90 litres of water per minute.

Calculate the minimum power of the pump.

power = [2]

- (d) The pump is switched off.

Immediately after the pump is switched off, what is the value of the water pressure at the bottom of the 0.8m pipe, due to the water in the pipe?

pressure = [2]

[Total: 8]

3 Fig. 2.1 shows a rock that is falling from the top of a cliff into the river below.

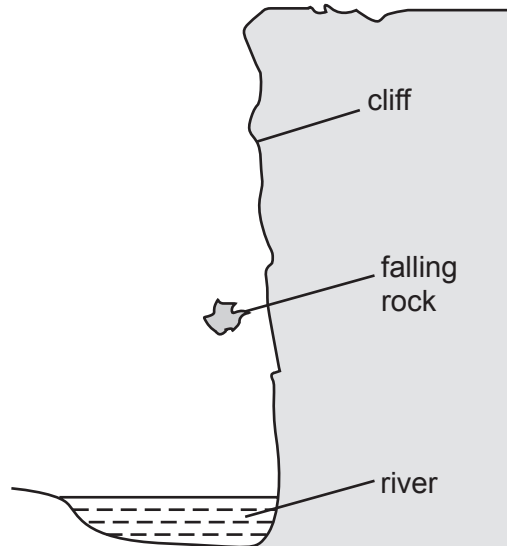


Fig. 2.1

(a) The mass of the rock is 75 kg. The acceleration of free fall is 10 m/s^2 . Calculate the weight of the rock.

weight =[1]

(b) The rock falls from rest through a distance of 15 m before it hits the water. Calculate its kinetic energy just before hitting the water. Show your working.

kinetic energy =[3]

(c) The rock hits the water. Suggest what happens to the kinetic energy of the rock during the impact.

.....
.....
.....[3]

[Total : 7]

- 4 Fig. 3.1 shows the arm of a crane when it is lifting a heavy box.

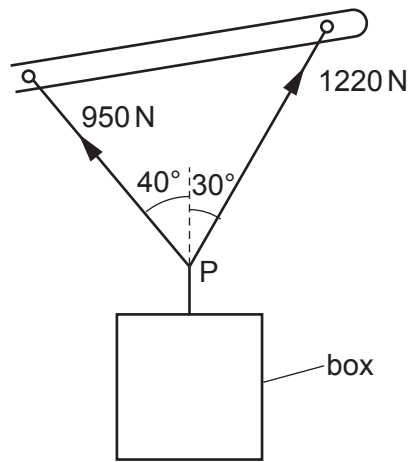


Fig. 3.1

- (a) By the use of a scale diagram (**not** calculation) of the forces acting at P, find the weight of the box. [5]

(b) Another box of weight 1500 N is raised vertically by 3.0 m.

(i) Calculate the work done on the box.

work done =

(ii) The crane takes 2.5 s to raise this box 3.0 m. Calculate the power output of the crane.

power =
[4]

[Total : 9]

- 5 Fig. 1.1 shows a smooth metal block about to slide down BD, along DE and up EF. BD and DE are friction-free surfaces, but EF is rough. The block stops at F.

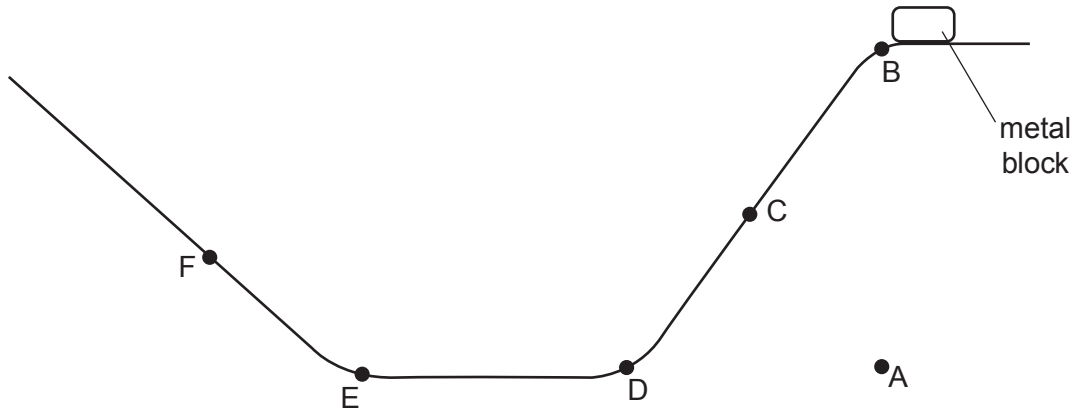


Fig. 1.1

- (a) On Fig. 1.2, sketch the speed-time graph for the journey from B to F. Label D, E and F on your graph.

[3]



Fig. 1.2

- (b) The mass of the block is 0.2 kg. The vertical height of B above A is 0.6 m. The acceleration due to gravity is 10 m/s^2 .

- (i) Calculate the work done in lifting the block from A to B.

work done =

- (ii) At C, the block is moving at a speed of 2.5 m/s. Calculate its kinetic energy at C.

kinetic energy =

[5]

- (c) As it passes D, the speed of the block remains almost constant but the velocity changes. Using the terms *vector* and *scalar*, explain this statement.

.....
.....
.....[2]

- (d) F is the point where the kinetic energy of the block is zero. In terms of energy changes, explain why F is lower than B.

.....
.....
.....
.....[3]

[Total : 13]