Name of the Student:_____
Max. Marks :19 Marks **Time : 19 Minutes**

Q1.

This question is about energy changes.

Figure 12 shows a person pushing a box from the bottom of a slope to the top of the slope.

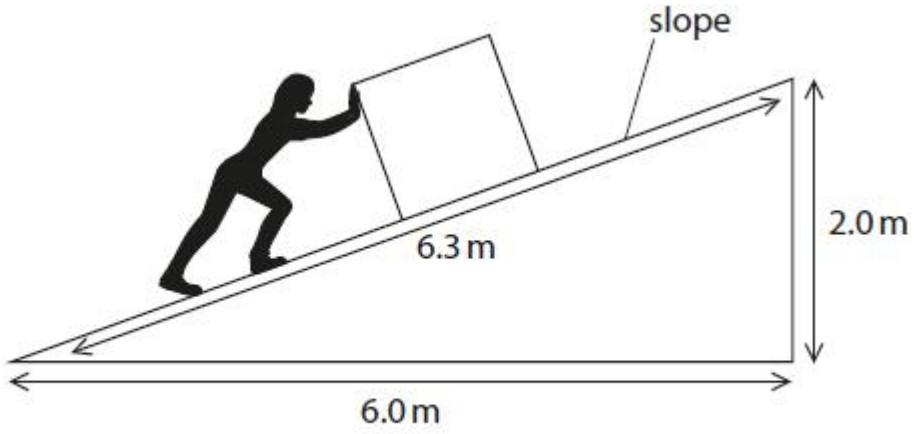


Figure 12

Explain which one of the three distances shown in Figure 12 should be used to calculate the work done against the force of friction between the box and the slope.

(2)

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.....
.....
.....

(Total for question = 2 marks)

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Q2.

The system transfers 8400 J of useful kinetic energy to the water passing through the pump in 1 minute.

Figure 13 shows a diagram of the energy transfers.

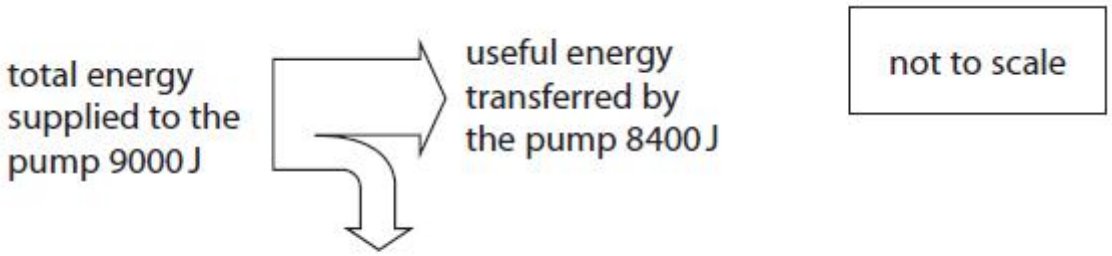


Figure 13

(i) Explain why the useful energy transferred to the water is different from the total energy supplied to the pump.

(2)

.....

.....

.....

.....

(ii) Calculate the efficiency of the pump.

Use the equation

$$\text{efficiency} = \frac{\text{useful energy transferred by the pump}}{\text{total energy supplied to the pump}}$$

(2)

efficiency = ...

(Total for question = 4 marks)

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Q3.

This photograph shows a fan.



The blades of the fan are turned by an electric motor.

In one second, the motor gets 200 J of electrical energy from the mains supply.
Only 180 J of this energy is used to turn the blades of the fan.

The rest of the energy is wasted.

(i) Calculate how much of the 200 J of energy is wasted.

(1)

wasted energy = ... J

(ii) State what happens to the wasted energy.

(1)

.....

.....

(iii) Calculate the efficiency of the motor.

(2)

efficiency = ...

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Q4.

A cyclist is riding a bicycle at a steady velocity of 12 m/s.

The cyclist and bicycle have a total mass of 68 kg.

Describe the energy transfers that happen when the cyclist uses the brakes to stop.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

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Q5.

(i) Complete the equation that relates efficiency, useful energy transferred by a device and total energy supplied to the device.

(1)

efficiency = ...

(ii) In one second an engine has a total energy input of 7500 J.

In one second 3200 J is transferred to the surroundings as wasted energy.
Calculate the useful energy transferred by the engine.

(1)

useful energy transferred = ...

(iii) Calculate the efficiency of this engine.

(2)

efficiency of the engine = ...

(Total for question = 4 marks)

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Q6.

This question is about energy transfers.

Figure 13 shows the apparatus used for investigating the transfer between gravitational potential energy and kinetic energy.

A metal ball is attached to a thread.

The ball is released from a starting position and swings on the thread.

The ball cuts a light beam at the bottom of its swing.

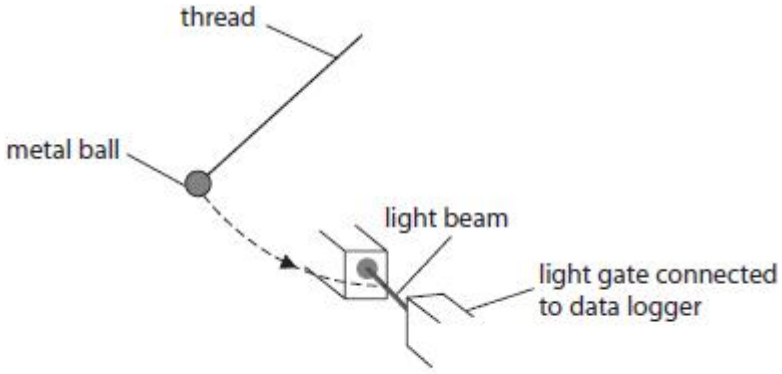


Figure 13

When the ball cuts the light beam, the speed of the ball is recorded by the data logger.

The ball was released 3 times from the same height and the speed measured each time.

The measurements of speed are given in Figure 14.

speed in m/s	1.31	1.27	1.16

Figure 14

Figure 15 shows an end-on view of the ball's swing from its starting position.

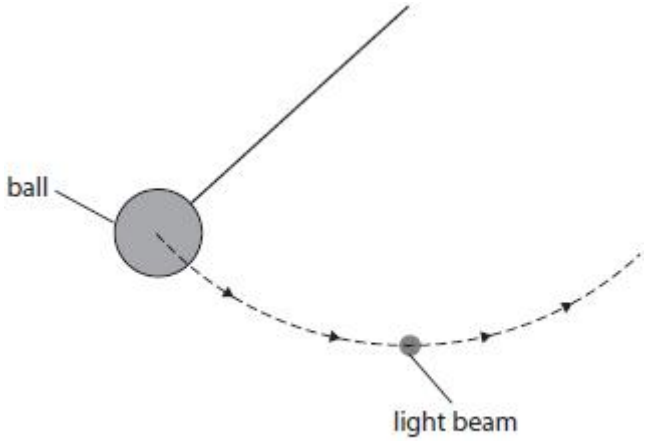


Figure 15

(i) To measure the change in vertical height, Δh, through which the ball moves, a ruler could be used.

Draw a ruler on Figure 15, placed in a position to measure the change in vertical height Δh.

(1)

(ii) Figure 16 shows a set square.

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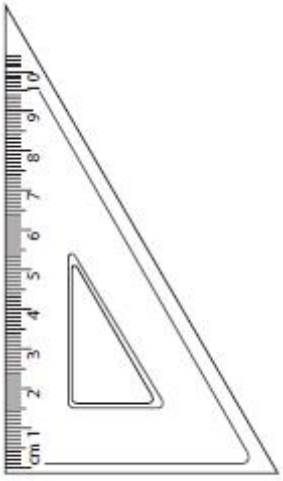


Figure 16

Describe how the measurement of the change in vertical height, Δh, could be improved using the set square. You may add to Figure 15 or Figure 16 to help your description.

(2)

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.....

(Total for question = 3 marks)

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