Centre Number

71

Candidate Number

General Certificate of Secondary Education
2011–2012

Science: Double Award (Modular)

Forces and Energy

End of Module Test

Foundation Tier

C [GDC01]

GDC01

THURSDAY 24 MAY 2012, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all twelve** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
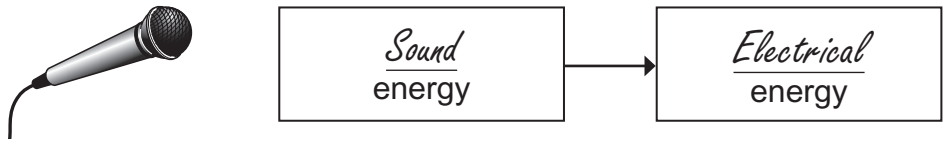
| For Examiner's use only ||
Question Number	Marks
1	
2	
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12	
Total Marks	

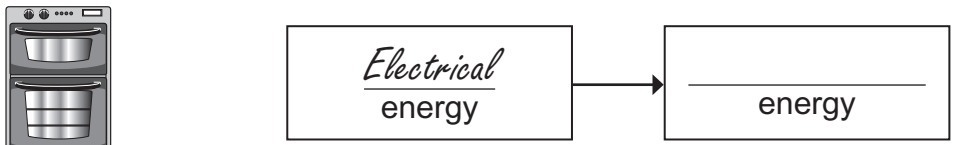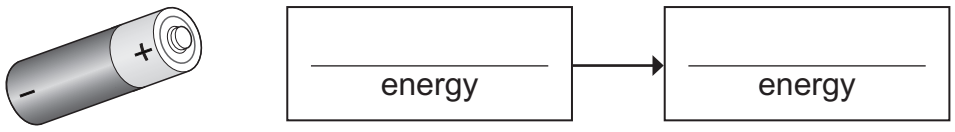**1** A microphone changes **sound** energy into **electrical** energy, as shown in the energy flow diagram below.

| _Sound_ energy | → | _Electrical_ energy |

Fill in the the spaces below to show the energy changes each device is designed to bring about.
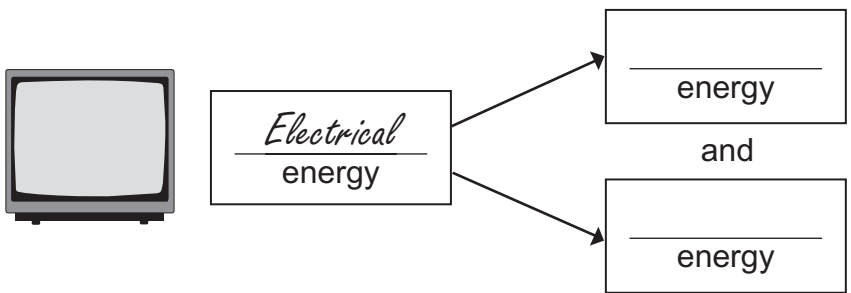
(a) Electrical oven

| _Electrical_ energy | → | _____ energy |

[1]

(b) Battery

| _____ energy | → | _____ energy |

[2]

(c) Television

| _Electrical_ energy | → | _____ energy |

and

| _____ energy |

[2]

2 Coal, oil, solar, nuclear and wind are examples of energy resources used in the United Kingdom to generate electricity.

(a) (i) Write down an example of a non-renewable energy resource from the list above.

_____ [1]

(ii) Explain the meaning of the term non-renewable energy resource.

_____

_____ [1]

(b) (i) Write down an example of a renewable energy resource from the list above.

_____ [1]

(ii) Explain the meaning of the term renewable energy resource.

_____

_____ [1]

3

[Turn over

3 A cyclist can travel 5040 m in a time of 1200 s.

Calculate the average speed of the cyclist.

You are advised to show your working out.

Average speed = _____ m/s [3]

4 **(i)** Fibreglass is often used in the roof space to reduce heat loss.

Explain, fully, why fibreglass is a suitable material for this purpose.

_____

_____ [2]

(ii) Name two other methods of reducing heat loss from the home.

1. _____

2. _____ [2]

5 Purple dye may be used to trace heat transfer in water, heated with a Bunsen burner.
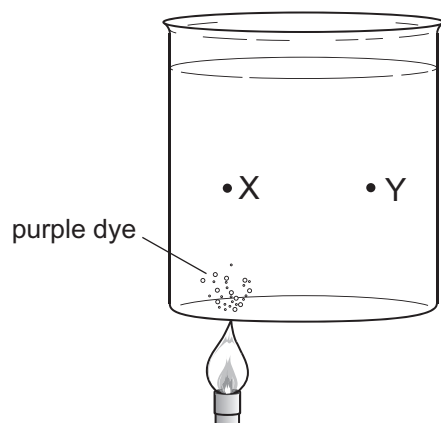
(a) (i) Draw **two** arrows, one at **X** and one at **Y**, to show the direction of heat flow in the water. [2]

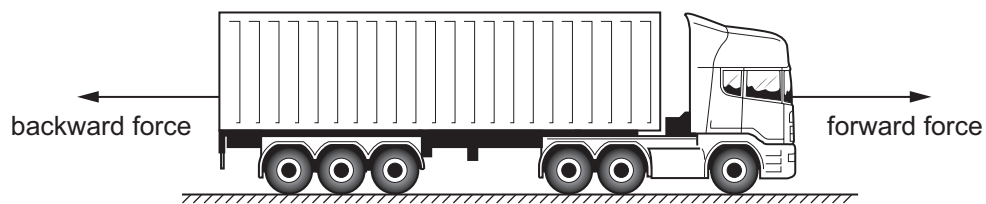**(ii)** Name the **main** process by which heat travels through the water.

_____ [1]

(b) One method of heat transfer can take place in a vacuum. What is the name of this method of heat transfer?

_____ [1]

6 A lorry is moving at a **constant** speed, in a straight line.

backward force   forward force

(a) The forward force due to the engine is 40 000 N.

    (i) Tick (✓) the correct statement.

        The backward force is less than 40 000 N   ☐

        The backward force is equal to 40 000 N   ☐

        The backward force is greater than 40 000 N   ☐

        [1]

    (ii) What is the name of the backward force acting on the lorry?
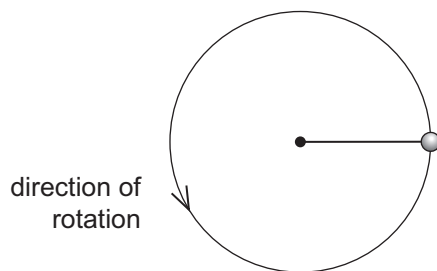
        _____ [1]

(b) The forward force due to the engine increases to 60 000 N.

    If the backward force does not change, what happens to the speed of the lorry?

    _____ [1]

7 The diagram shows a bird's eye view of a ball being whirled in a horizontal circle.

direction of
rotation

(a) Draw an arrow to show the direction in which the ball moves as soon as the string breaks. [1]

(b) The ball has a mass of 0.6 kg and at the instant the string breaks the velocity of the ball is 3.0 m/s.

Calculate the momentum of the ball.

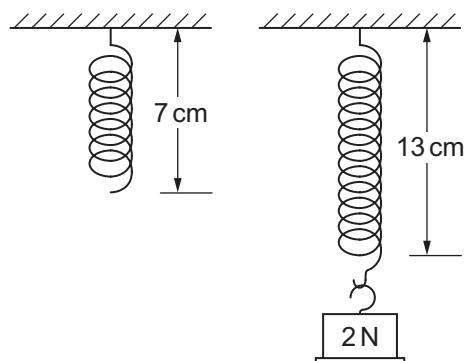**You are advised to show your working out.**

Momentum = _____ kg m/s [3]

8 **(a)** A spring has a natural length of 7 cm.

When loaded with a 2 N weight, the total length of the spring is 13 cm.

What weight would extend the spring so that its total length is 22 cm?

You are advised to show your working out.

Weight = _____ N [3]

(b) Describe what happens to the spring if it is stretched beyond its elastic limit.

_____ [1]

9 A soldier on guard weighs 650 N. His boots have a total area of 0.02 m^2 in contact with the ground.

Calculate the pressure the soldier exerts on the ground.

Remember to include the unit for pressure.

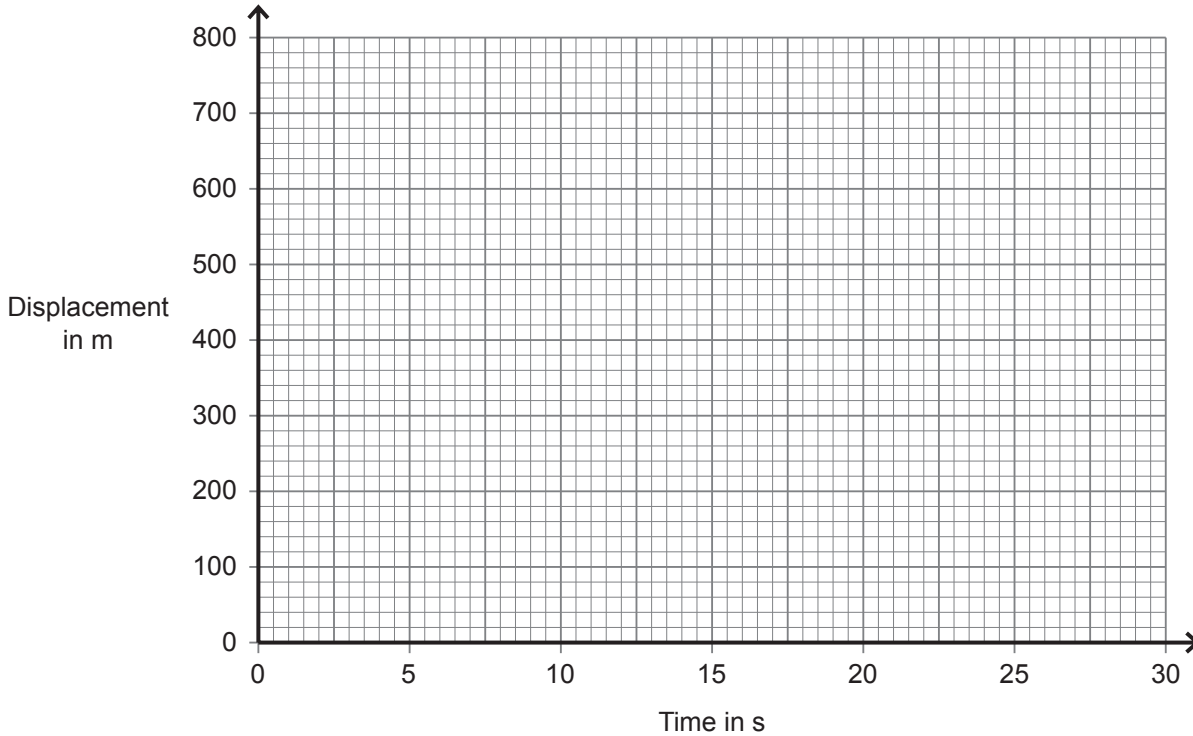**You are advised to show your working out.**

Pressure = _____ [4]

10 The table of results shows how the displacement of a car varies with time.

Displacement in m	0	150	300	450	600	750
Time in s	0	5	10	15	20	25

(a) Use the grid to draw a graph of displacement against time for the car.

Time in s

[2]

(b) Use the graph to calculate the velocity of the car.

You are advised to show your working out.

Velocity = _____ m/s [3]

[Turn over

11 (a) When a lawnmower is supplied with 1500 J of electrical energy, the useful work done is 240 J.

Calculate the efficiency of the lawnmower.

You are advised to show your working out.

Efficiency = _____ [3]

(b) Calculate the amount of energy converted into heat and sound.

Energy converted = _____ J [1]

12 A motor is used on a building site to lift a block of stone.

© Probst Handling Equipment

(a) Calculate the work done by the motor in lifting the block of stone of weight 120 N through a height of 1.5 m.

You are advised to show your working out.

Work done = _____ J [3]

(b) Calculate the power of the motor if it does this work in 15 seconds.

You are advised to show your working out.

Power = _____ W [3]

THIS IS THE END OF THE QUESTION PAPER

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