Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Double Award (Modular)

Forces and Energy

End of Module Test

Foundation Tier

C

[GDC01]

GDC01

FRIDAY 25 FEBRUARY 2011, 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.

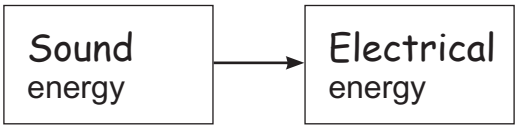
INFORMATION FOR CANDIDATES

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	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

Examiner Only	
Marks	Remark

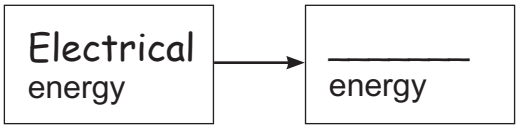
1 A microphone changes **sound** energy into **electrical** energy, as shown in the energy flow diagram below.



Fill in the spaces below to show the energy changes, for which following devices are designed.

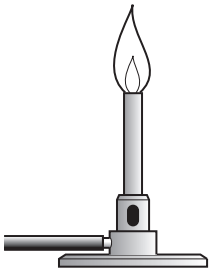
(i)

loudspeaker

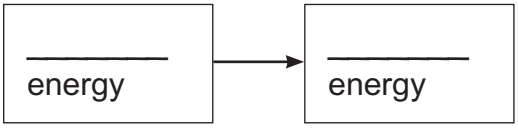


[1]

(ii)

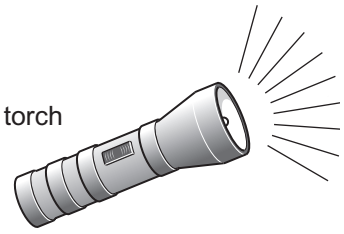


Bunsen burner



[2]

(iii)



[2]

2 This question is about renewable and non-renewable energy resources.

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Marks	Remark

(a) Name two energy resources used to generate electricity which involve moving water.

_____ and _____ [2]

(b) Which renewable energy source

(i) comes from deep underground? _____

(ii) consists of moving air?

_____ [2]

We must continue to use fossil fuels.

(c) **(i)** What can we do to make fuels last longer before they run out?

_____

_____ [1]

(ii) What type of energy sources will we eventually have to depend on?

_____ [1]

3 During a World Cup football match, a midfield player ran 2.64 km.

(i) Convert this distance into metres.

Distance = _____ m [1]

(ii) The time taken to run this distance was 1200 s.

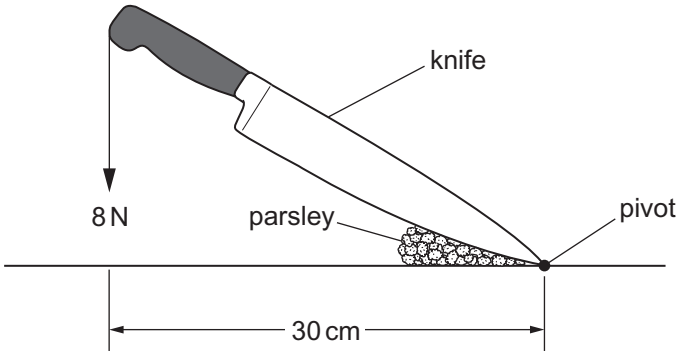
Calculate the average speed of the midfield player in m/s.

You are advised to show clearly your working out.

Average speed = _____ m/s [3]

Examiner Only	
Marks	Remark

4 The diagram shows a chef using a knife to chop up parsley. The force exerted by the chef is 8.0 N.



(a) Calculate the moment of the 8.0 N force about the pivot.

You are advised to show clearly your working out.

Moment = _____ N cm [3]

(b) Tick (✓) the correct box to indicate the direction of the moment of the 8.0 N force.

Clockwise	☐
Vertically downwards	☐
Anticlockwise	☐

[1]

Examiner Only

Marks	Remark

5 On the planet Jupiter the force of gravity is **five** times that on the Earth.

A spanner weighs 40 N on Earth.

(a) What does the spanner weigh on Jupiter?

_____ N [1]

(b) What is the mass of the spanner on Jupiter?

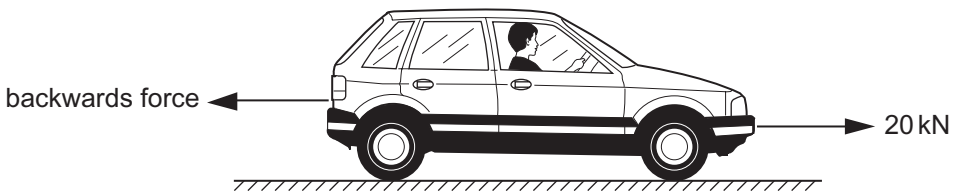
_____ kg [1]

(c) Name the scientific instrument used to measure the weight of the spanner on Jupiter.

_____ [1]

Examiner Only	
Marks	Remark

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



(a) The forward force due to the engine is 20 kN.

(i) Tick (✓) the correct statement

The backwards force is less than 20 kN ☐

The backwards force is equal to 20 kN ☐

The backwards force is greater than 20 kN ☐ [1]

(ii) What is the name of the backwards force on the car?

_____ [1]

(b) The forward force due to the engine increases to 30 kN.

If the backwards force does not change, what happens to the speed of the car?

_____ [1]

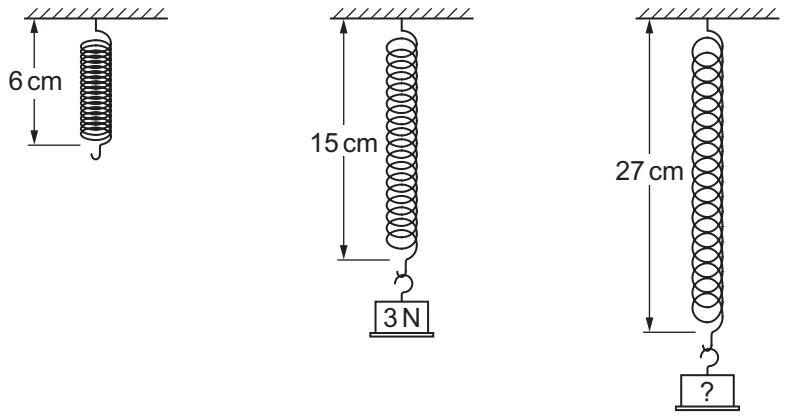
Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

7 **(a)** A spring has a natural length of 6 cm.

When loaded with a 3 N weight, the total length of the spring is 15 cm.



What weight would extend the spring so that its total length is 27 cm?

You are advised to show your working out.

Weight = _____ N [3]

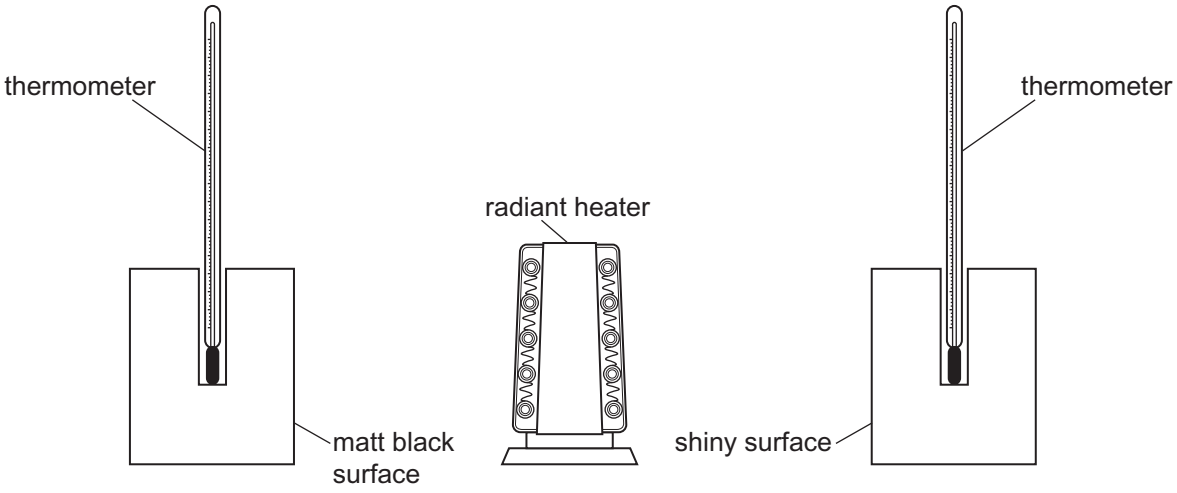
(b) Describe fully what happens to the spring if it is stretched beyond its elastic limit and the load is then removed.

_____ [1]

8 The nature of the surfaces of materials was investigated in a laboratory to find their effect on heat absorption.

Julie used two metal cylinders, identical in shape and size, with a thermometer in each.

One cylinder had a matt black surface while the other had a shiny surface, as shown in the diagram below.



An electrical radiant heater was placed the same distance from each cylinder.

After a time the two thermometers showed different readings.

(a) Explain fully why they had different readings.

_____

_____

_____ [2]

(b) Explain why a paramedic will sometimes wrap a patient in an aluminium blanket to keep the patient warm.

_____

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

9 The skier below weighs 650 N. His skis have a total area of $0.5\,m^2$ when in contact with the snow.

Calculate the pressure the skier exerts on the snow.

Remember to include the unit for pressure.

You are advised to show clearly your working out.

Pressure = _____ [4]

10 (a) No machine can have an efficiency greater than 1 (100%). What does this mean?

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Marks	Remark

_____

_____ [1]

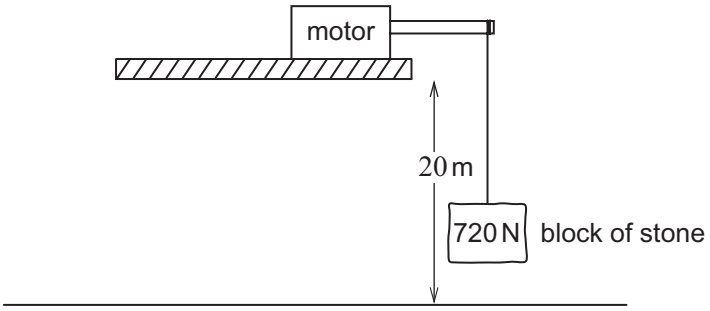
(b) An electric motor is supplied with 600 J of electrical energy. The motor does 240 J of useful work.

Calculate the efficiency of the electric motor.

You are advised to show your working out.

Efficiency = _____ [3]

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



(a) Calculate the work done in lifting the block of stone which has a weight of 720 N through a height of 20 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 24 seconds.

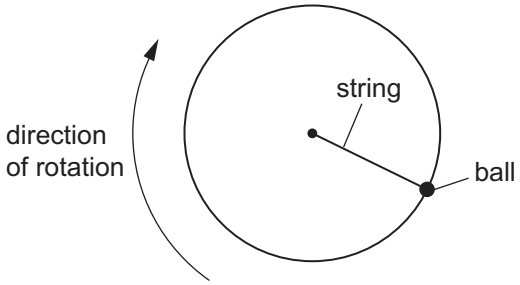
You are advised to show your working out.

Power = _____ W [3]

Examiner Only

Marks	Remark

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



(a) What is the name of the force which acts towards the centre of the circle?

_____ [1]

(b) The ball has a mass of 2.5 kg and a velocity of 8.0 m/s.

Calculate the momentum of the ball.

You are advised to show your working out.

Momentum = _____ kg m/s [3]

THIS IS THE END OF THE QUESTION PAPER

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Marks	Remark

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