Rewarding Learning

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

WEDNESDAY 29 FEBRUARY 2012
9.30 am–10.15 am

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

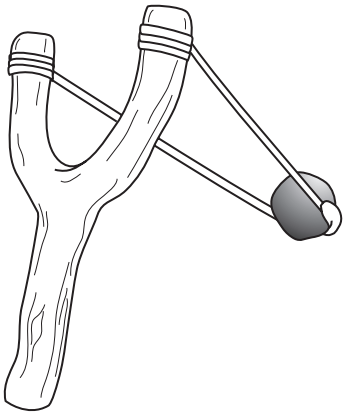
The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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 catapult is used to fire a stone into the air. Use the words in the box below to complete the sentences.

Chemical	**Strain**	**Kinetic**
Heat	**Potential**	**Sound**



(i) The energy stored in the rubber band is _____ energy. [1]

(ii) The instant the catapult is released the stone gains

_____ energy. [1]

(iii) As the stone rises upwards it gains _____ energy. [1]

(iv) When the stone hits the ground all the energy is changed into

_____ and _____ . [2]

2 Much of the electricity produced in Northern Ireland comes from burning oil.

A number of statements are given below.

Tick (✓) the **three** which apply to oil.

It is renewable. ☐

It is a fossil fuel. ☐

Its energy originally comes from the sun. ☐

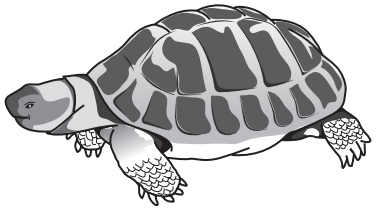
It does not cause pollution. ☐

It is formed over millions of years. ☐

It is formed when vegetation is compressed. ☐ [3]

Examiner Only	
Marks	Remark

3 A tortoise travels 45 mm in 3 seconds.



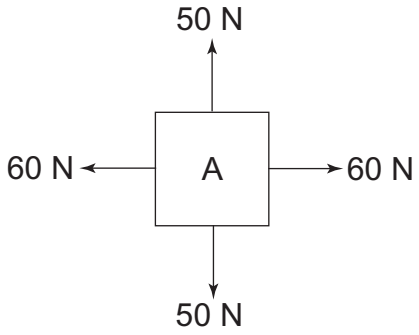
Calculate the speed of the tortoise in mm/s.

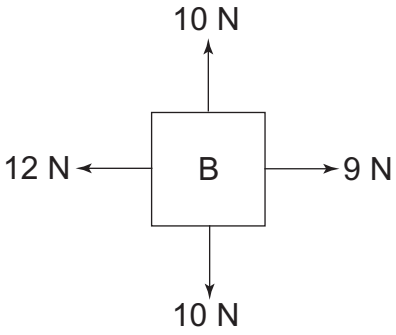
You are advised to show your working out.

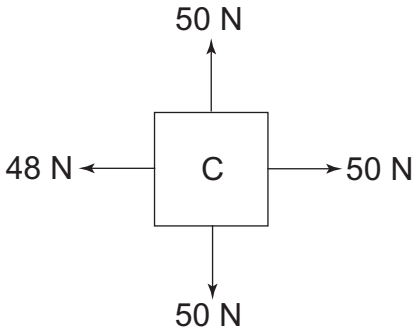
Speed = _____ mm/s [3]

Examiner Only	
Marks	Remark

4 The diagrams below show identical objects with different forces acting on them.







(a) Which object could be at rest?

Letter _____ [1]

(b) Which object could be moving at constant speed?

Letter _____ [1]

(c) Which object has an unbalanced force of 2 N?

Letter _____ [1]

(d) Give two possible effects of an unbalanced force on the **motion** of an object.

1. _____

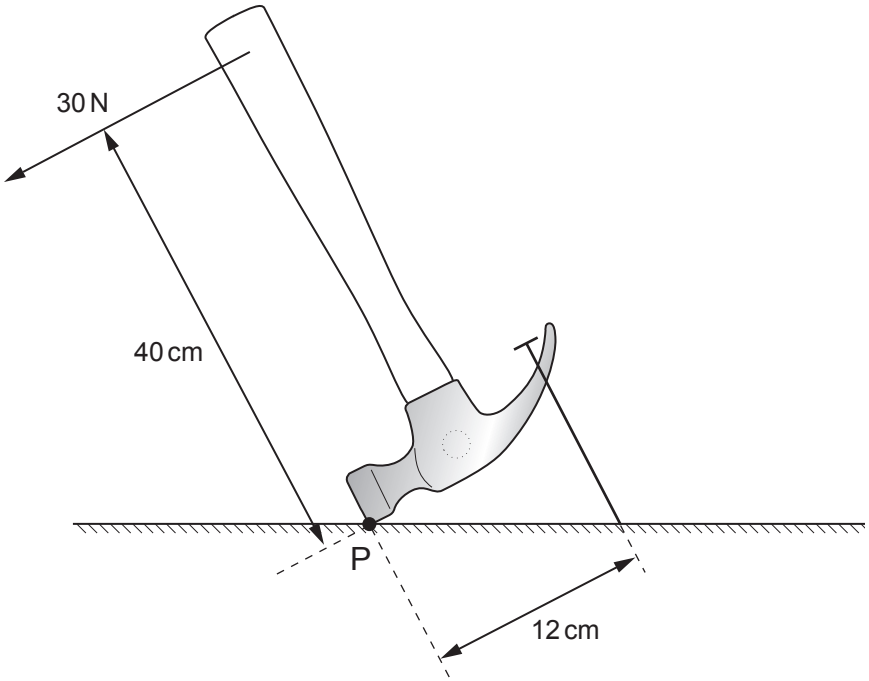
2. _____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

5 Benjamin tries to remove a nail from a piece of wood.



He exerts a force of 30 N as shown.

(i) Choose information from the diagram above to help you calculate the moment Benjamin is exerting, about the pivot P.

Remember to include the unit.

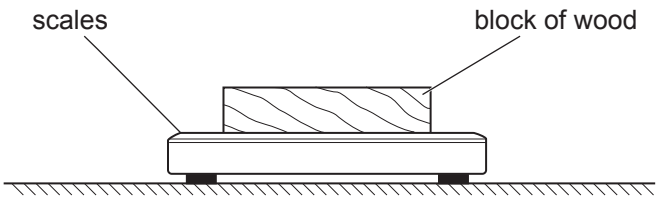
You are advised to show your working out.

Moment = _____ [4]

(ii) State the direction of the moment.

_____ [1]

6 A block of wood sits on top of a set of scales.



The scales give a reading of 12 N.

A mass of 1.5 kg is now set on top of the block.

What is the new reading on the scales?

You are advised to show your working out.

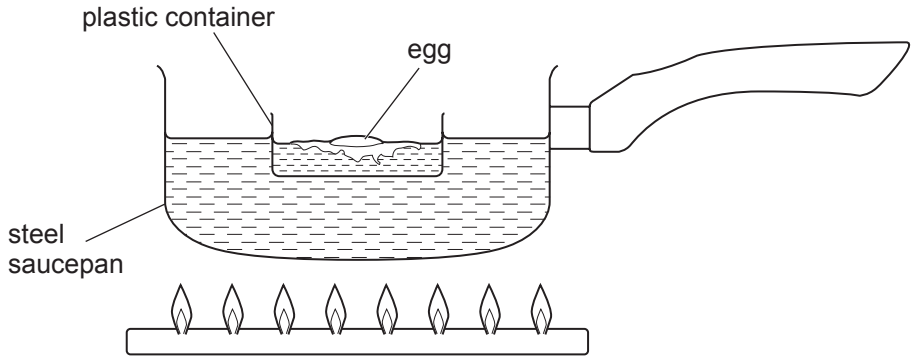
Reading = _____ N [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

7 Jamie poaches an egg by setting it in a plastic container which floats in a saucepan of hot water. The saucepan is made of steel and sits on a gas cooker.



(a) (i) What is the method of heat transfer through the bottom of the steel saucepan?

_____ [1]

(ii) What is the particle mainly responsible for this process?

_____ [1]

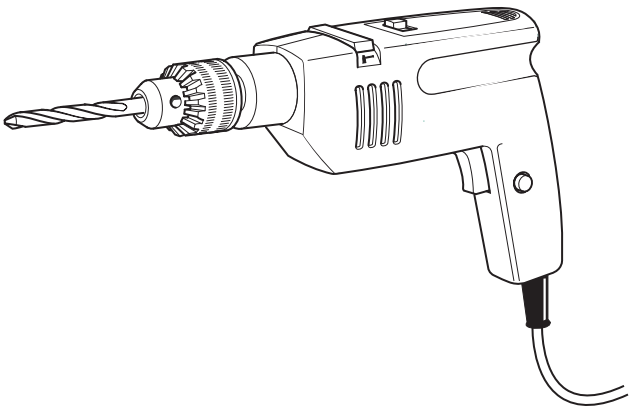
(b) (i) What is the method of heat transfer through the plastic container?

_____ [1]

(ii) What is the particle responsible for this process?

_____ [1]

8 Patricia uses an electric drill to drill a hole.



Choose the appropriate data to calculate the efficiency of the drill.

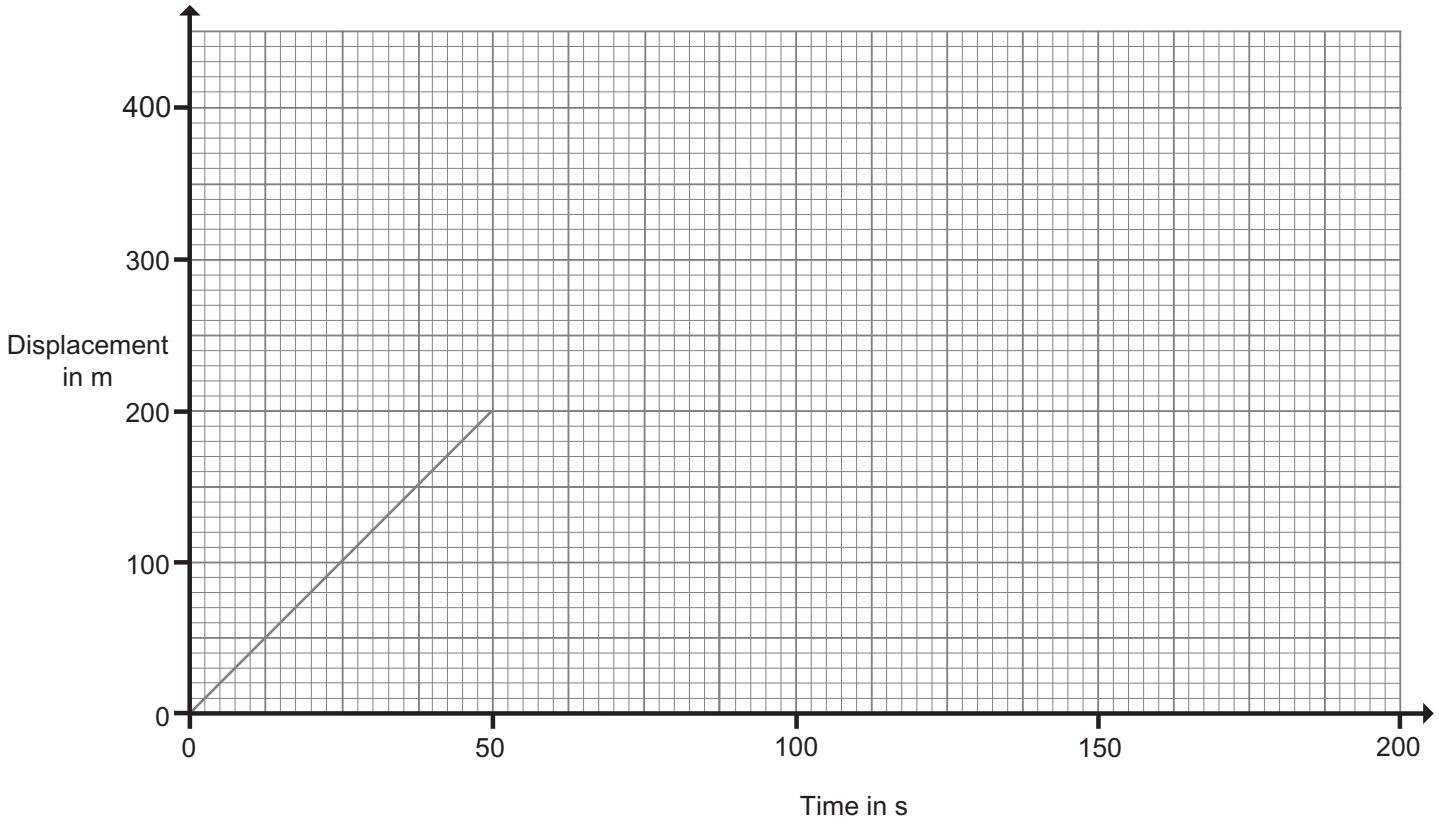
75 J of heat energy were produced.
200 J of electrical energy were used.
80 J of kinetic energy were produced in the drill bit.
45 J of sound energy were produced.

You are advised to show your working out.

Efficiency = _____ [3]

Examiner Only	
Marks	Remark

9 A cyclist travels a distance of 200 m in 50 seconds. This is shown in the displacement–time graph below.



The cyclist then rests for 50 seconds before returning to his starting point at a steady speed in a further 100 seconds.

(i) Complete the displacement–time graph for the journey. [2]

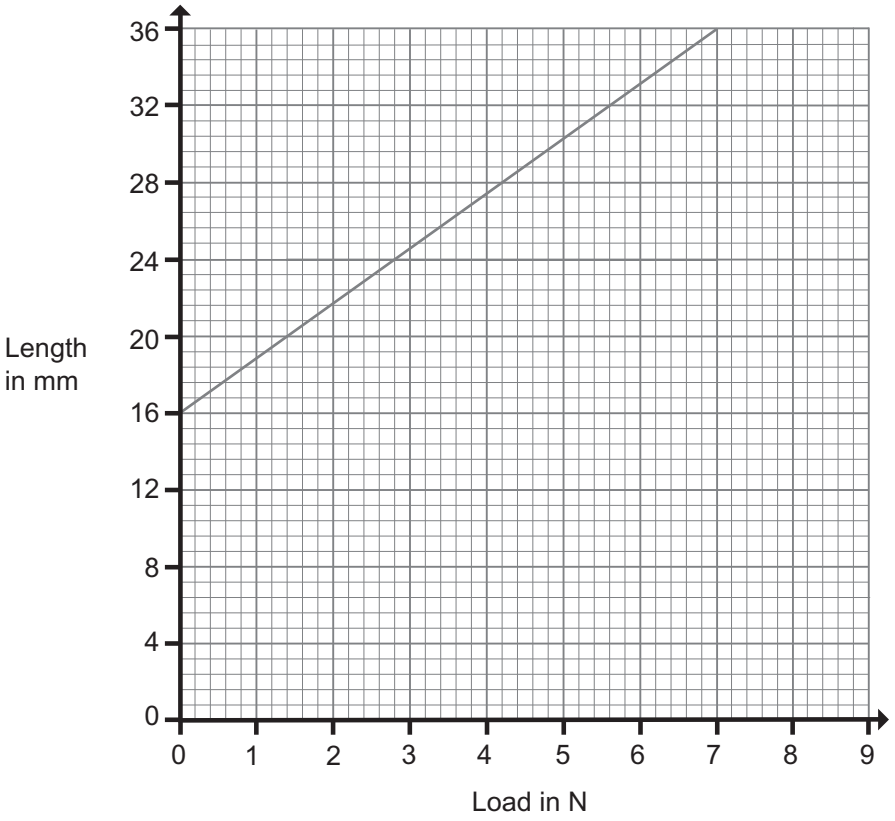
(ii) What is the total distance travelled by the cyclist in 200 seconds?

Total distance = _____ m [1]

Examiner Only	
Marks	Remark

10 Phyllis carries out a Hooke's Law investigation using a spiral spring.

She plots her results on a graph as shown.



(a) What is the unstretched length of the spring?

Unstretched length = _____ mm [1]

(b) How can you tell, from the graph, that the spring has not been stretched beyond its elastic limit?

_____ [1]

(c) **(i)** Phyllis could have investigated Hooke's Law by plotting a more suitable graph. What should she have plotted on the vertical y-axis?

_____ [1]

(ii) An unknown load is hung on the spring and the extension produced is 20 mm.
What is the unknown load?

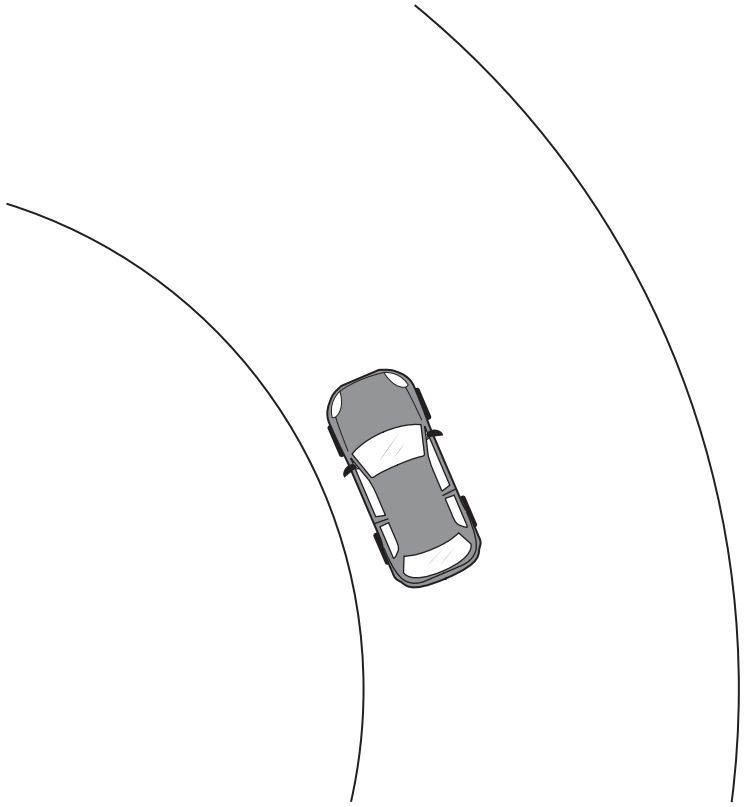
You are advised to show your working out.

Load = _____ N [2]

Examiner Only

Marks	Remark

11 The diagram shows a bird's eye view of a car of mass 2000 kg going round a circular track at a constant speed of 7 m/s.



(a) Calculate the momentum of the car.

You are advised to show your working out.

Momentum = _____ kgm/s [3]

In order to move in a curve around the corner a force, called a centripetal force, must act on the car.

(b) What supplies the centripetal force in this case?

Centripetal force supplied by _____ [1]

(c) In what direction does this force act?

_____ [1]

Examiner Only

Marks	Remark

12 A weightlifter raises a set of weights into the air.

Examiner Only	
Marks	Remark

The weight at each end of the bar is 200 N and the bar weighs 100 N.

(a) What is the **total** weight lifted by the weightlifter?

Total weight = _____ N [1]

The weightlifter raises the total weight through a distance of 2 m into the air in a time of 1.5 seconds.

(b) Calculate the power developed by the weightlifter.
Remember to include the unit.

You are advised to show your working out.

Power = _____ [5]

THIS IS THE END OF THE QUESTION PAPER

112817