



General Certificate of Secondary Education
2009–2010

Centre Number

71	
----	--

Candidate Number

--

Science: Double Award (Modular)

Forces and Energy
End of Module Test
Foundation Tier

C

[GDC01]



THURSDAY 20 MAY 2010, AFTERNOON

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.

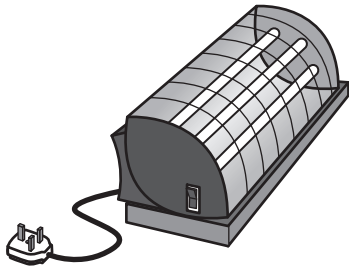
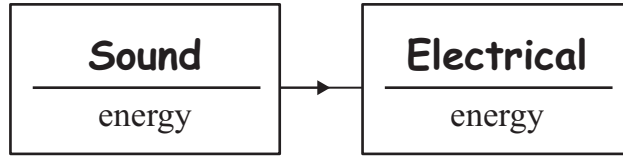
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Total Marks	
--------------------	--

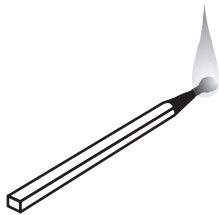
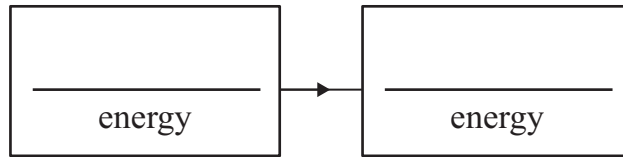
1 Many devices convert energy from one form to another. Complete the boxes to show the **main** energy change taking place in each device. The first one has been completed for you.



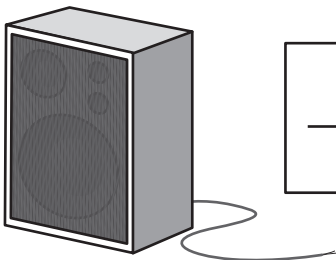
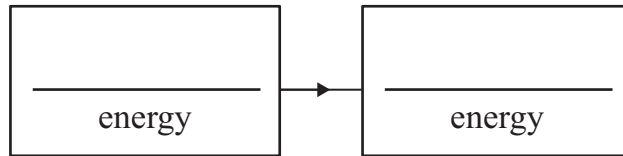
Microphone



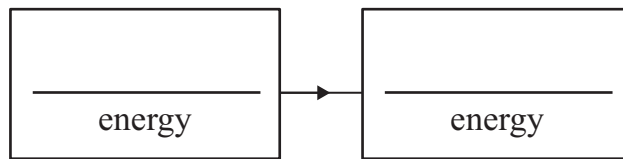
Electric fire



Match



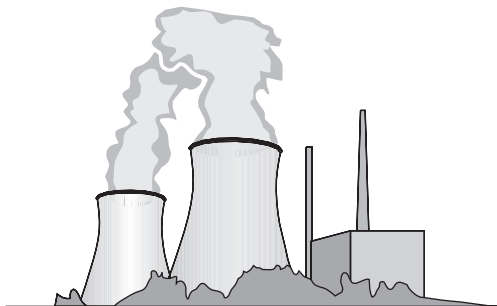
Loudspeaker



Examiner Only	
Marks	Remark
○	○

[6]

- 2 The diagram shows a coal-fired power station.
It burns coal to produce electricity.



- (a) (i) Coal is a fossil fuel.
Name two other fossil fuels which may be used to produce electricity.

1. _____

2. _____

[2]

- (ii) What is the original source of the energy in all fossil fuels?

_____ [1]

- (b) What gas, produced by coal-fired power stations, contributes to the greenhouse effect?

_____ [1]

Examiner Only	
Marks	Remark
○	○

- 3 During a cycling race, a cyclist of mass 60 kg travelled at an average speed of 15 m/s.



Calculate the average momentum of the cyclist.
Remember to include the units in your answer.
You are advised to show your working out.

Average momentum = _____ [4]

Examiner Only	
Marks	Remark
○	○

4 The diagram shows a car moving to the right.



(a) Name the force opposing the forward motion of the car.

_____ [1]

(b) The forward force is 1800 N when the car is travelling at **constant speed** in a straight line.

What is the size of the opposing force?

Opposing force = _____ N [1]

(c) The driver takes his foot off the accelerator and this reduces the size of the forward force. Describe the motion of the car assuming that the opposing force remains the same as before.

_____ [1]

Examiner Only	
Marks	Remark
○	○

- 5 An ice skater weighs 500 N. The area of the blade of her boot is 2.5 cm².



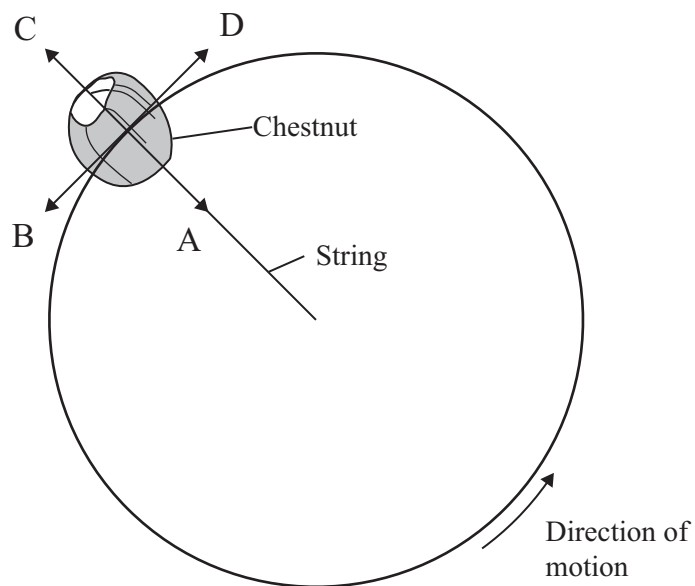
Calculate the pressure the ice skater exerts when only one boot is in contact with the ice.

You are advised to show your working out.

Pressure = _____ N/cm² [3]

Examiner Only	
Marks	Remark
○	○

6 A chestnut is whirled in a horizontal circle.



(a) What is the name of the force which keeps the chestnut moving in a circle?

_____ [1]

(b) Which letter, **A**, **B**, **C** or **D**, gives the direction of this force?

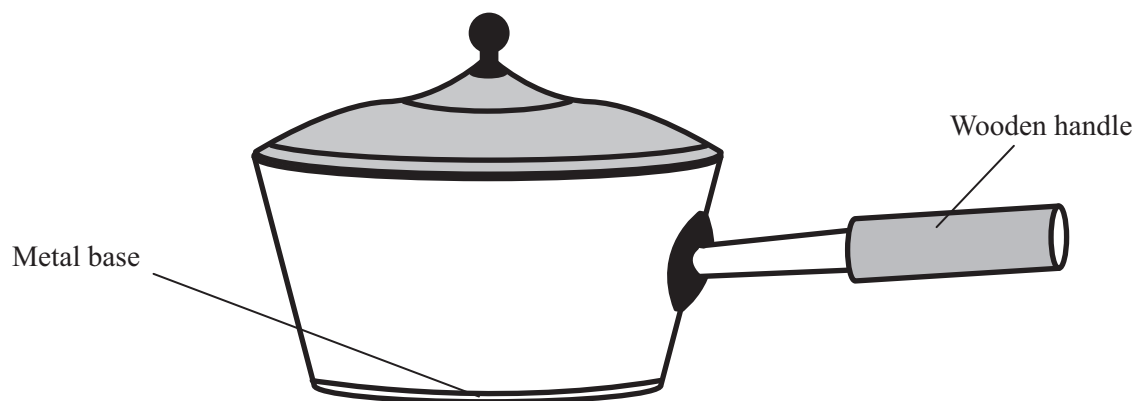
Letter _____ [1]

(c) If the string breaks, in which direction, **A**, **B**, **C** or **D**, will the chestnut move?

Letter _____ [1]

Examiner Only	
Marks	Remark
○	○

7 (a) The diagram below shows a saucepan designed to cook food.



(i) Why is copper a suitable metal for the base of the saucepan?

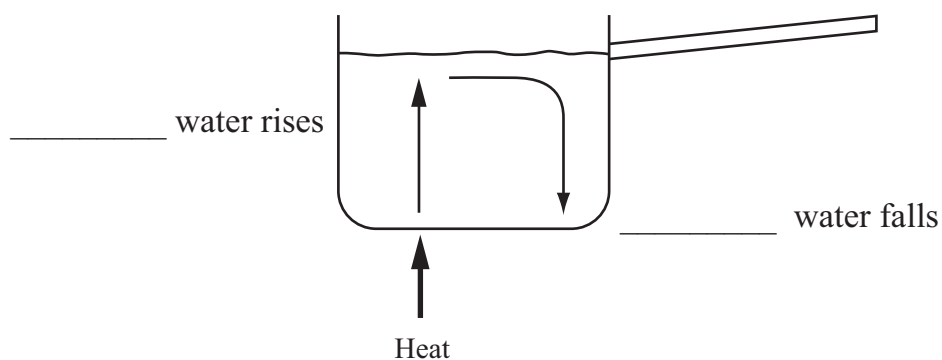
_____ [1]

(ii) Why is the handle of the saucepan made of wood?

_____ [1]

(b) This diagram shows how water in the saucepan becomes hot.

(i) Complete the labels on the diagram.



[2]

(ii) Complete the following sentence.

The movement of the water in the saucepan is called a

_____ current.

[1]

Examiner Only	
Marks	Remark
<input type="text"/>	<input type="text"/>

- 8 (a) The table below gives information about three balls. Complete the table.

Ball	Mass	Weight
glass	50 g	0.5 N
brass	250 g	
steel		2.0 N

[2]

The three balls are dropped from the same height at the same instant.

- (b) Which ball, if any, will hit the ground first? (Assume air resistance can be ignored.)

Tick (✓) the correct box.

The glass ball will hit the ground first.

The brass ball will hit the ground first.

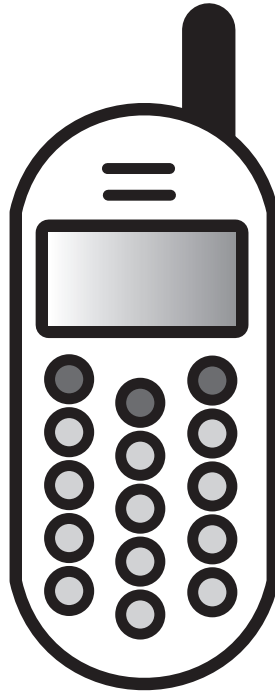
The steel ball will hit the ground first.

They all hit the ground at the same instant.

[1]

Examiner Only	
Marks	Remark

- 9 A mobile phone **wastes** 5 J of energy as heat when the input electrical energy is 25 J.



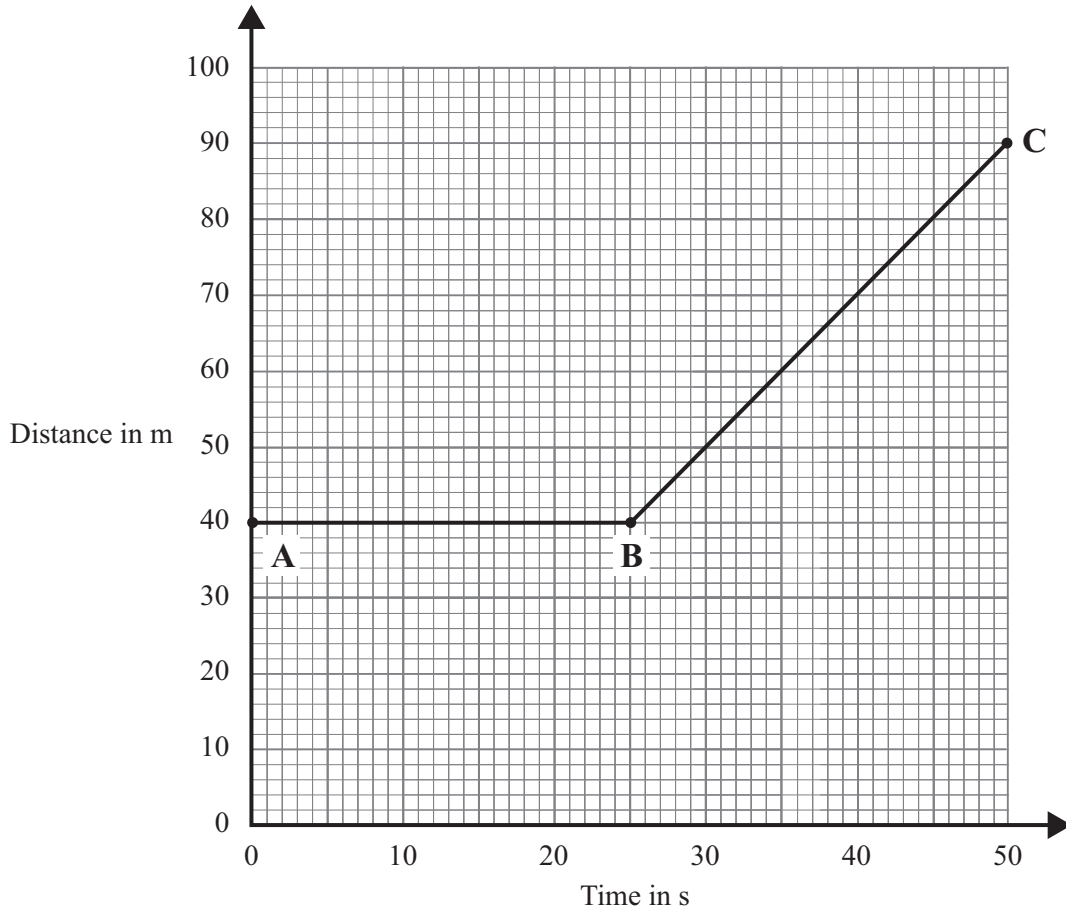
Find the useful output energy and use your answer to calculate the efficiency of the mobile phone.

You are advised to show your working out.

Efficiency = _____ [4]

Examiner Only	
Marks	Remark
○	○

10 The distance–time graph for a train is shown below.



(i) Describe the motion of the train from:

A to B. _____

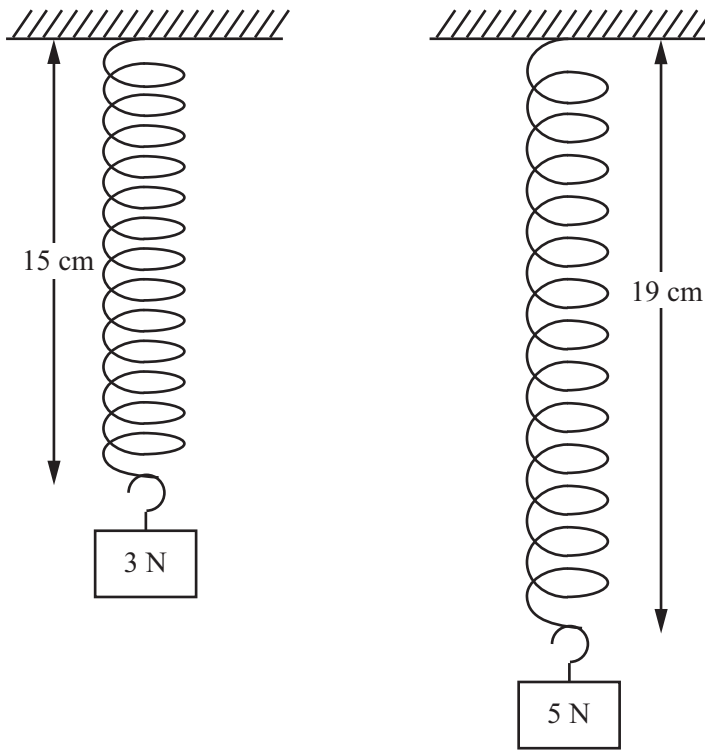
B to C. _____
 _____ [2]

(ii) Calculate the average speed of the train between **B** and **C**.
You are advised to show your working out.

Average speed = _____ m/s [3]

Examiner Only	
Marks	Remark
○	○

- 11 When a load of 3 N hangs from a spiral spring, its total length is 15 cm. When the load is 5 N, the total length is 19 cm.



- (i) What extension would be caused by a load of 1 N?
You are advised to show your working out.

Extension = _____ cm [2]

- (ii) Calculate the natural (unextended) length of the spring.
You are advised to show your working out.

Natural (unextended) length = _____ cm [2]

Examiner Only	
Marks	Remark
○	○

12 The photograph shows the space shuttle *Discovery* taking off.



© NASA

- (a) The work done by the engines of the space shuttle during lift-off is 9 400 000 J. This takes the space shuttle 5 seconds.
Calculate the average power generated by the engines during lift-off.
You are advised to show your working out.

Average power = _____ W [3]

- (b) One of the engines in the space shuttle exerts a force of 11 750 N. In this time interval of 5 seconds, the space shuttle rises to a height of 200 m.
Calculate the work done by this engine.
You are advised to show your working out.

Work done = _____ J [3]

Examiner Only	
Marks	Remark
○	○

THIS IS THE END OF THE QUESTION PAPER

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA
will be happy to rectify any omissions of acknowledgement in future if notified.