



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 25 FEBRUARY 2010, 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

1 (a) (i) Explain what is meant by a **renewable** resource of energy.

\_\_\_\_\_ [1]  
\_\_\_\_\_

(ii) Give two examples of renewable energy resources.

1. \_\_\_\_\_
2. \_\_\_\_\_ [2]

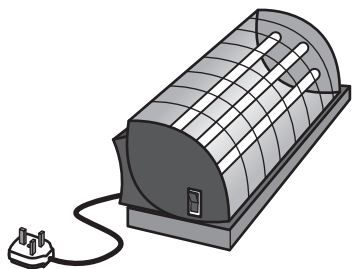
Using renewable energy resources saves fossil fuels.

(b) Name two fossil fuels.

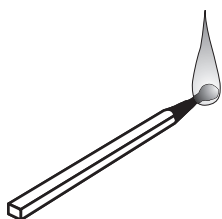
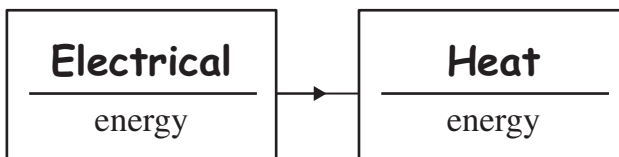
1. \_\_\_\_\_
2. \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark
○	○

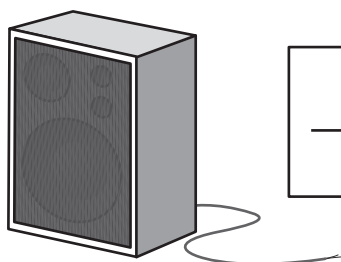
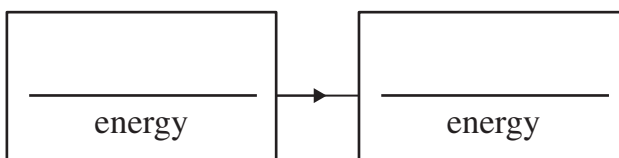
- 2 Many devices change energy from one form to another.  
 Complete the boxes below to show the main energy change which each device is **designed** to bring about.  
 The first one has been completed for you.



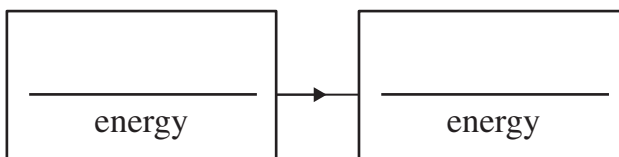
Electric fire



Match



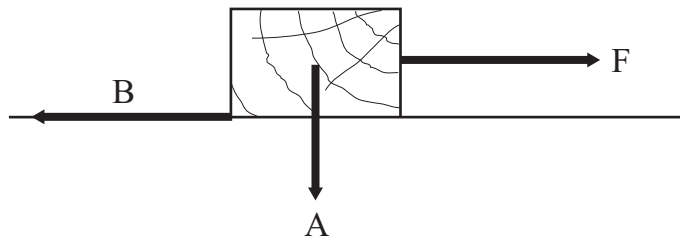
Loudspeaker



[4]

Examiner Only	
Marks	Remark
○	○

3 Patrick pulls a block of wood over a rough surface with a force F.



The diagram shows two other forces acting on the block of wood.

(a) Name the downward force A and the horizontal force B.

Downward force A: \_\_\_\_\_

Horizontal force B: \_\_\_\_\_ [2]

(b) The block moves to the right at **constant speed**. Is force B less than, equal to or greater than force F?  
Circle the correct answer.

**less than**

**equal to**

**greater than**

[1]

(c) Some of Patrick's energy is wasted in overcoming force B. In what form is most of the energy wasted?

Energy wasted as \_\_\_\_\_ [1]

Examiner Only	
Marks	Remark
○	○

- 4 John stands on a set of laboratory scales and the reading is 650 N. He is then given a suitcase of 25 kg to hold.



- (i) What is the new reading on the scales when John is holding the suitcase?

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

Reading on laboratory scales = \_\_\_\_\_ N [2]

- (ii) What physical quantity is being measured by the laboratory scales?  
Put a tick (✓) in the correct box below.

Mass

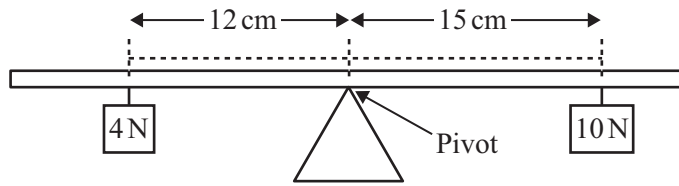
Weight

Acceleration

[1]

Examiner Only	
Marks	Remark
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- 5 Mary tries to balance a lever by hanging weights from it as shown. The pivot is at the centre of the lever.



- (i) Calculate the anticlockwise moment exerted by the 4 N force about the pivot.  
Give your answer in N cm.

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

Anticlockwise moment = \_\_\_\_\_ N cm [3]

- (ii) Calculate the clockwise moment exerted by the 10 N force about the pivot.  
Give your answer in N cm.

Clockwise moment = \_\_\_\_\_ N cm [1]

- (iii) Will the lever:

Tip clockwise

or Remain horizontal

or Tip anticlockwise

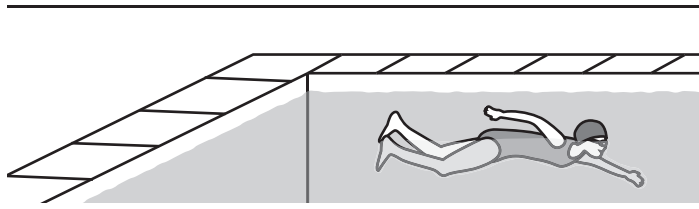
about the pivot.

Tick (✓) in the correct box.

[1]

Examiner Only	
Marks	Remark
○	○

- 6 Rachel swims two lengths of her 25 m swimming pool. She swims the first length in 18 s and the second length in 22 s.



- (a) Calculate the total time taken to complete the two lengths.

Total time = \_\_\_\_\_ s [1]

- (b) Calculate her average speed over the two lengths.

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

Average speed = \_\_\_\_\_ m/s [3]

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

7 A ballet dancer of weight 630 N balances on one toe.



If the area of toe in contact with the floor is  $3 \text{ cm}^2$ , calculate the pressure exerted on the floor in  $\text{N/cm}^2$ .

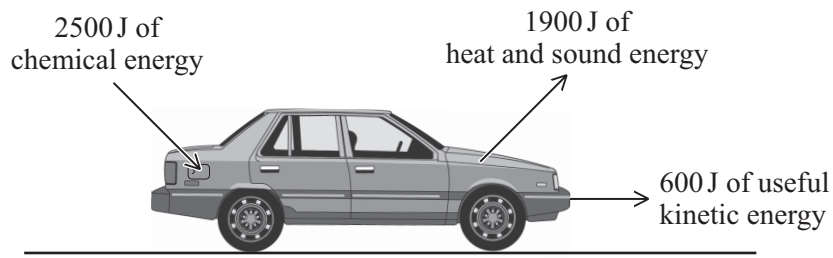
**You are advised to show your working out.**

Pressure = \_\_\_\_\_  $\text{N/cm}^2$  [3]

Examiner Only	
Marks	Remark
○	○



- 8 The diagram below shows what happens to 2500 J of chemical energy input to the engine of a car.



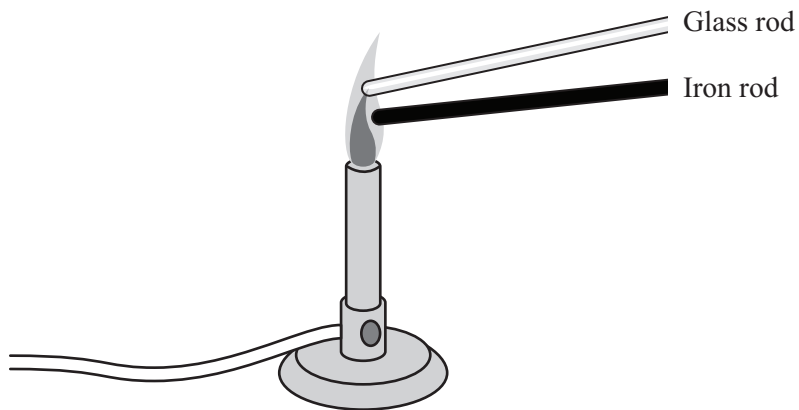
Calculate the efficiency of the car's engine.

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

Efficiency of engine = \_\_\_\_\_ [3]

Examiner Only	
Marks	Remark
○	○

- 9 Two rods, one made of glass and the other of iron, are placed in a Bunsen flame as shown. The dimensions of the rods are exactly the same.



After each of the statements below, write the letter **G** if the statement applies to glass.

Write **I** if the statement applies to Iron.

If the statement applies to both rods, then put **GI** in the box.

This rod has no free electrons.

Atoms are mainly responsible for heat conduction.

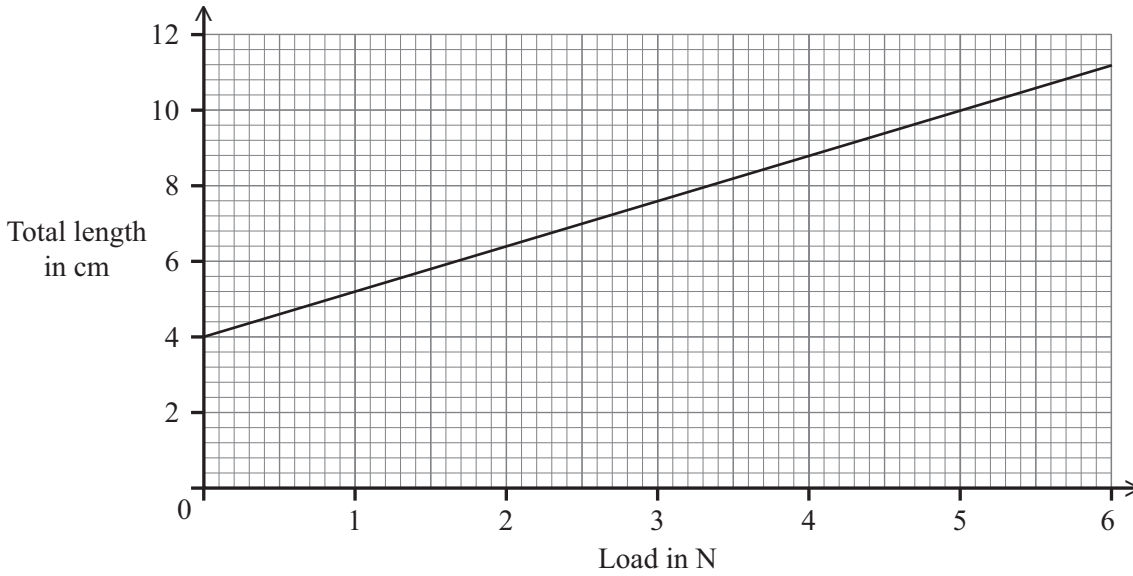
Atoms vibrate more quickly when heat is added.

Heat is transferred when electrons collide with neighbouring atoms.

[4]

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

10 The graph below shows results from a Hooke's Law experiment for a steel spring.



(a) Is the load proportional to the total length of the spring?

Tick (✓) the correct box and give a reason for your answer.

Yes

No

Reason: \_\_\_\_\_ [1]

(b) What is the natural (unextended) length of the spring?

Natural length = \_\_\_\_\_ cm [1]

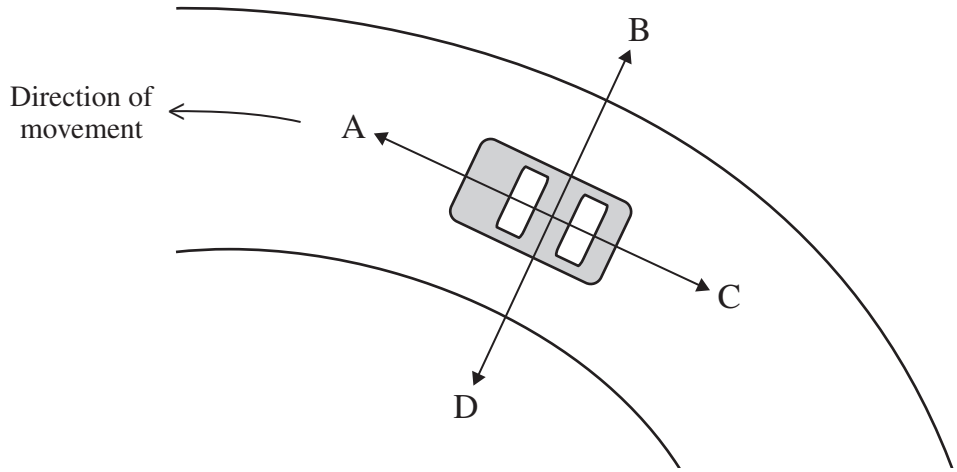
(c) An unknown load extends the spring by 6 cm. Use the graph to find the unknown load.

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

Unknown load = \_\_\_\_\_ N [2]

Examiner Only	
Marks	Remark
○	○

11 The diagram shows a plan view (bird's eye view) of a car going round a circular track.



Four directions, A, B, C and D, are shown.

(a) (i) Which letter indicates the direction of the force which keeps the car moving in a circle?

Letter \_\_\_\_\_ [1]

(ii) What is the name of this force?

Force \_\_\_\_\_ [1]

(b) The car has a mass of 1500 kg and it is going at a constant speed of 20 m/s. Calculate the car's momentum.

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

Momentum = \_\_\_\_\_ kg m/s [3]

Examiner Only	
Marks	Remark
○	○

- 12 Patricia wants to calculate the power she develops in running up a flight of steps.



The data sheet below gives one set of results recorded by her classmate.

Data Sheet	
Patricia's weight = 700 N	
Height of one step = 0.15 m	
Number of steps = 20	
Time to run up steps = 5 seconds	

- (a) Use the information in the data sheet to calculate the work done in running up the 20 steps.

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

Work done = \_\_\_\_\_ J [3]

- (b) Use the information in the data sheet and your answer to part (a) to calculate the power developed by Patricia.

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

Power developed = \_\_\_\_\_ W [3]

Examiner Only	
Marks	Remark
○	○

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**THIS IS THE END OF THE QUESTION PAPER**

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