



Rewarding Learning

General Certificate of Secondary Education
2011–2012

Centre Number

71

Candidate Number

Science: Double Award (Modular)

Forces and Energy

End of Module Test

Higher Tier

C

[GDC02]

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.

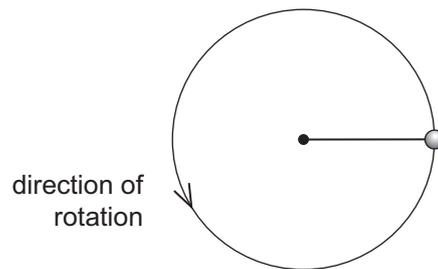
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use only

Question Number	Marks
1	
2	
3	
4	
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7	
8	
9	
10	
11	
12	

Total
Marks



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



- (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.

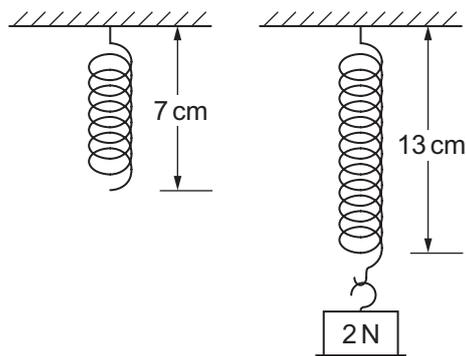
You are advised to show your working out.

Momentum = _____ kg m/s [3]

Examiner Only	
Marks	Remark
○	○

- 2 (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]

Examiner Only	
Marks	Remark
○	○

- 3 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.

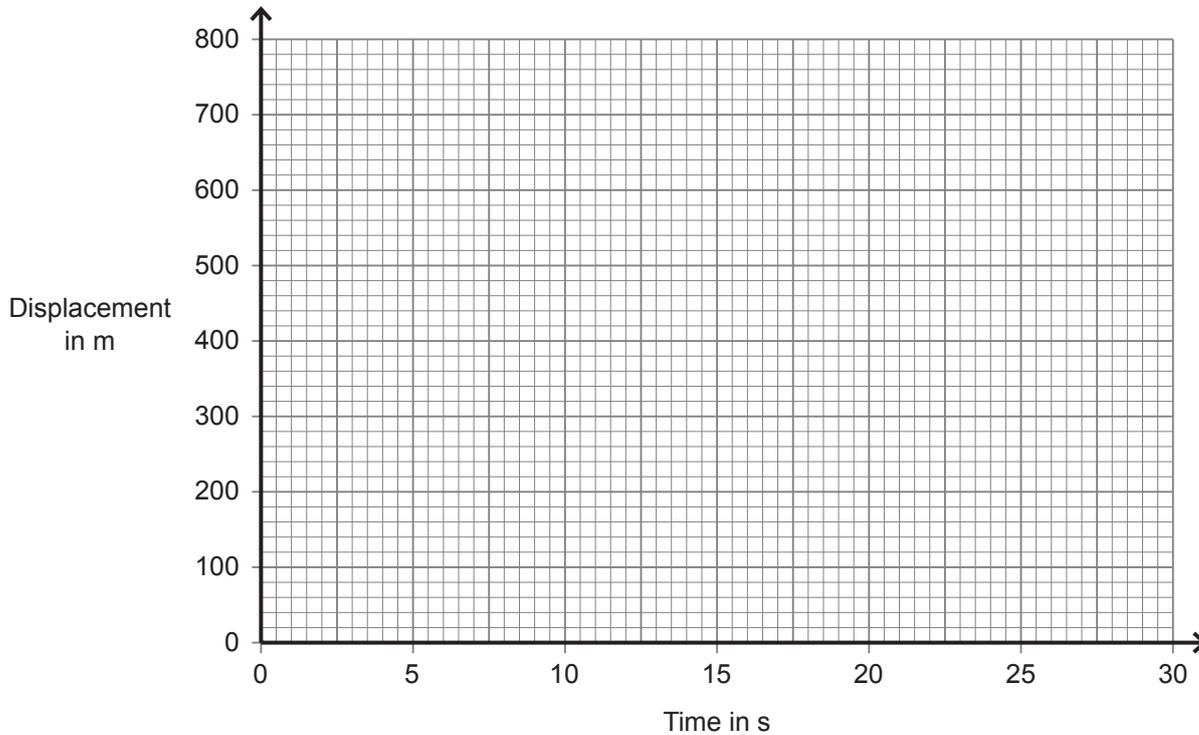
Pressure = _____ [4]

Examiner Only	
Marks	Remark
○	○

- 4 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.



[2]

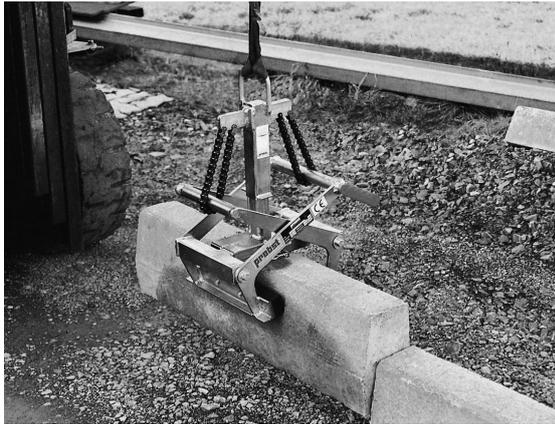
- (b) Use the graph to calculate the velocity of the car.

You are advised to show your working out.

Velocity = _____ m/s [3]

Examiner Only	
Marks	Remark
○	○

- 6 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.

$$\text{Work done} = \text{_____ J [3]}$$

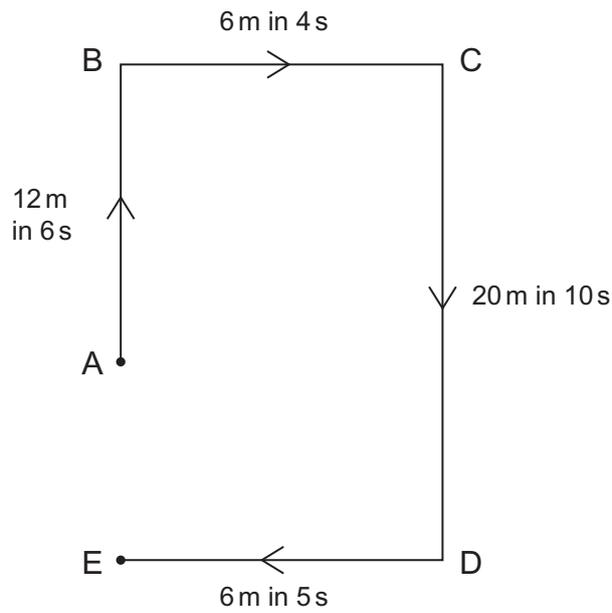
- (b) Calculate the power of the motor if it does this work in 15 seconds.

You are advised to show your working out.

$$\text{Power} = \text{_____ W [3]}$$

Examiner Only	
Marks	Remark
○	○

- 8 The diagram below shows a bird's eye view of a child running in the playground. Distances and times are given for each stage.



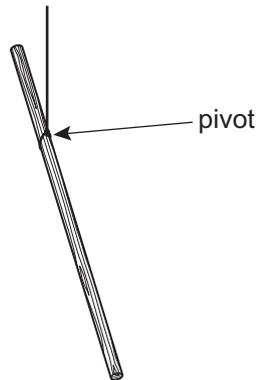
Calculate the child's average velocity for the whole journey from A to E.

You are advised to show your working out.

Average velocity = _____ m/s [3]

Examiner Only	
Marks	Remark
○	○

- 9 Maureen makes a simple bird perch by tying a piece of string to a uniform piece of wooden rod.

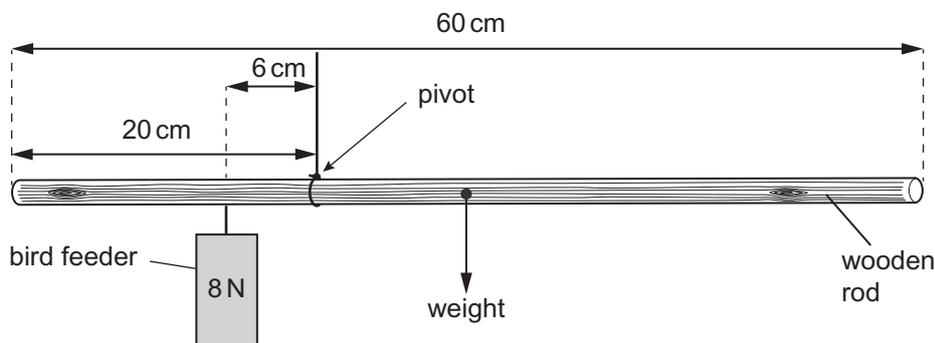


- (a) Why does the wooden rod not lie horizontally?

_____ [1]

The rod is 60 cm long and Maureen ties the string 20 cm from one end.

She now hangs a bird feeder, of weight 8 N, on one side and moves it until the perch is horizontal, as in the diagram below.



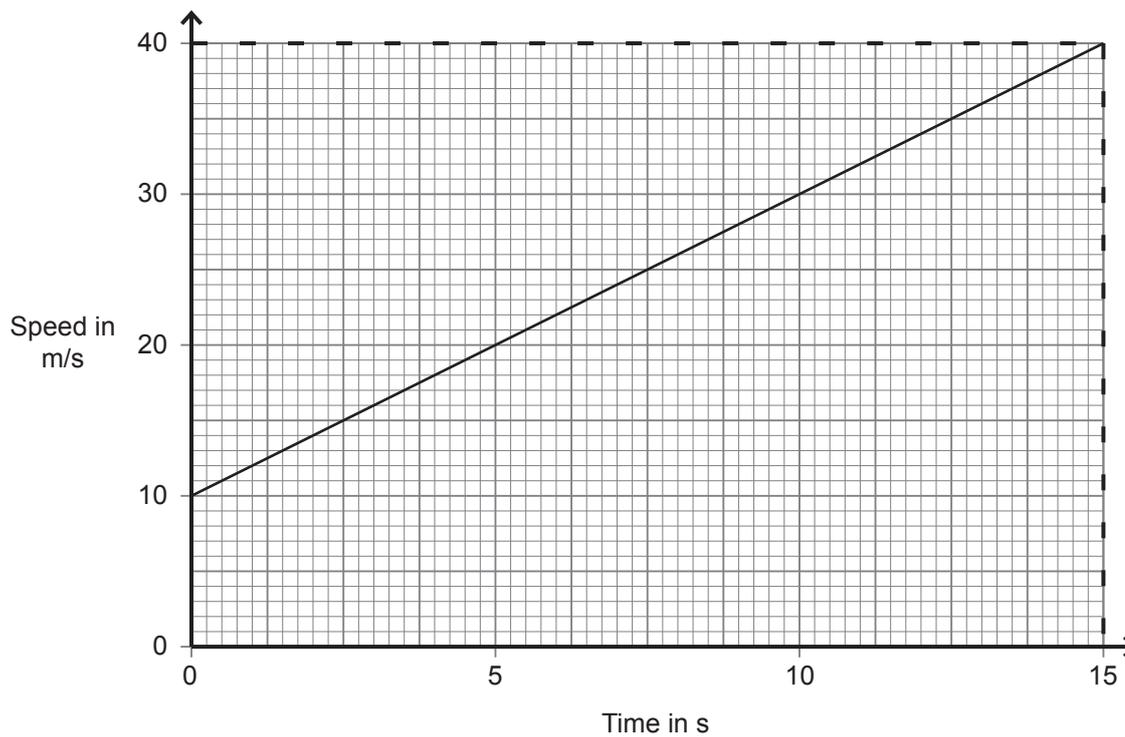
- (b) Use the principle of moments to calculate the weight of the wooden rod.

You are advised to show your working out.

Weight = _____ N [4]

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Marks	Remark
○	○

- 10 During part of a journey a car accelerates from 10 m/s to 40 m/s in 15 seconds. A graph of this part of the journey is shown.



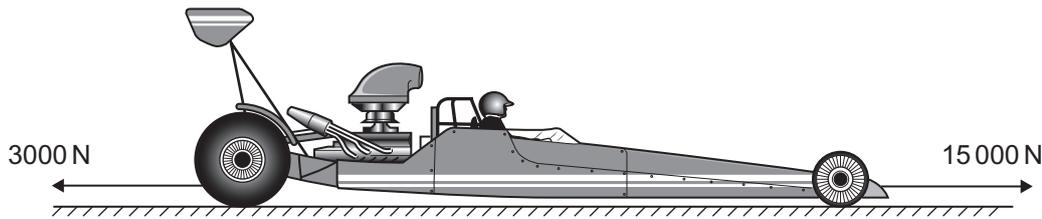
Calculate the distance travelled during this time.

You are advised to show your working out.

Distance = _____ m [4]

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11 The forces acting on a dragster car of mass 800 kg are shown below.



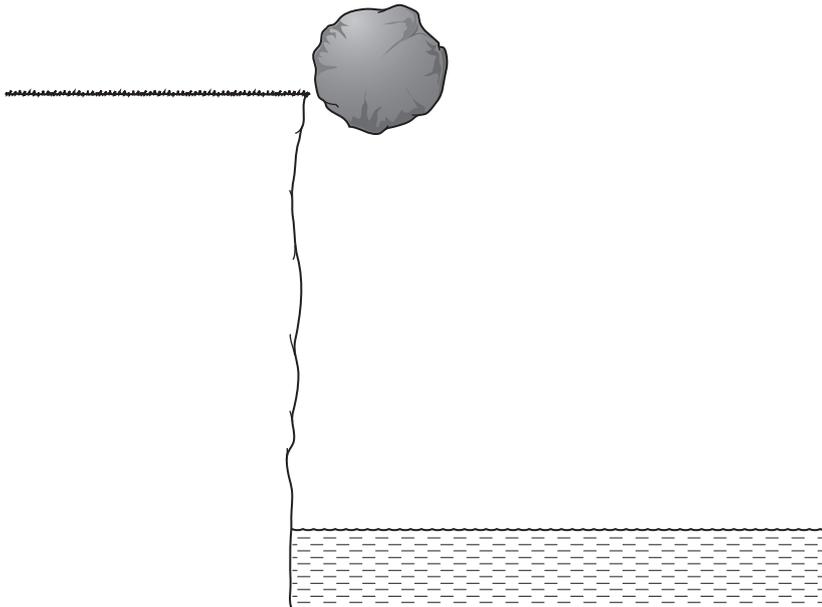
By first finding the resultant force, calculate the acceleration of the dragster car.

You are advised to show your working out.

Acceleration = _____ m/s² [4]

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Marks	Remark
○	○

- 12 A boulder of mass 15 kg and gravitational potential energy of 6750 J falls off the edge of a cliff into the sea.



Use the principle of conservation of energy to calculate the velocity of the boulder just as it strikes the water.

You are advised to show your working out.

Velocity = _____ m/s [4]

THIS IS THE END OF THE QUESTION PAPER

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Marks	Remark
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