

IGCSE Physics - Section 1– Forces and motion – practice exam questions.

Question 1.

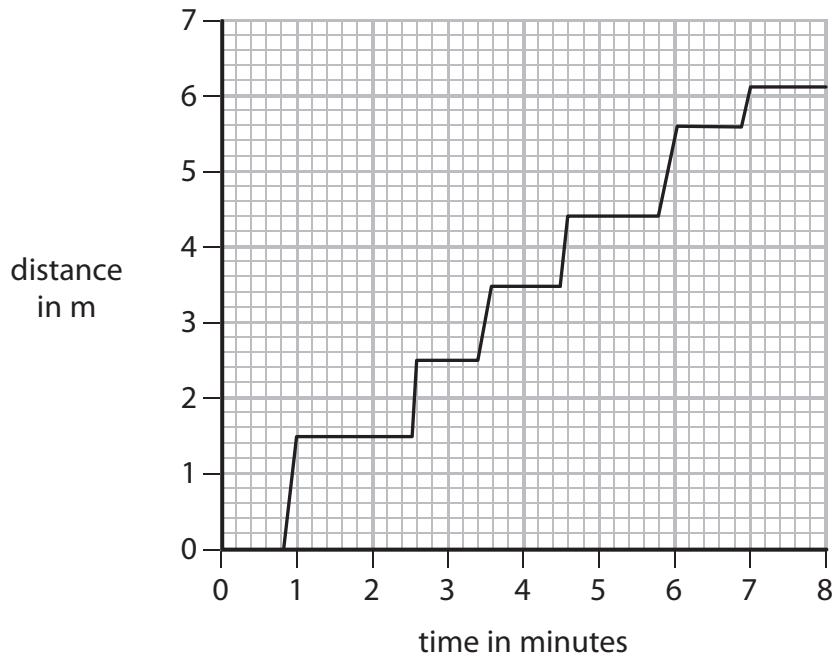
4 The diagram shows some people waiting in a queue at a supermarket.



The queue moves forward each time a person leaves the checkout.

Person X spends seven minutes in the queue before reaching the checkout.

The graph shows how distance changes with time for person X.



(a) (i) What is the initial length of the queue?

(1)

initial length = m

(ii) Explain how you could use the graph to work out the number of times person X is stationary.

(2)

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(b) (i) State the equation linking average speed, distance moved and time taken.

(1)

(ii) Calculate the average speed of person X in the queue.

Give the unit.

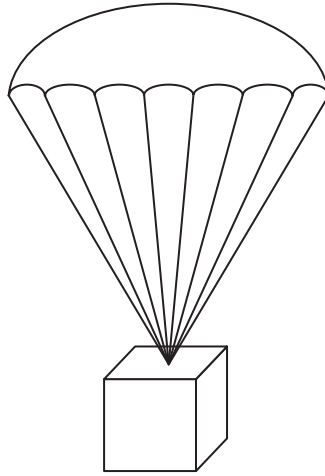
(3)

average speed = unit

(Total for Question 4 = 7 marks)

Question 2.

12 The diagram shows a box attached to a parachute, falling at constant velocity.



(a) State the name for this constant velocity.

(1)

(b) Explain, in terms of forces, why the box and parachute fall at constant velocity.

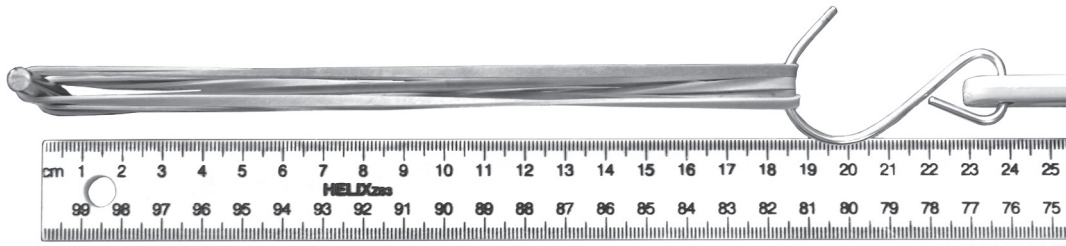
(4)

(Total for Question 12 = 5 marks)

Question 3.

4 A student investigates the stretching of rubber bands.

She stretches four rubber bands as shown in the photograph.



She applies a force of 5.0 N and measures the length of the rubber bands.

She repeats the experiment with different numbers of rubber bands, using a force of 5.0 N each time.

The table shows her results.

Number of rubber bands	Stretched length in cm
1	43.2
2	28.0
3	21.5
4	
5	17.6
6	17.0

(a) (i) Estimate the length of the four rubber bands shown in the photograph and use your value to complete the table.

(1)

(ii) Suggest two reasons why your estimate may not be accurate.

(2)

1.....

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2.....

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(b) Suggest how the student made this investigation a fair test.

(1)

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(c) (i) The number of rubber bands is a series of whole numbers.

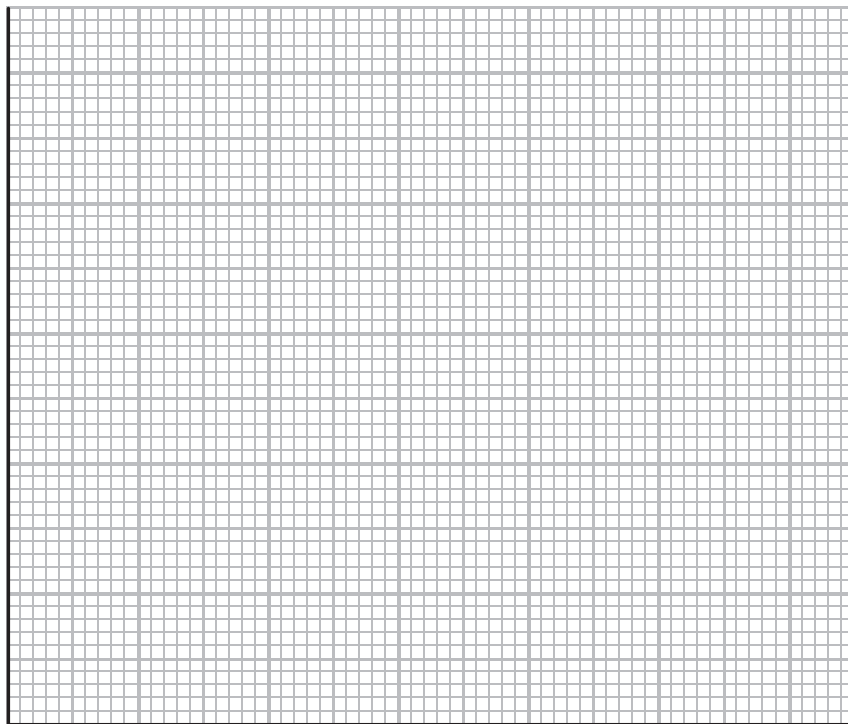
State the name of this type of variable.

(1)

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(ii) Display the results of the student's investigation on the grid.

(4)



(iii) Describe the relationship between the number of rubber bands and the stretched length.

(2)

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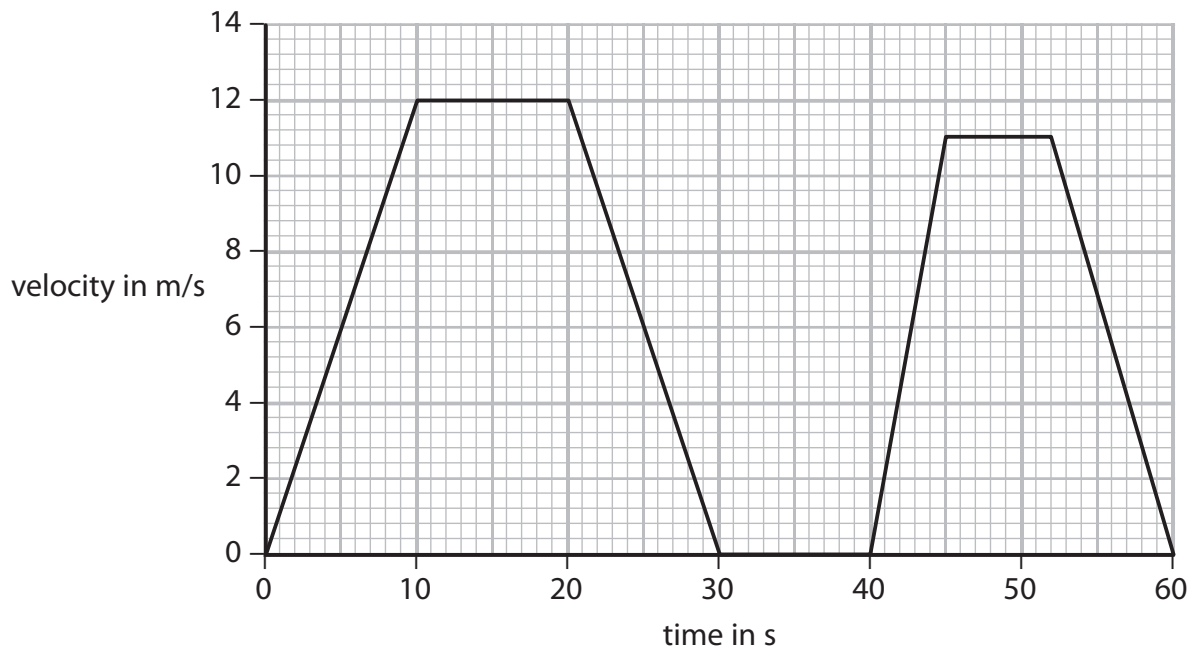
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(Total for Question 4 = 11 marks)

Question 4.

2 A bus travels along a straight road.

The graph shows how the velocity of the bus changes during a short journey.



(a) (i) State the velocity of the bus after 25 s.

(1)

velocity = m/s

(ii) How long is the bus stationary during its journey?

(1)

time = s

(b) (i) State the equation linking acceleration, change in velocity and time taken. (1)

(ii) Calculate the acceleration of the bus during the first 10 seconds.
Give the unit. (3)

acceleration = unit

(c) (i) State the equation linking average speed, distance moved and time taken. (1)

(ii) The bus moves a total distance of 390 m during the journey.
Calculate the average speed of the bus. (2)

average speed = m/s

(d) The bus travels further in the first 30 seconds of its journey than it does during the last 30 seconds.
Explain how the graph shows this. (2)

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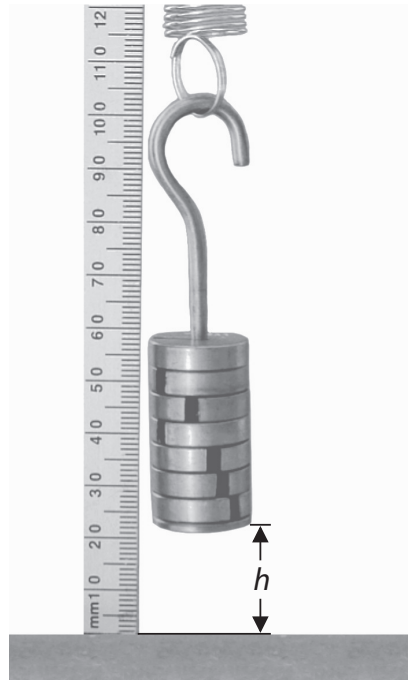
(Total for Question 2 = 11 marks)

Question 5.

5 A student uses this apparatus to investigate forces stretching a spring.



She uses a ruler to measure the vertical distance h between the bottom of the mass hanger and the base of the stand.



(a) Suggest two ways that the student can measure distance h more accurately.

(2)

1

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2

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(b) The student continues her investigation by loading the spring with different masses.

The table shows her results.

Mass in g	Force in N	Distance h in cm
20	0.2	4.6
40	0.4	3.9
60	0.6	3.1
80	0.8	2.3
100	1.0	1.6
120	1.2	0.9

(i) Name the dependent variable in this investigation.

(1)

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(ii) Explain how the force values in the table are calculated.

(2)

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(iii) Plot a graph of distance h against force, and draw the line of best fit.

(5)



(iv) Use your graph to find the force for which h is zero.

(2)

force = N

(v) Explain whether the spring obeys Hooke's law.

(2)

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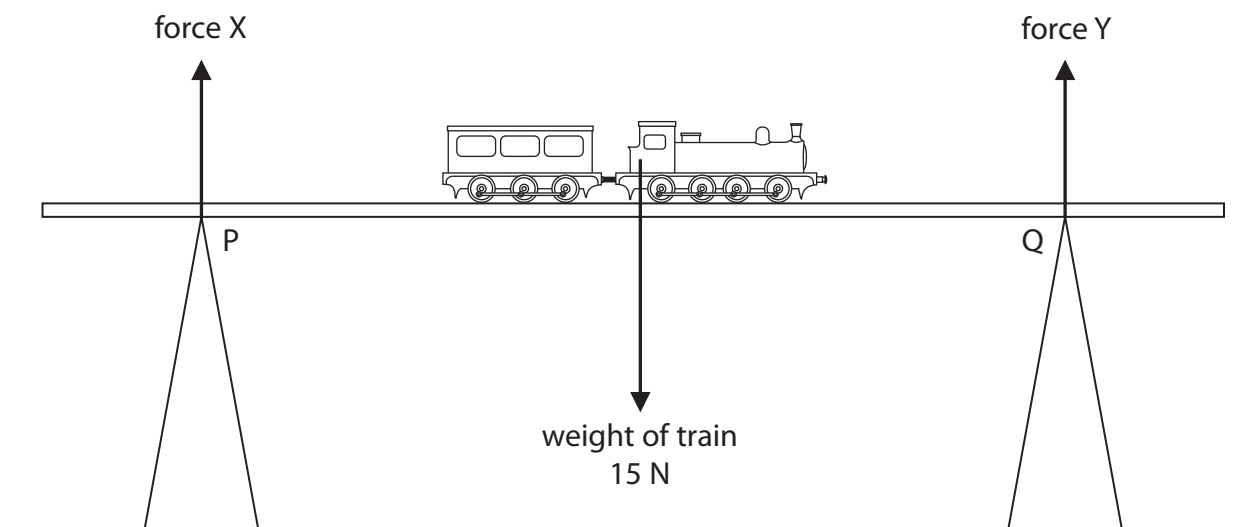
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(Total for Question 5 = 14 marks)

Question 6.

3 A toy train is placed on the middle of a bridge on a model railway.



The weight of the train acts through its centre of gravity.

Ignore the weight of the bridge.

(a) Which row of the table shows the correct values for forces X and Y?

(1)

	force X	force Y
<input type="checkbox"/> A	7.5 N	7.5 N
<input type="checkbox"/> B	0 N	0 N
<input type="checkbox"/> C	0 N	15 N
<input type="checkbox"/> D	15 N	0 N

(b) Describe how force X changes if the train moves from P to Q.

(2)

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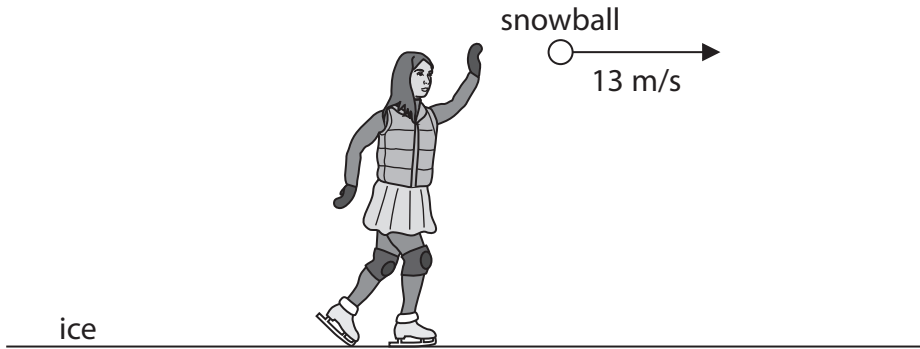
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(Total for Question 3 = 3 marks)

Question 7.

5 An ice skater throws a 0.23 kg snowball with a velocity of 13 m/s.



(a) (i) State the equation linking momentum, mass and velocity.

(1)

(ii) Calculate the initial momentum of the snowball.

(2)

initial momentum = kg m/s

(b) When the skater throws the snowball forwards, she slides backwards on the ice.

Explain why she moves in this direction.

(3)

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(c) The skater wears soft knee pads that compress easily.

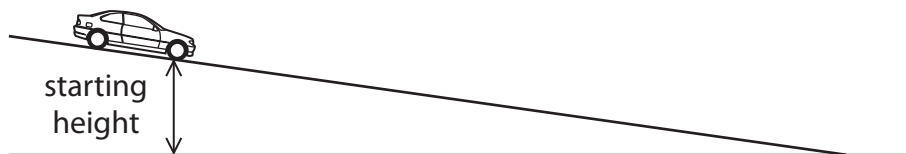
Explain how the pads protect her knees when she falls on the ice.

(3)

(Total for Question 5 = 9 marks)

Question 8.

5 A student investigates the speed of different toy cars as they roll down a slope.



(a) The student makes this prediction.

'The more weight a toy car has the faster it will roll down the slope.'

(i) What is the independent variable in the student's prediction?

(1)

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(ii) What is the dependent variable in the student's prediction?

(1)

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(b) State two factors that the student should keep constant in his investigation.

(2)

1

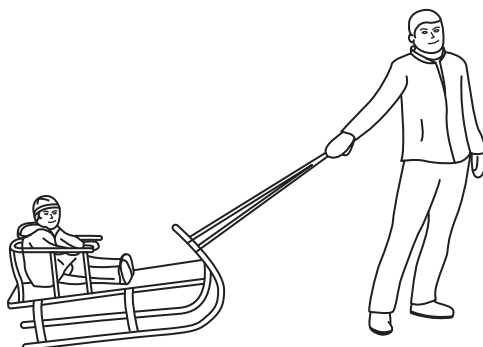
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2

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Question 9.

7 The diagram shows a man pulling a child on a sledge.



(a) The acceleration of the sledge is 1.5 m/s^2 .

The mass of the child and sledge is 38 kg.

(i) State the equation linking force, mass and acceleration.

(1)

(ii) Calculate the force needed to produce this acceleration.

(2)

force = N

(iii) Suggest a reason why the force exerted on the sledge by the man must be greater than the force calculated.

(1)

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(b) The sledge starts from rest and accelerates at 1.5 m/s^2 until its velocity is 2.8 m/s .

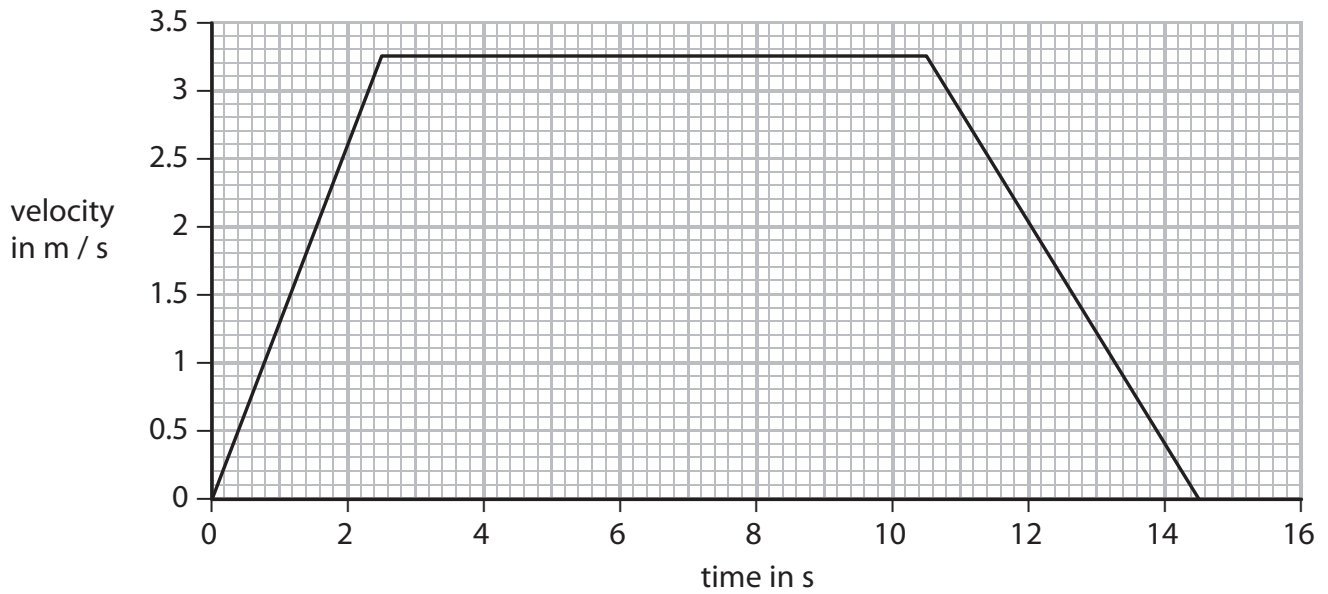
(i) State the relationship between acceleration, velocity and time.

(1)

(ii) Show that the time taken to reach 2.8 m/s is about 2 s .

(2)

(c) This velocity-time graph shows the motion of the sledge as it travels down a hill.



(i) Calculate the distance travelled by the sledge.

(3)

distance travelled = m

(ii) State the equation linking average speed, distance moved and time taken.

(1)

(iii) Calculate the average speed of the sledge for the whole journey.

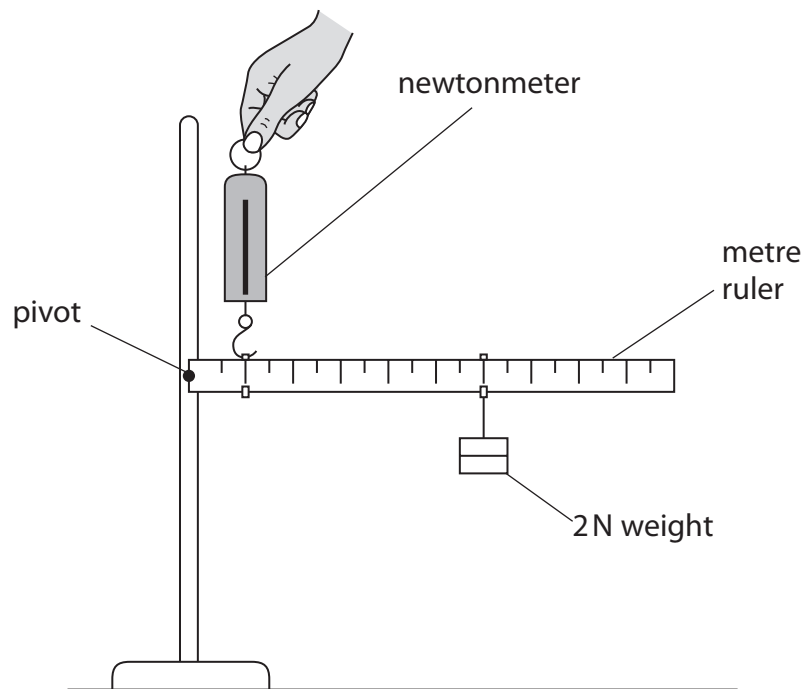
(2)

average speed =m/s

(Total for Question 7 = 13 marks)

Question 10.

3 The diagram shows the apparatus used to investigate moments.



The 2 N weight is placed 60 cm from the pivot.

The newtonmeter is placed 10 cm from the pivot.

(a) (i) State the equation linking moment, force and perpendicular distance from the pivot.

(1)

(ii) Calculate the reading on the newtonmeter.

Ignore the weight of the ruler.

(3)

reading = N

(b) The metre rule is replaced by an iron bar.

The iron bar is 1 m long and has a weight of 10 N.

The newtonmeter and the 2 N weight stay in their original position.

Explain how this change affects the reading on the newtonmeter.

(3)

(Total for Question 3 = 7 marks)
