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EDEXCEL GCSE PHYSICS: QUESTIONS BY TOPIC

Forces and Matter (15)

GCSE Physics (Higher) Topic 15

3 questions · 34 marks · Mark schemes included

Pearson Edexcel GCSE (9-1) Physics 1PH0, Higher Tier, June 2018 - June 2025

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HOW TO USE THIS BOOKLET

Questions run from the lowest mark tariff to the highest, so similar questions sit together.

Click any row below to jump straight to that question.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme.

Diagrams, graphs, tables and data are printed exactly as they appeared in the original papers.

QUESTION	SOURCE	MARKS	PAGE
1. Q7	Paper 2 June 2023	11	4
2. Q8	Paper 2 June 2025	11	7
3. Q6	Paper 2 November 2020	12	14



QUESTIONS

3 questions · 34 marks · lowest tariff first



11-MARK QUESTIONS

2 questions in this booklet



- 7 (a) Figure 16 shows part of the inside of a pen.

The pen contains a spring that can be compressed.

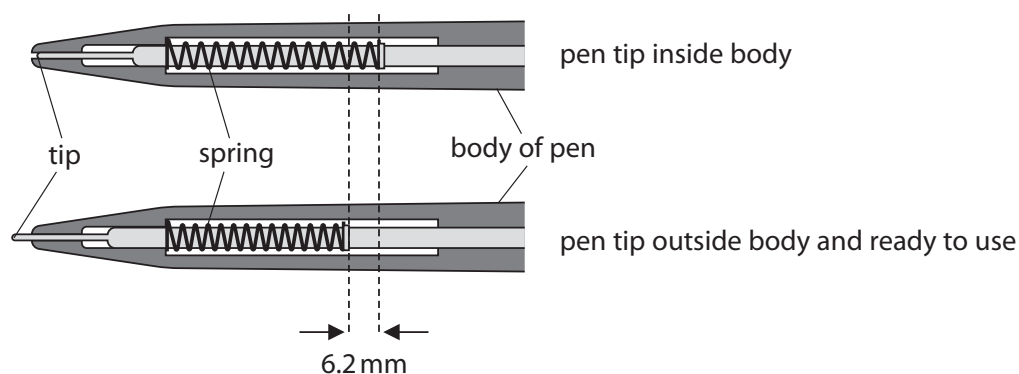


Figure 16

The spring constant of the spring is 260 N/m.

- (i) Calculate the force needed to compress the spring by the amount shown in Figure 16.

Give your answer to an appropriate number of significant figures.

(3)

force = ... N

- (ii) A student removes the spring from the pen and investigates the compression of the spring.

Figure 17 shows the equipment and the procedure that the student uses.

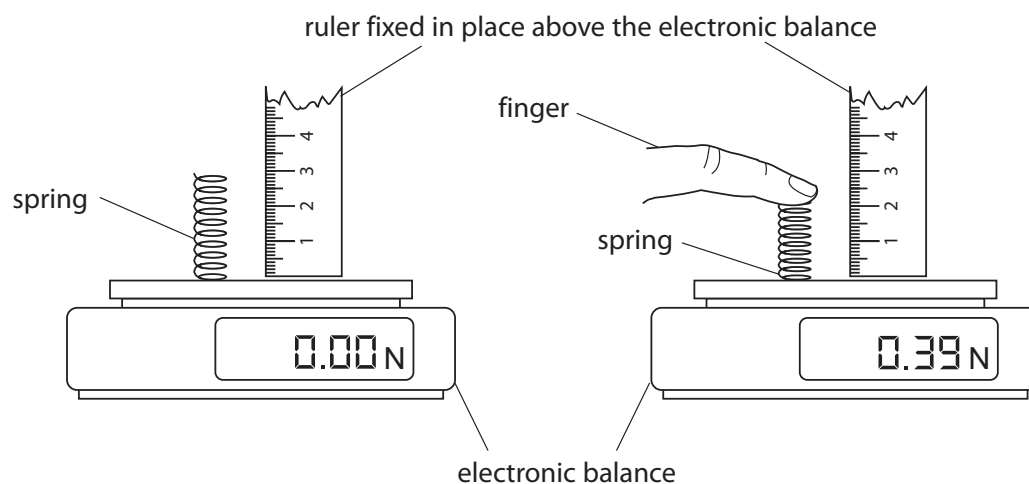


Figure 17

The student presses down on the spring to change its length.

The electronic balance measures the force applied to the spring.

Describe how the student can determine the change in length of the spring.
You may add to Figure 17 to help your answer.

(3)

.....

.....

.....

.....

.....

- (iii) The student finds it difficult to make an accurate measurement of the change in length of the spring using the equipment as shown.

Describe **one** way that the student could improve the procedure.

(2)

.....

.....

.....

.....

(b) Figure 18 shows a different spring hanging from a hook fixed to the ceiling.

A block hangs from the other end of the spring.

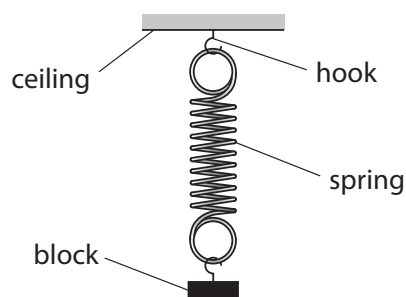


Figure 18

The weight of the spring is 1 N.

The weight of the block is 5 N.

The force exerted on the top of the spring by the hook is

(1)

- ☐ **A** 4 N down
- ☐ **B** 4 N up
- ☐ **C** 6 N down
- ☐ **D** 6 N up

(c) Figure 19 shows two forces, P and Q, acting at point X.

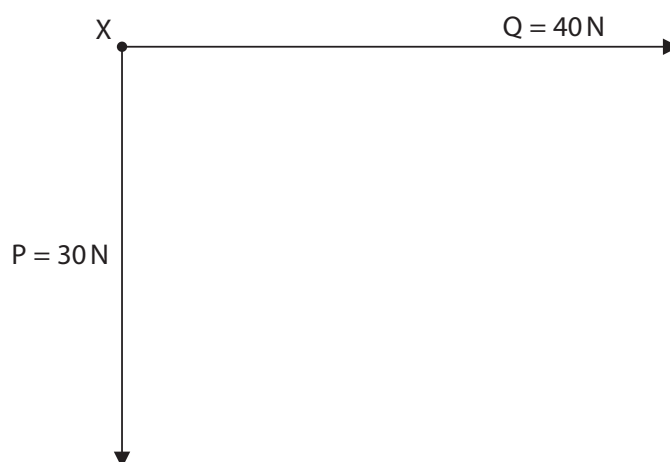


diagram is
drawn to scale

Figure 19

Complete the diagram in Figure 19 to show the size and direction of the resultant force, R, on point X.

(2)

(Total for Question 7 = 11 marks)

- 8 (a) A student measures the length of a spring when it is horizontal and when it is vertical, as shown in Figures 15a and 15b.

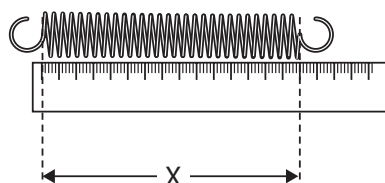


Figure 15a

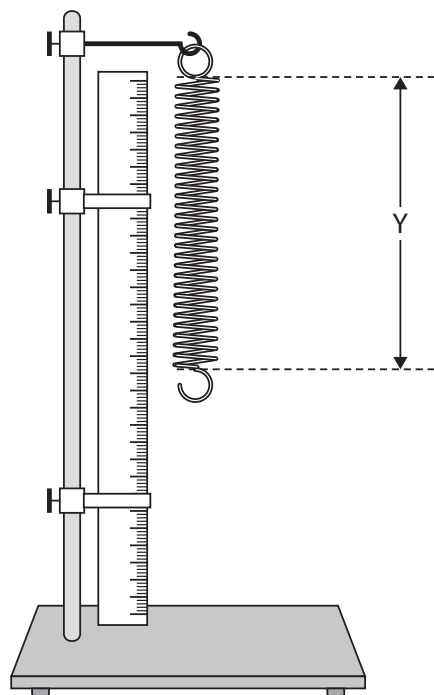


Figure 15b

The length, Y , of the vertical spring in Figure 15b is greater than the length, X , of the spring in Figure 15a.

- (i) Give a reason why the length of the spring in Figure 15b is greater than the length of the spring in Figure 15a.

(1)

- (ii) The student adds some weights to the end of the spring, as shown in Figure 16b.

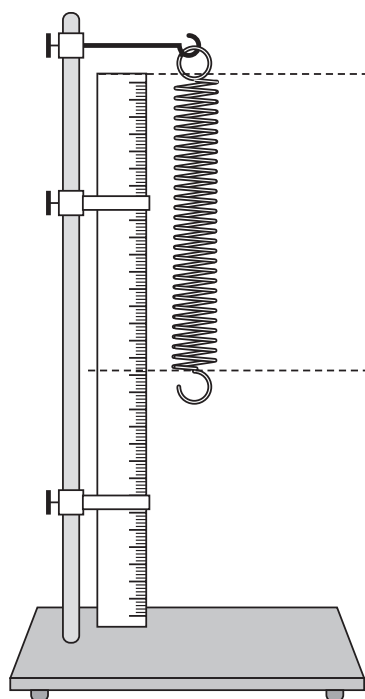


Figure 16a

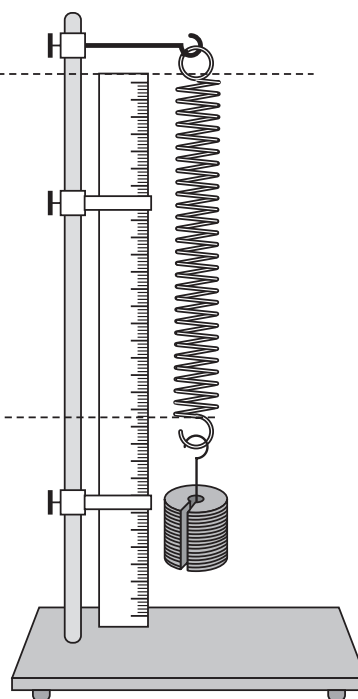


Figure 16b

(Source: <https://www.shalom-education.com/courses/ks3-physics/lessons/motion-and-forces/topic/deformation-and-hookes-law/>)

The extension of the spring due to these added weights is equal to

(1)

- ☐ A $Z - Y$
- ☐ B $Z + Y$
- ☐ C Z
- ☐ D Y

- (b) The extension of the spring in Figure 16b is now determined for different weights added to the spring up to a maximum of 6 N.

Figure 17 shows a graph of the results.

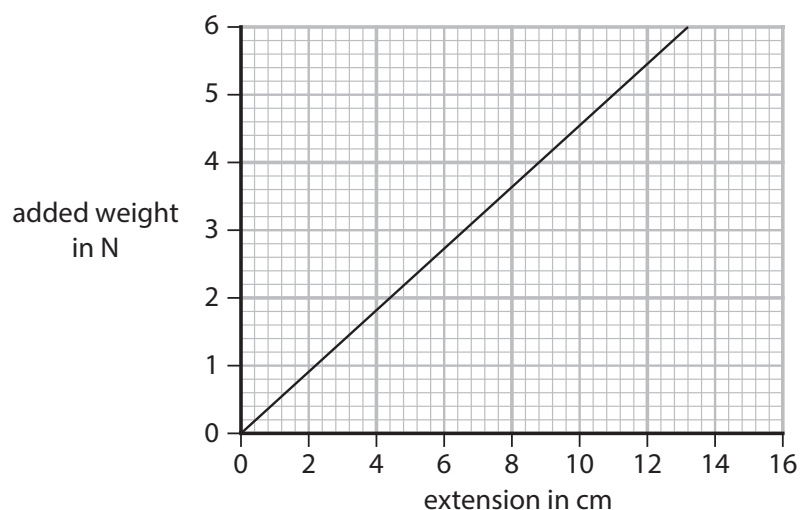


Figure 17

- (i) The increase in potential energy stored in the spring is equal to the area under the graph in Figure 17.

Calculate the increase in potential energy stored in the spring when the spring is extended from 0 cm to 8 cm.

Give your answer in joules (J).

(3)

energy = ... J



- (ii) Calculate the spring constant of the spring using data from the graph in Figure 17.

State the unit.

(2)

spring constant = ... unit



(iii) The box in Figure 18 represents a weight added to the end of the spring.



Figure 18

Draw **two** vectors on Figure 18 to complete a free body force diagram of a 5 N weight in equilibrium.

(2)



(c) Figure 19 shows two forces, P and Q, acting at point X.

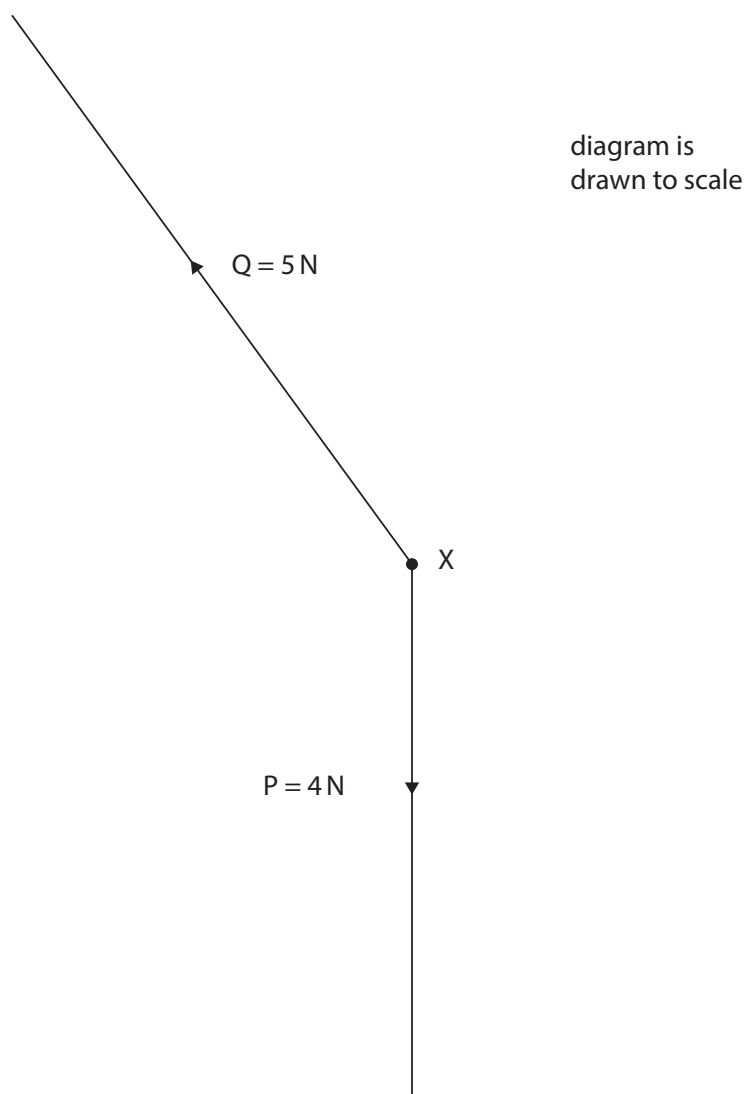


Figure 19

Complete the diagram in Figure 19 to show the size and direction of the resultant force, R, on point X.

(2)

(Total for Question 8 = 11 marks)



12-MARK QUESTIONS

1 question in this booklet



6 Figure 14 shows a spring standing on a table.

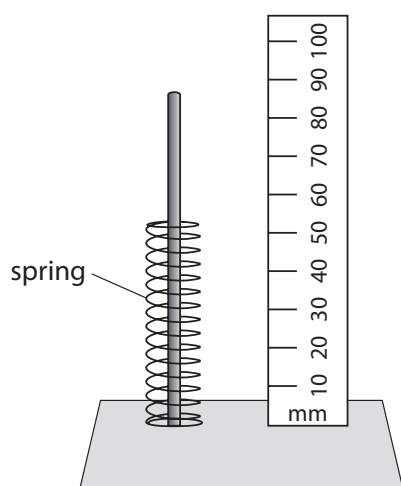


Figure 14a

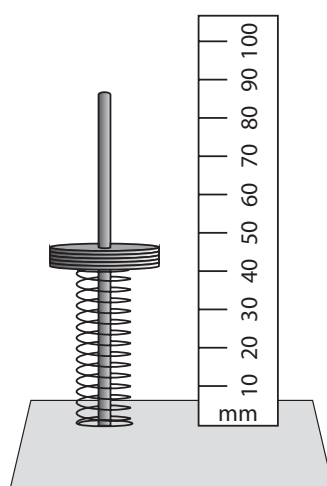


Figure 14b

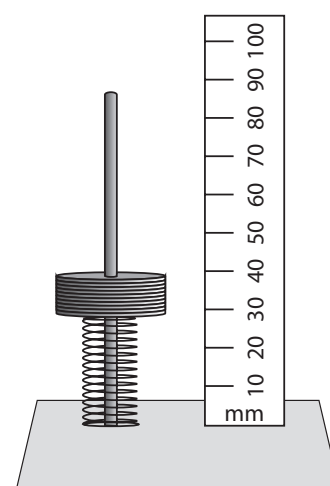


Figure 14c

Weights are added to the spring as shown in Figures 14b and 14c.

(a) (i) Estimate the original length of the spring as shown in Figure 14a.

(1)

original length = ... mm

(ii) Describe how the reduction in the length of the spring when weights are added can be determined.

(2)

.....

.....

.....

.....

(iii) State **two** ways that the experimental procedure could be improved.

(2)

1

.....

2

.....

(iv) Give **one** reason why the reduction in length eventually reaches a limit as more weights are added.

(1)

.....

.....

(b) A different spring is extended.

A force of 0.50 N gives an extension of 13 mm.

Calculate the spring constant k in N/m.

(3)

spring constant $k =$ N/m



(c) Another spring is extended.

The work done to extend the spring is 0.14 J.

The spring constant of the spring is 175 N/m.

Calculate the extension of the spring.

Use an equation selected from the list of equations at the end of this paper.

(3)

extension of spring = ... m

(Total for Question 6 = 12 marks)



MARK SCHEMES

official Pearson Edexcel mark schemes

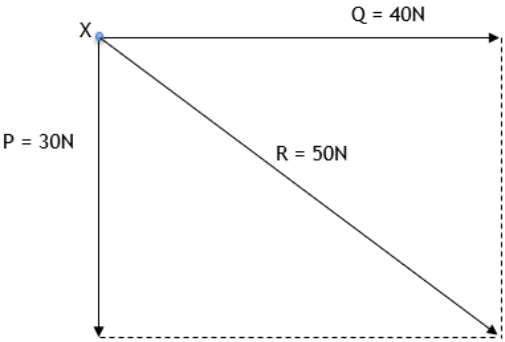


Question number	Answer	Additional guidance	Mark
7 (a) (i)	selection and substitution (1) (F=) $260 \times 6.2 \times 10^{-3}$ evaluation (1) (F=) 1.612 (N) or 1.61 (N) answer to 2 s.f. (1) 1.6 (N)	award 1 mark only for answer of 1.61(2) to any other power of ten, e.g. 1612 (N) independent mark for any answer given to 2 significant figures allow 2 marks for answer of 1600 (N) with or without working 1.60 scores 2 marks award full marks for correct answer without working.	(3) AO2

Question number	Answer	Additional guidance	Mark
7 (a) (ii)	a description including read position of top of spring against the ruler (1) read position of top of spring when pressed down (1) subtract the two readings (1) OR substitution (1) $0.39 = 260 \times \text{change in length}$ rearrangement (1) (change in length =) $\frac{0.39}{260}$ evaluation (1) 1.5 mm unit must be shown	May be seen drawn in figure 17 measure length at the start allow value from ruler e.g. 2.9 (cm) measure the length when pressed down allow value from ruler e.g. 2.0 (cm) subtract the two measurements allow find the difference for subtract allow calculated value from diagram e.g. 0.9 (cm) ignore repeat (0).0015m unit must be shown	(3) AO1

Question number	Answer	Additional guidance	Mark
7 (a) (iii)	description to include change to enable accurate location of top of spring (1) for example: pointer, set square, thin sheet / another ruler (under finger) description of how the change is used (1)	may be seen drawn in Figure 17 move ruler closer to spring compress spring with weight rather than finger ignore photographs make measurements from where pointer / set square / thin sheet / other ruler touches the ruler reduce parallax error prevents fluctuations while measuring ignore repeats ignore unqualified references to accuracy or precision	(2) AO3

Question number	Answer	Additional guidance	Mark
7 (b)	D 6 N up A and C are incorrect because the force is upwards B is incorrect because the force is the sum of the two weights given.		(1) AO3

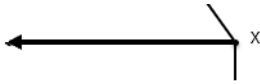
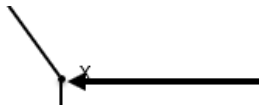
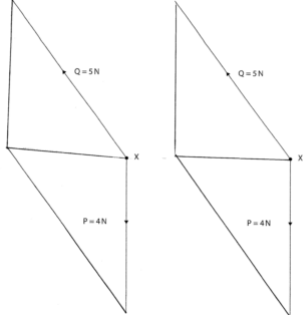
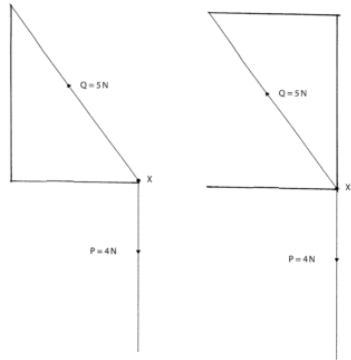
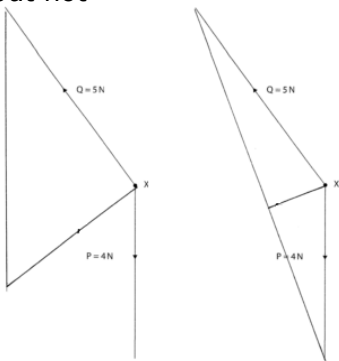
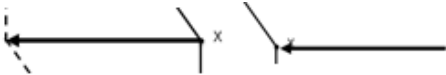
Question number	Answer	Additional guidance	Mark
7 (c)	arrow (any length) (labelled R) in correct direction (judge by eye) (1) (size of R =) 50N (1)	independent marks  construction lines need not be shown arrow head must be present for MP1 accept answers in range 48N to 52N obtained from scale drawing working need not be shown	(2) A01

Total 11 marks

Question number	Answer	Additional guidance	Mark
8(a) (i)	(force of) gravity / weight (acts on spring)		(1) AO2

Question number	Answer	Additional guidance	Mark
8(a) (ii)	A Z-Y B is incorrect because it is a sum not a difference of the two lengths C is incorrect because that is the final length of the spring D is incorrect because that is the initial length of the spring		(1) AO1

Question number	Answer	Additional guidance	Mark
8(b)(i)	relevant values from graph(1) 8 ($\times 10^{-2}$) and 3.6 seen substitution (1) (energy =) $0.5 \times 3.6 \times 8 (\times 10^{-2})$ evaluation (1) (energy =) 0.14 (J)	accept 8 ($\times 10^{-2}$) and values between 3.6 and 3.7 accept value between 0.14 and 0.15 (J) values between 0.14 and 0.15 (J) to any other power of ten scores 2 marks values between 0.28 and 0.30 (J) scores 2 marks values between 0.28 and 0.30 (J) to any other power of ten scores 1 mark award full marks for correct answer without working	(3) AO2

Question	Answer	Additional guidance	Mark
8(c)	correct direction (1) any size horizontal (judge by eye) arrow pointing left at point X  or 	if arrow missing or incorrect then allow attempt to find direction by construction of a suitable parallelogram or triangle e.g.  or  but not 	(2) A02
	indication of size (1) drawn correctly, size judged by eye or any arrow labelled 3 (N) . Allow values between 2.5 and 3.5	independent mark  or 	

Total for Question 8 = 11 marks

Question number	Answer	Additional guidance	Mark
6 (a)(i)	50.0 to 55.0 (mm) inclusive		(1)

Question number	Answer	Additional guidance	Mark
6 (a)(ii)	a description including note the original length (1) note the final length and subtract (1)		(2)

Question number	Answer	Additional guidance	Mark
6 (a)(iii)	any two from: use a ruler with a smaller/millimetre divisions (1) use interim values of weight (1) add more weights (to increase the range) (1) move the ruler closer to the spring (1) use of pointer (1) repeat and average (1)	ignore more accurate add fixed values of weights eye level / no parallax	(2)

Question number	Answer	Additional guidance	Mark
6(a)(iv)	the coils are {pushed together /touching} (1) or spring is fully compressed /cannot be made shorter (1)		(1)

Question number	Answer	Additional guidance	Mark
6 (b)	recall and substitution (1) $0.5 = k \times 13 \times 10^{-3}$ rearrangement (1) $\frac{0.5}{13 \times 10^{-3}}$ evaluation (1) 38 (N/m)	$k = \frac{F}{x}$ allow 38.5 (N/m) or 38.46 (N/m) or 39 (N/m) 0.04/0.038 (N/m) gains 2 marks 2958 (N/m) gains 1 mark (x^2 used in equation) award full marks for the correct answer without working	(3)

Question number	Answer	Additional guidance	Mark
6 (c)	substitution (1) $0.14 = \frac{1}{2} \times 175 \times x^2$ rearrangement for x^2 (1) $(x^2 =) \frac{0.14 \times 2}{175} \text{ or } \frac{0.14}{0.5 \times 175}$ evaluation (1) 0.04 (m)	substitution and rearrangement in either order $x^2 = \frac{E}{\frac{1}{2} \times k}$ 1.6×10^{-3} seen gains 2 marks 0.02(m) gains 2 marks 0.028 gains 1 mark award full marks for the correct answer without working	(3)

Total marks for question 6 = 12

