PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

PHYSICS



MARK SCHEME

TOPIC 15: FORCES AND MATTER (PAPER 2)

SCORE	PERCENTAGE
/105	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. Pearson Edexcel has not endorsed, approved or been involved in the production of it. Pearson Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson Edexcel publishes its past papers, mark schemes and examiner reports. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Mark Scheme

Q1.

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

Question number	Answer	Additional guidance	Mark
(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

(**QU05a 1SC0/2PH, June 2025**)

Q2.

Question Number	Answer	Additional guidance	Mark
(i)	a description including any **four** of the following: measure **initial** d / distance / height (1) change weight (1) measure **new** d / distance / height (1) repeat / continue (changing weight and measuring d) (1) plot a graph (d against weight)(1)	accept reference to 16 (mm)	(4) AO3a AO 3.2a/2b

Question Number	Answer	Additional guidance	Mark
(ii)	any **one** from: distance between the clamp and the masses (1) (change) strip (1)	accept ruler for strip throughout accept length of the strip accept thicker strip /thinner strip / material of strip / strip of different density etc.	**(1)** **AO3.3b**

(**QU04b 1SC0/2PF, June 2025**)

Q3.

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

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

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

(**Q04a 1SC0/2PH, Nov 2020**)

Q4.

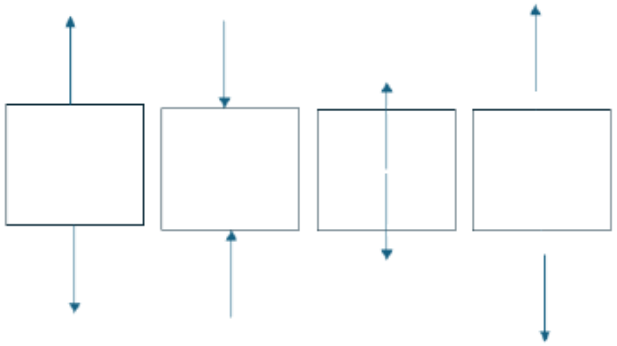
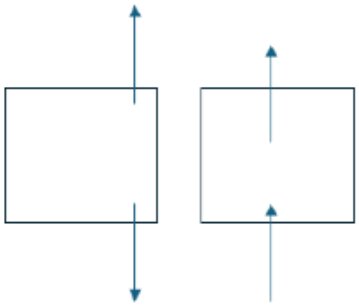
Question Number:	Answer	Additional Guidance	Mark
(i)	a description to include 4 of the following: • note position of pointer before current is switched on (1) • measure position of pointer when current in coil (1) • (use an ammeter to) measure current (1) • calculate the extension / stretch of the spring (1) • use force (of attraction) is proportional to extension / stretch (of spring) (1) • repeat with different currents (1)	measure length of spring before current is switched on how far nail moves calculate force from spring constant and extension calibrate spring increase the current calculate the extension of the spring using new position of pointer minus starting position of pointer is worth 3 marks	**(4)** AO 2 2

Question Number:	Answer	Additional Guidance	Mark
(ii)	select and substitute (1) (E =) ½ x 24 x 0.12^2 evaluation (1) (E =) 0.17 (J)	 ½ x 24 x 12^2 max 1 mark accept answers that round down to 0.17 e.g. 0.1728 POT error (e.g. 1728) max 1 mark award full marks for correct answer without working	**(2)** AO 2 1

Q5.

Question number	Answer	Additional guidance	Mark
(i)	relevant values from graph(1) 8 ($x10^{-2}$) and 3.6 seen substitution (1) (energy =) 0.5 x 3.6 x 8 ($x10^{-2}$) evaluation (1) (energy =) 0.14 (J)	 accept 8 ($x10^{-2}$) 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 number	Answer	Additional guidance	Mark
(ii)	45 or 0.45 (1) **OR** 45 N/m or 0.45 N/cm (2)	allow values between 44 and 47 or between 0.44 and 0.47 allow full marks for values between 44 and 47 N/m or between 0.44 and 0.47 N/cm	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
(iii)	two straight vertical arrows in opposite directions and (if extended) go through centre of the box (judge by eye) (1) label 5N on both arrows (1)	examples  scores this mark  does not score this mark independent mark	**(2)** **AO1**

(**QU05b 1SC0/2PH, June 2025**)

Q6.

Question number	Answer	Additional guidance	Mark
	substitution (1) $0.14 = ½ \times 175 \times x^2$ rearrangement for x^2 (1) $(x^2=)$ $\frac{0.14 \times 2}{175}$ 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)**

(**Q04c 1SC0/2PH, Nov 2020**)

Q7.

Question number	Answer	Additional guidance	Mark
(i)	selection and substitution (1) (F=) 260 x 6.2 (x 10^{-3})		**(3)** **AO2**
	evaluation (1) (F=) 1.612 (N) or 1.61 (N)	award 1 mark only for answer of 1.61(2) to any other power of ten, e.g. 1612 (N)	
	answer to 2 s.f. (1) 1.6 (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.	

Question number	Answer	Additional guidance	Mark
(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**	May be seen drawn in figure 7 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	**(3)** **AO1**

	substitution (1) 0.39 = 260 x change in length rearrangement (1) (change in length =) $\frac{0.39}{260}$ evaluation (1) 1.5 mm unit must be shown	 (0).0015m unit must be shown	

Question number	Answer	Additional guidance	Mark
(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 7 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**

(**QU04a 1SC0/2PH, June 2023**)

Q8.

Question number	Answer	Additional guidance	Mark
	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)**

(**Q04b 1SC0/2PH, Nov 2020**)

Q9.

Question Number	Answer	Additional guidance	Mark
(i)	substitution (1) 4.0=k x 0.06 rearrangement (1) $\frac{4.0}{0.06}$ (=k) evaluation (1) 67 (N/m)	allow substitution and rearrangement in either order (k=) $\frac{F}{x}$ allow values that round to 67 (N/m) award full marks for the correct answer without working POT error 2 marks maximum	**(3)**

Question Number:	Answer	Additional guidance	Mark
(ii)	(measurement of) original length (1) (measurement of) final length (1)	Accept measure length of spring for 1 mark	**(2)**

(**Q03b 1SC0/2PF, June 2019**)

Q10.

Question Number	Answer	Additional guidance	Mark
(i)	substitution (1) (k =) $\frac{2}{6.2 (\times 10^{-2})}$ evaluation (1) 32 (N/m)	 accept answers which round to 32 32 to any other power of ten scores 1 mark award full marks for the correct answer without working ignore 3.1 (from 6.2/2)	**(2)** **AO2.2**

Question Number	Answer	Additional guidance	Mark
(ii)	substitution (1) (E =) $0.5 \times 25 \times 0.06^2$ evaluation (1) 0.045 (J)	 accept 0.05 (J) 0.045 to any other power of ten scores 1 mark award full marks for the correct answer without working	**(2)** **AO 2.1**

(**QU04c 1SC0/2PF, June 2025**)

Q11.

Question Number	Answer	Additional guidance	Mark
(i)	recall (1) (P =) $\frac{E}{t}$ substitution and evaluation (1) (P=) 75 (W)	P = work done ÷ time P = $\frac{45}{0.6}$ award full marks for the correct answer without working	**(2)**

Question Number	Answer	Additional guidance	Mark
(ii)	substitution into E = $\frac{1}{2} \times k \times x^2$ (1) $45 = \frac{1}{2} \times 140 \times x^2$ rearrangement (1) $(x =) \sqrt{\frac{2 \times 45}{140}}$ evaluation (1) 0.8(0) (m)	allow substitution and rearrangement in either order $x^2 = (\frac{E}{0.5k} =) \frac{2 \times 45}{140}$ $x^2 = 0.64(28571)$ accept values that round to 0.80 e.g. 0.80178 award full marks for the correct answer without working	**(3)**

(**Q05a 1SC0/2PH, June 2019**)

Q12.

Question Number	Answer	Additional guidance	Mark
	substitution (1) (E=) ½ x 250 x 0.30(^{2}) evaluation 11 (1) unit (1) joule(s)/J	 accept 37.5, 37, 38 only accept 11.25, 11.2, 11.3 award full marks for the correct answer without working no POT error in evaluation independent mark j , Nm	**(3)**

(**Q03c 1SC0/2PF, June 2019**)

Q13.

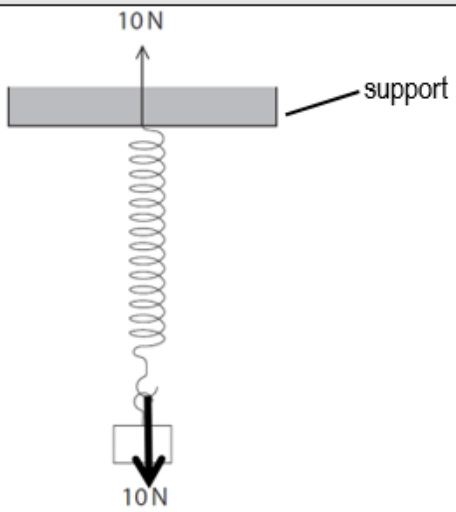
Question number	Answer	Additional guidance	Mark
i	substitution (1) (E =) ½ X 20 x 0.09$^{(2)}$ evaluation (1) 0.08(1) (J)	 allow 1 mark for ½ x 20 x 9^2 or answer of 810 (J) or answer of 90 (J) award full marks for the correct answer without working	**(2)**

Question number	Answer	Additional guidance	Mark
ii	a description including mention of one relevant energy store (1) correct transfer in context (1)	 potential/ PE/ kinetic/ KE/ thermal/ heat/ elastic potential energy stored in the spring transferred to kinetic energy of the ball/rod scores 2 marks kinetic energy of rod is transferred to kinetic energy of ball scores 2 marks idea of energy transferred to the surroundings/ thermal scores 2 marks	**(2)**

Question number	Answer	Additional guidance	Mark
iii	an explanation linking two from (controls the maximum) extension (1) idea of keeping below the elastic limit (1) (which would result in) spring being permanently stretched (1)	ignore <u>damaging</u> the spring (given in stem) stretch prevents spring being over-stretched / extended too far scores 2 marks allow distorted/ break	**(2)**

(**Q02b 1SC0/2PF, Nov 2020**)

Q14.

Question Number	Answer	Additional guidance	Mark
	 downwards arrow (1) Plus any one from: the same length as top arrow (1) from the bottom of the spring or from the weight (1)	Anywhere below the support Judge by eye Judge by eye	**(2)**

(**Q03a 1SC0/2PF, June 2019**)

Q15.

Question Number	Answer	Additional guidance	Mark
(i)	A description including any one from the following (1) **measure** a length or a specific distance related to the rubber or weights on a hanger OR with a **named device** (e.g. metre rule / stick / ruler / measuring tape) OR note position of a fixed point on rubber / weight carrier **AND** extension calculated / measured as the change in or difference between two positions or lengths or extensions (1)	evidence may be taken from additions to the diagram ignore vague statements such as see how it much it extends	**(2)**

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation linking graph of rubber band is non-linear / curved / not directly proportional (1) graph for unloading does not go through same points as loading (1)	 (graph for) spring would be straight (graph for) spring would only have one line / go through the same points ignore reference to returning to original shape / length	**(2)**

(**Q05b 1SC0/2PH, June 2019**)

Q16.

Question number	Answer	Additional guidance	Mark
	An answer that combines points of interpretation/evaluation to provide a logical description: • above 37.5 N/4 mm there are large increases of extension for small increases in load (1) • the maximum extension of the wire is about 16.5 mm before it breaks (1) • above 12 mm the wire keeps on extending when the load is reduced below 46 N (1)	accept extension is (much) greater for each 1 N increase in load above 37.5 N	**(3)**

(**Q06c 1SC0/2PF, SAM 2016**)

Q17.

Question number	Answer	Additional guidance	Mark
	two similarities such as: (2) • both use the same loads • both start/end with same extension • both return to original length **two differences such as:** (2) • extensions for spring and rubber band differ • spring - loading and unloading are the same – rubber band different • extension- spring linear, rubber band non-linear	go up evenly/even steps steps uneven	**(4)**

(**Q02b 1SC0/2PF/S2, SAM**)

Q18.

Question number	Answer	Additional guidance	Mark
i	 D A and B are incorrect because they only show one force C is incorrect because the forces are in the wrong direction		**(1)**

Question number	Answer	Additional guidance	Mark
ii	substitution (1) (F =) 20 × (0.0)7 evaluation (1) 1.4 (N)	award full marks for the correct answer without working allow 1 mark max for POT error	**(2)**

(**Q02a 1SC0/2PF, Nov 2020**)

Q19.

Question number	Answer	Additional guidance	Mark
	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**

(**QU04b 1SC0/2PH, June 2023**)

Q20.

Question Number	Answer	Mark
	B squashing a piece of modelling clay **A** ,**C** and **D** are incorrect because all return to original shape when the force is removed. The distortion is elastic.	**(1)** **AO1.1**

(**QU04a 1SC0/2PF, June 2025**)

Q21.

Question number	Answer	Additional guidance	Mark
(a)	evidence that anomalous reading excluded (1) answer (1) average length = 20.31 (mm)	accept 101.57 (÷5) for first mark accept 20.314 (mm)	**(2)**

Question number	Answer	Additional guidance	Mark
(b)(i)	• Axes with linear scales that use more than half of each edge of the grid and labelled with units from table (1) • All points correctly plotted to ± half a square (1) • Single straight line passing through all points and the origin (1)	allow 1 mark if only one plotting error and correct line drawn for points plotted	**(3)**

Question number	Answer	Additional guidance	Mark
(b)(ii)	A comment that makes reference to the following points: (using table) • idea that equal increments of force/weight/mass cause equal increments of extension (1) • correct reference to figures in the table (1) OR (using graph) • the graph line is straight (1) • the graph line passes through the origin (1) AND therefore the student's conclusion is correct (1)	last marking point can only be achieved if at least one of the other two marks is awarded	(3)

(**Q06ab 1SC0/2PF, SAM 2016**)

Q22.

Question number	Answer	Additional guidance	Mark
(a)	evidence that anomalous reading excluded (1) evaluation (1) average length = 20.31 (mm)	accept 101.57 (÷5) for first mark accept 20.314 (mm)	(2)

Question number	Answer	Additional guidance	Mark
(b)(i)	• Axes with linear scales that use more than half of each edge of the grid and labelled with units from table (1) • All points correctly plotted to ± half a square (1) • Single straight line passing through all points and the origin (1)	allow 1 mark if only one plotting error and correct line drawn for points plotted	(3)

Question number	Answer	Additional guidance	Mark
(b)(ii)	A comment that makes reference to the following points: (using table) • idea that equal increments of force/weight/mass cause equal increments of extension (1) • correct reference to figures in the table (1) OR (using graph) • the graph line is straight (1) • the graph line passes through the origin (1) AND therefore the student's conclusion is correct (1)	last marking point can only be achieved if at least one of the other two marks is awarded	(3)

Question number	Answer	Additional guidance	Mark
(c)	An answer that combines points of interpretation/evaluation to provide a logical description: • above 37.5 N/4 mm there are large increases of extension for small increases in load (1) • the maximum extension of the wire is about 16.5 mm before it breaks (1) • above 12 mm the wire keeps on extending when the load is reduced below 46 N (1)	accept extension is (much) greater for each 1 N increase in load above 37.5 N	(3)

(**Q05 1SC0/2PH, SAM 2016**)

Q23.

Question number	Answer	Additional guidance	Mark
(i)	An answer that combines the following to provide a logical description of the method • measure unstretched length of spring (1) • measure stretched length of spring (1) • subtract (1)	 set unstretched position at 0 read stretched position use a ruler	(3)

Question number	Answer	Additional guidance	Mark
(ii)	substitution (1) $\frac{1.5}{30}$ evaluation (1) 0.05 (N/mm)	award full marks for correct answer without working 50 N/m allow power of 10 (POT) error for 1 mark	(2)

(**Q02a 1SC0/2PF/S2, SAM**)