



Mark Scheme (Results)

Summer 2024

Pearson Edexcel GCSE
In Combined Science Physics
(1SC0) Paper 1PF

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Additional guidance	Mark
1 (a)	transverse (1) speed (1) frequency (1)	must be in correct order. allow any recognisable spelling.	3 A01.1

Question number	Answer	Additional guidance	Mark
1 (b)	(visible) light (1) gamma (rays) (1) radio (waves) (1) ultraviolet (waves) (1)	γ (rays) allow microwaves UV (rays)	4 A03.3

Total for question 1 =7 marks

Question number	Answer	Additional guidance	Mark
2 (a)(i)	<p>B 1s</p> <p>A is incorrect because this is before the driver reacts.</p> <p>C is incorrect because this is the braking time</p> <p>D is incorrect because 22 is a value of the initial velocity</p>		1 AO2.1

Question number	Answer	Additional guidance	Mark
2(a)(ii)	<p>Any one from</p> <ul style="list-style-type: none"> tiredness distraction drugs / alcohol (old) age 	<p>accept similar descriptions</p> <p>any named drug</p>	1 AO1.1

Question number	Answer	Additional guidance	Mark
2(a)(iii)	<p>attempt to use the correct part of the graph (1)</p> <p>attempt to find area under graph(1) $\frac{1}{2} \times b \times h$</p> <p>evaluation (1) 33 (m)</p>	<p>values of 22(± 0.5) and 4 or 22(± 0.5) and 3 seen</p> <p>0.5 x 4 x 22(± 0.5) or 0.5 x 3 x 22(± 0.5)</p> <p>accept values between 32 and 34 for 3 marks</p> <p>accept values between 43 and 45 for 2 marks</p> <p>accept values between 64.5 and</p>	3 AO2.1

		67.5 for 1 mark. accept values between 86 and 90 for 1 mark award full marks for the correct answer without working	
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Question number	Answer	Additional guidance	Mark
2(b)	an explanation linking any two from shorter reaction time (of computer-controlled car) (1) shorter thinking distance (1)	allow reverse arguments computer (reaction time) not affected by other relevant factors shorter distance (travelled) before brakes applied	2 A03.1

Question number	Answer	Additional guidance	Mark
2(c)(i)	speed should be reduced (1)	slower accept specified numerical reduction e.g. from 40 to 20	1 A03.1

Question number	Answer	Additional guidance	Mark
2(c)(ii)	any one from friction (between wheel and road) is reduced (1) braking distance would be longer (on wet road) (1)	allow reverse argument idea that (road) more slippery / car could skid less traction	1 A03.1

	(overall) stopping distance would be longer (on wet road) (1)	longer (time/distance) to stop ignore crash / collision/ accident ignore changes to thinking distance	
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Total for question 2 = 9 marks

Question number	Answer	Additional guidance	Mark
3(a)	B A, C and D are incorrect because energy is transferred but air is not transferred		1 AO1.1

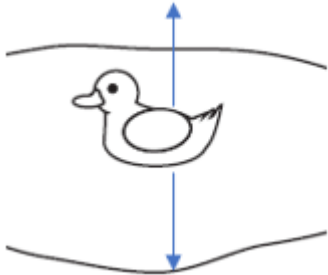
Question number	Answer	Additional guidance	Mark
3(b)	A amplitude B, C and D are incorrect because they are independent of intensity		1 AO1.1

Question number	Answer	Additional guidance	Mark
3(c)	substitution (1) $330 = f \times 0.75$ rearrangement (1) $(f =) \frac{330}{0.75}$ evaluation (1) $(f =) 440 \text{ (Hz)}$	substitution and rearrangement may be in either order. $f = \frac{v}{\lambda}$ if no other marks scored then award 1 mark for an answer that rounds to 0.0023 or 250 award full marks for the correct answer without working	3 AO2.1

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Question number	Answer	Additional guidance	Mark
3(d)	<p>A 9cm</p> <p>B is incorrect because amplitude is measured from zero to the peak displacement</p> <p>C is incorrect because this is half the wavelength</p> <p>D is incorrect because this is the wavelength.</p>		<p>1</p> <p>A02.1</p>

Question number	Answer	Additional guidance	Mark
3(e)(i)	<p>a description to include:</p> <p>use (wave) speed = $\frac{\text{distance}}{\text{time}}$ (1)</p> <p>find relevant time (1)</p> <p>measure specified distance (1)</p>	<p>use $v = f \times \lambda$</p> <p>count number of waves in specified time</p> <p>width / radius / circumference of pond</p> <p>do not accept wavelength</p>	<p>3</p> <p>A02.2</p>

Question number	Answer	Additional guidance	Mark
3(e)(ii)	arrow(s) up and/or down (1) 	judge by eye need not be on duck do not credit answers that imply duck (also) moves horizontally	1 (grad) AO1.1

Total for question 3 = 10 marks

Question number	Answer	Additional guidance	Mark
4(a)	X: electron (1) Y: neutron (1) Z: proton (1)	accept recognisable spellings. accept Y and Z in the wrong order for 1 mark independent of any mark for X	3 AO1.1

Question number	Answer	Additional guidance	Mark
4(b)	D it does not change A, B and C are incorrect because the number of nucleons does not change in gamma emission		1 AO1.1

Question number	Answer	Additional guidance	Mark
4(c)(i)	any one from: keep a safe distance (1) point the source away from people (1) handle the source with tongs/at a distance (1) limit exposure time/return source to store (asap) (1) use shielding (1) use of gloves / mask (1) protective clothing (1) wear a film badge/monitor (1)	(store in) lead-lined box use of screen PPE ignore goggles	1 AO1.2

Question number	Answer	Additional guidance	Mark
4(c)(ii)	the activity varies (slightly) (1)	numbers / counts / results / measurements are different no pattern increases and decreases ignore random(ly)	1 AO1.1

Question number	Answer	Additional guidance	Mark
4(c)(iii)	21 (1)	$\frac{21+23+19+22}{4}$ or $\frac{85}{4}$ accept 21.3 or 21.2 or 21.25 do not accept 21.5 (median)	1 AO3.2

Question number	Answer	Additional guidance	Mark
4(d)(i)	an explanation linking any two from readings fall (to almost zero) (1) radiation is (all) absorbed (1) after a few cm (of air) (1)	accept graph / activity / measurements for readings stopped by air in a short distance (in air) reverse arguments must include beta and gamma	2 AO2.1

Question number	Answer	Additional guidance	Mark
4(d)(ii)	background radiation (1)	or words to that effect accept named examples ignore reference to original alpha source	1 AO2.1

Total for question 4 = 10 marks

Question number	Answer	Additional guidance	Mark
5 (b)	<p>substitution (1)</p> $(v^2) = \frac{950 \times 2}{35}$ <p>evaluation of v^2 (1)</p> <p>54(.29)</p> <p>evaluation of v (1)</p> <p>($v =$) 7.4 (m/s)</p>	<p>accept values that round to 7.3(m/s) or 7.4(m/s)</p> <p>accept answer of 7 (one sig. fig.)</p> <p>award 2 marks for an answer that rounds to 54 (m/s)</p> <p>if no other mark scored allow 1 mark for an answer that rounds to 0.23 (m/s) (use of mass in g)</p> <p>award full marks for correct answer without working</p>	<p>3</p> <p>AO2.1</p>

Question number	Answer	Additional guidance	Mark
5(c)(i)	thermal (energy/store) (1)	energy dissipated energy wasted energy lost energy transferred to surroundings energy transferred due to friction energy transferred due to air resistance allow heat (energy) ignore sound/ not useful energy	1 AO2.1

Question number	Answer	Additional guidance	Mark
5 (c)(ii)	30 (J) (1)	accept -30	1 AO2.1

Question number	Answer	Additional guidance	Mark
5 (c)(iii)	substitution (1) $\frac{950}{980} \times 100$ evaluation (1) 0.97 OR 97%	 allow answers that round to 0.97 or 97% for 2 marks allow 1 mark for answers that round to 97 or 0.97% allow 1 mark for answers of 0.96 or 96% (truncated) award full marks for correct answer without working	2 AO2.1

Question number	Answer	Additional guidance	Mark
5 (d)	any two from reduce air resistance (1) lubricate (wheels) (1) push off (1)	be more aerodynamic crouch down	2 AO1.1

Total for question 5 = 11 marks

Question number	Answer	Additional guidance	Mark
6 (a)(i)	66 (m)	<p>allow values between 64 and 68 inclusive</p> <p>allow values between 32 and 36 as the distance L has to run after M overtakes in this context</p>	1 A03.2

Question number	Answer	Additional guidance	Mark
6 (a)(ii)	<p>select (1)</p> $v = \frac{x}{t}$ <p>evaluation (1)</p> <p>6.6 (m/s)</p>	<p>allow any identifiable distance from graph divided by any identifiable time from graph</p> <p>e.g.</p> $\frac{100}{15.2}$ <p>allow values that round to between 6.5 (m/s) and 6.7 (m/s) for example 6.666 (m/s) or 6.579 (m/s)</p> <p>award full marks for correct answer without working</p>	2 A02.1

Question number	Answer	Additional guidance	Mark
6 (b)(i)	substitution (1) $(t =) \frac{10 - 6.2}{2.5}$ evaluation (1) $(t =) 1.5 \text{ (s)}$	$\frac{3.8}{2.5}$ allow $\frac{6.2 - 10}{2.5}$ or $\frac{3.8}{2.5}$ 1.52 (s) allow $-1.5(2) \text{ (s)}$ award full marks for correct answer without working	2 AO2.1

Question number	Answer	Additional guidance	Mark
6 (b)(ii)	substitution OR rearrangement (1) $(-)10^2 = 2 \times (-) 4.4 \times x$ evaluation (1) $(x =) 11 \text{ (m)}$	$(x) = \frac{v^2 - u^2}{2 \times a}$ $(x =) \frac{(-)10^2}{2 \times (-) 4.4}$ allow values that round to 11 (m) e.g. 11.36 (m) ignore negative sign in answer line	2 AO2.1

		accept 1.1(36) for one mark award full marks for correct answer without working	
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Question number	Indicative content	Mark
*6(c)	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive, and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <p>measurement of distance using a rule or similar to find</p> <ul style="list-style-type: none"> • height of the ramp • travelled length of ramp / distance x to Y • width of card (if used) • distance between light gates (if used) • distance between dots on tape (if used) <p>measurement of time such as</p> <ul style="list-style-type: none"> • use of ticker-tape • use of a single light gate connected to electronic timer with a card fixed to the trolley • use of two light gates connected to electronic timer with a means of interrupting the light beams • use of (manually operated) stop clock /watch / timer 	6 AO1.2

	determination of speed <ul style="list-style-type: none">• detail about which distance and time measurements are being used• repeat and average• repeat using different heights of the ramp	
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Level	Mark	Descriptor
	0	<ul style="list-style-type: none"> No rewardable material.
Level 1	1-2	<ul style="list-style-type: none"> Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3-4	<ul style="list-style-type: none"> Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5-6	<ul style="list-style-type: none"> Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	<u>Additional guidance</u> Limited description of measurement of distance and time	<u>Possible candidate responses</u> Measure the distance down the ramp. determine the time it took.
Level 2	3–4	<u>Additional guidance</u> Partial description including two from measurement of a relevant distance measurement of relevant time calculation of speed	<u>Possible candidate responses</u> Use the light gates to measure the time it took to go down. Measure the distance down the ramp with a ruler.
Level 3	5–6	<u>Additional guidance</u> Detailed description of measurements of relevant distances and associated times to find speed	<u>Possible candidate responses</u> Use light gates to measure the time to go from X to Y Use a ruler to measure the distance between the light gates. Divide distance between the light gates by the time taken to travel from X to Y.

Total for question 6 = 13 marks

Total for paper = 60 marks

