



# Mark Scheme (Results)

Summer 2022

Pearson Edexcel GCSE  
In Combined Science Physics  
(1SC0) Paper 2PF

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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.

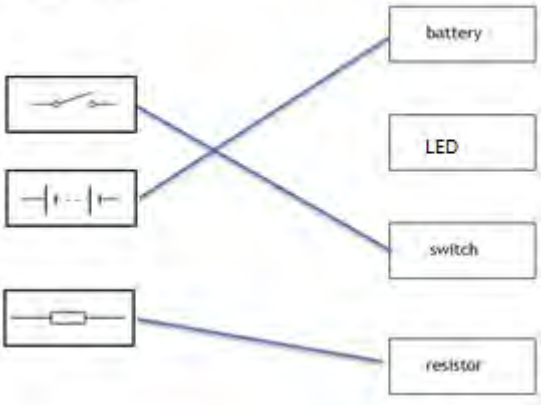
Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.

Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.

When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

Assessment Objective		Command Word	
Strand	Element	Describe	Explain
AO1*		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

## Paper 2PF 2206

Question number	Answer	Additional guidance	Mark
1 (a)	<p><b>circuit symbol</b></p>  <p><b>description</b></p> <p>battery</p> <p>LED</p> <p>switch</p> <p>resistor</p>	<p>1 mark for each correct line.</p> <p>more than one line to or from any box loses the mark for that symbol.</p>	<p>(3)</p> <p>AO1</p>

Question number	Answer	Additional guidance	Mark
1 (b) (i)	<p>B electrons</p> <p>A C and D are incorrect because they do not move through a conductor to create an electric current.</p>		<p>(1)</p> <p>AO1</p>

Question number	Answer	Additional guidance	Mark
1 (b) (ii)	<p>substitution (1)</p> <p>(charge =) <math>0.21 \times 300</math></p> <p>evaluation (1)</p> <p>(charge = ) 63</p> <p>unit (1)</p> <p>coulombs</p>	<p>award full marks for the correct answer without working</p> <p>independent mark</p> <p>C(oulombs)</p> <p>C</p> <p>As</p>	<p>(3)</p> <p>AO2</p> <p>AO1</p>

Total 7 marks

Question number	Answer	Additional guidance	Mark
2 (a) (i)	(soft) iron (1)	allow (in this context) nickel (alloys) cobalt steel	(1)  AO1

Question number	Answer	Additional guidance	Mark
2 (a) (ii)	would be magnetised (when switch is closed) (1)  would be demagnetised when switch is open (1)	(is) magnetic (is) electromagnetic induced magnetism  magnetism can be switched off  accept for either mark not permanent magnet or temporary magnet	(2)  AO1

Question number	Answer	Additional guidance	Mark
2 (b) (i)	the <u>Earth/world/planet</u> has a magnetic field / core(1)	<u>Earth/world/planet</u> has a north (and south) pole	(1)  AO3

Question number	Answer	Additional guidance	Mark
2(b) (ii)	direction (of the field) has changed / rotated (1)  (strength of the) field has increased (1)	(from 0 to) 36° from N to NE  field is stronger  <b>(changed by) 16.52 (<math>\mu</math>T)</b>  numbers have increased (from 46.67 to 63.19)	(2)  AO3

Question number	Answer	Additional guidance	Mark
2 (b) (iii)	<p>a description including three from</p> <p>use of equipment to measure distance (1) ruler / tape measure</p> <p>obtain a measurement (1) measure / record strength of the field (at a certain point)</p> <p>change the conditions (1) move the phone / magnet (to a different location)</p> <p>process the results (1) e.g.</p> <ul style="list-style-type: none"> <li>• draw a diagram</li> <li>• make a table</li> <li>• compare results/values</li> <li>• see when (field) stays constant</li> </ul>	<p>measure the distance between phone and magnet</p> <p>rotate the phone/magnet</p>	<p>(3)</p> <p>A03</p>

Total 9 marks

Question number	Answer	Additional guidance	Mark
3 (a) (i)	B live and neutral  A , C and D are incorrect because the terms positive and negative are not used in the context of wires in a mains cable.		(1)  AO1

Question number	Answer	Additional guidance	Mark
3 (a) (ii)	a description that includes any two from  melts (1) if there is a fault (1) breaks the circuit (1) stops current (1) safety (1)	blows / breaks  if current too large  prevents overheating / fire  if no other marks scored allow 1 mark for identifying the fuse.	(2)  AO1



Question number	Answer	Additional guidance	Mark
3 (b)	conversion of time (1) $1 \times 60$ (s)  substitution (1)  $(I = ) \frac{9000}{230 \times 60}$  evaluation (1)  $(I = ) 0.65$ (A)	          any value that rounds to 0.65; e.g. 0.65217  0.7 0.6  award full marks for the correct answer without working  allow 2 marks for answer of 39(.130)	(3)  AO2

Question number	Answer	Additional guidance	Mark
3 (c) (i)	An explanation linking  energy has been dissipated /wasted / lost (1)        as thermal energy (1)	energy has been transferred mechanically  useful energy is less than total energy supplied  identifies difference of 600(J)  heat  to the surroundings  ignore sound  accept (some) energy has been transferred to thermal store for 2 marks	(2)  AO3

Question number	Answer	Additional guidance	Mark
3 (c) (ii)	substitution (1)  (efficiency = ) $\frac{8400}{9000}$  evaluation (1)  (efficiency = ) 0.93	0.9 93(%) allow values that round to 0.93 or 93(%)  award full marks for the correct answer without working	(2)  AO2

Total 10 marks

Question number	Answer	Additional guidance	Mark
4 (a)	B  A, C and D are incorrect because these do not measure the vertical change in height <b>above the earth's surface.</b>		(1)  AO1

Question number	Answer	Additional guidance	Mark
4 (b) (i)	joule(s)	J j Nm newton metre(s) $\text{kg m}^2 \text{s}^{-2}$ $\text{kg m}^2/\text{s}^2$  Ignore SI prefixes do not accept nm	(1)  AO1

Question number	Answer	Additional guidance	Mark
4 (b) (ii)	selection of and substitution into $E = F \times d$ (1)  $1960 = \text{weight} \times 4.0$  rearrangement and evaluation (1) (weight =) 490 (N)	accept  $P \times t = F \times d$  $436 \times 4.5 = \text{weight} \times 4.0$  490.5 or 491  award full marks for the correct answer without working  530 scores 1 mark (used data to calculate median value)	(2)  AO2

Question number	Answer	Additional guidance	Mark
4 (b) (iii)	<p>selection of and substitution into <math>P = E \div t</math> (1)  <math>425 = 2040 \div t</math></p> <p>rearrangement and evaluation (1)</p> <p>(time =) 4.8 (s)</p>	<p>0.208 scores 1 mark  867000 scores 1 mark</p> <p>award full marks for the correct answer without working</p>	<p>(2)</p> <p>AO2</p>

Question number	Answer	Additional guidance	Mark
4 (b) (iv)	<p>values for power selected and added (1)</p> $\frac{440 + 436 + 425}{(3)}$ <p>evaluation (1)</p> <p>434 (W)</p>	<p><u>1301</u> (3)</p> <p>accept values that round to 434 e.g. 433.667</p> <p>accept 436 (median average) for 2 marks</p> <p>1301 scores 1 mark  1017(.666) scores 1 mark</p> <p>award full marks for the correct answer without working</p>	<p>(2)</p> <p>AO2</p>

Question number	Answer	Additional guidance	Mark
4 (c)	estimate of weight (1)  measure (actual) weight (1)	ignore reaction time  use scales  ignore repeating measurements	(2)  A03

Total 10 marks

Question number	Answer	Additional guidance	Mark
5 (a)(i)	Substitution and evaluation (1) 15 ( $\Omega$ )		(1) AO2

Question number	Answer	Additional guidance	Mark
5 (a)(ii)	select / recall (1)  (power =) $V \times I$ or (power =) $I^2 \times R$ or (power =) $\frac{V^2}{R}$  substitution and evaluation (1)  (power =) 1.4 (W)	  (power =) $4.5 \times 0.3$  $0.3^2 \times 15$  $\frac{4.5^2}{15}$  allow 1.3(5) (W)  award full marks for the correct answer without working	(2) AO2

Question number	Answer	Additional guidance	Mark
5 (b)	<p>an explanation linking any three from:</p> <p>lamp in second circuit is dimmer (than lamp in first circuit) (1)</p> <p>current in second circuit is less (than in first circuit) (1)</p> <p>potential difference / voltage across each lamp (in second circuit is) less / shared (1)</p> <p>idea that power of each lamp (in second circuit) is less / shared (1)</p> <p>the (total) resistance of the second circuit is more (than in first circuit) (1)</p>	accept reverse arguments throughout	(3) AO1

Question number	Answer	Additional guidance	Mark
5 (c)	<p>a diagram of a circuit including all of the following: power supply / cell(s) / battery, identifiable resistance wire an ammeter a voltmeter (1)</p> <p>plus any two from</p> <p>ammeter in series (1)</p> <p>voltmeter in parallel (1)</p> <p>indication of tapping off / using 50cm of resistance wire (1)</p>	<p>accept symbols</p> <p>accept ohmmeter with resistance wire only</p> <p>ignore lamp(s) / additional resistors</p> <p>allow ohmmeter (across wire) instead of ammeter and voltmeter for 1 mark</p> <p>e.g. (crocodile) clips</p>	(3) AO2

Question number	Answer	Additional guidance	Mark
5 (d)	d.c. - (current) in one direction only (1)  a.c. - (current) changes direction (1)	one way  both ways	(2)  AO1

Total 11 marks



Question number	Answer	Mark			
6 (a)	<table border="1"><tr><td>[x] B</td><td>bigger than in water</td><td>less than water</td></tr></table> <p>A is incorrect because the density of steam is less than water. C is incorrect because the space between the particles increases. D is incorrect because the space between the particles increases and density of steam is less than water.</p>	[x] B	bigger than in water	less than water	(1) AO1
[x] B	bigger than in water	less than water			

Question number	Answer	Additional guidance	Mark
6 (b)	<p>calculation of change in volume (1)  <math>(530 \text{ cm}^3 - 490 \text{ cm}^3) = 40 \text{ (cm}^3\text{)}</math></p> <p>substitution (1)  <math>7.9 = \frac{\text{mass}}{40}</math></p> <p>rearrangement and evaluation (1)            (mass = <math>7.9 \times 40</math>)            (mass =) 316 (g)</p> <p>evaluation to 2 sig fig (1)            320 (g)</p>	<p>measurement mark – using scale</p> <p>allow use of incorrect volume</p> <p>answers without working</p> <p>316 scores 3 marks</p> <p>0.316 kg scores 3 marks</p> <p>316 to any other power of 10 scores 2 marks</p> <p>4187 or 3871 scores 2 marks (incorrect volume)</p> <p>any answer written to 2sf independent mark</p> <p>answers without working</p> <p>320 scores 4 marks</p> <p>320 to any other power of ten scores 3 marks</p> <p>4200 scores 3 marks            3900 scores 3 marks</p>	(4)  AO2

Question number	Answer	Additional guidance	Mark
6 (c)	an explanation linking  density of wood less (than that of water) (1)       less (volume of) water displaced (than volume of wood) (1)	allow wood floats / should be submerged  allow wood absorbing water   allow (idea of) incorrect volume reading  allow (idea that) the volume cannot be measured this way	(2)  AO2

Question number	Indicative content	Mark
*6(d)	<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>Equipment</p> <ul style="list-style-type: none"> <li>• Thermometer</li> <li>• Measuring cylinder / balance</li> <li>• Power supply</li> <li>• Stirrer</li> <li>• Joule meter / ammeter / voltmeter</li> <li>• Stopwatch / clock</li> </ul> <p>Measurements</p> <ul style="list-style-type: none"> <li>• Mass / volume of water</li> <li>• Initial / final / change of temperature of water</li> <li>• Voltage / current / energy / power</li> <li>• Time (heated for)</li> </ul> <p>Detail</p> <ul style="list-style-type: none"> <li>• Lid/insulation to reduce energy loss</li> <li>• Ensure heater fully immersed / keep stirring the water</li> <li>• Use of equation <math>\Delta Q = m \times c \times \Delta\theta</math> / calculation of input energy</li> <li>• Repeat and find average</li> <li>• Plot graph of temp change and time / energy</li> </ul> <p>Credit can be given for correctly labelled diagrams</p>	(6)  AO1

Level	Mark	Descriptor
	0	<ul style="list-style-type: none"> <li>No rewardable material.</li> </ul>
Level 1	1-2	<ul style="list-style-type: none"> <li>Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1)</li> <li>Presents a description which is not logically ordered and with significant gaps. (AO1)</li> </ul>
Level 2	3-4	<ul style="list-style-type: none"> <li>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)</li> <li>Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)</li> </ul>
Level 3	5-6	<ul style="list-style-type: none"> <li>Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1)</li> <li>Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)</li> </ul>

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> one measurement or two items of equipment or one piece of detail	<u>Possible candidate responses</u> measure the temperature of the water to start with or the student needs a power supply and a thermometer or insulated material around the beaker
Level 2	3–4	<u>Additional guidance</u> two items of equipment and at least one measurement or one piece of equipment and two measurements or two items of equipment and one piece of detail  or one measurement and one piece of detail	<u>Possible candidate responses</u> The student needs a measuring cylinder to measure the volume of water. They also need a thermometer Or Measure the temperature rise of the water and use a balance to measure the mass or They need a power supply for the heater and a voltmeter. Keep the heater in the water. or Measure temperature rise of the water. Keep stirring the water all the time.
Level 3	5–6	<u>Additional guidance</u> two items of equipment and two measurements and one piece of detail.	<u>Possible candidate responses</u> The student needs a balance to find the mass of water. They also need a thermometer to measure the rise in temperature of the water. Then use the equation $\Delta Q = m \times c \times \Delta\theta$

Total 13 marks

Total for paper = 60 marks