

Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in
Physics (5PH1F) Paper 01
Unit P1: Universal Physics

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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.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|------------|--------------------|------------|
| 1(a)(i) | electrical | electric | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|----------|--------------------|------------|
| 1(a)(ii) | chemical | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--------|---|------------|
| 1(b)(i) | 20 (J) | 200 – 180 (even if calculated value from this is incorrect) | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--------------------------------------|--|------------|
| 1(b)(ii) | (changed to) {thermal energy / heat} | dissipated (lost) to {surroundings / motor / air / atmosphere} sound / noise reject if kinetic, light or chemical is mentioned | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|------------------|---|---|------------|
| 1(b)(iii) | $\frac{180}{200} \times 100 \quad (1)$ 90 (%) (1) | award full marks for correct answer with no working $\frac{180}{200}$ 0.9, 9/10 Or [100 - (20/200)] % not needed but if a unit is given then maximum score is 1 | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|-----------------------|--------------------|------------|
| 1(c)(i) | D dark : rough | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--|------------|
| 1(c)(ii) | C the container is losing thermal energy at the same rate it is absorbing it | Heat for thermal Same amount in same time for same rate | (1) |

Total for Question 1 = 8 marks

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--------------------|------------|
| 2(a) | C Herschel discovered infrared radiation | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--------------|---|------------|
| 2(b)(i) | 384 440 (km) | 385 000 – 560 (even if calculated value from this is incorrect) accept 384 000 | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--|------------|
| 2(b)(ii) | An explanation linking any two of 1. change of relative positions in orbits (1) 2. different radii orbits (1) 3. different (orbital) {speeds / times} (1) | on same side and opposite sides of Earth – may be shown by calculation or diagram different distances (from Earth) moon is further away (moon/Hubble) moves faster than other mention of {not perfect circle / elliptical / different orbital planes} on its own is insufficient – needs qualifying one moves faster than the other and overtakes it = 2 marks | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|----------------------|---|------------|
| 2(c)(i) | Correct plotting (1) | +/- ½ a small square if line is drawn exactly through the point accept for the mark even if point is not obvious | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|------------------------|--|------------|
| 2(c)(ii) | Line of best fit drawn | <p>straight line to be within lower two printed dots and upper 3 printed dots</p> <p>does not need to pass through origin</p> <p>ignore line below the given points</p> | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--|------------|
| 2(d) | <p>A description including</p> <p>1. expansion (of space) (1)</p> <p>and any one of</p> <p>2. continuing (expansion) (1)</p> <p>3. from very {hot/dense} start (1)</p> <p>4. from a {point /small volume} (1)</p> <p>5. origin of Universe (1)</p> | <p>ignore expansion of Earth, particles and other objects</p> <p>unqualified 'explosion' is insufficient, a reference to expansion is needed</p> <p>(this point only is dependent on first)</p> <p>singularity</p> <p>{Universe / Space} still expanding = 2 marks</p> | (2) |

Total for Question 2 = 8 marks

| Question Number | Answer | Acceptable answers | Mark | | | | | | | | | | | | |
|-----------------|---|--------------------|--------------------------|---------|--|--------------|--------------------------|---------|--|--------|--------------------------|-----------|--|--|------------|
| 3(a)(i) | <table border="1"> <thead> <tr> <th>component</th> <th><input type="checkbox"/></th> </tr> </thead> <tbody> <tr> <td>ammeter</td> <td></td> </tr> <tr> <td>coil of wire</td> <td><input type="checkbox"/></td> </tr> <tr> <td>battery</td> <td></td> </tr> <tr> <td>magnet</td> <td><input type="checkbox"/></td> </tr> <tr> <td>voltmeter</td> <td></td> </tr> </tbody> </table> | component | <input type="checkbox"/> | ammeter | | coil of wire | <input type="checkbox"/> | battery | | magnet | <input type="checkbox"/> | voltmeter | | <p>one mark for each correct tick</p> <p>deduct 1 mark for each extra tick</p> | (2) |
| component | <input type="checkbox"/> | | | | | | | | | | | | | | |
| ammeter | | | | | | | | | | | | | | | |
| coil of wire | <input type="checkbox"/> | | | | | | | | | | | | | | |
| battery | | | | | | | | | | | | | | | |
| magnet | <input type="checkbox"/> | | | | | | | | | | | | | | |
| voltmeter | | | | | | | | | | | | | | | |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 3(a)(ii) | <p>Explanation linking any two of</p> <ul style="list-style-type: none"> wind (speed) is not constant (1) voltage depends on wind speed (1) | <p>need idea of varying wind</p> <p>{electrical energy / electricity} depends on wind speed</p> <p>higher wind speed gives {higher voltage/more electrical energy/more electricity} = 2 marks</p> <p>voltage is alternating = 2 marks</p> | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|------------------|---|---|------------|
| 3(a)(iii) | <p>(saving) = $2 \times 3 \times 15$ (1)</p> <p>90 (p) (1)</p> | <p>award full marks for correct answer with no working</p> <p>$2 \times 3 \times 0.15$</p> <p>(£) 0.90</p> | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 3(b) | <p>power = 2500 (W) (1)</p> <p>(current) = $\frac{2500}{230}$ (1) ecf</p> <p>11 (A) (1)</p> | <p>award full marks for correct answer with no working</p> <p>[2.5/230 is 1 mark for these 2]</p> <p>10.9 / 10.8...</p> <p>accept {0.01... / 0.11... / 1.1...} for 2 marks</p> | (3) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|---|------------|
| 3(c) | <p>EITHER</p> <p>sometimes no / very little wind (1)</p> <p>OR</p> <p>some appliances rated above 2 kW (1)</p> | <p>need wind</p> <p>vague references to weather are insufficient</p> <p>may use more than one appliance at once or house needs more (than 2kW) power</p> <p>not enough power for kettle</p> <p>ignore references to electrical energy / electricity</p> | (1) |

Total for Question 3 = 10 marks

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|-------------|--------------------|------------|
| 4(a) | B cm | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|-----------------|--------------------|------------|
| 4(b) | D yellow | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--|------------|
| 4(c) | <p>A description including any two of human eye can only {react to /see} visible (light) (1)</p> <p>bee eye can {react to/see} {ultraviolet/infrared/different frequencies/different wavelengths} (1)</p> <p>{Maxima/peaks} more evenly spaced for bee (1)</p> | <p>bee can 'see' outside (human) visible range smaller frequency range than bee</p> <p>ignore 'see more colours'</p> <p>human peaks are concentrated in lower frequencies</p> | (2) |


| Question Number | Answer | Acceptable answers | Mark |
|-----------------|----------------|--------------------|------------|
| 4(d) | C sound | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 4(e) | conversion of time 4×60 (1) substitution (1) $1608 / (4 \times 60)$ ecf if conversion shown evaluation (1) 6.7 (m/s) | award full marks for correct answer with no working [1608 / 4 for 1 mark for these two] allow 402 for 2 marks accept for 2 marks: 5.36 (t=300 s $60 \rightarrow 120 \rightarrow 180 \rightarrow 240 \rightarrow 300$, i.e. 4 steps of 60) 4.02 (t=400 s based on the misconception of 100 s to 1 minute) allow maximum of 1 mark for any other power of 10 error if no working | (3) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 4(f) | <p>A suggestion which includes any two of:</p> <ol style="list-style-type: none"> 1. harmful effect e.g. damage to {skin (cells) / cancer / mutation / eyes} (1) 2. bee can 'see' objects reflecting UV radiation (1) 3. allows bees to find (more) food (1) 4. discussion of different (intensities /) {brightnesses / amounts} (1) 5. discussion of time of exposure compared to life span (1) | <p>sunburn</p> <p>{emitting/giving out} for reflecting</p> <p>OWTTE accept 'see pollen' for MP2 OR 3 ignore honey ignore making food</p> <p>relevant mention of more exposure/ absorption by humans</p> <p>discussion such as humans have long term exposure which can be cumulative</p> | (2) |

Total for Question 4 = 10 marks

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--------------------|------------|
| 5(a)(i) | X amplitude (1) Y wavelength (1) | | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--------------------|------------|
| 5(a)(ii) | A  (1) | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--|------------|
| 5(b)(i) | mirror (1) linked to: (which is) converging / concave / parabolic (1) | reflector (reflection / reflects is insufficient) curved ignore any reference to lenses, converging lenses and eyepieces | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|-----------|--|------------|
| 5(b)(ii) | magnifies | makes it (look) bigger ignore closeness, clearness, more detail etc. ignore focus the image ignore zoomed in | (1) |

| Question Number | | Indicative Content | Mark |
|-----------------|-------------------|---|------------|
| QWC | *5 (c) | <p>A description including some of the following points</p> <p>evidence for</p> <ul style="list-style-type: none"> • idea of Sun, Moon, stars or planets moving across the sky (not just orbiting) • in the same direction • pattern is repeated • appear to be going around the Earth • same every day <p>evidence against</p> <ul style="list-style-type: none"> • moons of {Jupiter/ other planet (with moons)} • appear to {orbit/ go around} {Jupiter/ other planet} • movement of Sun etc. not quite the same each day • planets do not move in a simple path • retrograde (west-east) motion of planets <p>If no other marks scored</p> <ul style="list-style-type: none"> • heliocentric model = Level 1 | (6) |
| Level | 0 | No rewardable content | |
| 1 | 1 - 2 | <ul style="list-style-type: none"> • a limited description stating one fact for or against e.g. for – the Sun / stars move across the sky OR against - Jupiter has moons OR against - (Galileo) produced the {heliocentric / sun-centred} model • the answer communicates ideas using simple language and uses limited scientific terminology e.g. some correct names for the moving objects • spelling, punctuation and grammar are used with limited accuracy | |
| 2 | 3 - 4 | <ul style="list-style-type: none"> • a simple description involving (linked) facts e.g. the Sun and stars move across the sky AND do the same thing each day OR moons orbit Jupiter OR one fact for AND one against e.g. the sun moves across the sky but changes from day to day • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately e.g. correct names for the moving objects • spelling, punctuation and grammar are used with some accuracy | |
| 3 | 5 - 6 | <ul style="list-style-type: none"> • a detailed description of arguments for AND against, including at least one link. e.g. the Sun and stars move across the sky. Galileo observed moons, which orbit Jupiter. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors | |

Total for Question 5 = 12 marks

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|-----------------------------|--------------------|------------|
| 6(a) | A longitudinal : yes | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--|------------|
| 6(b) | <p>An explanation linking any two of:</p> <ol style="list-style-type: none"> 1. A cause or description of earthquakes (1) 2. why timing of earthquake is uncertain / complex (1) 3. we cannot see {what is happening deep inside the Earth / where the plates are rubbing} (1) | <p>The release of {energy / pressure/friction force} (in Earth's surface)</p> <p>(caused when tectonic) plates slide past each other</p> <p>any idea of relative movement of plates e.g. move over each other, collide</p> <p>(movement of plates is) {sudden / random / jerky}</p> <p>it is too difficult to {work out / measure} when release of energy will happen</p> <p>"it is difficult to measure when the plates will collide" = 2 marks</p> | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 6(c) | <p>P-wave = 8 (minutes) (1)</p> <p>S-wave = 14.5 (minutes) (1)</p> <p>time difference = 6.5 (minutes) (1)</p> | <p>award full marks for correct answer (6.5) with no working (since 13 small squares = 6.5 mins)</p> <p>7.5 – 8.5 (minutes) inclusive</p> <p>14.0 - 15.0 (minutes) inclusive</p> <p>ecf for difference of wrong readings from graph</p> <p>accept time shown as m:ss (e.g. 6:30)</p> <p>if correct construction lines are shown on graph but no values written, the score is maximum of 1 of the three</p> | (3) |

| Question Number | Indicative Content | Mark |
|-----------------|--|------------|
| QWC | <p>*6 (d)</p> <p>A description including some of the following points</p> <p>Data collection</p> <ul style="list-style-type: none"> • S and P arrival times found • Use or collect data from more than one station <p>Manipulation / Calculation for one station</p> <ul style="list-style-type: none"> • Circle drawn on map with station at centre • Circle drawn on map at appropriate distance from station • Earthquake on that circle • (Distance found from) S minus P time <p>Triangulation</p> <ul style="list-style-type: none"> • Repeat calculation / drawing with at least three stations • Epicentre / earthquake at point of intersection of all three (or more) circles • Triangulation • Meaning of triangulation <p>If no other marks scored</p> <ul style="list-style-type: none"> • Strength greatest nearer earthquake = Level 1 • Time shortest nearest the earthquake = Level 1 | (6) |

| Level | 0 | No rewardable content |
|--------------|--------------|--|
| 1 | 1 - 2 | <ul style="list-style-type: none"> • a limited description of process involving isolated fact(s) from one section. e.g. Circle drawn on map with station at centre OR “triangulation” • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy |
| 2 | 3 - 4 | <ul style="list-style-type: none"> • a simple description of process involving linked facts from two sections e.g. the S and P arrival time is recorded, and the difference noted. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy |
| 3 | 5 - 6 | <ul style="list-style-type: none"> • a detailed description of process involving elements from all three sections e.g. showing how three stations can identify the epicentre of an earthquake using a calculation and intersecting circles. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors |

Total for Question 6 = 12 marks

