edexcel

Mark Scheme (Results)

Summer 2016

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

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2016
Publications Code 5PH1F_01_1606_MS
All the material in this publication is copyright
© Pearson Education Ltd 2016

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.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- 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)	4.5	$\frac{36}{8}$	**(1)**

Question Number	Answer	Acceptable answers	Mark
1 (a)(ii)	substitution (1) $\frac{36}{20}$ evaluation (1) 1.8 m/s (1)	award full marks for correct answer with no working independent unit mark metres per second ms^{-1} **IGNORE** mps	**(3)**

Question Number	Answer	Acceptable answers	Mark
1 (b)	**D** refraction		**(1)**

Question Number	Answer	Acceptable answers	Mark
1 (c)(i)	**C** on a screen		**(1)**

Question Number	Answer	Acceptable answers	Mark
1 (c)(ii)	Description to include two from: • move the lens/screen until there is an image on a screen (1) • (measure the distance) from lens (1) • to screen / image / focal point (1)	 obtain a clear/sharp/in focus image owtte	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)	ultrasound	accept any recognisable spellings	**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (b)	Any one suitable description linking a use and the appropriate method, e.g. detecting genuine banknotes (1) using a uv light (1) or tanning / sunbeds (1) using a uv light (1) or at discos (1) using uv lamps (1) or disinfecting water (1) using fluorescent lamps (1) or curing glues / fillings / nail polish (1) using uv lamps (1)	 detecting forged banknotes using a fluorescent light / fluorescence fluorescent light / the sun using a fluorescent light / uv light / chemicals glow killing bacteria	**(2)**

Question Number	Answer	Acceptable answers	Mark
2 (c)	ultraviolet	No marks if two waves given	**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (d)	Any **TWO** from microwave (1) infrared (1) ultraviolet (1)	**IGNORE** radiation not on list Responses including ultrasound score maximum 1 mark. All four radiations score no marks.	**(2)**

Question Number	Answer	Acceptable answers	Mark
2 (e)	Explanation linking any two from: microwaves heat water (1) (idea of) inside the body / internal heating of body (cells) (1) the microwave radiation may be more {intense / powerful} (1)	Take 'it' unqualified as referring to microwaves boils blood / body fluids humans are (mainly) water infrared (only) heats skin (cells) / burns skin there may be more microwave radiation **IGNORE** references to frequency, wavelength, cooking food, mutation, cancer, UV	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)	(gravitational) potential (energy) (1)	GPE PE gravitational gravitation energy gravity	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	substitution (1) $\frac{190\ 000}{2.3}$ evaluation (1) 83 000 (W)	award full marks for correct answer with no working 82 608 numbers that round up to 83 000 POT errors 1 mark max	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	40 000 (J)	190 000 – 150 000 Accept this for one mark even if the final answer is incorrect	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	substitution $\frac{150\ 000}{190\ 000}$ (× 100 %) (1) (1) evaluation 79 (%) (1)	award full marks for correct answer with no working 0.79 numbers that round up to 79 or 0.79 15/19 with no working scores 2	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(d)(i)	**B**		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(d)(ii)	Explanation linking 2 of: • energy is transferred / lost / dissipated / wasted (1) • (lost) as heat/thermal (energy) / sound (1) • (to) surroundings (1)	 the boat loses energy (KE) the pirate boat has less energy each swing / max PE decreases each swing (through) friction / air resistance / wind air / environment	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a) (i)	D the Milky Way, the Solar system and the Universe		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	C a manned mission (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	a value between 210 (nm) and 290 (nm) inclusive (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	infrared	Microwave(s), radio (waves)	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(iii)	substitution (1) 1250 x 10 x 60 evaluation (1) 750 000 (J)	correct answer no working scores 2 marks 1250 x 10 or 12500 gains one mark OR 1250 x 60 or 75 000 gains one mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(iv)	Explanation linking any two from: • There is an atmosphere on Earth / no atmosphere on the Moon (1) • (The Earth's atmosphere) absorbs (some solar) radiation (1) • at all wavelengths (1) • some wavelengths more than others (1)	allow reflects / blocks / deflects / reduces for absorbs If no other marks scored, award 1 mark for: Moon and Earth are different distances from the Sun	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)	An explanation linking any two from : • (on Earth) image is distorted/not as bright/less clear (1) • (objects being studied) very small/far away (1) • atmosphere (in way)/light pollution (1) • can detect different parts of the em spectrum (that are not detectable on Earth) (1) • can keep it pointed at the same spot more easily (1) • less radiation collected (on Earth	(above atmosphere) image is more defined /clearer/better/more detail see {further/further away} /fainter/more objects obscured by clouds waves can be detected (that are not detectable on Earth) not affected by Earth's rotation	**(2)**

Question Number	Answer	Acceptable answers	Mark
5 (a)	substitution (1) 230 × 11 evaluation (1) 2500 (W)	award full marks for correct answer with no working 2530 numbers that round down to 2500	**(2)**

Question Number	Answer	Acceptable answers	Mark
5 (b)(i)	**C** chemical energy		**(1)**

Question Number	Answer	Acceptable answers	Mark
5 (b)(ii)	transformer	switch mode SM SMPS	**(1)**

Question Number	Answer	Acceptable answers	Mark
5 (c)	Explanation linking: • d.c. goes one way only (1) • a.c. (continually) <u>changes</u> direction (1)	 goes backwards and forwards/ is positive and negative both marks can be scored by correctly labelled diagrams note that on diagrams a.c. must show positive and negative	**(2)**

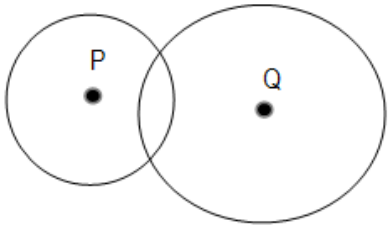
<table>
<tr><th colspan="2">Question Number</th><th>Indicative Content</th><th>Mark</th></tr>
<tr><td>QWC</td><td>*5(d)</td><td>A description including some of the following points

Advantages: (RA disadvantages) not quantitative
• A costs less to buy
• B lasts longer
• A uses less power
• B is on for shorter time
• A uses less electricity
• A costs less to run

Advantages: (RA disadvantages) quantitative
• Over 6 years B costs £200 less than A to buy
• A costs £300 less than B
• A lasts half as long as B
• B lasts three years longer than A
• The power of A is 0.1 kW less than B
• The compressor of A runs for 2 hours more per day
• A uses 1.35 kWh/day, B uses 1.75 kWh/day
• A costs 5.44 p less per day to run (18.36p vs 23.80p)

<table>
<tr><td></td><td>fridge A</td><td>fridge B</td></tr>
<tr><td>cost</td><td>£ 500</td><td>£ 800</td></tr>
<tr><td>lifetime</td><td>3 years</td><td>6 years</td></tr>
<tr><td>power of compressor</td><td>0.15 kW</td><td>0.25 kW</td></tr>
<tr><td>time the compressor is on in one day</td><td>9 hours</td><td>7 hours</td></tr>
<tr><td>cost of 1 kWh of electrical energy</td><td>13.6 p</td><td>13.6 p</td></tr>
</table>
</td><td>(6)</td></tr>
</table>

Level	0	No rewardable content
1	1 - 2	• A limited description of at least one advantage or one disadvantage e.g. Fridge A is cheaper (to buy/run) **OR** Correct values quoted from table and used to provide one comparison without calculations e.g. Fridge A costs £500 and Fridge B costs £800 • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	• A simple description of **two** different advantages / disadvantages comparing relevant data from the table but not involving relevant processing e.g. Fridge A is cheaper but does not last as long (as Fridge B) **OR** Correct values quoted from table and used to provide two comparisons without calculations e.g. Fridge A costs £500 and Fridge B costs £800, Fridge A lasts 3 years, Fridge B lasts 6 years. • 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	• A detailed description of two different advantages / disadvantages using **a quantitative** comparison for at least one. e.g. Fridge A is £300 cheaper but does not last as long (as Fridge B) OR The power of A is less than the power of B, but is on for two hours longer • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	Description to include any two from: • circles of radius = distance between earthquake and station (1) • earthquake possibly where circles cross / intersect / meet (1) • arrival time of S and P waves recorded (1) • S-P time used to get distance (from EQ) (1)	A diagram such as this  <u>One</u> circle from each point with at least one possible site of earthquake labelled would score 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	D three results will pinpoint the exact position of the earthquake		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)	6 km = 6000 m at some stage (1) substitution (1) 6000 / 10 Evaluation (1) 600 (Hz)	Correct answer with no working scores three marks 6 x 10 to any power /10 (one mark) evaluation of acceptable substitution 0.6 scores (2 marks)	**(3)**

Question Number		Indicative Content	Mark
QWC	***6(c)**	An explanation linking some of the following points Aspects of model • biscuit pieces represent the (tectonic) plates (accept recognisable alternatives e.g. crust, continents) • syrup corresponds to the mantle/magma/ molten rock/lava • heaters are the same as the (hot) core/nuclear reactions Physical processes • convection currents in mantle/syrup • (convection currents) push the {plates/biscuits} around the surface • (convection currents cause) irregular movement due to uneven heating • the heater/core provides energy for movement • the heater/core heats the mantle/ magma/ molten rock/lava/syrup • collisions between moving objects can cause earthquakes or volcanoes	**(6)**

Level	**0**	no rewardable material	
1	**1-2**	• a limited explanation giving one aspect or physical process. e.g. heaters are the same as the core OR biscuits move on the surface. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3-4**	• a simple explanation linking two aspects of the model with the Earth or the physical processes involved. e.g. heaters are the core and the syrup is the mantle OR heaters are the same as the core and cause the syrup to move around (idea of convection currents) • 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**	• a detailed explanation linking two aspects of the model with the Earth and a physical processes involved. e.g. the biscuits moving on the syrup can be likened to the plates moving on the mantle. The mantle moves the plates around (idea of convection current). OR heaters are the same as the core and cause the syrup, which is the mantle, to move around. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately. • spelling, punctuation and grammar are used with few errors.	

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL