edexcel

Mark Scheme (Results)

March 2013

GCSE Physics
5PH1F/01

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. 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 for our BTEC qualifications.
Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

If you have any subject specific questions about this specification that require the help of a subject specialist, you can speak directly to the subject team at Pearson.
Their contact details can be found on this link: www.edexcel.com/teachingservices.

You can also use our online Ask the Expert service at www.edexcel.com/ask. You will need an Edexcel username and password to access this service.

Pearson: helping people progress, everywhere
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

March 2013
Publications Code UG035110

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	A the focal length (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	smaller than (1) real (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)	• Any (more or less) straight ray which changes direction inside the lens (1)	Ray does not need to touch far side. Allow slight discontinuities Ignore any ray drawn beyond the 2nd surface and any reflected ray(s). Ignore any extra incident rays.	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)	substitution into given equation (1) 1.3 x 300 000 evaluation (1) 390 000 (km)	Power of 10 error max 1 mark 3.9×10^5 (km) 2 marks for correct numerical answer with no working shown Ignore any unit given by candidate.	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(d)	D energy and information (1)		**(1)**

Total for Question 1 = 7 marks

Question Number	Answer	Acceptable answers	Mark
2(ai)	(Bow and arrow:) kinetic (1) (Electric kettle:) heat (thermal) (1) (Microphone:) sound (1)	Heat/thermal	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	Any **one** from (transferred into) {thermal/heat/sound}(energy) (1) (Energy) is dissipated (1)	Do not accept light energy or it disappears goes into surroundings/air (energy) is wasted/lost	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	12 (J) Ignore any unit given by candidate.	20 - 8 (J)	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	An explanation linking any **two** of • (For the) same amount of {electrical/supplied} (energy/power) (1) • (CFL/it) has a greater output (of light energy) (1) • (CFL/it) wastes less (electrical energy) (1)	Same input (energy) gives out/produces more {light/useful} (energy) Do not accept more energy is used in the (CFL/it) Ignore brightness. (CFL/it) produces less thermal/heat (energy) Accept explanations using data from the energy transfer diagrams as comparisons eg (CFL/it) is four times as efficient gains both marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)	An explanation linking • dissipating heat (1) • at same (rate)/as quickly as energy is being supplied (1)	{gives out/radiates/conducts/ convects /loses /produces} {heat/thermal/ energy} gives out as much energy/power as it takes in(each second) Gains both marks If no other marks scored: There is a constant current/ steady flow of energy into the heater gains one mark Ignore refs to thermostat	**(2)**

Total for Question 2 = 9 marks

Question Number	Answer	Acceptable answers	Mark
3(a)	18 (°C) (1) Ignore any unit given by candidate.		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	(black is the) best absorber (of radiation/heat)(compared to other colours) (1)	(Black/it) absorbs more (Black/it) is a good absorber (of radiation/heat) (black is) good at taking in (radiation/heat) Ignore (black is a) good emitter Ignore light. Reject black attracts heat/radiation	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	• Heating effect/temperature greatest at/beyond red (1) • (There is) radiation beyond red (end of spectrum)(1)	(idea of) different colours have different heating effects (Radiation from) sunlight causes a heating effect accept reverse argument Infrared/IR (beyond red end of spectrum)	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(b)(iii)	Any **one** from • To check the thermometers produce the same readings/ temperature (under the same conditions) (1) • To show that temperature changes.	(To check) they were all at the same temperature (before starting the experiment.) To be able to make a comparison (between shade and light) (To allow them to carry out a) fair test	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	C damage to the eyes (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	D all three signals arrive at the same time (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)iii	Description linking **one** of the following pairs: • security marking (1) • ink absorbs UV and re-radiates (visible) light (1) • fluorescent lamps (1) • coating absorbs UV and re-radiates (visible) light (1) • genuine bank notes (1) • watermark absorbs UV and re-radiates (visible) light (1) • disinfecting water (1) • UV kills bacteria (1) • sun beds (1) • UV absorbed by (melanin in) skin (1) Any suitable use gains 1 mark Any suitable use + detail gains 2 marks	invisible ink/smart water glows under UV (outside of) lamp glows when hit by UV forgeries/fake bank notes/passports/fingerprints/ body fluids etc markings glow under UV tanning beds tans the skin /the body e.g. disco lighting (1) makes clothing glow (1)	**(2)**

Total for Question 3 = 9 marks

Question Number	Answer	Acceptable answers	Mark
4 (ai)	D ultrasound waves (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (aii)	Any 3 from • emits (high frequency/ultra) (sound)(1) • (sound is) reflected (off fish) (1) • (reflection) detected by Dolphin (1) • dolphin (estimates) time between (sending and receiving) sounds (1) • dolphin is able to change time into (estimate of) distance (1)	Makes/sends out/produces (ultra sound/signal/wave) Uses 'high frequency sound' is insufficient (sound) bounces off (fish) or echoes towards dolphin 1st three marks can be scored on the diagram. ie unless stated otherwise, assume any waves/rays starting at dolphin are ultrasound. Rays do not need to be straight	**(3)**

Question Number	Answer	Acceptable answers	Mark
4 (b)	An explanation including: • Infrasound (1) Plus one from: • Decrease/change in amplitude is least (1) • can be detected/'heard' further away (1)	 Marks are independent Stays the biggest/stays high. Has a bigger amplitude would travel the furthest/further	**(2)**

Question Number	Answer	Acceptable answers	Mark
4 (ci)	B seismic waves (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (cii)	(there is a) difference/change in density (1)	more/less/too dense (reach a) boundary (between different materials) Ignore 'the waves cannot travel through liquids/oil'	**(1)**

Question Number	Answer	Acceptable answers	Mark
4 (d)	Substitution into correct equation(1) v = 15 x 125 Evaluation (1) 1875 Unit (1) m/s	 Power of 10 error max 1 mark for numerical answer 2 marks for correct numerical answer even with no working shown ms^{-1} **not** mps 1.875 km/s or 6750 km/h gain 3 marks If numerical answer incorrect, accept any correctly-written unit of speed: eg **k**m/s or km/hr or miles per hour / mph	**(3)**

Total for Question 4 = 11 marks

Question Number	Answer	Acceptable answers	Mark
5(a)	D the Universe (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	(nebula) main sequence (star) (1) AND red giant white dwarf (1) All three in correct order for 2 marks	Red Giant White Dwarf (Main sequence) (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(c)i	infrared (radiation)/(rays) (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)ii	An explanation linking any two from • above the clouds / no clouds/ no weather (1) • image is clearer/more detailed/ not distorted/not blurred (1) • no light pollution (1) • (some) telescopes use gamma/ X-rays/ultraviolet /infrared/microwaves (1) • no absorption (by atmosphere) of gamma/ X-rays/ultraviolet /infrared/ microwaves (1)	Credit to be given for stating that all telescopes would be better in space, but size and weight may exclude e.g. Jodrell Bank from space. no {air/dust/pollution} wider field of view/ can use anytime IGNORE 'see further' IGNORE 'it is closer (to the stars/planets)' IGNORE: references to improving understanding / knowledge of space	**(2)**

Question Number		Indicative Content	Mark
QWC	***5*(d)**	A description including some of the following points • improved QUALITY eg higher or better magnification/ detail/resolution or clearer/brighter image **OR** MORE INFORMATION (than with naked eye) of image/data eg new planets/stars/nebulae/pulsars (This could be extra detail for greater magnification/resolution only) • detection of (non-visible) electromagnetic WAVES eg X-ray / UV / IR/ radio • TECHNOLOGY that enable collection of more data eg reflecting telescope/arrays ***and/or*** additions eg computer-aided /photographic connections or larger (objective) lens/mirror • POSITION of telescopes – eg orbital/outside atmosphere/on top of mountains/away from atmosphere/rays not absorbed/obscured/scattered by atmosphere. Ignore 'Hubble' or 'Compton'.	**(6) Exp**
Level	**0**	No rewardable content	
1	**1 - 2**	a limited description e.g. mention of any one example such as "magnifies stars/planets" OR "discovering new planets/stars" • 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 e.g. mention of either two of the improvements **OR** extra detail about one of the improvements eg improvement **plus** example (ie Magnifies planets *so that craters/mountains may be seen)* • 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 e.g. mention of three (or more) improvements **OR** two improvements **plus extra detail about one of them (ie Telescopes in space can detect X-Rays *that would be absorbed by the atmosphere*)** • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Suitable extra detail shown in italics in examples above)

Total for Question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
6 (ai)	Substitution (1) 1.5 x 6 Evaluation (1) 9 (W) Ignore any unit given by candidate.	Power of 10 error max 1 mark Give full marks for correct answer with no working shown	**(2)**

Question Number	Answer	Acceptable answers	Mark
6 (aii)	• More turns on the coil (1) • More powerful/stronger magnet(s) (1)	Wrap coils on iron (core/former)/ more coils/twists/loops. Bigger coil is insufficient. More magnets. Bigger/larger magnet is insufficient. Ignore increase speed of rotation	**(2)**

Question Number	Answer	Acceptable answers	Mark
6 (aiii)	A description including • in one direction only for DC (1) • reversing direction for AC (1)	 'DC goes straight' is insufficient AC switches/changes direction OR moves to and fro 'AC goes different ways' is insufficient. Diagram with labelled arrows could get 2 marks.	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(b)**	A comparison including some of the following ideas • Transformers can be used or {voltages/currents} can be {changed/transformed} • AC (can transmit) at lower current/high(er) voltage • National Grid is (usually) over ground (DC cables (were) underground) • Less energy lost in transmission • National Grid system can supply to customers further away • Possible to create a grid linking power stations • More flexibility in voltage for consumer • Consumer can draw large(r) current • More flexibility in power drawn • Great(er) range of devices can be powered Ignore methods of electricity production	**(6)** **Exp**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited (maybe implied) comparison giving one fact e.g: AC can be at high(er) voltage OR the National Grid can supply houses not close to a power station/ further (away/than the New York system.) • 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 comparison including two ideas which may be linked or not eg Nat. Grid can supply whole country and can be used for more appliances (than just lighting). e.g: AC can be transmitted further (than DC) (because it) wastes less energy • 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 comparison including at least three ideas, with at least one direct link between two of them. • e.g. AC can be transmitted further (than DC) because AC can be transformed to {lower current/high(er) voltages}. OR AC can be transformed to {lower current/high(er) voltages}. Greater range of devices used. • 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 mark

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481
Email publication.orders@edexcel.com
Order Code UG035110 March 2013

For more information on Edexcel qualifications, please visit our website
www.edexcel.com

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Rewarding Learning