edexcel

Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE in Physics (5PH3F) Paper 01

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 2014
Publications Code UG040017
All the material in this publication is copyright
© Pearson Education Ltd 2014

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	Acceptable answers	Mark
1 (a)	normal (1)	normal line	**(1)**

Question Number	Answer	Acceptable answers	Mark
1 (b)(i)	plot the points: • 0,0 (1) • 6,9 (1)	allow within one square tolerance. Bod if 0,0 not clearly visible but must be able to see a plotted point for 6,9 If they plot more than 2 points, take a mark off for each incorrect one plotted.	**(2)**

Question Number	Answer	Acceptable answers	Mark
1 (b)(ii)	straight line through both points joining existing curve (1)	Reject multiple lines and unreasonably wavering lines. allow ecf from wrongly plotted points, including curves if plausible	**(1)**

Question Number	Answer	Acceptable answers	Mark
1 (b)(iii)	42° (1) +/- 0.5°		**(1)**

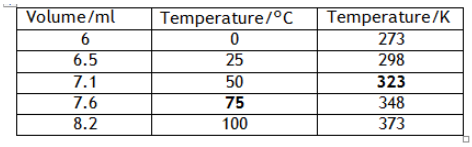
Question Number	Answer	Acceptable answers	Mark
1 (c)(i)	diagram showing: • reflection (1) • angle of incidence = angle of reflection (1)	reject (for this marking point) with an additional partial refraction / ray along boundary judge by eye allow angles marked as equal	**(2)**

Question Number	Answer	Acceptable answers	Mark
1 (c)(ii)	The idea that it enters along the normal	At 90 ° to the surface / at right angles to the surface / along a radius / perpendicular to the tangent / hits straight on reject 'goes through centre of glass'	**(1)**

(Total for Question 1 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
2(a)	B do not move at absolute zero		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	An explanation linking: • particles move / collide (1) with • the walls of the syringe (1) 2nd mark dependent on first	hit/strikes/bounces ignore vibrate with the syringe 'hits the syringe' = 2 marks ignore 'push against the syringe'	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	323K (1) 		**(1)**

Volume/ml	Temperature/°C	Temperature/K
6	0	273
6.5	25	298
7.1	50	**323**
7.6	**75**	348
8.2	100	373

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	A description including: • V increases as T increases (or reverse) / there is a positive correlation (1) • proportional / goes up in equal steps / constant increase (1)	hotter leads to greater volume / cooler leads to smaller volume do not allow 'as heat rises' accept a doubling argument for the second mark.(Ignore readings taken from graph if not supporting doubling.) volume is (directly) proportional to temperature for 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)	• Substitution $\frac{6.5 \times 450}{298}$ (1) • evaluation 9.8 (ml) (1)	Any answer between 9.8(ml) and 9.9(ml) (ignore dp / rounding off) Accept answer with no working for full marks	**(2)**

(Total for Question 2 = 8 marks)

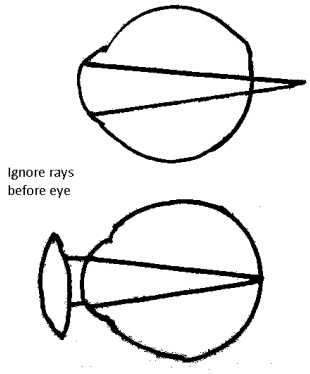
Question Number	Answer	Acceptable answers	Mark
3(a)(i)	• cornea (1) • lens / ciliary muscles (1)	In either order accept misspellings where meaning is clear	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (a)(ii)	An explanation linking: • Lens B (1) with one of • smaller radius of curvature • (because) it is thicker (1) • (because) bends/refracts light more (1)	 more curved fatter / wider (not 'bigger') has a shorter focal length	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)(iii)	B dioptre		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	• 4 x3 (1) • Evaluation 12(cm) (1)	 10.0 (cm) to 15.0(cm) Correct answer with no working for 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	D right way up, virtual		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)	An explanation linking any two of the following: • the eyeball is too short / the image is formed behind the retina (eye) / the eye lens does not bend the light enough / is not powerful enough / person cannot see objects close up (clearly) (1) • (lens) bends / refracts the light more (1) • (lens) focuses the image (of an object) on the retina / back of eye (1)	Credit diagrams  reject contradictions where short sight is shown or described i.e. lens focusing rays before the retina.	**(2)**

(Total for Question 3 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	**D** 27 (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	an explanation linking: • no change in mass (number) (1) • (because) gamma is a wave (electromagnetic) / has no mass (itself) (1) OR • mass decreases (1) • idea of mass – energy equivalence (1) (must be clearly stated)	gamma is only energy / not a particle nucleus de-excites / rearranged for one mark do not allow 'mass number decreases'	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b) (i)	**A** gamma can penetrate further than alpha or beta (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b) (ii)	description to include: • protects / stops radiation escaping (1) • affecting operator/doctor/nurse (1)	absorbs (radiation) other people / others	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b) (iii)	two from: • non invasive / no surgery required (1) • no radioactive substances left in the body (1) • no anaesthetic used • patient does not become radioactive (1) • outpatient procedure (1) • does not affect the whole body (1) • (accurate) targeting of tumour (1) • painless (at the time) for the patient • procedure (may be) quicker	no need to operate / cut open patient / reduces risk of infection no harmful side effects like chemotherapy ignore answers\that apply equally to other treatments e.g. 'kills cancer'	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b) (iv)	explanation linking two from: • idea of targeting / beams concentrate / focus on tumour (1) • avoid damage to healthy cells / tissue (1) • (reaching / getting to) all parts of the tumour (1)	more rays hit tumour / beams overlap at tumour ignore '(more) beams penetrate more' / (more) accurate	**(2)**

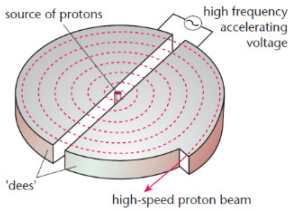
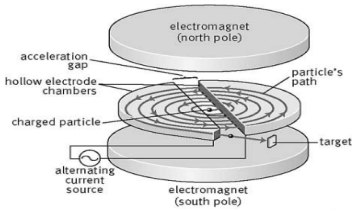
(Total for Question 4 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	D towards the centre of the circle		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	centripetal (force)	reject centrifugal force accept misspellings where meaning is clear e.g. centripedal	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	Any two of the following :- ball slows down (1) ball / it drops (down) / circles at a lower height (1) go in smaller circles (1)	 less **<u>kinetic</u>** energy / momentum any lowering / less **<u>potential</u>** energy stops going in circles the ball/it would not make complete circles (not just 'stops')	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iv)	An explanation linking: • the idea that momentum (of the closed system) would stay the same (1) • the idea that kinetic energy would not be conserved (1)	 momentum **<u>of the ball</u>** decreases / changes (direction) / passed to wall must specify which momentum; do not credit 'momentum decreases' by itself kinetic energy → heat/sound/wall ignore 'KE decreases / is lost' without qualification allow 'KE is lost because it's not elastic' (i.e. qualified)	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(b)**	A description including some of the following points :- Cyclotron • two D-shaped halves • gap between the Dees • (alternating) voltage across the gap • magnetic field (at right angles to the moving particles) • vacuum enables free movement of particles Particle movement • accelerate • start at the centre • move in a circular path • spiral outwards • exit in a straight line Examples of labelled diagrams which would give Level 3 by themselves (not all labels / details needed)   Level 2 if no labels but Dees AND particle path shown. Level 1 if no labels but either Dees OR spiral of particle shown Ignore uses of cyclotron	**(6)**

Level	0	No rewardable content
1	**1 - 2**	• a limited description of either particle movement OR cyclotron e.g. The particles move in a circle OR Cyclotrons have two Dees OR Cyclotrons are particle accelerators OR there's a vacuum • 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 particle movement AND cyclotron OR a more detailed description of one e.g. A cyclotron has two D-shaped halves and the particles inside accelerate OR A cyclotron has a magnetic field and a voltage across the gap OR Charged particles increase in speed as they spiral outwards OR vacuum allows free movement of particles • 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 description of particle movement AND cyclotron with a detailed description of one of them e.g. the charged particles get faster as they accelerate across the gap in the Dees **OR** the magnetic field (of the cyclotron) causes the particles to move in a circle • 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)(i)	50 (W/m^2) (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	• using distance^2 (1) (0.9^2) = 0.81 • substitution(1) (intensity) = $\frac{200}{(0.9^2)}$ • evaluation (1) 250 (W/m^2)	 Allow ecf from mp1 200/0.81 has achieved first two marks correct answer with no working scores full marks 246.9 numbers which would correctly round up to 250 (e.g. accept 246) 222 scores two marks (using 200/0.9)	**(3)**

Question Number	Answer	Acceptable answers	Mark
6(b)	A CAT scan (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
6 (c)	damage to cell/DNA (1)	causes cancer / stops cell division / causes tumours / causes radiation burns for cell accept tissue / named tissue / organ / for damage accept kills / destroys / mutates / denatures / ionises but not just ionising by itself 'radiation poisoning' by itself insufficient	**(1)**

Question Number		Indicative Content	Mark
QWC	***6(d)**	An description including some of the following points • C is heated • C is the cathode / filament • A is the anode • A is the (metal) target • electrons produced at C • by thermionic emission (boil off filament) • p. d. (voltage) between A and C • electrons move towards A • through a vacuum B • electrons accelerated by voltage (between A & C) • electrons collide with A	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a description limited to isolated facts e.g. B is a vacuum • 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 linking some facts e.g. electrons / negative particles come from the cathode OR electrons collide with the anode OR electrons accelerate in the tube • 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. **electrons** come from the cathode and hit the anode N.B. must mention electrons to get level 3 • 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)

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