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IGCSE Physics 4437 / 6H
Final Mark Scheme
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IGCSE

IGCSE Physics (4437/6H)

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Question Number	Question		
1	**(a)**		
	Acceptable Answers	Reject	Mark
	(directly) proportional		**(1)**

Question Number	Question		
1	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) tension / weight / gravitational force (1) **(ii)** 2.5 (N) (1) **(iii)** 4.0 – 5.0 (1)		**(3)**

Question Number	Question		
1	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) A (1) **(ii)** B (1) **(iii)** large extension for small increase in force (1)		**(3)**

Total 7 marks

Question Number	Question		
2	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) decreases (1) **(ii)** increases (1) **Notes** **(ii)** e.c.f		**(2)**

Question Number	Question		
2	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) $V = I \times R$ (1) **(ii)** Increases (1) not dop no ecf **(iii)** *R* (almost)same (1) *I* bigger (1) **Notes** **(iii)** potential divider idea can score 2		**(4)**

Question Number	Question		
2	**(c)**		
	Acceptable Answers	Reject	Mark
	voltmeter connected in parallel across buzzer or R		**(1)**

Total 7 marks

Question Number	Question		
3	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) number of cycles (or waves) in unit time (1) **(ii)** time for one cycle (period) (1)		**(2)**

Question Number	Question		
3	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) 72 /60 = 1.2 (Hz) (1) **(ii)** 1 / 1.2 = 0.833 (s) (1)		**(2)**

Question Number	Question		
3	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) points plotted (2), curve (1) blobs (-1) **(ii) off the graph** (1)		**(4)**

Total 8 marks

Question Number	Question		
4	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) proton number (1) **(ii)** number of protons and neutrons (1) **(iii)** same number of protons /different number of neutrons(1)		**(3)**

Question Number	Question		
4	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) 11 (1) **(ii)** 12 (1) **(iii)** 11 (1)		**(3)**

Question Number	Question		
4	**(c)**		
	Acceptable Answers	Reject	Mark
	gamma	gamma particle	**(1)**

Question Number	Question		
4	**(d)**		
	Acceptable Answers	Reject	Mark
	mutations, cancer, damage tissue, cells, waste problems allow deforming		**(1)**

Total 8 marks

Question Number	Question		
5	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) weight down(wards) (1) 'or' (force of) gravity down(wards) (water) resistance / drag / friction up(ward) (1) 'or' in opposite direction (to the movement / motion) **Notes -** both force and direction for each either order **(ii)** (water) resistance / drag / friction increases (1) as speed/velocity increases (1) (depends on previous so do not credit unless first mark gained)		**(4)**

Question Number	Question		
5	**(b)**		
	Acceptable Answers	Reject	Mark
	1.25 (2) 'or' F = ma (1) 'or' (a) = 15 ÷ 12 (1) m/s^2 or ms^{-2} (1)		**(3)**

Question Number	Question		
5	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) down(wards) (1) at a steady speed (1) 'or' no acceleration / deceleration (2) 'or' constant velocity (2) **(ii)** zero/0(N) (1)		**(3)**

Total 10 marks

Question Number	Question		
6	**(a)**		
	Acceptable Answers	Reject	Mark
	1.5 (V)	do not credit just '9 ÷ 6'	**(1)**

Question Number	Question		
6	**(b)**		
	Acceptable Answers	Reject	Mark
	Charge / electrons / ions		**(1)**

Question Number	Question		
6	**(c)**		
	Acceptable Answers	Reject	Mark
	19 440 (2) 'or' (energy =) 0.2 x 9 x 3 × 60 x 60 (1) joules/J(1) note '5.4 J' is (2),324 J is (2),3240 J is (2)		**(3)**

Question Number	Question		
6	**(d)**		
	Acceptable Answers	Reject	Mark
	flow/movement of (free) electrons (1) from negative to positive (1) 'or' through lattice of ions / charged atoms		**(2)**

Question Number	Question		
6	**(e)**		
	Acceptable Answers	Reject	Mark
	direct current		**(1)**

Question Number	Question		
6	**(f)**		
	Acceptable Answers	Reject	Mark
	ANY TWO (1 each) mains supply is alternating current (1) 'or' mains is a.c. mains supply is at a (much) higher voltage / 230 V(1) supply from battery is limited/battery has to be replaced /recharged		**(2)**

Total 10 marks

Question Number	Question		
7	**(a)**		
	Acceptable Answers	Reject	Mark
	Communication / endoscope / decorative lighting / etc **Notes** accept any suitable use e.g. taking light from a central unit (to various outlets)		**(1)**

Question Number	Question		
7	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) perpendicular at point of incidence (1) angle of incidence clearly shown as angle between incident ray and normal (1) **Notes -** angles of incidence and reflection must look fairly equal depends on previous mark. **(ii)** total internal reflection/ t.i.r. (1) **(iii)** angle of incidence is greater than the critical angle (1) **Notes -** or angle i > angle c		**(4)**

Question Number	Question		
7	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) sine critical angle = 1 ÷ refractive index (1) 'or' the converse 'or' sin c = 1/*n* **(ii)** 1.51 (3) 'or' or 1.508…….. (2) 'or' 1 ÷ 0.67 (1) 'or' other value calculated but given 'correctly' to two places of decimals (1) **(d)** total internal reflection occurs (1) angle of incidence = 45° (1) so critical angle < 45° (1)		**(7)**

Total 12 marks

Question Number	Question		
8	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) any three points (1) each • high speed • random/erratic • frequent collisions (with each other) • translational **(ii)** (very) large number/millions/billions of them (1) collide with/hit (1) walls of the container (1)	just 'collisions'	**(6)**

Question Number	Question		
8	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) 100 (kPa) (2) 'or' (pressure) = 500 x 1.2 ÷ 6 (1) **(ii)** no change in temperature (1) no leaks/no loss of mass /no loss of weight (1)		**(4)**

Total 10 marks

Question Number	Question		
9	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) (nuclear) fission (1) **(ii)** hit other uranium/nuclei (1) neutrons emitted which go on to hit other nuclei and so on (1) **Notes -** or words to that effect but must convey the idea that the process goes on and on also depends on the previous mark **(iii)** kinetic energy (of the fission products) (1) 'or' kinetic energy of the (daughter) nuclei and neutrons **Notes -** allow 'heat' or 'thermal energy' or 'internal kinetic energy' **(iv)** alpha particle has positive charge (1) is repelled (by the positively charged nucleus) (1) (but) neutron has no charge (so it is not repelled) (1)	any suggestion that the neutron is attracted	**(7)**

Question Number	Question		
9	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) any two of • slows neutrons • neutron(s) more likely to hit/split nucleus/nuclei (of U235) • so the reactor works more efficiently **(ii)** to control the speed/rate of the (fission) reaction (1) prevent overheating/reaction getting out of control / meltdown (1)	'…. of U238' just 'they are moved in and out' just'control reaction'	**(4)**

Total 11 marks

Question Number	Question		
10	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) kinetic energy = ½ x m x v^2 'or' correctly transposed version 'or' in words but do not accept '…velocity squared' for '… speed squared' (1) **(ii)** 11 (m/s) (2) or v^2 = 26.62 ÷ 0.22 or v = √121 (1)		**(3)**

Question Number	Question		
10	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) gravitational/potential energy = mgh (1) 'or' in words **(ii)** 6.05 (m) (2) 'or' (max) height = 26.62 ÷ 4.4 (1) **(iii)** any one of • ball went straight up • all the k.e. transferred as g.p.e. • energy transfer 100% efficient • no friction/(air) resistance/drag • no energy transferred as heat • no energy transferred as sound		**(4)**

Total 7 marks