

IGCSE Physics 4437 / 6H

Final Mark Scheme

November 2007

IGCSE

IGCSE Physics (4437/6H)

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' $a = 15 \div 12$ (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 ' $9 \div 6$ '	(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 =) $0.2 \times 9 \times 3 \times 60 \times 60$ (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 $i > c$		(4)

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

Total 12 marks

Question Number	Question		
8	(a)		
	Acceptable Answers	Reject	Mark
	<p>(i) any three points (1) each</p> <ul style="list-style-type: none"> • high speed • random/erratic • frequent collisions (with each other) • translational <p>(ii) (very) large number/millions/billions of them (1) collide with/hit (1) walls of the container (1)</p>	just 'collisions'	(6)

Question Number	Question		
8	(b)		
	Acceptable Answers	Reject	Mark
	<p>(i) 100 (kPa) (2) 'or' (pressure) = $500 \times 1.2 \div 6$ (1)</p> <p>(ii) no change in temperature (1) no leaks/no loss of mass /no loss of weight (1)</p>		(4)

Total 10 marks

Question Number	Question		
9	(a)		
	Acceptable Answers	Reject	Mark
	<p>(i) (nuclear) fission (1)</p> <p>(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</p> <p>(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'</p> <p>(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)</p>	any suggestion that the neutron is attracted	(7)

Question Number	Question		
9	(b)		
	Acceptable Answers	Reject	Mark
	<p>(i) any two of</p> <ul style="list-style-type: none"> slows neutrons neutron(s) more likely to hit/split nucleus/nuclei (of U235) so the reactor works more efficiently <p>(ii) to control the speed/rate of the (fission) reaction (1) prevent overheating/reaction getting out of control / meltdown (1)</p>	<p>'... of U238'</p> <p>just 'they are moved in and out' just 'control reaction'</p>	(4)

Total 11 marks

Question Number	Question		
10	(a)		
	Acceptable Answers	Reject	Mark
	(i) kinetic energy = $\frac{1}{2} \times m \times v^2$ 'or' correctly transposed version 'or' in words but do not accept '...velocity squared' for '... speed squared' (1) (ii) 11 (m/s) (2) or $v^2 = 26.62 \div 0.22$ or $v = \sqrt{121}$ (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 = $26.62 \div 4.4$ (1) (iii) any one of <ul style="list-style-type: none"> • 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