

Mark Scheme (Results)

January 2009

GCE

GCE O level Physics
7540/01

Question Number	Acceptable Answers	Reject	Mark
1(a)(i)	(air) drag / air friction / air resistance	ignore upthrust	(1)

Question Number	Acceptable Answers	Reject	Mark
1(a)(ii)	weight / force of gravity / gravitational (force) / pull of gravity / gravitational	gravity	(1)

Question Number	Acceptable Answers	Reject	Mark
1(b)	unequal acting on same body not same type of force	unbalanced	max (2)

Question Number	Acceptable Answers	Reject	Mark
1(c)(i)	3 (N) ACCEPT 3.0 (N)	another unit e.g. kg	(1)

Question Number	Acceptable Answers	Reject	Mark
1(c)(ii)	Downwards / towards ground / towards the centre of the Earth		(1)

Question Number	Acceptable Answers	Reject	Mark
1(d)	$3.0 = 6.0 \times a$ e.c.f. from (c)(i) $a = 0.5$ or $\frac{1}{2} \text{ m/s}^2$ UP allow $F = 3, 5, 8$ or 13 giving $a = 0.5, 0.83, 1.33, 2.17, 2.16 \text{ m/s}^2$	use of $a = (v - u)/t$	(1) (1)

Question Number	Acceptable Answers	Reject	Mark
1(e)	two vertical arrows in opposite directions in line with each other	arrows shown as 5(.0 N) up and 8(.0 N) down scores zero	(1)
	both labelled 8(.0) N UP dop		(1)

Question Number	Acceptable Answers	Reject	Mark
2(a)	straight line from (0,30) to (10,30)		(1)
	straight line from (10,30) to(25,0) or line of correct slope from a point on the line $v = 30$ m/s		(1)

Question Number	Acceptable Answers	Reject	Mark
2(b)	area (under graph)		(1)

Question Number	Acceptable Answers	Reject	Mark
2(c)	$30 \times 10 = 300$ must e.c.f from (a)		(1)
	$\frac{1}{2} \times 30 \times 15 = 225$ must e.c.f. from (a)		(1)
	One of these areas must be correct for 1 st mark		(1)
	$300 + 225 = 525$ m <u>UP for 3rd mark only</u> e.c.f from previous two lines		

Question Number	Acceptable Answers	Reject	Mark
3(a)	(any) gas/fluid hot/heats up		(1)
	less dense		(1)
	rises ora		(1)

Question Number	Acceptable Answers	Reject	Mark
3(b)	no (or less) convection	vacuum more evaporation	(1)
	filament (stays) hotter <i>independent mark</i>		(1)

Question Number	Acceptable Answers	Reject	Mark
4(a)	expansion/expands	gap / molecules expands	(1)

Question Number	Acceptable Answers	Reject	Mark
4(b)	expand differently	ignore conduction	(1)
	copper more/faster iron less		(1)
	'copper expands more' scores (2) ora		

Question Number	Acceptable Answers	Reject	Mark
4(c)	up		(1)

Question Number	Acceptable Answers	Reject	Mark
5(a)	(molecules) moving or have kinetic energy/momentum/velocity/speed Ignore vibrating colliding with (inside of) bag scores 2	colliding with each other	(1)
			(1)

Question Number	Acceptable Answers	Reject	Mark
5(b)(i)	32 kPa UP		(1)

Question Number	Acceptable Answers	Reject	Mark
5(b)(ii)	$32 \times 0.0006 = 100 \times V$ $V = 0.00019(2) \text{ m}^3$ UP ecf from (i) e.g. $30 \times 0.0006 = 100 \times V$ $V = 0.00018 \text{ m}^3$ $42 \times 0.0006 = 100 \times V$ $V = 0.000252 \text{ m}^3$	$V = 100 \times 0.0006 / 32$ $= 0.001875 \text{ m}^3$	(1)
			(1)

Question Number	Acceptable Answers	Reject	Mark
5(b)(iii)	constant mass/number of molecules owtte constant temperature		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
6(a)	(current is) a movement / (rate of) flow/transfer of charge (in one second)/electrons/charged particles ignore coulombs/protons	$I = V/R$ or $I = Q/t$	(1)

Question Number	Acceptable Answers	Reject	Mark
6(b)	(positively) charged ignore 'negatively'		(1)

Question Number	Acceptable Answers	Reject	Mark
6(c)	$5.4 \times 10^{-6} / 60$ $= 9 \times 10^{-8} \text{ A UP}$ $5.4 \times 10^{-6} / 1 = 5.4 \times 10^{-6} \text{ A (1)}$		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
6(d)	larger / greater / bigger / more (current) double (current) (scores both marks on its own)		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
7(a)	<u>very</u> large/ infinite (resistance)		(1)

Question Number	Acceptable Answers	Reject	Mark
7(b)	correct use of $I = V / R$ i.e. $6/24$ (A) allow $R = V / I$ $24 = 6 / 0.25$ or $V = I \times R$ $6 = 0.25 \times 24$ No UP		(1)

Question Number	Acceptable Answers	Reject	Mark
7(c)(i)	0.2(0) A		(1)
7(c)(ii)	total resistance = $6 / 0.20$ e.c.f. for I from (i) e.g. $0.45 \text{ A} / 13.3 \Omega / -10.7 \Omega$ $0.25 \text{ A} / 24 \Omega / 0 \Omega$ $0.225 \text{ A} / 26.7 \Omega / 2.7 \Omega$ = 30Ω UP if this is final answer ($30 - 24 =$) 6Ω UP		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
7(d)	rectifier / convert (ac) to dc / current only (flows) in one direction / half the time/half wave rectification shown graphically		(1)

Question Number	Acceptable Answers	Reject	Mark
8(a)(i)	arrow on line A to B allow arrow on or near to AB allow any clockwise arrow(s) in or near the 'square' but not if there is/are any anticlockwise arrow(s)		(1)

Question Number	Acceptable Answers	Reject	Mark
8(a)(ii)	arrow pointing anticlockwise on one of the circles allow more than one arrow if they all point anticlockwise <u>must</u> e.c.f. from (i)		(1)

Question Number	Acceptable Answers	Reject	Mark
8(b)(i)	direction of magnetic force on a N pole / direction a compass points / line from N.pole to S.pole	direction of current	(1)

Question Number	Acceptable Answers	Reject	Mark
8(b)(ii)	<ol style="list-style-type: none"> 1. use of (plotting) compass / iron filing/dust/powder 2. place on card / scatter iron filings on card 3. mark/note/shows position of needle/(N) pole / (filings) tap the card / <u>surround</u> wire with several compasses 4. move compass and mark/note (again)/ note directions of needles 5. repeat until complete a circle <p>NOTE Use of iron filings can only score first three marks</p>		max (4)

Question Number	Acceptable Answers	Reject	Mark
9(a)	too small (to see) / size of an atom / allow / very small / tiny / microscopic $1 \times 10^{-9} \text{m}$ (or smaller) UP	can only be seen under microscope	(1)

Question Number	Acceptable Answers	Reject	Mark
9(b)(i)	Water (vapour) drops / droplets / particles or alcohol drops / droplets / particles / vapour	water alcohol	(1)

Question Number	Acceptable Answers	Reject	Mark
9(b)(ii)	Ionisation / ionising / ionising ability / ionise easily	ions	(1)

Question Number	Acceptable Answers	Reject	Mark
9(b)(iii)	thick/solid/unbroken tracks straight tracks (all) same length/size/distance /energy 4-8 cm long /don't reach wall	short can't penetrate wall	max (2)

Question Number	Acceptable Answers	Reject	Mark
9(c)	<i>beta and / or gamma</i> not (very)/less ionising tracks (very) faint	not straight can penetrate wall range large or more than 8 cm	max (1)

Question Number	Acceptable Answers	Reject	Mark
10(a)(i)	transverse		(1)

Question Number	Acceptable Answers	Reject	Mark
10(a)(ii)	$3 \times 10^8 / 5 \times 10^6$ = 60 m m/(s Hz) UP		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
10(b)(i)	$3 \times 10^8 \times 1.9 \times 10^{-3}$ 5.7×10^5 m (570 000 m/ 570 km) halve distance = 2.85×10^5 m/285 km UP in <u>candidate's</u> final answer or $(1.9 \times 10^{-3}/2 =) 0.95 \times 10^{-3}$ $0.95 \times 10^{-3} \times 3 \times 10^8$ 2.85×10^5 m / 285 km		(1) (1) (1)

Question Number	Acceptable Answers	Reject	Mark
10(b)(ii)	orbit not circular / further away from Mars / distance increased / surface of Mars not even	distance changes / surface of Mars is circular	(1)

Question Number	Acceptable Answers	Reject	Mark
11(a)	move/adjust <u>lens</u> (back and forth) or change distance from <u>lens</u> to object <u>and screen</u> until <u>sharp/clear</u> image seen (on screen) dop		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
11(b)	distance from <u>lens</u> to screen/image/object / raybox allow 'optical centre' or 'surface of lens'		(1)

Question Number	Acceptable Answers	Reject	Mark
11(c)	inverted/upside down laterally inverted same size (as object) <i>each answer line must be completely correct</i>		max (2)