

IGCSE DA Physics 4437 6H

Mark Scheme (Results)

Summer 2008

IGCSE

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Question Number	Correct Answer	Reject	Mark
1 (b)(ii)	intentionally straight vertical arrow pointing downwards from, above, below or through point X	arrow from middle of car	1 (1)

(Total 6 marks)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (a)(i)	infra red <i>allow</i> phonetic spelling	i.r. IR	microwaves ultraviolet	1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (a)(ii)	gamma (rays/radiation)	γ gama	X-rays	1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (b)(i)	same speed (in a vacuum) same velocity (in a vacuum) <i>or</i> (travel at) speed of light (travel at)velocity of light	travel through a vacuum or empty space	transverse	1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (b)(ii)	water (waves)/waves on water/tidal waves/sea waves/ocean waves	waves on (slinky) spring shaken/moved up and down or side to side waves on a rope moved up and down or side to side <i>S waves ignore 'seismic'</i> mexican wave	P waves analogue wave waves on a CRO	1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (b)(iii)	90°	normal/ perpendicular right angles		1
	energy <i>independent marks</i>	information or data wavefront/front	crest/vibration/direction/ pattern	1 (2)

(Total 6 marks)

Question Number	Correct Answer	Acceptable answers	Reject	Mark
3 (a)(i)	voltage = current × resistance <i>or</i> current = voltage/resistance <i>or</i> resistance = voltage/current	V = IR I = V/R R = V/I	V = C × R	1 (1)
3 (a)(ii)	4.5 nwn volts or V or J/C or JC ⁻¹ or AΩ			1 1 (2)

Question Number	Correct Answer	Acceptable Answers	Mark
3 (b)	decrease		1
	increase	Increase decrease scores 1 decrease decrease scores 1 increase increase scores 1	1 (2)

(Total 5 marks)

Question Number	Correct Answer	Reject	Mark
4 (a)(i)	(semiconductor)diode	LED light emitting diode	1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4 (a)(ii)	50 50	both required		1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4 (a)(iii)	one cell is connected the wrong way	two cells cancel one another/not all facing the same way	battery	1
	some of the voltage is across/used up by diode/component Y/ ammeter(s)/(connecting) wire /switch	reference to resistance of these components /cells / whole circuit	voltage used up by/voltage across <i>voltmeter/lamp</i> voltmeter does not have infinite resistance <i>ignore</i> reference to current and energy	1 (2)

Question Number	Correct Answer	Acceptable Answers	Mark
4 (b)	<i>any <u>three points</u></i>		
	current increases	voltage increases	1
	increases temperature	increases heat / molecular movement	1
	increases resistance		1
	line or slope becomes less steep	non-ohmic / / not proportional to V/ decrease rate of increase /current levels off	(3)

(Total 7 marks)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
5 (a)(i)	not moving (or vibrating) none zero	no <u>kinetic</u> energy no momentum	a response which suggests any kind of movement	1 (1)

Question Number	Correct Answer	Acceptable Answers	Mark
5 (a)(ii)	-273 (°C)	minus 273 -273.15	1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
5 (a)(iii)	373 (K)	373.15(K)	373°C	1 (1)

Question Number	Correct Answer	Reject	Mark
5 (b)	particles knock /jostle /collide	diffusion	1
	smaller/invisible /air/water particles		1
	cause a change of direction dop only as 3 rd mark		1
			(3)

(Total 6 marks)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (a)(i)	gradient	slope	area	1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (a)(ii)	$6.0 \div 0.25$ $= 24$ m/s^2 or $m/s/s$ or ms^{-2} <i>ignore minus signs</i>	Nwn N/kg or Nkg^{-1}		1 1 1 (3)
6 (a)(iii)	$F = m \times a$ $= 70 \times 24$ $= 1680$ (N)	ecf from (a)(ii) nwn	70×10 700×24 score 0/3	1 1 1 (3)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (b)	<i>any <u>three</u> points</i> same change in velocity (in) more time less acceleration or deceleration ora less force ora	comes to a stop over a longer distance $24 ms^{-2}$ is too high <i>allow 'slower deceleration'</i>	damage to joints effect of area of contact and pressure impact reduced	1 1 1 1 (3)

(Total 10 marks)

Question Number	Correct Answer	Acceptable Answers	Mark
7 (a)	recall $n = \sin i \div \sin r$		1
	$\sin i = 1.5 \times \sin 40^\circ$	$\sin^{-1}(1.5 \sin 40^\circ)$	1
	$i = 74.6^\circ$ or 75°	73.7° or 74° nwn (rounding $\sin 40^\circ$ to 0.64)	1
		$i = 40^\circ$ $r = 25.3^\circ$ scores 1 st mark only	(3)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
7 (b)(i)	intentional straight line from point of incidence above existing refracted ray		bending away from normal	1 (1)
7 (b)(ii)	n less	less dense/slow down less/less bent	bends away from normal	1
	r is more	turns less to normal refracts less	greater refracted 'ray'	1
		<i>Calculation of $r = 47.9^\circ$ scores both marks</i>		(2)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
7 (c)	external normal correctly drawn		arrow(s) on normal	1
	i correctly marked between incident ray and drawn normal	ecf		1
	<i>independent marks</i>			(2)

(Total 8 marks)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
8 (a)	fracture energy = initial gpe - final gpe i.e. $E = I - F$ <u>in words</u>	$I = E + F$ $F = I - E$ <u>in words</u>	division or product of phrases	1 (1)

Question Number	Correct Answer	Acceptable Answers	Mark
8 (b)(i)	$60 \times 10 \times 0.5$ = 300 (J) nwn	$60 \times 9.81 \times 0.5 = 294.3(j)$ $60 \times 9.8 \times 0.5 = 294(j)$	1 1 (2)
8 (b)(ii)	300 / same as (i)	ecf	1 (1)
8 (b)(iii)	$\frac{1}{2}mv^2 =$ answer from (i) or (ii) = 3.16 (m/s)	ecf	1 1 (2)
8 (b)(iv)	friction / air resistance / drag not all gpe changed to ke	energy lost to a stated form e.g heat and/or sound	1 (1)
8 (b)(v)	300 - 70 = 230 (J) or 0.230 kJ	allow ecf from b(i) no ecf from (a)	1 1 (2)

Question Number	Correct Answer	Acceptable Answers	Mark
8 (c)(i)	metal any metal <i>ignore 'spring'</i>	metal spring metal wire	1 (1)

Question Number	Correct Answer	Reject	Mark
8 (c)(ii)	linear region correctly marked		1 (1)
8 (c)(iii)	<u>dop</u> proportionality between force(or mass or load or weight) and extension OWTTE	elastic behaviour	1 (1)

(Total 12 marks)

Question Number	Correct Answer	Reject	Mark
9 (a)	(Fleming's) left hand (rule)	(Fleming's)right hand left hand grip rule left hand corkscrew rule	(1)

Question Number	Correct Answer	Mark
9 (b)(i)	I out of page correct direction anywhere in circuit	1 (1)
Question Number	Correct Answer	Mark
9 (b)(ii)	M downwards allow B as a label	1 (1)
Question Number	Correct Answer	Mark
9 (b)(iii)	F to the right must ecf from b(i)&(ii)	1 (1)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
9 (c)	stronger magnet	magnets closer	bigger magnets electromagnet	1
	more current	larger voltage/ more batteries	bigger battery	1 (2)

Question Number	Correct Answer	Acceptable Answers	Mark
9 (d)(i)	current/voltage varies	diagram with at least 1½ cycles about axis scores 3	1
	about axis	'current changes direction' scores 1	1
	pattern repeated dop <i>maximum of 2 marks if no diagram</i>	single cycle sine wave seen anywhere e.g. on a.c. supply scores 1	1 (3)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
9 (d)(ii)	(moves)backwards and forwards (quickly) vibrate (not up and down)	(moves)right and left side to side (quickly)	changes direction	1
	at (a frequency of) 50 Hz <i>independent marks</i>	at high frequency appears stationary		1 (2)

(Total 11 marks)

Question Number	Correct Answer	Mark
10 (a)(i)	n 1 0	1 1 (2)

Question Number	Correct Answer	Mark
10 (a)(ii)	Be 9 4	1 1 (2)

Question Number	Correct Answer	Acceptable Answers	Mark
10 (b)(i)	He	Helium 2 protons & 2 neutrons	1 (1)

Question Number	Correct Answer	Acceptable Answers	Mark
10 (b)(ii)	electron ignore β^+	symbol e- or β^-	1 (1)

Question Number	Correct Answer	Acceptable Answers	Mark
10 (c)(i)	same no of protons <i>ignore</i> 'electrons'	same atomic number or Z	1
	different no of neutrons or N dop <i>exception</i> : 'same element with different number of neutrons' scores 1	different mass number or A different nucleon number	1 (2)

Question Number	Correct Answer	Acceptable Answers	Mark
10 (c)(ii)	U-238 \rightarrow Th-234		1
	Th-234 \rightarrow Pa-234		1
	Pa -234 \rightarrow U-234		1 (3)
	bald answer (2)	final product has atomic number 92 score 1 if no other mark scored	

(Total 11 marks)

Question Number	Correct Answer	Reject	Mark
11 (a)	daughter		1
	two/ three/more/ a few/several / some	fast / ≥ 4 / 1	1
	chain		1
	speed/velocity/ <u>kinetic</u> energy/momentum		1
			(4)

Question Number	Correct Answer	Acceptable Answers	Mark
11 (b)(i)	slow down neutrons/particles (not nuclei)	absorbs (kinetic) energy of neutrons/particles	1
	enable fission to occur	reaction is more efficient OWTTE increase rate of collision	1
			(2)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
11 (b)(ii)	absorb neutrons	stop neutrons		1
	stop / reduce / control the rate of fission or reaction			1
				(2)

(Total 8 marks)

PAPER TOTAL 90 MARKS