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IGCSE DA Physics 4437 6H
Mark Scheme (Results)
Summer 2008

IGCSE

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4437-6H MARK SCHEME

Abbreviations used in mark scheme:

OWTTE - or words to that effect
dop - depending on previous
ecf - error carried forward
ora - or reverse argument
sfs - start from scratch
UP - unit penalty

Question Number	Correct Answer	Acceptable Answers	Mark
1 (a)(i)	0.8 (seconds)	4/5 second 8/10 second	**1** **(1)**

Question Number	Correct Answer	Acceptable Answers	Mark
1 (a)(ii)	3.2 (seconds)	3 1/5 allow **ecf** from (i) 4.0 – previous answer	**1** **(1)**

Question Number	Correct Answer	Acceptable Answers	Mark
1 (a)(iii)	*one line* horizontal line beyond 0.8 less steep slope down (to the *x* axis) **dop**	 *two separate lines or one of these lines* labelled 1 mark for each correct	 **1** **1** **(2)**

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1 (b)(i)	air (resistance) mass of car speed (of the car) brakes tyre pressure area of tyre streamlining	drag weight (force of) gravity size shape velocity (of car)	wind (resistance) temperature	**1** **(1)**

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 *allow* 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) *or* (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 S waves *ignore* 'seismic' 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/ perpendicu right angles		**1**
	energy *independent marks*	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 *or* current = voltage/resistance *or* resistance = voltage/current	V = IR I=V/R R=V/I	V = C x 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 increase	 Increase decrease scores 1 decrease decrease scores 1 increase increase scores 1	**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 some of the voltage is across/used up by diode/component Y/ ammeter(s)/(connecting) wire /switch	two cells cancel one another/not all facing the same way reference to resistance of these components /cells / whole circuit	battery voltage used up by/voltage across *voltmeter/lamp* voltmeter does not have infinite resistance *ignore* reference to current and energy	**1** **1** **(2)**

Question Number	**Correct Answer**	Acceptable Answers	Mark
4 (b)	*any <u>three</u> points* current increases increases temperature increases resistance line or slope becomes less steep	 voltage increases increases heat **/** molecular movement non-ohmic / *I* not proportional to *V*/ decrease rate of increase /current levels off	 **1** **1** **1** **(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 3rd 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 ÷ 0.25 = 24 m/s^2 or m/s/s or ms^{-2} *ignore minus signs*	 **Nwn** N/kg or Nkg^{-1}		**1** **1** **1** **(3)**
6 (a)(iii)	$F = m \times a$ = 70 × 24 = 1680 (N)	 **ecf** from (a)(ii) **nwn**	 70 x 10 700 x 24 score 0/3	**1** **1** **1** **(3)**

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (b)	*any <u>three</u> points* 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 *allow* 'slower deceleration'	 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 ÷ sin r sin i = 1.5 × sin 40° i = 74.6(°) or 75(°)	 $\sin^{-1}$(1.5 sin 40°) 73.7(°) or 74(°) **nwn** (rounding sin 40° to 0.64) i= 40˚ r = 25.3˚ scores 1st mark only	**1** **1** **1** **(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 r is more	less dense/slows down less/less bent turns less to normal refracts less *Calculation of r = 47.9˚scores both marks*	bends away from normal greater refracted 'ray'	**1** **1** **(2)**

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
7 (c)	external normal correctly drawn i correctly marked between incident ray and drawn normal *independent marks*	 **ecf**	arrow(s) on normal	**1** **1** **(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 × 10 × 0.5 = 300 (J) nwn	60 x 9.81 x 0.5 = 294.3(j) 60 x 9.8 x 0.5 = 294(j)	**1** **1** **(2)**
8 (b)(ii)	300 / same as (i)	**ecf**	**1** **(1)**
8 (b)(iii)	½mv^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 *ignore* 'spring'	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>** <u>proportionality</u> 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 more current	magnets closer larger voltage/ more batteries	bigger magnets electromagnet bigger battery	**1** **1** **(2)**

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

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
9 (d)(ii)	(moves)backwards and forwards (quickly) vibrate (not up and down) at (a frequency of) 50 Hz *independent marks*	(moves)right and left side to side (quickly) at high frequency appears stationary	changes direction	**1** **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 ß+	symbol **e-** or **β-**	**1** **(1)**

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

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

(Total 11 marks)

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

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

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

(Total 8 marks)

PAPER TOTAL 90 MARKS