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PHYSICS **0625/43**

Paper 4 Extended Theory **October/November 2017**

MARK SCHEME

Maximum Mark: 80

Published

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Question	Answer	Marks
1(a)(i)	(x =)½ $v_i t$ **or** ½ × 12 × 30 **or** (x =)½ at^2 **or** ½ × 0.40 × 30^2	**C1**
	180 m	**A1**
1(a)(ii)	(a =)$\Delta v / t$ **or** 12 / 30	**C1**
	0.40 (m / s^2) **or** 12 / 30	**C1**
	(F =)ma **or** 2.0 × 10^4 × 0.40 **or** 2.0 × 10^4 × 0.40 × 12 / 30	**C1**
	8000 N	**A1**
1(b)	drag / friction / air resistance mentioned	**C1**
	drag / friction / air resistance increases (as speed increases)	**A1**

Question	Answer	Marks
2(a)	(m =)ρV **or** 950 × 8.2 × 10^{-5} **or** 0.95 × 82	**C1**
	7.8 / 7.79 × 10^N (where N is a integer)	**C1**
	0.078 / 0.0779 kg **or** 78 / 77.9 g	**A1**
2(b)(i)	(p =)$h\rho g$ **or** 0.094 × 950 × 10	**C1**
	890 / 893 Pa	**A1**
2(b)(ii)	atmospheric pressure (is acting)	**B1**
2(c)(i)	steel is denser (than liquid) **or** denser than 950 kg / m^3	**B1**
2(c)(ii)	take new reading **and** subtract 82 (cm^3) / original reading	**B1**

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Question	Answer	Marks
3(a)(i)	nuclear fusion	**B1**
3(a)(ii)	nuclei combine / join together	**B1**
	small nuclei to larger nuclei **or** hydrogen to helium (in some way) **or** loss of mass	**B1**
3(b)	any suitable resource e.g. fossil fuels; hydroelectric; wave; wind	**M1**
	renewable **or** not (according answer) **and** matching explanation	**A1**
3(c)	**two** advantages from: no polluting gases / quiet / low maintenance / can be placed on roofs / clean / cheap to run	**B2**
	two disadvantages from: intermittent supply / unattractive / takes up space / uses land / d.c. output	**B2**

Question	Answer	Marks
4(a)	molecules of solid arranged in lattice / in organised pattern / without gaps / orderly / fixed structure	**B1**
4(b)(i)	glass heated first **or** at first liquid not heated / does not expand / takes time (to heat up) **or** glass poor conductor	**B1**
	glass expands	**B1**
	capacity / volume of flask increases	**B1**
4(b)(ii)	liquid (starts to) warms up	**B1**
	liquid expands more than the solid / glass	**B1**

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Question	Answer	Marks
5(a)	(quantity of internal) energy that raises temperature	**M1**
	per degree Celsius / per unit temperature change	**A1**
5(b)(i)	560 / 562 / 561.6 J	**B1**
5(b)(ii)	kinetic energy / potential energy / total energy (of atoms / molecules / particles)	**B1**
	kinetic <u>added to</u> potential energy (of atoms / molecules / particles)	**B1**
5(c)	line from 100 °C **and** falling	**B1**
	falls at decreasing rate	**B1**
	levels off at labelled / approximate 22 °C	**B1**

Question	Answer	Marks
6(a)(i)	box next to 3.0×10^8 (second box down) ticked	**B1**
6(a)(ii)	($\lambda =$)c / f **or** $3.0 \times 10^8 / 4.8 \times 10^{14}$	**C1**
	$6.2 / 6.25 / 6.3 \times 10^{-7}$ m	**A1**
6(b)(i)	1. <u>sines</u> have no unit **or** sines are ratio of two lengths **or** ratio of two speeds (whose units cancel) **or** units cancel	**B1**
	2. ($v =$) c / n **or** $3.0 \times 10^8 / 1.5$	**C1**
	2.0×10^8 m / s	**A1**
6(b)(ii)	information / message / music/sound / signal / data (encoded as pulses of light) sent	**B1**
	light (travels along fibre) **or** infra-red (radiation)	**B1**
	light detected (at far end) **or** message decoded **or** total internal reflection mentioned	**B1**

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Question	Answer	Marks
7(a)(i)	any **two** rays that start at the top of the image from: • seems to come from F_1 to lens and emerges paraxially • passes through centre of lens undeviated • paraxial to the lens and passes through F_2	**M2**
	two correct rays traced back **and** image indicated	**A1**
7(a)(ii)	any **two** of enlarged; inverted; real underlined	**B1**
	enlarged **and** inverted **and** real underlined	**B1**
7(b)	refracted ray in prism below yellow ray **and** above normal	**B1**
	emergent ray diverging away from the yellow ray and above side of prism	**B1**

Question	Answer	Marks
8(a)	touch the sphere with the earth wire	**B1**
	negatively charged **and** electrons flow to sphere	**B1**
	remove earth wire **or** electrons / negative charges attracted (by rod)	**B1**
8(b)	four **or** more straight, radial lines **and** uniformly spaced	**B1**
	at least one arrow outwards **and** no wrong arrows	**B1**
8(c)	(I =) Q / t **or** 7.0 / (5.0 × 60) **or** 7.0 / 5.0 **or** 1.4 (A)	**C1**
	0.023(3333) A	**A1**

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Question	Answer	Marks
9(a)(i)	cosine **or** sine curve **and** maximum value equal to |minimum value|	**B1**
	two complete cycles of 0.02 s between 0 and 0.040 s	**B1**
9(a)(ii)	point marked *A* where output voltage is zero	**B1**
9(b)(i)	magnetic field (due to a.c.) mentioned	**B1**
	changing / alternating (magnetic) field **or** field lines cut solenoid	**B1**
	e.m.f. / voltage induced (in coil)	**B1**
9(b)(ii)	diode	**B1**
	prevents / stops the backward current **or** allows only one direction of current	**B1**

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Question	Answer	Marks
10(a)	electromagnetic (waves / rays / radiation)	**M1**
	high frequency / energy **or** short wavelength	**A1**
10(b)(i)	no change **or** (stays at) 43	**B1**
10(b)(ii)	no change **or** (stays at) 99	**B1**
10(c)(i)	(radiation) always present / due to environment / in absence of radioactive sample / natural (radiation)	**B1**
10(c)(ii)	112 – 16 **or** 96 **or** 112 / 28 **or** ¼ or 18 / 2	**C1**
	28 – 16 **or** 12 **or** 1 / 8 **or** 18 / 3 **or** 9.0 (hours)	**C1**
	6.0 hours	**A1**
10(d)	any **two** of: • (distance): tongs / manipulator / centre of cardboard box • (absorption): lead gloves / suit / lead glass screen / googles / glasses • (time): limit exposure time / keep in box until needed / film badge	**B2**

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