

---

**PHYSICS**

**0625/43**

Paper 4 Extended Theory

**October/November 2017**

MARK SCHEME

Maximum Mark: 80

---

**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

© IGCSE is a registered trademark.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

---

This document consists of **7** printed pages.

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

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

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

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

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

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

Question	Answer	Marks
7(a)(i)	any <b>two</b> rays that start at the top of the image from: <ul style="list-style-type: none"> <li>• seems to come from <math>F_1</math> to lens and emerges paraxially</li> <li>• passes through centre of lens undeviated</li> <li>• paraxial to the lens and passes through <math>F_2</math></li> </ul>	<b>M2</b>
	<b>two</b> correct rays traced back <b>and</b> image indicated	<b>A1</b>
7(a)(ii)	any <b>two</b> of enlarged; inverted; real underlined	<b>B1</b>
	enlarged <b>and</b> inverted <b>and</b> real underlined	<b>B1</b>
7(b)	refracted ray in prism below yellow ray <b>and</b> above normal	<b>B1</b>
	emergent ray diverging away from the yellow ray and above side of prism	<b>B1</b>

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

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

Question	Answer	Marks
10(a)	electromagnetic (waves / rays / radiation)	<b>M1</b>
	high frequency / energy <b>or</b> short wavelength	<b>A1</b>
10(b)(i)	no change <b>or</b> (stays at) 43	<b>B1</b>
10(b)(ii)	no change <b>or</b> (stays at) 99	<b>B1</b>
10(c)(i)	(radiation) always present / due to environment / in absence of radioactive sample / natural (radiation)	<b>B1</b>
10(c)(ii)	112 – 16 <b>or</b> 96 <b>or</b> 112/28 <b>or</b> $\frac{1}{4}$ <b>or</b> 18/2	<b>C1</b>
	28 – 16 <b>or</b> 12 <b>or</b> 1/8 <b>or</b> 18/3 <b>or</b> 9.0 (hours)	<b>C1</b>
	6.0 hours	<b>A1</b>
10(d)	any <b>two</b> of: <ul style="list-style-type: none"> <li>• (distance): tongs / manipulator / centre of cardboard box</li> <li>• (absorption): lead gloves / suit / lead glass screen / goggles / glasses</li> <li>• (time): limit exposure time / keep in box until needed / film badge</li> </ul>	<b>B2</b>