



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**PHYSICS**

**0625/43**

Paper 4 Extended Theory

**May/June 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

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This document consists of **10** printed pages.

Question	Answer	Marks
1(a)	force <b>and</b> impulse underlined	<b>B1</b>
1(b)(i)	$(v =) at$ OR $2.2 \times 3.0$	<b>C1</b>
	6.6 m/s	<b>A1</b>
1(b)(ii)	3.3 m/s	<b>B1</b>
1(c)	curve/line starts at origin	<b>B1</b>
	initial gradient zero OR curve passing through (3.0, 9.9)	<b>B1</b>
	gradient increasing (with time)	<b>B1</b>
	<b>Total:</b>	<b>7</b>

Question	Answer	Marks
2(a)	(momentum =) mass $\times$ velocity	<b>B1</b>
2(b)(i)	$(p = )3.2 \times 4.0$	<b>C1</b>
	13 kg m/s	<b>A1</b>
2(b)(ii)	momentum conserved	<b>C1</b>
	12.8 – (3.2 $\times$ 1.5) OR 12.8 – 4.8 OR 8.0 OR 8.0 $\div$ 1.6	<b>C1</b>
	5.0 m/s	<b>A1</b>
2(c)	$(F = ) \frac{\Delta p}{\Delta t}$ or 8.0 $\div$ 0.050	<b>C1</b>
	160 N	<b>A1</b>
2(d)	internal energy (of blocks) increase OR thermal energy/sound energy (lost/produced at collision)	<b>B1</b>
	<b>Total:</b>	<b>9</b>

Question	Answer	Marks
3(a)	$(\rho = ) \frac{m}{V}$ OR $180 \div 210$ OR $0.18 \div 210$	<b>C1</b>
	0.86 g/cm <sup>3</sup>	<b>A1</b>
3(b)	floats OR words to the same effect	<b>B1</b>
	density of wood is less than density of liquid	<b>B1</b>
	<b>Total:</b>	<b>4</b>
Question	Answer	Marks
4	$F_1 d_1 = F_2 d_2$ OR $(F_2 = ) \frac{F_1 d_1}{d_2}$	<b>C1</b>
	OR $200 \times 22 \div 8.0$	
	550 (N) or $200 \times 22 \div 8.0$	<b>C1</b>
	$(p = ) \frac{F}{A}$ OR $550 \div 0.00050$ OR $200 \times 22 \div (8.0 \times 0.00050)$	<b>C1</b>
	$1.1 \times 10^6$ Pa	<b>A1</b>
	<b>Total:</b>	<b>4</b>

Question	Answer	Marks
5(a)	white kit cooler OR black kit warmer	<b>M1</b>
	white poor absorber/good reflector of (IR) <u>radiation/heat/thermal energy</u> OR v.v. for black	<b>A1</b>
5(b)(i)	any <b>two</b> pairs from: more/less wind; dries quicker/slower temperature increases/decreases/sunnier/cloudier; dries quicker/slower stops/starts raining; dries quicker/slower less/more humid; dries quicker/slower	<b>B2</b>
5(b)(ii)	molecules with most (kinetic) energy (escape) OR water cools	<b>B1</b>
	escape liquid/break intermolecular bonds / molecules enter air / evaporate / become vapour	<b>B1</b>
	<b>Total:</b>	<b>6</b>
Question	Answer	Marks
6(a)	<u>molecules/they</u> move/collide	<b>B1</b>
	molecules/they move/collide with <u>walls</u>	<b>B1</b>
	<u>change</u> of momentum OR force on area	<b>B1</b>
6(b)(i)	$pV = \text{constant}$ OR $p_1 V_1 = p_2 V_2$	<b>B1</b>
6(b)(ii)1	100 (kPa) OR $1.0 \times 10^5$ (Pa)	<b>M1</b>
	Pa OR kPa	<b>A1</b>
6(b)(ii)2	( $p =$ )50 (kPa)	<b>C1</b>
	$3700 \text{ m} < p < 3900 \text{ m}$	<b>A1</b>
	<b>Total:</b>	<b>8</b>

Question	Answer	Marks
7(a)(i)	$(v = )f\lambda$ or $6000 \times 0.25$	<b>C1</b>
	1500 m/s	<b>A1</b>
7(a)(ii)	$300 \text{ m/s} \leq c \leq 360 \text{ m/s}$	<b>B1</b>
7(a)(iii)	less <b>and</b> travels less far in same/periodic time	<b>B1</b>
7(b)	vibration/oscillation	<b>B1</b>
	vibration/oscillation parallel to direction of travel OR compressions and rarefactions	<b>B1</b>
7(c)(i)	inversely related OR the wider the gap, the less the diffraction OR v.v.	<b>B1</b>
7(c)(ii)	directly related OR greater wavelength, greater diffraction OR v.v.	<b>B1</b>
	<b>Total:</b>	<b>8</b>

Question	Answer	Marks
8(a)	OP/it is along the normal/at 90° (to the curved surface)	<b>B1</b>
8(b)(i)	$\sin i / \sin r = n$	<b>C1</b>
	$\sin r / \sin 30(^{\circ}) = 1.5$ OR $\sin r = 1.5 \times \sin 30(^{\circ})$	<b>C1</b>
	49°	<b>A1</b>
8(b)(ii)	ray bends away from the normal <b>c.a.o.</b>	<b>B1</b>
8(c)	angle (from normal) of refraction increases	<b>B1</b>
	refracted ray travels along boundary OR reflected ray becomes brighter OR refracted ray becomes dimmer	<b>B1</b>
	light reflects back into glass (with $i = r$ )	<b>B1</b>
	<b>Total:</b>	<b>8</b>

Question	Answer	Marks
9(a)	$(I =) \frac{P}{V}$ OR $24 \div 6.0$ OR $4.0$ (A) OR $(R =) \frac{V}{I}$	<b>C1</b>
	$6.0 \div 4.0$	<b>C1</b>
	$1.5 \Omega$	<b>A1</b>
9(b)(i)	$6.0 \text{ V}$	<b>B1</b>
9(b)(ii)	$1.5 \Omega$	<b>B1</b>
9(b)(iii)	$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ OR $1 \div 1.5 = \frac{1}{R_1} + \frac{1}{R_2}$ OR $1 \div 1.5 = \frac{2}{R}$	<b>C1</b>
	$3.0 (\Omega)$	<b>A1</b>
9(c)	resistance of circuit/parallel pair increases	<b>B1</b>
	current (in lamp) decreases OR less p.d. across lamp	<b>B1</b>
	<b>Total:</b>	<b>9</b>



Question	Answer	Marks
10(a)(i)	<u>magnetic</u> field mentioned	<b>B1</b>
	changing (magnetic) field in core/Q	<b>B1</b>
	<b>induction</b> in Q	<b>B1</b>
10(a)(ii)	(iron is) magnetic <b>and</b> temporary magnetic	<b>B1</b>
10(b)(i)	$(V_S = )V_P \times N_S \div N_P$ OR $4.0 \times 340 \div 200$	<b>C1</b>
	6.8 V	<b>A1</b>
10(b)(ii)	$(I_P = )I_S V_S / V_P$ OR $3.5 \times 6.8 \div 4.0$	<b>C1</b>
	6.0 A	<b>A1</b>
10(c)	less energy wasted (in cables)	<b>B1</b>
	cheaper <b>and</b> one from: thinner cables fewer pylons fewer power stations/less fuel required	<b>B1</b>
	<b>Total:</b>	<b>10</b>

Question	Answer	Marks
11(a)(i)	produces a narrow beam of $\gamma$ -rays OR absorb $\gamma$ -rays that are not on path shown	<b>B1</b>
11(a)(ii)	no change	<b>B1</b>
	$\gamma$ -rays not deflected	<b>B1</b>
	$\gamma$ -rays are electromagnetic radiation/uncharged OR not deflected by magnetic field	<b>B1</b>
11(b)	<b>(ionising effect of) <math>\alpha</math>-particles greater than <math>\beta</math>-particles and <math>\beta</math>-particles greater than <math>\gamma</math>-rays</b>	<b>B1</b>
	any <b>two</b> from: mass $\alpha > \text{mass } \beta > \text{mass } \gamma$ charge $\alpha > \text{charge } \beta > \text{charge } \gamma$ speed $\gamma > \text{speed } \beta > \text{speed } \alpha$	<b>B2</b>
	<b>Total:</b>	<b>7</b>