



Cambridge IGCSE™

PHYSICS**0625/41**

Paper 4 Extended Theory

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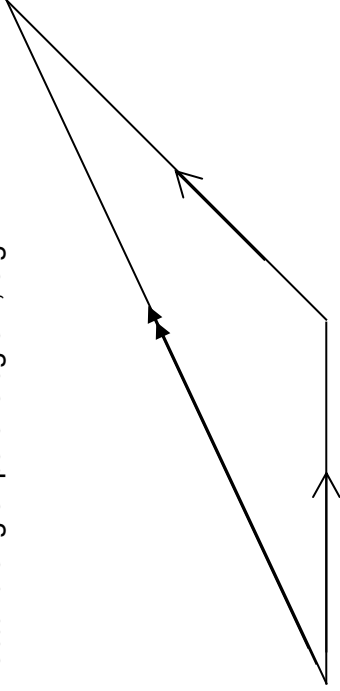
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This document consists of **17** printed pages.

Question	Answer	Marks
1(a)	$(p =) mv$ (in any form) or 0.16×15	C1
	2.4 kg m / s	A1
1(b)(i)	3.0 N s and at 45° to the original direction	B1
1(b)(ii)	vector triangle / parallelogram, e.g.: 	B1
	scale indicated or correct triangle / parallelogram	B1
	4.8 kg m / s $\leq$ magnitude $\leq$ 5.2 kg m / s	B1
	22° (to original direction) $\leq$ direction $\leq$ 28° (to original direction)	B1

Question	Answer	Marks
2(a)	it / velocity / speed changes / increases (with time)	C1
	it / velocity / speed <u>increases</u> at constant rate / steadily	A1
2(b)	any three from: • (initial) acceleration caused by weight / force of gravity • acceleration decreases • drag / resistance force increases (with speed) • (finally / at terminal velocity) no acceleration / constant speed • (finally / at terminal velocity) no resultant force	B3
2(c)(i)	(GPE =) $mg (\Delta) h$ (in any form) or $0.0021 \times 10 \times 0.80$ or $2.1 \times 10 \times 0.80$ or 17 (J)	C1
	0.017 J	A1
2(c)(ii)	(KE =) $\frac{1}{2} mv^2$ (in any form)	C1
	$\frac{1}{2} \times 0.0021 \times 1.2^2$ or $\frac{1}{2} \times 2.1 \times 1.2^2$ or 1.5 (J)	C1
	1.5×10^{-3} J	A1
2(c)(iii)	(work done against) friction / drag / resistance or thermal energy generated or (displaced) liquid gains gravitational potential energy	B1

Question	Answer	Marks
3(a)	$(p_{\text{liq}} =) h\rho g$ (in any form) or $0.400 \times 1000 \times 10$ or 2000 or 4000 or 1.02×10^5 (Pa)	C1
	$(p =) p_{\text{atm}} + h\rho g$ (in any form) or $1.00 \times 10^5 + 0.400 \times 1000 \times 10$ or 4000 or 1.02×10^5 (Pa)	
	1.04×10^5 Pa	
3(b)(i)	$(F =) pA$ (in any form) or 4000×0.025	C1
	100 N	A1
3(b)(ii)	$(W.D. =) F \times x$ (in any form) or $1.04 \times 10^5 \times 0.025 \times 0.50$ or $4000 \times 0.025 \times 0.50$ or 50 (J)	C1
	1300 J	A1

Question	Answer	Marks
4(a)	molecules close(r)	B1
	molecules move only small distances (between collisions) or do not move freely	
	molecules move in clusters or slide past each other	
4(b)	molecules (in liquid) move faster or gain energy	B1
	molecules move apart (on average)	B1
4(c)(i)	molecules overcome forces / gain potential energy as the liquid boils	B1
4(c)(ii)	$(m =) \rho V$ (in any form) or 0.86×50 or 43 (g)	C1
	$(I_v =) Q \div m$ (in any form) or $18\,000 / 43$ or $18\,000 / (0.86 \times 50)$	C1
	420 J / g or 4.2×10^5 J / kg	A1

Question	Answer	Marks
5(a)	electrons mentioned	B1
	electrons travel (a great distance) through the metal or (vibrating) atoms hit (free) electrons	
	electrons hit (distant) particles or transfer energy (to distant atoms)	
5(b)	shiny surfaces are poor emitters (of radiation)	B1
	infrared / radiation / mentioned	
	less energy lost or lost energy does not need to be supplied	
5(c)	less thermal energy emitted or less space for energy to be lost	B1

Question	Answer	Marks
6(a)	speed changes or (wave) speed is smaller in right-hand part of tank or waves slow down or bottom (on the page) section of wave hits the boundary first	C1
	(wave) speed is smaller in right-hand part of tank or waves slow down or bottom (on the page) section of wave hits the boundary first	C1
	bottom (on the page) / one part / one side / one section of wave slows down first (and different sections are delayed by different amounts)	A1
6(b)(i)	$(f =) v \div \lambda$ (in any form) or $0.39 \div 0.052$ or 15 (Hz) or $0.39 \div 5.2$ or 0.15 (Hz) or 0.075 (Hz)	C1
	$0.39 \div 0.052$ or 15 (Hz) or $0.39 \div 5.2$ or 0.15 (Hz) or 0.075 (Hz)	C1
	7.5 Hz	A1
6(b)(ii)	angle of incidence / $i = 45(^{\circ})$ or angle of refraction / $r = 33(^{\circ})$	C1
	$(v_2 =) v_1 \times \sin(r) \div \sin(i)$ (in any form) or $\lambda_2 = \lambda_1 \times \sin(r) \div \sin(i)$ (in any form) or $0.39 \times \sin(33^{\circ}) \div \sin(45^{\circ})$ or $0.39 \times \sin(57^{\circ}) \div \sin(45^{\circ})$	C1
	0.30 m / s	A1

Question	Answer	Marks
7(a)	steel (underlined)	B1
7(b)(i)	the direction of the force on a N-pole and left to right / N to S	B1
7(b)(ii)	beam deflects	B1
	beam deflects <u>into</u> the page	B1
	moving electrons / charges constitute a current or left-hand rule or moving electrons / current in a magnetic field experiences a force	B1
7(b)	(part of) beam deflects	B1
	α -particles deflect in opposite / different direction to β -particles / electrons or all α -particles have similar deflections or α -particles deflect less	B1
	γ -rays do not deflect	B1

Question	Answer	Marks
8(a)	(related to) energy supplied in driving charge in a circuit / conductor or property of source / battery / cell / power supply	B1
	energy supplied per / to unit charge or energy transferred to electrical energy or from other form of energy or energy in driving charge around a complete circuit	B1
8(b)(i)	$(I = V \div R = 240 \div 30 =) 8.0 \text{ A}$	B1
8(b)(ii)	$(P =) VI$ or 240×8.0	C1
	1900 W	A1
8(b)(iii)1	half (the size)	B1
	(equal voltage / p.d. / e.m.f. and) resistance is twice the size or I and R are inversely proportional	B1
8(b)(iii)2	(fuse rating =) 13 A / 14 A / 15 A / 16 A / 17 A / 18 A / 19 A	B1
	total current is 12.1 A	B1

Question	Answer	Marks
9(a)(i)	wave / light / energy / ray is completely / entirely reflected (at the boundary between two mediums) or no refraction or no wave / light / energy / ray passes into second medium / across boundary or only reflection occurs	B1
9(a)(ii)	light (must pass) from medium where it travels slower or to medium where it is faster or from medium with larger refractive index or to medium with smaller refractive index	B1
	angle of incidence (must be) greater than the critical angle / $\sin^{-1}(1 \div n)$	B1
9(b)	light / infrared travels in fibre	B1
	total internal reflection at <u>inner</u> surface or <u>within</u> (graded-index) fibre	B1
	light carries information / signal / data / message or signal / light encoded	B1

Question	Answer	Marks
10(a)	radiation that is always present or due to environment or in everyday life	B1
10(b)(i)	soil / rocks / earth / cosmic rays / space / Sun / weapons testing / radon / nuclear waste	B1
	alpha-emission (only)	B1
	alpha-particles do not penetrate (two sheets of) paper or β -particles and γ -rays pass through (two sheets of) paper	B1
10(b)(ii)	${}^{208}_{84}\text{Po} \rightarrow {}^4_2\alpha / {}^4_2\text{He}$	B1
	${}^{204}\text{Pb} \dots$ or ${}^{82}_{82}\text{Pb}$	C1
	${}^{204}_{82}\text{Pb}$	A1