Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/43**

Paper 4 Extended Theory **October/November 2020**

MARK SCHEME

Maximum Mark: 80

Published

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[Turn over

Question	Answer	Marks
1(a)(i)	same distance travelled in same time / 0.02 s / dots equally spaced	**B1**
1(a)(ii)	trolley accelerates OR trolley increases speed / velocity	**B1**
	a resultant force is acting on the trolley	**B1**
1(b)	distance = area under graph, in any form	**C1**
	(distance = $\frac{0.5 \times 0.75}{2}$ =) 0.19 m	**A1**
1(c)	any **three** from • initially velocity increases or the metal ball is accelerating OR (downwards) resultant force • resistance (of liquid) has increased (as velocity increases) • downwards force (on metal ball) = upwards force (on metal ball) (at point X) • (metal ball) travels at constant velocity / speed	**B3**

Question	Answer	Marks
2(a)	PE lost = KE gained, in any form	**C1**
	$v^2 = 2gh$ or $0.16 \times 10 \times 115 = 0.5 \times 0.16 \times v^2$	**C1**
	(speed =) 48 m / s	**A1**
2(b)	momentum = mv	**C1**
	(momentum=) 7.7 kg m / s or 7.7 N s	**A1**

Question	Answer	Marks
3(a)(i)	One other scalar quantity	**B1**
3(a)(ii)	One other vector quantity	**B1**
3(b)(i)	$v = d \div t$ in any form OR (t=) $d \div v$ OR $3.9 \div 0.3$	**C1**
	(t =) 13 s	**A1**
3(b)(ii)	inward arrow labelled *F* towards centre of circle	**B1**
3(b)(iii)	**1** frictional / inward force / resultant force insufficient (at higher speed)	**B1**
	2 tangential arrow at P in either direction, labelled *S*	**B1**

Question	Answer	Marks
4(a)	A liquid B solid C gas	**B2**
4(b)	average distance between molecules greater (in gas)	**B1**
	(attractive) forces between molecules lower or zero in gas	**B1**
4(c)(i)	$p_1V_1 = p_2V_2$ in any form OR $0.9 \times 10^5 \times 3400 = 2.5 \times 10^5 \times V_2$	**C1**
	(V_2 =) $p_1V_1 \div p_2$ OR (V_2 =) $0.9 \times 3400 \div 2.5$	**C1**
	1200 cm^3	**A1**

Question	Answer	Marks
4(c)(ii)	pressure increases	**B1**
	molecules move / collide faster OR have greater momentum	**B1**
	molecules collide more frequently (with piston) OR with greater change in momentum	**B1**

Question	Answer	Marks
5(a)	cork on black plate / side B falls off (before cork on shiny plate / side A)	**B1**
	black surface are better absorbers than shiny surfaces **or** shiny surfaces are better reflectors than black surfaces	**B1**
	black surface are better absorbers than shiny surfaces **or** shiny surfaces are better reflectors than black surfaces **AND** of (infrared) radiation	**B1**
	wax on black plate / plate B melts before wax on shiny plate / plate A	**B1**
5(b)	conduction	**B1**

Question	Answer	Marks
6(a)	molecules closer together than normal in a compression	**B1**
	molecules further apart than normal in a rarefaction	**B1**
	pressure higher (than normal) in a compression AND pressure lower (than normal) in a rarefaction	**B1**

Question	Answer	Marks
6(b)(i)	4400 (Hz) seen	C1
	(λ =)$v \div f$ in any form OR 340 ÷ 4400 OR 340 ÷ 4.4 OR 77	C1
	($\lambda = v \div f =$) 0.077 m	A1
6(b)(ii)	**1** speed stays the same	B1
	2 wavelength decreases	B1

Question	Answer	Marks
7(a)	any **two** from: remote controls (infrared) sensors / alarms specific electrical appliances thermal imaging	B2
7(b)	Any **three** from • shielding of operator behind screen / lead apron / out of room AND to absorb radiation • shielding of other parts of patient with lead / shielding of other parts of patient AND to absorb radiation • distance from source AND reduces intensity / amount of radiation / exposure • limit time of exposure / not too frequent / max number of X-rays per year AND to limit dose • limit strength / intensity of X-ray beam AND to limit dose	B3
7(c)(i)	**1** 3×10^8 m / s	B1
	2 3×10^8 m / s	B1
7(c)(ii)	> 20 000 Hz	B1

Question	Answer	Marks
8(a)(i)	$V = IR$ in any form OR (I =) $V \div R$ OR (I =) 3 ÷ 4	**C1**
	(I =) 0.75 A	**A1**
8(a)(ii)	0 (V) OR nothing OR no reading	**M1**
	diode does not pass current (in reverse direction)	**A1**
8(b)	AND gate	**B1**
8(c)(i)	C and D both 1 0 0 0	**B1**
	first line of E 0	**B1**
	2nd, 3rd and 4th lines of E 1	**B1**
8(c)(ii)	OR	**B1**

Question	Answer	Marks
9(a)	high voltage results in low current (for same power)	**B1**
	Any **two** from: • heat loss depends on current • less power / energy loss (in transmission) • thinner wires can be used	**B2**

Question	Answer	Marks
9(b)	Efficiency = $\frac{\text{(useful) power output}}{\text{(total) power input}}$	**C1**
	$P = VI$ in any form	**C1**
	power output = $(20 \times 2.3) = 46$ (W)	**C1**
	power input = $46 \div 0.9 = 51$ (W)	**C1**
	input current = $(51 \div 240 =)$ 0.21 A	**A1**

Question	Answer	Marks
10(a)	iron core / coil / solenoid becomes a magnet	**B1**
	iron core / coil / solenoid <u>attracts</u> iron armature	**B1**
	armature pivots/moves **and** contacts touch / there is a current in circuit B	**B1**
10(b)	current in circuit B does not stop when switch in circuit A is opened	**B1**
	steel remains magnetised when there is no current in the coil	**B1**

Question	Answer	Marks
11(a)	α deflected in smooth curve away from plate P / towards plate Q	**B1**
	α continues in straight line beyond plates OR multiple paths for β and no more than a single α path	**B1**
	β deflected in smooth curve towards plate P / away from plate Q	**B1**
	β deflected more than α	**B1**
	γ passes straight through without deviation **and** continues in straight line beyond plates	**B1**
11(b)	suitable application e.g. sterilisation of equipment, medical diagnosis / treatment, thickness control, detecting leaks / cracks, food preservation	**B1**
	explanation e.g. destroys bacteria, destroys cancer cells, lower amount of radiation detected if thickness too large, radiation detected at site of leak, destroys microbes in food	**B1**