Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/41**

Paper 4 Extended Theory **May/June 2020**

MARK SCHEME

Maximum Mark: 80

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

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

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

[Turn over

Question	Answer	Marks
1(a)(i)	(a =) $(v - u) / t$ OR $(62 - 6.0) / 35$ OR $56 / 35$	C1
	$1.6\ m / s^2$	A1
1(a)(ii)	$(F =) ma$ OR $\Delta p / \Delta t$ OR $2.5 \times 10^5 \times 1.6$ OR $(62 \times 2.5 \times 10^5 - 6.0 \times 2.5 \times 10^5) / 35$	C1
	4.0×10^5 N	A1
1(a)(iii)	$(p =) mv$ OR $2.5 \times 10^5 \times 6.0$	C1
	1.5×10^6 kg m / s	A1
1(b)	curve of decreasing gradient from (0,0) to a point along dashed line	B1
	straight line of positive gradient after $t = 35$ s	B1
	gradient not zero at $t = 35$ s OR no change of gradient (at $t = 35$ s)	B1
1(c)	thermal energy AND in something specific (e.g. brakes / air / tyres) OR kinetic energy of air	B1

Question	Answer	Marks
2(a)	0 (N) AND 8.0 N	B1
2(b)	$(k =) F / x$ OR $8.0 / 0.15$	C1
	53 N / m OR 0.53 N / cm	A1
2(c)(i)	elastic potential (energy)	B1
2(c)(ii)	15 cm	B1
2(c)(iii)	7.5 cm OR 2(c)(ii) / 2	B1

Question	Answer	Marks
3(a)	liquid levels in the two limbs of the tube are equal	**B1**
3(b)	molecules collide with the walls (of the container)	**B1**
	momentum of molecules changes (reverses)	**B1**
	this causes a force AND force spread out (over area of walls)	**B1**
3(c)(i)	$(p_2 =)\ p_1V_1 / V_2 = 1.0 \times 10^5 \times 60 / 50$	**C1**
	1.2×10^5 Pa	**A1**
3(c)(ii)	$p_2 = p_{atm} + h\rho g$ OR $1.2 \times 10^5 - 1.0 \times 10^5$ OR 2.0×10^4 OR $(\rho =)\ 2.0 \times 10^4 / (0.15 \times 10)$	**C1**
	1.3×10^4 kg m^{-3}	**A1**

Question	Answer	Marks
4(a)	<u>temperature</u> at which liquid turns into gas	**B1**
4(b)(i)	$(E =)\ mc\Delta T$ OR $0.30 \times 4200 \times (100 - 95)$	**C1**
	6300 J	**A1**
4(b)(ii)	$(C =)\ E / \Delta T$ OR $6300 / 84$	**C1**
	75 J / °C	**A1**
4(b)(iii)	molecules do work against attractive force as they evaporate	**B1**
	more energetic molecules more likely to escape	**B1**
	average energy of remaining molecules decreases	**B1**

Question	Answer	Marks
5(a)	(point) where incident parallel rays meet after passing through lens OR origin of rays that emerge parallel after passing through lens	**M1**
	on principal axis OR use of term paraxial OR centre line	**A1**
5(b)(i)	**enlarged virtual upright** two correct answers underlined AND no more than one wrong answer underlined	**M1**
	three correct answers underlined AND no wrong answer underlined	**A1**
5(b)(ii)1	both principal focuses marked at points 5.0 cm from the optical centre	**B1**
5(b)(ii)2	any **two** construction lines from: • line from top of I towards far principal focus and traced back from lens horizontally • line from top of I to (and through) centre of lens • horizontal line from top of I to lens and traced back to near principal focus	**B2**
	O marked with top at intersection	**B1**
5(b)(iii)	2.7 cm ⩾ distance ⩾ 3.1 cm	**B1**

Question	Answer	Marks
6(a)	(λ =) v / f OR 340 / 20 000 OR 340 / 20	**C1**
	0.017 m AND 17 m	**A1**
6(b)	(longitudinal wave) vibration direction parallel to propagation / energy travel direction	**B1**
	transverse wave vibration direction perpendicular to propagation / energy travel direction	**B1**
	consists of rarefactions AND compressions	**B1**

Question	Answer	Marks
6(c)	diffraction mentioned	**B1**
	wavelength of sound from drum / low frequency sound greater (than wavelength of high frequency sound)	**B1**
	more diffraction of sound from drum OR less diffraction of high frequency sound	**B1**

Question	Answer	Marks
7(a)(i)	(copper) contains free electrons	**B1**
	good electrical conductor	**B1**
7(a)(ii)	magnetic material OR easily magnetised	**B1**
	temporary magnetic material OR easily demagnetised	**B1**
7(b)(i)	alternating / changing / varying magnetic field (produced by X)	**B1**
	(electromagnetic) induction in Y	**B1**
	(alternating) electromotive force (e.m.f.) between terminals of Y / in Y	**B1**
7(b)(ii)	current in X increases	**B1**
	to supply the power used in Y / the lamp	**B1**

Question	Answer	Marks
8(a)	990 / (54 / 1.2) OR 990 / 45 OR (number of cells in pack =) 54 / 1.2 OR 45	**C1**
	22	**A1**
8(b)(i)	(P =) EI OR 1.2×3.5	**C1**
	4.2 W OR 4.2 J / s	**A1**

Question	Answer	Marks
8(b)(ii)	thick wires have a smaller resistance	**B1**
	less thermal energy generated in wires	**B1**
	more efficient OR less risk of fire / insulation melting	**B1**

Question	Answer	Marks
9(a)	digital signal: consists of high and low states / voltages	**B1**
	analogue signal: continuously varying voltage	**B1**
9(b)(i)	AND gate  AND OR gate 	**B1**
9(b)(ii)	when the inputs differ AND 'AND gate' produces 0 AND 'OR gate' produces 1	**B1**
9(c)(i)	both inputs to upper NOR gate are 0s	**B1**
9(c)(ii)	two (identical) inputs to NAND gate are 1s	**M1**
	lower input to lower NOR gate is 1	**M1**
	output Q is 0	**A1**

Question	Answer	Marks
10(a)	equal number of electrons OR equal number of protons	**B1**
10(b)(i)	$^{13}_{5}X$	**C1**
	$^{0}_{-1}\beta$	**C1**
	$^{13}_{6}Y$	**A1**
10(b)(ii)	any **three** from: • β-particles have charge of smaller size • β-particles have smaller mass • β-particles have less energy • β-particles travel faster / less time near to air molecule • effect / force on electrons in air molecules less	**B3**