



Cambridge IGCSE™

PHYSICS**0625/43**

Paper 4 Extended Theory

October/November 2023

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 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **16** printed pages.

Question	Answer	Marks
1(a)	(oil) stays on surface / floats on the water	B1
	(oil has) lower density than water OR liquids of lower density float on liquids of higher density	B1
1(b)(i)	measure (initial) volume of liquid / water AND immerse object OR immerse object in a known / measured volume of liquid / water	B1
	subtract initial / start volume from final / new volume OR calculate the difference in volume OR measure change in volume	B1
	OR (alternative answer)	
	fill displacement can / container with water AND immerse object	(B1)
	measure volume of displaced water	(B1)
	220 g	A3
1(b)(ii)	$\rho = m / V$ OR $(m =) \rho V$ OR 2.7×83	C1
	$(m =) 2.7 \times 83$ OR 2.2×10^n	C1

Question	Answer	Marks
2(a)(i)	3.5 N / cm OR 350 N / m	A3
	$k = F / x$ OR $(k =) F / x$ OR $(k =)$ load / extension OR 14 / 4	C1
	$(k =)$ 14 / 4 OR 14 / 0.04 OR 3.5×10^n	C1
2(a)(ii)	mark at end of straight-line portion	B1
2(b)(i)	arrow below the horizontal and to the left of vertically down from car	M1
	arrow radial	A1
2(b)(ii)	(force) increases	B1

Question	Answer	Marks
3(a)	1.3 kg m / s	A2
	$p = mv$ OR $(p =) mv$ OR 0.19×6.9 OR 190×6.9 OR 1.3×10^n	C1
3(b)	(speed of object =) 0.89 m / s OR 0.88 m / s	A3
	momentum before (collision) = momentum after (collision) OR $1.3 \text{ (kg m / s)} = -(0.19 \times 1.5) \text{ (kg m / s)} + 1.8 v \text{ (kg m / s)}$ OR (momentum of object =) $1.3 \text{ (kg m / s)} + (0.19 \times 1.5) \text{ (kg m / s)}$ OR (momentum of object =) $1.3 \text{ (kg m / s)} + 0.29 \text{ (kg m / s)}$ OR (momentum of object =) 1.6 (kg m / s)	C1
	(speed of object =) $\{1.3 + (0.19 \times 1.5)\} / 1.8 \text{ (m / s)}$ OR (speed of object =) $1.6 / 1.8$	C1
3(c)	(loss of KE =) 3.8 J OR 3.6 J	A3
	$KE = \frac{1}{2} mv^2$ OR $(KE =) \frac{1}{2} mv^2$ OR $\frac{1}{2} \times 1.8 \times 0.89^2$	C1
	((final) KE of object) = 0.70 (J) OR 0.71 (J) OR $(\Delta KE =) 4.5 - (0.2 + \text{calculated KE of object})$	C1

Question	Answer	Marks
4(a)(i)	absolute zero	B1
4(a)(ii)	–196 (°C) (absolute zero / 0 K) = –273 (°C)	A2 C1
4(b)	increased (pressure) particles of gas move faster OR have more KE / momentum / velocity any two from from: • more frequent collisions of particles (with walls) • particles collide (with walls) with a larger force OR larger impulse • (greater change in momentum of particles) causes greater force (on walls) • pressure = force / area	B1 B1 B2
4(c)	(pressure =) 60 kPa OR 6.0×10^4 Pa $p_1 V_1 = p_2 V_2$ OR ($p_2 =$) $p_1 V_1 / V_2$ OR $pV = \text{constant}$ OR $p \propto 1 / V$ OR $1.2 \times 10^5 \times 0.5$ OR 6.0×10^n	A2 C1

Question	Answer	Marks
5(a)	3 wavecrests same wavelength as original	B1
	3 arcs	B1
	3 semi-circular wavecrests centred on middle of gap	B1
5(b)	3 parallel wavecrests on left, reduced wavelength	B1
	angular spread must be less / reduced divergence	B1
	3 wavecrests on right with reduced curvature compared with (a) no reverse curvature anywhere	B1

Question	Answer	Marks
6(a)	<u>sketch:</u> one axis labelled V and the other labelled I , either way round AND gradual curve from origin curving such that V/I increases	B1
	<u>explanation:</u> (as current / temperature increases so) resistance increases	B1
	(so) more voltage required for same increase in current owtte OR if V on y-axis: gradient must increase OR if V on x-axis: gradient must decrease	B1
6(b)(i)	9.0 V	A2
	12.0 – 3.0	C1
6(b)(ii)	2.1 A	A2
	$I = V/R$ OR ($I =$) V/R OR 9.0 / 4.2	C1
6(b)(iii)	0 (A)	A1
6(b)(iv)	(ammeter reading) 2.1 A	A1
6(b)(v)	19 W	A2
	$P = VI$ OR ($P =$) VI OR 9×2.1	C1

Question	Answer	Marks
7(a)(i)	radial arrow	B1
	inward radial arrow	B1
7(a)(ii)	positive point charge	A2
	positive (charge)	C1
7(b)	electrons / negative charges (move)	B1
	out of (plastic) OR removed from / lost from (plastic)	B1
7(c)	any mention of free / mobile / delocalised electrons	M1
	conductors have free / mobile / delocalised electrons OR insulators do not have free / mobile / delocalised electrons	A1

Question	Answer	Marks
8(a)(i)	clockwise	B1
	force on left of coil up OR force on right of coil down	B1
8(a)(ii)	(turning effect is) greater	B1
8(a)(iii)	(turning effect is) less	B1
8(b)(i)	horizontal line, labelled B on the left and A on the right	B1
8(b)(ii)	vertical line, labelled A at top and B at bottom	B1
8(b)(iii)	horizontal line, A on the left and B on the right	B1

Question	Answer	Marks
9(a)(i)	alpha	B1
	highly ionising OR not (very) penetrating	B1
	any value between 10–500 years	B1
9(a)(ii)	beta	B1
	absorption depends on thickness (of aluminium)	B1
	any number of years	B1
9(b)	too many neutrons	B1
	decay reduces number of neutrons	B1
9(c)	any two from: • radon gas (in the air) • rocks OR buildings • food OR drink • cosmic rays	B2

Question	Answer	Marks
10(a)(i)	1 Hubble constant	B1
	2 $H_0 = v/d$	B1
10(a)(ii)	per second OR s^{-1} OR 1/s	B1
10(a)(iii)	4.5×10^{17} (s)	A2
	$d/v = 1/H_0$ OR (age of Universe $\Rightarrow$) $1/H_0$ OR (age of Universe $\Rightarrow$) d/v OR (age of Universe $\Rightarrow$) $1/2.2 \times 10^{-18}$	C1
10(b)	shortly after the Universe was formed OR shortly after the Big Bang	B1
	all points in space	B1