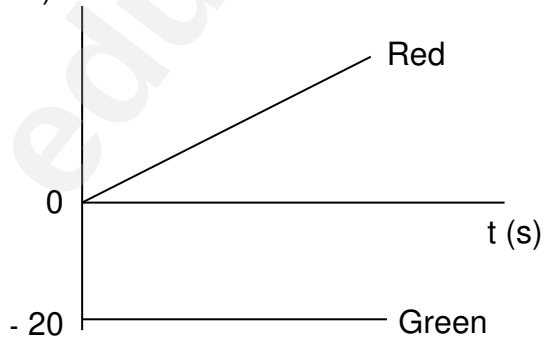
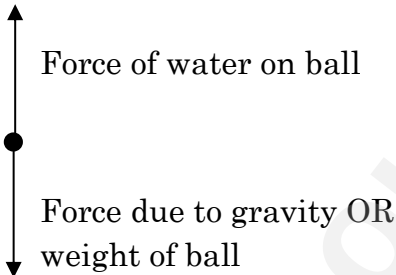


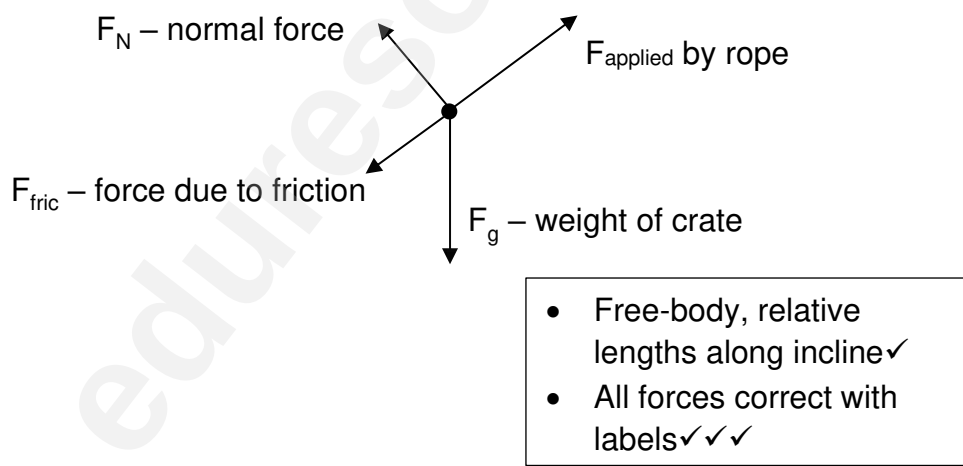


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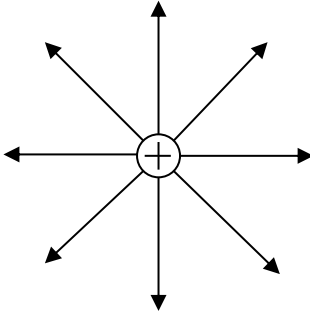
MEMO

QUESTION 1 MCQ's				
1.1	B ✓✓	1.6	B	
1.2	D	1.7	C	
1.3	A	1.8	C	
1.4	B	1.9	B	
1.5	D	1.10	C	
				[10x2=20]
QUESTION 2				
2.1	305 m ✓			(1)
2.2	Its speed / velocity is increasing ✓✓ OR accelerated motion			(2)
2.3	12 s ✓			(1)
2.4	$\bar{v} = \frac{\Delta x}{\Delta t}$ ✓ ; $\Delta x = 20 \times 12 \checkmark = 240 \text{ m } \checkmark$			(3)
2.5	Distance travelled by the red car from t = 0 s to t = 12 s: 305 – 240 = 65 m AND v _i = 0 $\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓ ; $65 = \frac{1}{2} a \times 12^2$ ✓ ; $\therefore a = \frac{65 \times 2}{144} = 0,90 \text{ m.s}^{-2} \checkmark$			(3)
2.6	v (m.s⁻¹)  0 t (s) - 20 Red Green • Labels, value(s)✓ • graphs (shapes, direction) ✓✓			(3)
				[13]

QUESTION 3			
3.1	Falling lead ball		
	3.1.1	constant✓ OR equal to the weight of the lead ball, down ✓	(2)
	3.1.2	$v_f^2 = v_i^2 + 2a\Delta x$ ✓ ; $v_i = 0$; $v_f = \sqrt{2 \times 9,8 \times 5,2}$ ✓ = 10,10 m.s⁻¹ ✓	(3)
	3.1.3	<u>Time taken to fall through the air:</u> $v_f = v_i + g\Delta t$; $\Delta t = \frac{v_f}{g} = \frac{10,10}{9,8}$ ✓ = 1,03 s✓ <u>Depth of the lake:</u> $\bar{v} = \frac{\Delta x}{\Delta t}$; $\Delta x = \bar{v} \times \Delta t = 10,10 \times (4,8 - 1,03)$ ✓ = 38,1 m ✓ formulas ✓	(5)
	3.1.4	$\bar{v} = \frac{\Delta x}{\Delta t} = \frac{5,2 + 38,1}{4,8}$ ✓ = 9,02 m.s⁻¹ ✓	(2)
	3.1.5	 • Free-body, vector lengths ✓ • Forces - correct labels	(3)
	3.1.6	<u>Take down as '+':</u> $\Delta x = v_i\Delta t + \frac{1}{2}g\Delta t^2$ ✓ ; $(5,2 + 38,1)$ ✓ = $v_i \times 4,8 + \left(\frac{1}{2} \times 9,8 \times 4,8^2\right)$ ✓ $v_i = -14,5 \text{ m.s}^{-1}$ i.e. 14,5 m.s⁻¹ up ✓	(5)
			[20]

3.2	Bouncing tennis ball:		
	3.2.1	Acceleration – rate of change of velocity✓✓	(2)
	3.2.2	<u>Down:</u> $v_i = 0$ $v_f^2 = v_i^2 + 2g\Delta x$; $v_f = \sqrt{2 \times 9,8 \times 4}$✓ = 8,85 m.s⁻¹✓ <u>Up:</u> $v_f = 0$ $v_i^2 = v_f^2 + 2g\Delta x$; $v_i^2 = -(2 \times -9,8 \times 2)$✓ ; $v_i = \sqrt{39,2} = 6,26$ m.s⁻¹✓ <u>Take down as '+':</u> $v_f = v_i + a\Delta t$; $a = \frac{v_f - v_i}{\Delta t} = \frac{-6,26 - (8,85)}{12 \times 10^{-3}}$✓✓ = -1259,17 m.s⁻² i.e. 1259,17 m.s⁻²✓ formulas ✓ OR Energy Principles	(8)
	3.2.3	Up ✓	(1)
			[11]
			[31]
QUESTION 4 Crate on incline			
4.1	Friction – the force that opposes the motion of an object✓ and acts parallel to the surface with which the object is in contact✓.		(2)
4.2			(4)
4.3	Newton's 2nd law – if a net force acts on an object, the object will accelerate in the direction of the net force✓. The magnitude of the acceleration is directly proportional to the magnitude of the net force but inversely proportional to the mass✓.		(2)

QUESTION 5			
5.1	Conservation of mechanical energy – in the absence of air resistance or any other external forces✓, the mechanical energy of an object remains constant✓.		(2)
5.2	$E_p(\text{top}) = E_k(\text{bottom})$; $mgh = \frac{1}{2}mv^2$ ✓ ; $v = \sqrt{2gh} = \sqrt{2 \times 9,8 \times 0,4}$ ✓✓ $\therefore v = 2,8 \text{ m.s}^{-1}$ ✓		(4)
5.3	Inelastic collision – a collision in which only momentum is conserved✓✓.		(2)
5.4	- The block and putty ball stick together on impact ✓ - The putty ball's shape is deformed ✓		(2)
5.5	$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$ ✓ $m_1v_{1i} = v_f(m_1 + m_2)$ $(0,5 \times 2,8)✓ = v_f(0,5 + 0,05)$ ✓ ; $\therefore v_f = 2,55 \text{ m.s}^{-1}✓$		(4)
5.6	- Principle of conservation of linear momentum✓ - Isolated system✓ - No external forces acting on the system during collision✓		(3)
5.7	$E_k(\text{bottom}) = E_p(\text{top})$ $\frac{1}{2}mv^2 = mgh$ ✓ ; $\frac{1}{2} \times 0,55 \times 2,55^2✓ = 0,55 \times 9,8 \times h✓$ $\therefore h = 0,33 \text{ m} = 33 \text{ cm}$ ✓		(4)
5.8	<u>Kinetic energy before collision</u> = E_k (block): $E_k = \frac{1}{2}mv^2 = \frac{1}{2} \times 0,5 \times 2,8^2✓ = 1,96 \text{ J}$ ✓ <u>Kinetic energy after collision</u> = E_k (block-putty): $E_k = \frac{1}{2}mv^2 = \frac{1}{2} \times 0,55 \times 2,55^2 = 1,79 \text{ J}$ ✓ Since E_k is not conserved✓(or constant) $\therefore$ collision is inelastic		(4)
			[25]

QUESTION 6 Charged spheres			
6.1	Electric field strength – force per unit positive charge ✓✓		(2)
6.2			(2)
6.3	<u>At x = 10 cm:</u> $E = 1,1 \times 10^3 \text{ N.C}^{-1}$ $E = \frac{F}{q}$ ✓ ; $F = Eq = (1,1 \times 10^3)(4 \times 10^{-6})$ ✓✓ = $4,4 \times 10^{-3} \text{ N}$ ✓ away from S ✓ (or right)		(5)
6.4	0,28 m✓✓ or 28 cm		(2)
6.5	• Positive✓ • Since the net electric field strength is 0 N.C⁻¹ at some point between the two charged spheres✓ • Indicates repulsion between like charges✓		(3)
6.6	• Less than✓ • Net zero electric field strength (0 N.C⁻¹)✓ lies closer to charged sphere T✓		(3)
6.7	The +4 μC charge will now experience a net force that acts towards sphere S✓✓ OR away from the sphere T OR accept 'in the opposite direction' OR to the left		(2)
			[19]

QUESTION 7 Electric current			
7.1	Connecting household appliances		
	7.1.1	$P_{\text{heater}} = VI \checkmark ; \quad I_{\text{heater}} = \frac{P}{V} = \frac{2000}{220} \checkmark = 9,09 \text{ A} \checkmark$ $P_{\text{iron}} = VI \quad ; \quad I_{\text{iron}} = \frac{P}{V} = \frac{1200}{220} = 5,45 \text{ A} \checkmark$ $I_{\text{total}} = \mathbf{14,54 \text{ A} \checkmark}$	(5)
	7.1.2	No✓, the total current required to operate the two appliances at their maximum power rating exceeds the 12 A limit of the multiplug✓.	(2)
			[7]
7.2	Electric circuit		
	7.2.1	$R_T = \frac{V}{I} \checkmark = \frac{9}{2,5} \checkmark = \mathbf{3,6 \Omega} \checkmark$	(3)
	7.2.2	$R_T = R + R_p \checkmark$ $R_T = R + \left(\frac{R_X \times R_Y}{R_X + R_Y} \right)$ $3,6 \checkmark = R + \left(\frac{3 \times 2}{3+2} \right) \checkmark \quad \therefore R = 3,6 - 1,2 = \mathbf{2,4 \Omega} \checkmark$	(4)
	7.2.3	$R_{\parallel} = \frac{V}{I} \quad ; \quad V_{\parallel} = R_{\parallel} \times I = 1,2 \times 2,5 \checkmark = 3 \text{ V} \checkmark$ $R_{3\Omega} = \frac{V}{I} \quad \checkmark ; \quad I = \frac{V_{\parallel}}{R_{3\Omega}} = \frac{3}{3} \checkmark = \mathbf{1 \text{ A} \checkmark}$ OR $I_{3\Omega} = \frac{2}{5} \times I_T = \frac{2}{5} \times 2,5 = 1 \text{ A}$	(5)
	7.2.4	$P_X = I^2 R \checkmark = 1^2 \times 3 \checkmark = \mathbf{3 \text{ W} \checkmark}$ OR $P_X = \frac{V^2}{R} = \frac{3^2}{3} = \mathbf{3 \text{ W}}$	(3)

8.3	ac generator		
	8.3.1	Kinetic energy✓(or mechanical) to electrical energy✓	(2)
	8.3.2	Slip rings ✓	(1)
	8.3.3	Brushes✓ (or carbon brushes)	(1)
	8.3.4	CDAB ✓✓	(2)
	8.3.5	• Increase the strength of the magnets ✓ • Turn the coil faster ✓ • Increase the number of coils of conductor in the coil ✓	(3)
			[9]
			[25]
		TOTAL : 200 MARKS	