Rewarding Learning

General Certificate of Secondary Education

2012

Science: Double Award (Modular)

Paper 3
Higher Tier

[G8206]

FRIDAY 15 JUNE, AFTERNOON

MARK SCHEME

				AVAILABLE MARKS
1	**(a)**	$F_R = ma$ [1] [1] $350 = 500 \times a$ [1] $a = 0.7\ (m/s^2)$ [1]	[4]	
	(b) **(i)**	Work = F × d [1] $= 320 \times 0.2$ [1]	[2]	
	(ii)	$KE = \frac{1}{2}\ mv^2$ [1] $64 = \frac{1}{2} \times 0.5 \times v^2$ [1] $v = 16\ (m/s)$ [1]	[3]	
	(c) **(i)**	For a body in equilibrium or balanced [1] clockwise moment(s) = anticlockwise moment(s) [1]	[2]	
	(ii)	CM = ACM [1] $40 \times d = 24 \times 150$ [1] and [1] $d = 90$ (cm) [1]	[4]	15
2	**(a)** **(i)**	Arrow from A towards centre of Earth	[1]	
	(ii)	The force on A is less than the force on B (Third box ticked)	[1]	
	(iii)	Gravity/centripetal (force)/gravitational/weight	[1]	
	(iv)	The force on A will increase (Third box ticked)	[1]	
	(v)	Tangent to circle going through B	[1]	
	(b) **(i)**	Galaxy	[1]	
	(ii)	1 [1], 4, 3 [1]	[2]	
	(iii)	Any two named e.m.s. members [1] each	[2]	
	(c) **(i)**	Universe has a starting point	[1]	
	(ii)	Steady State **or** String	[1]	
	(iii)	Lack of sufficient fuel [1] food [1] time required [1] (any **two**)	[2]	
	(iv)	Fusion	[1]	15

					AVAILABLE MARKS
3	**(a)**	**(i)**	Energy	[1]	
		(ii)	⟷	[1]	
		(iii)	3	[1]	
		(iv)	3 Allow e.c.f. from **(iii)**	[1]	
		(v)	0.5 (m)	[1]	
		(vi)	v (or speed) = f × λ [1] = 3 × 0.5 [1] = 1.5 (m/s) [1] Allow e.c.f. from **(iv)** and **(v)**	[3]	
		(vii)	Sound **or** Ultrasound	[1]	
	(b)	**(i)**	Vibrations are at right angles/perpendicular	[1]	
		(ii)	Light **or** (any named member of e.m.s.) **or** water waves	[1]	
	(c)	**(i)**	The gong vibrates	[1]	
		(ii)	It decreases	[1]	
		(iii)	Sound waves require a medium **or** Sound waves do not travel through a vacuum	[1]	
		(iv)	Vibrations/sound will travel through the glass	[1]	
	(d)	**(i)**	20 (Hz)	[1]	
		(ii)	20 000 (Hz) **or** 20 **k**Hz	[1]	
		(iii)	It decreases	[1]	
		(iv)	Damage to eardrums	[1]	
		(v)	Use ear protection/ear plugs/defenders	[1]	20

AVAILABLE MARKS

4 **(a)** **(i)**

Object	Luminous	Non-Luminous
Star	✓	
Moon		✓
Planet		✓
White paper		✓

[1] each [4]

(ii) A [1]

(b) **(i)** Normal, correctly drawn [1]

(ii) 50° [1]

(c) **(i)** Undeviated ray at first interface [1]
refracted [1]
correctly [1] [3]

(ii) Decreases [1]

(d) **(i)** Dispersion [1]

(ii) Violet, Indigo, Blue, Green, Yellow, Orange, Red [2]
Deduct [1] if correct but reversed

(iii) Spectrum [1]

(e) **(i)** Gamma **or** γ [1]

(ii) Infrared **or** IR [1]

(iii) Gamma **or** γ [1]

(iv) Ultraviolet **or** UV [1]

(v) Radio waves [1] 20

					AVAILABLE MARKS
5	**(a)**	**(i)**	Electrons move [1] due to friction/rubbing [1]	[2]	
			Quality of written communication	[1]	
		(ii)	Charges are similar	[1]	
		(iii)	Similar charges repel	[1]	
	(b)		Charge (Q) = Current (I) × time (t) [1] $0.6 = I \times 0.2$ **or** $I = 0.6/0.2$ } Correct substitutions [1] $= 3$ (A) [1]	[3]	
	(c)		10 [1] 40 [1] 30 [1]	[3]	
	(d)	**(i)**	5 correct points ($\pm \frac{1}{2}$ square)	[1]	
		(ii)	Best fit straight line through (0, 0) ($\pm \frac{1}{2}$ square)	[1]	
		(iii)	Voltage = 2.4 ± 0.1 (V) **or** e.c.f. from **(ii)**	[1]	
		(iv)	Current = 0.06 (A)	[1]	
		(v)	R = V/I [1] = 2.4/0.06 [1] e.c.f. from **(iii)** and **(iv)** = 40 (Ω) [1]	[3]	
	(e)		Curve with increasing positive gradient [1] through (0, 0) [1]	[2]	20

					AVAILABLE MARKS
6	**(a)**	**(i)**	Earth	[1]	
		(ii)	Neutral – blue Both required	[1]	
		(iii)	Live – brown Both required	[1]	
		(iv)	It is the live wire **or** It is the high voltage wire	[1]	
		(v)	Double insulated	[1]	
	(b)	**(i)**	Metal body can become "live"	[1]	
		(ii)	Metal body is connected to earth Low resistance path (to earth)/current flows to **earth** Large current flows Fuse blows Any **three**	[3]	
	(c)	**(i)**	No (relative) movement	[1]	
		(ii)	Switch circuit off [1] Move circuit X **or** Y [1] Replace with a.c. supply [1]	[3]	
	(d)	**(i)**	Voltage circled	[1]	
		(ii)	To step down the current [1] **and** save energy (or heat) losses [1]	[2]	
	(e)		$\frac{N_p}{N_s} = \frac{V_p}{V_s}$ [1] **or** equivalent formula $\frac{10560}{N_s}$ [1] = $\frac{132}{25}$ [1] $N_s = 2000$ [1]	[4]	20
				Total	**110**