



*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]		
		$a = 0.7 \text{ (m/s}^2\text{)}$ [1]	[4]	
	(b) (i)	Work = $F \times d$ [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]		
		$v = 16 \text{ (m/s)}$ [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]			
	$d = 90 \text{ (cm)}$ [1]	[4]		
2	(a) (i)	Arrow from A towards centre of Earth	[1]	
		The force on A is less than the force on B (Third box ticked)	[1]	
		Gravity/centripetal (force)/gravitational/weight	[1]	
		The force on A will increase (Third box ticked)	[1]	
		Tangent to circle going through B	[1]	
	(b) (i)	Galaxy	[1]	
		1 [1], 4, 3 [1]	[2]	
		Any two named e.m.s. members [1] each	[2]	
	(c) (i)	Universe has a starting point	[1]	
		Steady State <b>or</b> String	[1]	
		Lack of sufficient fuel [1] food [1] time required [1] (any <b>two</b> )	[2]	
		Fusion	[1]	
				15

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

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  
Deduct [1] if correct but reversed

[2]

(iii) Spectrum

[1]

(e) (i) Gamma or  $\gamma$ 

[1]

(ii) Infrared or IR

[1]

(iii) Gamma or  $\gamma$ 

[1]

(iv) Ultraviolet or UV

[1]

(v) Radio waves

[1]

AVAILABLE  
MARKS

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]	
	$\left. \begin{array}{l} 0.6 = I \times 0.2 \\ \text{or } I = 0.6/0.2 \\ = 3 \text{ (A)} \end{array} \right\} \text{Correct substitutions [1]}$	[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 = $2.4 \pm 0.1$ (V) <b>or</b> 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 ( $\Omega$ ) [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 <b>earth</b> Large current flows Fuse blows Any <b>three</b>	[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] <b>and</b> 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]
	<b>Total</b>	<b>110</b>