



**General Certificate of Secondary Education  
2011**

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**Science: Double Award (Modular)**

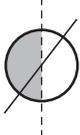
**Paper 3  
Foundation Tier**

**[G8203]**

**WEDNESDAY 25 MAY, MORNING**

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**MARK  
SCHEME**

- 1 (a) (i) C [1]
- (ii) Axis of Earth is pointing away from the Sun [1]
- (iii)  [1]
- (iv) Gravity/Centripetal [1]
- (b) (i) B Venus H Neptune ([1] each) [2]
- (ii) Same sense as arrow at A [1]
- (iii) Orbits the Sun [1]
- (iv) Makes *one* complete rotation on its axis [1]
- (v) Geocentric [1]
- (vi) Milky Way [1]
- (c) (i) 63% [1]
- (ii) It would increase [1]
- (d) (i) Fibre glass/insulating foam/polystyrene/rockwool [1]
- (ii) Contains trapped air [1]
- (e) (i) Conduction [1]
- (ii) (free) electrons [1]
- (iii) Particles (atoms) in plastic (near the hot coffee) vibrate *more* [1] } mark  
The vibration passes along the plastic/ jostle/particles collide [1] } independently [2]
- (iv) Use a lid/cover [1]

AVAILABLE  
MARKS

20

- 2 (a) (i) Electrons [1]
- (ii) Positive [1]
- (b) To stop charge building up [1] } dependent  
to prevent a spark [1] } marking [2]
- (c) (i) 2.4 (V) [1]
- (ii)  $R = V/I$  or equivalent formula [1]  
 $R = 4/0.5$  [1]  
 $R = 8$  [1] ( $\Omega$ ) [1] [3]
- (iii) straight line [1]  
through (0,0) [1] [2]
- (d) (i) 20(mA) [1]
- (ii) 20(mA) [1]
- (iii) 40(mA) [1]
- (e) (i) 4(V) [1]
- (ii) 4(V) [1]
- (iii) 8(V) [1]
- (f) (i)  $E = P \times t$  [1]  
 $E = 1.25 \times 2$  [1]  
 $E = 2.5$  (kWh) [1] [3]
- (ii) 30 (p) to nearest penny, allow e.c.f. from (i) [1]

AVAILABLE  
MARKS

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3 (a) (i) Energy [1]

(ii)  or  $\uparrow \downarrow$  or  $\downarrow \uparrow$  [1]

(iii) **A** Transverse      **B** Longitudinal [2]

(iv) 30 (cm) [1]

(v) 50 (cm) [1]

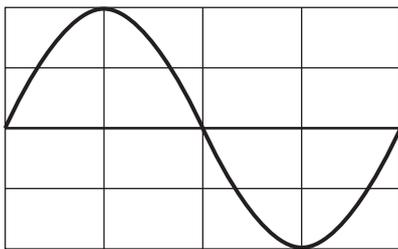
(vi) 8 (cm) [1]

(vii) 4 [1]

(viii) 4 (Hz) (allow ecf from (vii)) [1]

(b)  $v = f \times \lambda$  [1]  
 $= 6 \times 0.4$  [1]  
 $= 2.4$  (m/s) [1] [3]

(c)  $1 < \text{Amplitude} \leq 2$  on LHS and RHS



loudness [1] } independent marking  
 frequency [1]

[2]

(d)

Statement	True	False
Sound and light travel at the same speed in air		✓
Light can travel through a vacuum	✓	
Sound is a longitudinal wave motion	✓	

Mark by row [3]

(e) (i) Can cause loss of hearing **or** damage to ear drum or deafness [1]

(ii) Wear ear protectors/muffle the machine/ear muffs ear defenders/ear protection/ear plugs/ [1]

(iii) Decreases [1]

AVAILABLE MARKS

20

			AVAILABLE MARKS
<b>4 (a)</b>	<b>(i)</b> Incident ray from bulb to coin	[1]	[3]
	Reflected ray into eye	[1]	
	Correct direction on either ray	[1]	
	<b>(ii)</b> Any named luminous object		[1]
<b>(b)</b>	<b>(i)</b> Normal $\perp$ to block at point of incidence, on both sides (in air and glass) Bending of ray on correct side of normal Bending in correct sense i.e. $\hat{i} > \hat{r}$	} straight	[1]
			} by eye
			[1]
	<b>(ii)</b> Incident ray normal to glass block i.e. collinear with incident ray on LHS		[1]
	<b>(iii)</b> The light travels faster in air than in glass (✓)		[1]
<b>(c)</b>	<b>(i)</b> Splitting of light into (different) colours/wavelengths/spectrum	[1]	} dependent marking [2]
		[1]	
	Quality of written communication		[1]
	<b>(ii)</b> (Triangular) prism		[1]
	<b>(iii)</b> Spectrum		[1]
	<b>(iv)</b> (R) O Y G B I V (in words) and in correct order		[1]
<b>(d)</b>	<b>(i)</b> Ultraviolet or UV		[1]
	<b>(ii)</b> X rays, gamma rays – either order		[1]
<b>(e)</b>	<b>(i)</b> X-rays		[1]
	<b>(ii)</b> Visible		[1]
	<b>(iii)</b> Infra-red or IR		[1]
<b>Total</b>			<b>80</b>