



Rewarding Learning

**General Certificate of Secondary Education
2011**

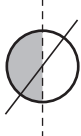
Science: Double Award (Modular)

Paper 3
Foundation Tier

[G8203]

WEDNESDAY 25 MAY, MORNING

**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] (Ω)	[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]	

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3 (a) (i) Energy [1]

(ii)  or  or  [1]

(iii) A Transverse B Longitudinal [2]

(iv) 30 (cm) [1]

(v) 50 (cm) [1]

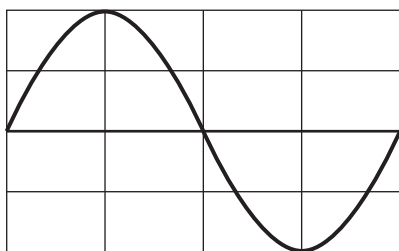
(vi) 8 (cm) [1]

(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

4	(a) (i)	Incident ray from bulb to coin Reflected ray into eye Correct direction on either ray	[1] [1] [1]	[3]				
	(ii)	Any named luminous object		[1]				
	(b) (i)	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. $\hat{i} > \hat{r}$	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">straight</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">by eye</td> </tr> </table>	}	straight	}	by eye	[1] [1] [1]
}	straight							
}	by eye							
	(ii)	Incident ray normal to glass block i.e. collinear with incident ray on LHS		[1]				
	(iii)	The light travels faster in air than in glass (✓)		[1]				
	(c) (i)	Splitting of light into (different) colours/wavelengths/spectrum	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">dependent</td> </tr> <tr> <td style="font-size: 3em; vertical-align: middle;">}</td> <td style="vertical-align: middle;">marking</td> </tr> </table>	}	dependent	}	marking	[2]
}	dependent							
}	marking							
		Quality of written communication		[1]				
	(ii)	(Triangular) prism		[1]				
	(iii)	Spectrum		[1]				
	(iv)	(R) O Y G B I V (in words) and in correct order		[1]				
	(d) (i)	Ultraviolet or UV		[1]				
	(ii)	X rays, gamma rays – either order		[1]				
	(e) (i)	X-rays		[1]				
	(ii)	Visible		[1]				
	(iii)	Infra-red or IR		[1]				

Total

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MARKS

20

80