



General Certificate of Secondary Education
2011

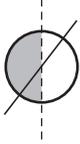
Science: Double Award (Non-Modular)

Paper 3
Foundation Tier

[G8403]

WEDNESDAY 25 MAY, MORNING

**MARK
SCHEME**

				AVAILABLE MARKS
1	Wind – renewable	} mark for each row [1]	[1]	4
	Biomass – renewable		[1]	
	Coal – non-renewable		[1]	
	Hydroelectric – renewable		[1]	
2	(i) Kinetic and potential		[2]	3
	(ii) Heat/Thermal		[1]	
3	(i) B		[1]	3
	(ii) A		[1]	
	(iii) A		[1]	
4	(a) (i) C		[1]	4
	(ii) Axis of Earth is pointing away from the Sun		[1]	
	(b)			
	(c) Gravity/Centripetal		[1]	
5	(a) B Venus H Neptune ([1] each)		[2]	7
	(b) Same sense as arrow at A		[1]	
	(c) (i) Orbits the Sun		[1]	
	(ii) Makes ONE complete rotation (on its axis)		[1]	
	(d) Geocentric		[1]	
	(e) Milky Way		[1]	

			AVAILABLE MARKS
6	(a) 63%	[1]	4
	(b) It would increase	[1]	
	(c) (i) Fibre glass or Insulating foam or Polystyrene or Rockwool	[1]	
	(ii) Contains trapped air	[1]	
7	(a) Conduction	[1]	5
	(b) (free) electrons	[1]	
	(c) Particles (atoms) in plastic (near the hot coffee) vibrate <i>more</i> [1] } independent The vibration passes along the plastic/ jostle/particles collide [1] } marks	[2]	
	(d) Use a lid/cover	[1]	
8	(i) 820 (N)	[1]	
	(ii) $P = \frac{W}{A}$ or $\frac{F}{A}$	[1]	5
	$= \frac{820}{164}$ allow e.c.f. from (i)	[1]	
	$= 5$	[1]	
	N/cm ² Free-standing unit mark	[1] [4]	
9	(a) Weight/gravity	[1]	4
	(b) (i) Friction	[1]	
	(ii) to left	[1]	
	(c) 0.8 (N)	[1]	

10 Acceleration = Speed (change)/time taken or Acceleration = gradient

$$\text{or } a = \frac{v - u}{t} \quad [1]$$

$$= 56/8 \quad [1]$$

$$= 7(\text{m/s}^2) \quad [1] \quad [3]$$

11 Work done = Force \times Distance moved

$$\text{WD} = F \times d \quad [1]$$

$$= 500 \times 3 \quad [1]$$

$$= 1500 [1] \text{ J } [1] \quad [2] \quad [4]$$

12 (i) Clockwise [1]

(ii) Moment = $F \times$ distance [1]

$$= 900 \times 20 \quad [1]$$

$$= 18\,000 \text{ (Ncm)} \quad [1] \quad [3]$$

13 (a) (i) Electrons [1]

(ii) Positive or + [1]

(b) To stop charge building up [1] } dependent
to prevent a spark [1] } marking [2]

(c) (i) 2.4 (V) [1]

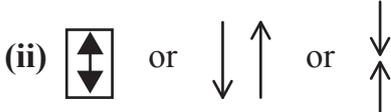
(ii) $R = V/I$ or equivalent formula [1]

$$R = 4/0.5 \quad [1]$$

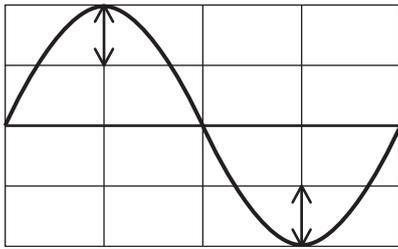
$$R = 8 [1] (\Omega) \quad [1] \quad [3]$$

(iii) straight line [1]
through (0,0) [1] [2]

AVAILABLE MARKS
3
4
4

		AVAILABLE MARKS
(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 the nearest penny, allow ecf from (i)	[1]	20
14 (a) (i) Energy	[1]	
(ii)  or $\downarrow \uparrow$ 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) But both amplitudes must be $1 < \text{amplitude} \leq 2$



loudness [1] } independent marks
 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	✓	

One 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

[1]

(iii) Decreases

[1]

20

AVAILABLE MARKS

			AVAILABLE MARKS
15 (a)	(i) Incident ray to coin from bulb	[1]	[3]
	Reflected ray into eye	[1]	
	Correct direction on either ray	[1]	
	(ii) Any named luminous object	[1]	
(b)	(i) Normal \perp to block at point of incidence, on both sides (in air and glass)	[1]	[3]
	Bending of ray on correct side of normal	[1]	
	Bending in correct sense i.e. $\hat{i} > \hat{r}$	[1]	
	(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	[1]	} dependent marking [2]
	into (different) colours/wavelengths/spectrum	[1]	
	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			20
			110