Rewarding Learning

General Certificate of Secondary Education
2011

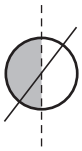
Science: Double Award (Non-Modular)

Paper 3
Foundation Tier

[G8403]

WEDNESDAY 25 MAY, MORNING

MARK SCHEME

					AVAILABLE MARKS
1	Wind – renewable Biomass – renewable Coal – non-renewable Hydroelectric – renewable	mark for each row [1]	[1] [1] [1] [1]	[4]	4
2	**(i)** Kinetic and potential			[2]	
	(ii) Heat/Thermal			[1]	3
3	**(i)** B			[1]	
	(ii) A			[1]	
	(iii) A			[1]	3
4	**(a)** **(i)** **C**			[1]	
	(ii) Axis of Earth is pointing away from the Sun			[1]	
	(b) 			[1]	
	(c) Gravity/Centripetal			[1]	4
5	**(a)** **B** Venus **H** Neptune	([1] each)		[2]	
	(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]	7

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

					AVAILABLE MARKS
10	Acceleration = Speed (change)/time taken or Acceleration = gradient				
	or $a = \frac{v - u}{t}$	[1]			
	$= 56/8$	[1]			
	$= 7\,(m/s^2)$	[1]	[3]		3
11	Work done = Force × Distance moved				
	WD = F × d	[1]			
	= 500 × 3	[1]			
	= 1500 [1] J [1]	[2]	[4]		4
12	**(i)** Clockwise		[1]		
	(ii) Moment = F × distance	[1]			
	= 900 × 20	[1]			
	= 18 000 (Ncm)	[1]	[3]		4
13	**(a)** **(i)** Electrons		[1]		
	(ii) Positive or +		[1]		
	(b) To stop charge building up [1] to prevent a spark [1]	dependent 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 the nearest penny, allow ecf from **(i)** [1] 20

14 **(a)** **(i)** Energy [1]

(ii)  [1]

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

(iv) 30 (cm) [1]

(v) 50 (cm) [1]

(vi) 8 (cm) [1]

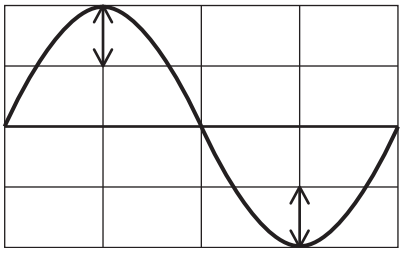
(vii) 4 [1]

(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]

AVAILABLE MARKS

(c) But both amplitudes must be $1 <$ amplitude $\leqslant 2$



loudness [1]
frequency [1]
} independent marks

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