



*Rewarding Learning*

**General Certificate of Secondary Education  
2010–2011**

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**Science: Single Award (Modular)**  
Electricity, Waves and Communication

Module 5

Higher Tier

**[GSC52]**

**THURSDAY 11 NOVEMBER 2010, AFTERNOON**

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**MARK  
SCHEME**

			AVAILABLE MARKS			
1	(a) (i)	teenagers hear all frequencies/teenagers hear higher frequencies/as frequency increases, numbers stay the same/teenagers can hear higher frequency sounds than pensioners [1]	[2]	9		
		none can hear 22 kHz [1]	[1]			
	(ii)	ultrasound	[1]			
	(b)	6 points correct [2]				
		5/4 points [1] [1] for correct line	[3]			
	(c) (i)	as we get older we can hear less well/unable to detect high frequency sounds/hearing decreases/hearing deteriorates [1]	[2]			
		can't hear above 18 kHz [1]	[1]			
	(ii)	repeat/average/more people/more frequencies	[1]			
	2	(a)	no cost of buying fuel/no cost for transporting fuel		} maximum [2] [3]	6
			solar is renewable (will not run out)			
less air pollution/carbon dioxide/global warming						
less greenhouse effect						
(b)		1 kW = 1000 W [1]				
	$\frac{1}{250}$ [1]					
	1000/250 [2]					
	4 [3]	[3]				
3	(a) (i)	magnet + coil of wire [1] movement [1]	[2]	8		
		(ii)	faster movement <b>or</b> stronger magnet <b>or</b> more coils		[1]	
		(iii)	Boiler = chemical → heat/thermal		[1]	
		Turbine = heat/thermal → kinetic/movement	[1]			
	(b)	removing radioactive waste/waste remains radioactive for long time	[3]			
		returning site to its former state/difficult to store waste/expensive to store waste				
		causes cancer/waste is dangerous/waste is toxic				
		Any <b>three</b> , [1] each				
	<b>not</b> nuclear is radioactive					

			AVAILABLE MARKS	
4	(a) (i)	digital are series of on/off pulses (1's and 0's) [1] analogue vary continuously [1] or appropriate diagrams	[2]	8
		(ii) microwave/infrared	[1]	
	(b) (i)	D as emits less radiation/lowest SAR rate	[1]	
		(ii) highest SAR value [1]/most radiation SAR value is above children's recommended level [1]	[2]	
(c)	shorter calls/speakerphone/text instead of calling use phone outside/hold phone further away Any <b>two</b> , [1] each	[2]		
5	(a) (i)	40 = refraction/bending [1] away from normal/to the right [1]	[2]	8
		(ii) 42 = refraction/bending [1] At 90 degrees right angles/along edge of block [1]	[2]	
		(iii) TIR = [2] reflection [1]	[2]	
	(b)	costs less/less cable required/more secure/less interference Signal needs less boosting/faster Any <b>two</b> , [1] each	[2]	
6	(a)	DVD video = 10 watts [1] 6 + 4 = 10 [1]	converting 10W to 0.01kW [1] 0.010 × 300 × 18 [2] 10 × 300 × 18 [2] 54p	[3]
		(b)	conventional = from +ve to -ve (or arrow on diagram) actual = from -ve to +ve (or arrow on diagram) or opposite Actual = flow of electrons electrons = -ve charge Any <b>three</b> , [1] each	[3]
			<b>Total</b>	<b>45</b>