AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	**one** from: • radio • microwave • infrared • visible		1	AO1 4.6.2.1
01.2	**one** from: • x-rays • gamma rays		1	AO1 4.6.2.1
01.3	**one** from: • premature skin aging • increase of skin cancer		1	AO1 4.6.2.3
01.4	wear clothing/hats/sunscreen		1	AO3 4.6.2.3
02.1	the sheet absorb radiation less radiation produces lower potential difference		1 1	AO3
02.2	ignoring outlier, $\frac{3.74+4.40}{2} = 4.07$		1	AO2

02.3	sensible suggestion and solution, e.g.,
	• background light from room lights/sunlight will always produce a potential difference even when the lamp is off
	  ○ so carry out the experiment in a dark room
	  ○ **or** reduce the amount of background light within the room
		one mark for suggestion
		one mark for associated solution
			2	AO3

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
02.4	gamma rays are ionising which can cause mutations and cancer		1 1	AO2 4.6.2.3
02.5	visible light is produced when electrons move between the energy levels in atoms gamma rays are produced by changes in the nucleus/when the nucleus decays		1 1	AO1 4.6.2.3
03.1	x-rays from ionising so can increase the risk of cancer/damage DNA in cells		1 1	AO1 AO2 4.6.2.3
03.2	a measure of the risk of harm resulting from an exposure of the body to radiation		1	AO1 4.6.2.3
03.3	the foot x-ray is a single x-ray, whereas a CT scan is multiple x-rays		1	AO2 4.6.2.3
03.4	number of foot x-rays = $\frac{2}{0.001}$ = 2000		1 1	AO2 4.6.2.3
03.5	$\frac{15}{2.7}$ = 5.5 years		1 1	AO2 4.6.2.3
04	**Level 3**: Describes how infrared/radio are used with reasons, describes risks of X-rays/gamma, and their uses. Well organised answer.		5-6	AO1 AO2 4.6.2.4
	Level 2: Describes how infrared/radio are used without clear reasons, describes risks of X-rays/gamma, but not their uses. Some organisation.		3-4	

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
	Level 1: Some uses and waves described, answer not well organised, uses or reasons missing.		1-2	
	No relevant comment.		0	
	Indicative content: • televisions use radio waves because you can add information to the waves • televisions receive the radio waves and convert them to light and sound • heaters emit infrared radiation, • the radiation is absorbed by the air and raises the temperature of the house • energy efficient lamps emit ultraviolet radiation • there are no household uses of X-rays and gamma rays • because they are ionising and increase the risk of cancer • but x-rays and gamma are used for medical imaging			
05.1	visible light		1	AO1 4.6.2.1
05.2	words in this order: transverse 300 000 km/s longitudinal 340 m/s energy matter		5	AO1 4.6.2.1
05.3	radio		1	AO1 4.6.2.4

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
05.4	satellite communication/mobile phones/radar		1	AO1 4.6.2.4
06.1 06.2	one mark for three parallel wave fronts above horizontal line/in medium 1 one mark for wave fronts perpendicular to ray one mark for three parallel wave fronts below horizontal line/in medium 2 one mark for wave fronts perpendicular to ray one mark for larger wavelength than in medium 1		2 3	AO2 AO3 4.6.2
06.3	the frequency stays the same the speed increases		1 1	AO2 AO3 4.6.2.2
06.4	any appropriate situation, e.g., light waves moving from glass/perspex/water into air		1	AO3 4.6.2.2
07.1	radio waves – television/radio microwaves – satellites/mobile phones	wave and description needed for each mark	1 1	AO1 4.6.2.4
07.2	x-rays to look at broken bones		1 1	AO1 4.6.2.4
07.3	visible light is produced by movement of electrons in atoms gamma rays originate from changes in the nucleus of an atom		1 1	AO1 4.6.2.3

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
08.1	four seconds the car changes from moving at a constant speed to decelerating		1 1	
08.2	distance = velocity × time/area under the graph = 10 × 4 = 40 m		1 1	AO1 AO2 4.5.6.1
08.3	acceleration = $\frac{\text{change in velocity}}{\text{time}}$ = $\frac{0-10}{2}$ = -5 m/s^2 answer is negative because the car is decelerating		1 1 1	AO1 AO2 4.5.6.1
08.4	the acceleration is $\frac{-2-0}{2}$ = -1 m/s^2 it is in the opposite/reverse direction/is five times smaller	answer must show evidence that the negative acceleration (in the opposite direction) is five times smaller	1 1	AO2 AO3 4.5.6.1
09.1	you can use a model to predict or explain not just describe what happens		1 1	AO1
09.2	by producing the electromagnetic waves and then detecting them, Hertz showed that the model was correct		1	AO2

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
09.3	the electromagnetic wave causes the electrons in the aerial to oscillate the oscillations produce an alternating current with the same frequency as the radio wave		1 1 1	AO1 AO2 4.6.2.3
10.1	black clothing gets hotter faster because it absorbs thermal radiation/energy faster than white clothing		1	AO2 4.6.2.2
10.2	correct suggestion, e.g., • mirror/foil blankets provided after marathon • foil used in cooking		1	AO2 4.6.2.2
10.3	**two** from: • the starting temperature of the water • the volume of the can • material of the can	one mark for each correct point up to two correct marks	2	AO2 4.6.2.2
10.4	one mark for two curved lines with negative gradients one mark for starting at the same temperature one mark for silver line above black line one mark for labelled axes		4	AO2 4.6.2.2
10.5	no the silver can emit radiation as it cools down, but not as fast as the black one		1	AO2 4.6.2.2
11.1	infrared		1	AO1 4.6.2.1

AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
11.3	any correct example, e.g., • water absorbs microwave radiation (to warm up) • UV absorbed by sun cream/skin • x-ray absorbed by bone • gamma camera absorbs energy from gamma rays		1 1	AO1 4.6.2.4
11.3	any correct example, e.g., • communication • using optical fibres		1 1	AO1 4.6.2.4
11.4	there is an uncertainty in all measurements/difficult to pull with a constant force		1	AO3 4.5.6.1.5 4.5.6.2.2
14	**Level 3**: Calculations of power generated in each bulb in each circuit. Link between power and brightness explicit. Correct statement about brightness.		5-6	AO1 AO2 4.2.2 4.2.4.1
	Level 2: Calculations of currents in circuits. Comment linking current and resistance to power. Statements about brightness that follow from previous reasoning.		3-4	
	Level 1: Recognition that power depends on current and potential difference/resistance. A general statement that bulbs are brighter in parallel/less bright in series.		1-2	
	No relevant content.		0	

Question	Answers	Extra information	Mark	AO / Specification reference
	Indicative content: • the brightness of the bulb depends on the power generated in it ○ $P = I^2R$ • in series, the current through each bulb is the same ○ current = $\frac{\text{potential difference}}{\text{total resistance}} = \frac{12}{15} = 0.8$ A ○ the 10 Ω lamp will have a power of $0.8^2 \times 10 = 6.4$ W ○ the 5 Ω lamp will have a power of $0.8^2 \times 5 = 3.2$ W ○ the 10 Ω lamp will be brighter • in parallel, the potential difference across each bulb is the same = 12 V ○ current through the 5 Ω lamp = $\frac{\text{potential difference}}{\text{total resistance}} = \frac{12}{15} = 2.4$ A ○ current through the 10 Ω lamp will be 1.2 A (as the resistance is double, current will halve) ○ the 10 Ω lamp will have a power of $1.2^2 \times 10 = 14.4$ W ○ the 5 Ω lamp will have a power of $2.4^2 \times 5 = 28.8$ W ○ the 5 Ω lamp will be brighter			