AQA GCSE Physics

Practice answers

	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 risk of skin cancer		1	AO1 4.6.2.3
01.4	wear clothing/hats/sunscreen		1	AO3 4.6.2.3
02.1	the sheets absorb radiation less radiation produces a 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/reduce the amount of background light within the room		1 1	AO3

	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 are 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 consists of 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	
	Level 1: Some uses and waves described, answer not well organised, uses or reasons missing.		1-2	

	Answers	Extra information	Mark	AO / Specification reference
	No relevant content.		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			
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	lose one mark for each incorrect word	5	AO1 4.6.2
05.3	radio		1	AO1 4.6.2.1
05.4	satellite communication/mobile phones/radar		1	AO1 4.6.2.4

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OXFORD Revise

	Answers	Extra information	Mark	AO / Specification reference
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 4.6.2.2
06.3	the frequency stays the same the speed increases		1 1	AO2 AO3 4.6.2.2
06.4	any correct 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		1 1	AO1 4.6.2.4
07.2	x-rays to look at broken bones	accept any correct use of medical x-ray imaging	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
08.1	4 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 4.5.6.1.2

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	Answers	Extra information	Mark	AO / Specification reference
08.3	acceleration = $\frac{\text{change in velocity}}{\text{time}}$ acceleration = $\frac{0-10}{2}$ = -5m/ s^2 answer is negative because the car is decelerating	measurements from the graph	1 1 1	AO1 AO2 4.5.6.1.5
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 4.5.6.1.5
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
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 4.6.2.31
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 marathons/foil used in cooking		1	AO2 4.6.2.2

	Answers	Extra information	Mark	AO / Specification reference
10.3	**two** from: • the starting temperature of the water • the volume of water • material of can	one mark for each correct answer up to a maximum of two points	2	AO2 4.6.2.2
10.4	one mark for two curved lines with negative gradients one mark for starting at 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 1	AO2 4.6.2.2
11.1	400 – 750 nm		1	AO2 4.6.2.1
11.2	heat absorbing glass two at that wavelength the light transmitted is the lowest, so the light absorbed is the biggest		1 1	AO3 4.6.2.2
11.3	heat absorbing glass one is the best it transmits the highest percentage of radiation in the range 430 nm and 662 nm		1 1	AO3 4.6.2.2
11.4	no to get a suntan you need to absorb ultraviolet radiation tis very little ultraviolet radiation transmitted by the glass at that wavelength		1 1 1	AO2 AO3 4.6.2.4

	Answers	Extra information	Mark	AO / Specification reference
12.1	speed = frequency × wavelength 300 000 000 = frequency × 2×10^{-10} frequency = $\frac{300000000}{2\times10^{-10}}$ = 1.5×10^{18} Hz	accept v = f x λ one mark for conversion to m/s and one mark for substitution	1 1+1 1 1	AO1 AO2 4.6.1.2
12.2	order of magnitude: 10^{18}Hz		1	AO2 4.6.2.1
12.3	10 cm = 0.1 m = $\frac{300000000}{0.1}$ = $3x10^{9}$		1 1 1	AO1 AO2 4.6.2.1 4.6.1.2
13.1	the frictional force of the brakes (and air resistance) acts on the car water resistance (and air resistance) acts on the boat		1 1	AO2 4.5.1.4
13.2	up arrow: upthrust left arrow: water resistance/drag force right arrow: weight	one mark for two equal length arrows pointing up and down one mark for labels for upthrust and weight one mark for single arrow pointing left one mark for labels for drag and water resistance	4	AO1 AO2 4.5.1.4

	Answers	Extra information	Mark	AO / Specification reference
13.3	kinetic energy = 0.5 × mass × speed^2 = 0.5 × 1500 × 16^2 = 192 000 J	allow $E_K = \frac{1}{2}mv^2$	1 1 1	AO2 4.1.1.2
13.4	(using the conservation of energy) work done by friction = kinetic energy kinetic energy (work done) = force × distance 192 000 = force × 100 force = $\frac{192000}{100}$ = 1920 N force on car is bigger same kinetic energy loss but it stops over a smaller distance/there is reaction time so the braking distance is smaller than 30 m		1 1 1 1 1 1	AO1 AO2 AO3 4.5.2
14.1	acceleration = $\frac{\text{change in velocity}}{\text{time}}$	accept a = (Δv)/t	1	AO1 4.5.6.1.5
14.2	acceleration = $\frac{2.7 - 0.5}{0.4}$ = -5.5 m/s^2		1 1	AO2 4.5.6.1.5
14.3	force = mass × acceleration	accept F = ma	1	AO1 4.5.6.2.2
14.4	2.0 = 0.4 × acceleration acceleration = $\frac{2.0}{0.4}$ = 5.0 m/s^2		1 1 1	AO2 4.5.6.2.2

	Answers	Extra information	Mark	AO / Specification reference
14.5	there is an uncertainty in all measurements but maybe more uncertainty in the force and mass than in the light gate measurements/difficult to pull with a constant force so acceleration may not be constant		1	AO3 4.5.6.1.5 4.5.6.2.2