AQA GCSE Physics

Practice answers

	Answers	Extra information	Mark	AO / Specification reference
01.1	concave convex concave convex		1 1 1 1	AO1 4.6.2.5
01.2	magnification = $\frac{\text{imageheight}}{\text{objectheight}}$ $= \frac{1.2}{0.7}$ = 1.7		 1 1	AO2 4.6.2.5
01.3	it is a ratio/the units cancel out		1	AO2 4.6.2.5
01.4	one mark for correct drawing/symbol of concave lens one mark for central ray going straight through one mark for at least two rays either side of centre diverging		3	AO1 4.6.2.5
02.1	P waves are longitudinal waves and can travel through solids and liquids S waves are transverse waves and can only travel through solids		1 1 1 1	AO1 4.6.1.5

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02.2	time = 26 × 60 = 1560 seconds distance = 2 × 6400 = 12 800 km speed = $\frac{\text{distance}}{\text{time}}$ = $\frac{12800}{1560}$ = 8.2 km/s the waves travel at different speeds through different parts of the Earth		1 1 1 1 1	AO1 AO2 4.5.6.1.2 4.6.1.5
02.3	outer core / part of the centre of the Earth is liquid S-waves do not travel through liquid		1 1	AO1 4.6.1.5
02.4	the P-wave travels a smaller distance in the same time so has a smaller speed compared with the wave travelling through the Earth		1 1	AO2 AO3 4.6.1.5
02.5	the waves travelled faster through the core – the core is denser		1	A03 4.6.1.5
03.1	e.g., 30 000 Hz	accept any value over 20 000 Hz	1	AO2 4.6.1.4
03.2	the frequency of the sound of the bark is lower/the wavelength of the sound is longer	**or** frequency of whistle sound is higher/wavelength shorter	1	AO2 4.6.1.4

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03.3	the eardrum vibrates/moves backwards and forwards when the sound of the bark reaches it the eardrum vibrates very fast but with less amplitude because the frequency is too high so you cannot hear the whistle		1 1 1 1	AO1 AO2 AO3 4.6.1.4
03.4	e.g., windows/wooden box around guitar		1	AO1 4.6.1.4
03.5	diffuse the surfaces of buildings are rough and not smooth		1 1	AO2 4.6.2.6
04.1	the shirt reflects red light and absorbs all the other colours in white light		1 1	AO1 4.6.2.6
04.2	red yellow light is likely to be a combination of red and green light the shirt reflects red light and absorbs green light	*allow* black shirt absorbs yellow light no light is reflected	1 1 1	AO1 4.6.2.6
04.3	the green filter transmits green light and absorbs all the other colours of the white light		1 1	AO1 4.6.2.6
04.4	there is light from other sources reflecting from the shirt so there is light other than green light reflecting from the shirt/some blue light reflecting		1 1	AO3 4.6.2.6
05.1	it is impossible to do experiments to collect data directly scientists use models for physical system that are very large or very small e.g., model of the atom	accept suitable example	1 1	AO1

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05.2	there was no data to support it/there was data from an experiment that did not support it		1	AO3 4.6.1.5
05.3	one mark for paths of P waves from earthquake to places left and right one mark for P waves going straight through one mark for S waves path on right and left only/no S waves in the bottom half the outer core is liquid and S waves don't go through liquid the presence of shadow zones does not predict a solid core		1 1 1 1 1	AO2 4.6.1.5
05.4	the paper would be checked by other scientists/peer review		1	AO1
06	**Level 3**: Describes the differences between light and paint in terms of absorption and reflection. Uses vocabulary correctly. Well organised answer.		5-6	AO1 AO2 4.6.2.6
	Level 2: Describes some differences between light and paint in terms of absorption and reflection. Some use of vocabulary is incorrect. Some organisation.		3-4	
	Level 1: Some comparison, answer not well organised, uses everyday vocabulary		1-2	
	No relevant content.		0	

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	Indicative content: • the science teacher is referring to the colours of visible light • white light is made of all of the colours of the visible spectrum ROYGBIV • your eye interprets all the colours of visible light added together as white • the art teacher is talking about paint, which absorbs some frequencies and reflects others when light is shone on to it • each colour reflects the colour that we see and absorbs the rest • all the colours together absorb all the colours • the eye 'sees' no colour, which it interprets as black			
07.1	convex		1	AO2 4.6.2.5
07.2	one mark for rays drawn from each object parallel to principal axis one mark for them going through the focus one mark for rays drawn through centre of lens one mark for these rays being undeflected one mark for rays for magnified image extrapolated backwards one mark for images drawn in the correct places/orientations		6	AO3 4.6.2.5
07.3	the image is the right way up initially/ when magnified/ when text is close to, but becomes inverted/upside down when diminished/ when text far away		1 1	AO3 4.6.2.5
08.1	mass is the amount of stuff/matter in an object weight is the force of gravity acting on the object		1 1	AO1 4.5.1.3

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08.2	weight = mass × gravitational field strength	allow W = mg	1	AO1 4.5.1.3
08.3	179 = mass × 3.8 mass = $\frac{179}{3.8}$ = 47(.1) kg		1 1 1	AO2 4.5.1.3
08.4	linear relationship the compression is proportional to the weight	greater weight, greater the compression	1 1	AO1 4.5.3
09.1	momentum = mass × velocity = 54 × 2 = 108 kg m/s = 110 kg m/s	equation allow p = mv answer to two significant figures	1 1 1 1	AO1 AO2 4.5.7.1
09.2	momentum in a collision is conserved if the mass increases the velocity decreases		1 1	AO2 4.5.7.2
09.3	force = mass × acceleration -80 = 54 × acceleration acceleration = $-\frac{80}{54}$ = –1.5 m/s^2	allow F = ma	1 1 1	AO1 AO2 4.5.6.2.2
10.1	sound with frequency greater than 20 000 Hz/20 kHz		1	AO1 4.6.1.4

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10.2	speed = $\frac{\text{distance}}{\text{time}}$	allow distance = speed x time	1	AO1 4.5.6.1.2
10.3	time = 16 ms = 16×10^{-3} s 1500 = $\frac{\text{distance}}{16\times10^{-3}}$ distance = $1500 \times 16\times10^{-3}$ = 24 m depth = $\frac{24}{2}$ = 12 m	 division by two either here or when calculating time	1 1 1 1 1	AO2 4.6.1.4 4.6.1.5
10.4	a systematic error all of the measurements are 0.02 m different from the actual distance		1 1	AO3
11.1	there are four boundaries/changes of density each pulse is transmitted through tissue and is partially reflected from any boundary		1 1	AO2 4.6.1.5
11.2	time = 35×10^{-6} s distance = speed × time = $1540 \times 35\times10^{-6}$ = 0.0 539 m distance = $\frac{0.0539}{2}$ = 0.027 m (0.02 695)	reading from graph division by two to find distance to foetus	1 1 1 1 1	AO1 AO2 AO3 4.5.6.1.2 4.6.1.5
11.3	the smallest change detectable/smallest measurable quantity		1	AO1
11.4	speed = frequency × wavelength	allow v = f x λ	1	AO1

	Answers	Extra information	Mark	AO / Specification reference
11.5	wavelength = 10^{-3} m speed = 1540 m/s 1540 = frequency × 10^{-3} frequency = $\frac{1540}{10^{-3}}$ = 1.5(4)×10^{6} Hz.	answer given in standard form	1 1 1 1 + 1	AO1 AO2 4.6.1.2 4.6.1.5
12.1	(±) 0.1 cm		1	AO1
12.2	the object distance has become larger but the image distance has not changed to take this into account, so the rays do not focus on the screen		1	AO2 4.6.2.5
12.3	with a larger object distance need to move the screen closer to the lens until the image is again clear and in focus.		1 1	AO3 4.6.2.5
12.4	uncertainty = $\frac{\text{largestvalue} - \text{smallestvalue}}{2}$		1	AO2
12.5	uncertainty = $\frac{5.0 - 4.7}{2} = \frac{0.3}{2} = 0.15$ this is (1.5 times) bigger than the uncertainty in part (a).		1 1	AO2 AO3 4.6.2.5
12.6	4 mm = 0.4 cm magnification = $\frac{\text{imageheight}}{\text{objectheight}}$ = $\frac{4.8}{0.4}$ = 12		1 1 1	AO1 AO2 4.6.2.5

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13.1	the force of the steam on the lid from the inside is greater than the force of gravity on the lid/weight of the lid.		1	AO2 4.5.1.2 4.5.1.3
13.2	the particles/water molecules in the steam are colliding with the lid each collision produces a change in momentum of the particles causing a force and a pressure on the lid	student may quote equations $F = \frac{\Delta mv}{t}$ and $P = \frac{F}{A}$	1 1 1	AO3 4.5.5.1.1 4.5.6.2.3
13.3	weight = mass × gravitational field strength		1	AO1 4.5.1.3
13.4	force of lid = weight = mass × g = 0.3 × 9.8 = 2.94 N pressure = $\frac{\text{force}}{\text{area}}$ = $\frac{2.94}{0.13}$ = 22.6 (23) N/m^2		1 1 + 1 1 1	AO1 AO2 4.5.1.3 4.5.5.1
13.5	this produces a force equal to the weight of the lid to lift the lid, you would need a bigger force so a bigger pressure		1 1	AO3 4.5.6.2.3
14.1	between 12 s and 15 s		1	AO3 4.5.6.1.5
14.2	between 26 s and 32 s	accept 25 s and 33 s	1	AO3 4.5.6.1.5
14.3	he was stationary/not moving		1	AO3 4.5.6.1.5

	Answers	Extra information	Mark	AO / Specification reference
14.4	between 20 and 23 seconds his velocity was not changing/no acceleration so zero resultant force		1 1	AO3 4.5.6.1.5
14.5	convert 10 km/h: $\frac{10000}{3600}$ = 2.8 m/s each 'square' is 5 s: 5 × 2.8 = 14 m estimate number of squares = 19 [18-20 acceptable] total distance = 19 × 14 m = 266 m = 270 m (to 2 significant figures)	**or** divide area under graph into triangles and rectangles and find total area $[\frac{1}{2}$ x 3 x 7.6 x 2.8] + $[\frac{1}{2}$ x 5 x 1.6 x 2.8] +[10 x 6 x 2.8] + $[\frac{1}{2}$ x 8 x 6.2 x 2.8] = 273 m (270 m to two significant figures)	1 1 1 1 1	AO2 AO3 4.5.6.1.5
14.6	the speed is changing		1	AO1 4.5.6.1.5