AQA GCSE Physics

Practice answers

	Answers	Extra information	Mark	AO / Specification reference
01.1	an induced potential difference is produced by the generator effect/when a conductor moves in a magnetic field/when a magnetic field changes around a conductor		1	AO1 4.7.3.1
01.2	a device that produces an alternating p.d. is a: dynamo a device that changes the p.d. is a: transformer a device that produces a direct p.d. is a: generator a device that changes a sound wave to an electrical signal is a: microphone	one mark for one correct line two marks for two correct lines three marks for three/four correct lines	3	AO1 4.7.3.2 4.7.3.3 4.7.3.4
01.3	alternator step-up primary magnetic field		1 1 1 1	AO1 4.7.3.2 4.7.3.3 4.7.3.4
02.1	move the magnet faster		1	AO1 4.7.3.1
02.2	move the magnet in and out of the coil the potential difference changes from positive to negative		1 1	AO2 4.7.3.1
02.3	the direction of the magnetic field inside the coil is opposite to that of the magnet	or words to that effect	1	AO1 4.7.3.1
03.1	diagram with downwards arrow labelled ‘force of gravity on student’/’weight’ upwards arrow labelled ‘force of plank on student’/’normal force’/’reaction force’ arrows of equal length		1 1 1	AO2 4.5.1.4

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03.2	the forces on the student are equal in magnitude and opposite in direction so there is no net force/no resultant force		1 1	AO2 4.5.6.2.1
03.3	one mark for diagram with one pivot one mark for large arrow labelled W at 1.2 m one mark for small arrow labelled S at 2 m one mark for correct distances labelled		4	AO1 AO2 4.5.4
03.4	total clockwise moment = total anticlockwise moment 1.2 × weight = 400 × 2.0 weight = $\frac{800}{1.2}$ = 670N (667N)	answer given to two significant figures	1 1 1	AO1 AO2 4.5.4
03.5	weight = mass × gravitational field strength		1	AO1
03.6	667 = mass × 9.81 mass = $\frac{667}{9.81}$ = 68 kg (67.99)		1 1	AO2 4.5.4
04.1	a changing potential difference in the primary coil produces a changing magnetic field in the core		1 1	AO2 4.7.3.1 4.7.3.4
04.2	number of turns on the primary coil potential difference across the primary coil		1 1	AO2 4.7.3.4

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04.3	The induced potential difference is proportional to the number of turns on the secondary coil e.g., if you double the number of turns from 10 to 20, the mean induced potential difference doubles from 2.5V to 5.0V		1 1	AO3 4.7.3.4
04.4	$V = kN$, $k = \frac{V}{N} = \frac{2.5}{10} = 0.25$ $N = \frac{V}{k} = \frac{3}{0.25}$ = 12		1 1	AO3 4.7.3.4
05.1	two coils around an iron core		1	AO1 4.7.3.4
05.2	$\frac{V_p}{12} = \frac{2000}{100}$ $V_p = 12 \times 20$ = 240 V		1 1 1	AO2 4.7.3.4
05.3	no it is a step down because N_p is bigger than N_s		1 1	AO1 AO2 4.7.3.4
05.4	iron is a magnetic material the magnetic field in the core in stronger		1 1	AO1 AO2 4.7.3.4

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06.1	the wire is a moving conductor in a magnetic field which is cutting the magnetic field (lines) causing a changing magnetic field		1 1	AO1 AO2 4.7.3.1
06.2	the graph shows how the induced pd varies with the position of the coil the induced potential difference is maximum when the coil is parallel to the magnetic field/cuts the field lines at 90°/perpendicularly the coil could be at B or D this is where the (plane of) the coil is parallel to the field		1 1 1 1	AO1 AO2 4.7.3.2
06.3	rotate the coil through 90°/put the coil at 90° to its current position put an alternating current through the turns of the electromagnet		1 1	AO3 4.7.3.1
07.1	~ = a.c./alternating current ---- = d.c./direct current		1 1	AO3 4.7.3.1
07.2	power = potential difference × current		1	AO1
07.3	mains potential difference = 230 V current = 1.8 A power = 230 × 1.8 = 414 = 410 W	recalling mains potential difference	1 1 1	AO1 AO2 4.7.3.4

	Answers	Extra information	Mark	AO / Specification reference
07.4	power = potential difference × current = 19.5 × 4.62 = 90.09 = 91 W		1 1	AO2 4.7.3.4
07.5	the output power is much smaller than the input power the transformer is not 100% efficient some of the energy transferred by the current is transferred to the thermal energy store of the surroundings so the adapter gets hot		1 1 1	AO3 4.7.3.4
08.1	one mark for general shape one mark for potential difference in one direction only/all positive or all negative one mark for labelled axes		3	AO2 4.7.3.2
08.2	the potential difference is only one sign/only positive/only negative which shows that it is in one direction only which will produce a direct (not an alternating) current		1 1 1	AO3 4.7.3.2
08.3	the potential difference would be negative/positive	must be opposite potential difference to that shown in graph of question 8.1	1	AO2 4.7.3.2
08.4	there would be more cycles/oscillations the magnitude of the potential difference is twice as big		1 1	AO2 4.7.3.2
09.1	a transformer contains wire that heats up when a current flows through it transferring energy to the thermal energy store of the surroundings		1 1	AO2 4.7.3.4

	Answers	Extra information	Mark	AO / Specification reference
09.2	power = potential difference × current		1	AO1 4.7.3.4
09.3	current = $\frac{\text{power}}{\text{potential difference}}$ 120 MW = 1.2×10^8 W 400 kV = 400 000V $\frac{1.2 \times 10^8}{400000}$ = 300 A		1 1 1 1	AO2 4.7.3.4
10	**Level 3**: Correctly links pressure to movement of diaphragm. Links movement to potential difference in positive and negative direction. Well organised answer.		5-6	AO1 AO2 4.7.3.3
	Level 2: Links movement of air to movement of diaphragm. Links movement to potential difference in but not direction. Some organisation of answer.		3-4	
	Level 1: Some link between air movement and movement of coil. Answer shows poor organisation.		1-2	
	No relevant content.		0	

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	Indicative content: • there are areas of high and low pressure in a sound wave • because air molecules in a sound wave move backwards and forwards as it is a longitudinal wave • when the high-pressure area hits the diaphragm, it pushes the diaphragm in • the coil moves through the magnetic field • which produces a potential difference in one direction • when the low-pressure area hits the diaphragm, it pulls the diaphragm out/ the diaphragm is not pushed in as far • which produces a potential difference in the other direction			
11.1	20Hz – 20 000Hz/20 – 20kHz		1	AO1 4.6.1.4
11.2	speed = frequency × wavelength		1	AO1 4.6.1.2
11.3	5000 = 400 000 × wavelength wavelength = $\frac{5000}{400000}$ = 0.013 m	do not credit answers with three significant figures (0.0125)	1 1 1	AO2 4.6.1.2

	Answers	Extra information	Mark	AO / Specification reference
11.4	distance = speed × time distance = $5000 \times 8.4 \times 10^{-7}$ = 0.0 042m		1 1	AO1 AO2 4.5.6.1.2
11.5	$\frac{0.0042}{2}$ = 0.0 021 m		1 1	
12.1	$\frac{1.85+2+1.9}{3} = 1.92$		1	AO2 4.7.3.1
12.2	one mark for points correctly plotted one mark for line of best fit		2	AO2 AO3 4.7.3.1
12.3	0.8 V	allow 0.7 – 0.9 V	1	AO2 4.7.3.1
12.4	random error		1	AO3 4.7.3.1
13.1	the atmosphere is assumed to have a constant density so the pressure at a point is due to the weight of air above that point		1 1	AO1 4.5.5.2

	Answers	Extra information	Mark	AO / Specification reference
13.2	as you come down a mountain the height/weight of air above you increases so the pressure increases which is the same when you dive in the ocean but the liquid pressure is much bigger than the atmospheric pressure.		1 1 1 1	AO1 AO2 4.5.5.2 4.5.5.1.2
13.3	$\frac{\text{density of water}}{\text{density of air}} = \frac{84}{0.1}$ = 840 water is 840 times denser than air		1 1	AO2 4.5.5.2 4.5.5.1.2
14.1	diagram with 4 arrows: vertical arrow down: weight/force of gravity on boat vertical arrow up: upthrust/force of water on boat horizontal arrow: thrust opposing horizontal arrow: drag/force of water and air on boat	allow two separate arrows for air/water resistance	 1 1 1 1	AO1 AO2 4.5.1.2 4.5.1.4
14.2	force = mass × acceleration		1	AO1
14.3	3000 = 850 × acceleration $\text{acceleration} = \frac{300}{850}$ = 3.5 m/s^2		1 1 1	AO2 4.5.6.2.2

	Answers	Extra information	Mark	AO / Specification reference
14.4	force = mass × acceleration = 2.7 × 850 = 2295 N (2300) resultant force = engine force - drag force 2295 = 3000 - drag force drag force = 3000 - 2295 = 705 N = 710 N (two significant figures)		1 1 1 1 1	AO1 AO2 4.5.6.2.2
14.5	final velocity^2 – initial velocity^2 = 2 × distance × acceleration $(14)^2 - (0)^2 = 2 \times \text{distance} \times 2.7$ $\text{distance} = \frac{196}{2 \times 2.7}$ = 36 m (36.3)	allow $v^2 = u^2 + 2as$	1 1 1	AO2 4.5.6.1.5