AQA GCSE Science Combined Higher

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	clockwise from AB to CD		1	AO2 4.7.2.2 4.7.2.3
01.2	the forces are the same size but in opposite directions/side AB goes up, side CD goes down so the coil spins clockwise		1 1 1	AO2 4.7.2.3
01.3	the current in BC is parallel to the magnetic field Fleming's Left Hand rule says that the current must be perpendicular to the field for a force to act		1 1	AO2 4.7.2.2 4.7.2.3
01.4	the coil has momentum so continues to move until the coil is in contact with the battery again on the other side		1 1	AO2 4.5.7.1 4.7.2.3
02.1	the Earth's magnetic field systematic error		1 1	AO2 4.7.1.2
02.2	subtract the measurement in question **02.1** from each of the readings		1	AO3 4.7.1.2
02.3	the sensor cannot be zero cm from the wire as that would be the centre of the wire/inside the wire		1	AO2 4.7.2.1

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02.4	If quantities are inversely proportional, then doubling one quantity will halve the other When the distance doubles from 1cm to 2cm the magnetic field goes from 0.203 mT for 0.102 mT $\frac{0.102}{0.203} = 0.5$	quote set of two readings from the table	1 1 1	
03.1	a permanent magnet is always magnetic an induced magnet becomes magnetic when it is put in a magnetic field but then loses its magnetism when it is removed from the field		1 1	AO1 4.7.1.1
03.2	yes (it has become an induced magnet) any magnet has a magnetic field around it		1 1	AO1 AO2 4.7.1.1
03.3	left box (closest to screwdriver) 'S', right box 'N'		1	AO2 4.7.1.1
03.4	no it is no longer magnetic when it is removed from the magnetic field		1 1	AO2 4.7.1.1
04.1	independent: material of the core dependent: mass of iron filings		1 1	AO2 4.7.2.1
04.2	number of turns in the solenoid/coil current in the wire		1 1	AO2 4.7.2.1
04.3	nickel alloy second measurement/1.0 g for nickel alloy they did not include it		1 1	AO3 4.7.2.1

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04.4	largest to smallest measurements = 1.38 – 1.20 = 0.18 g uncertainty = $\frac{0.18g}{2}$ = ± 0.09 g		1	AO1
04.5	bar chart the independent variable is categoric		1	AO2
04.6	nickel is a magnetic material if a magnetic material is used as a core it (significantly) increases the strength of the electromagnet the mass of iron filings picked up was very small so the amount of nickel in the alloy is very small		1 1 1	
05.1	the wire will get hot when it is connected to the battery only connect the wire for short periods of time		1 1	AO2 AO3 4.7.2.1
05.2	magnetic field lines with the same shape as that of a bar magnet with field lines through the middle as well		1	AO1 4.7.2.1
05.3	solenoid two it has more turns/coils		1 1	AO2 4.7.2.1
05.4	the compass needle does not move as all of the field lines are pointing in the same direction and the compass follows the direction of the field lines		1 1	AO2 4.7.2.1
06.1	a region where a magnetic material experiences a force **or** a region around a magnet where magnetic forces act		1	AO1 4.7.1.2

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06.2	one mark for arrows on lines pointing away from poles one mark for shape of field		2	AO1 4.7.1.2
06.3	the magnetic field lines are close together	do not accept 'there are more magnetic field lines'	1	AO1 4.7.1.2
06.4	halfway between P and Q the force exerted by each magnet is the same closer to P the force on the object depends on the distance from the poles the force byP is smaller, so the object needs to be closer		1 1 1 1 1	AO3 4.7.1.2
07.1	speed = $\frac{\text{distance}}{\text{time}}$ $3\times10^8 = \frac{\text{distance}}{2}$ distance travelled by radio waves = $3\times10^8 \times 0.2$ $= 6\times10^7$ m distance to asteroid = $\frac{6\times10^7}{2} = 3\times10^7$ m		1 1 1	AO2 4.5.6.1.2
07.2	the range of values within which the true value lies		1	AO1
07.3	measure the distance to the object after a certain time interval find the difference distance divide by the time between the pulses		1 1 1	AO3 4.5.6.1.2

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08.1	the motor effect/there is a force on a current carrying conductor in a magnetic field		1	AO2 4.7.2.2
08.2	the field around a magnet gets weaker as you move away the field is not strong enough to produce a force		1 1	AO2 4.7.1.2
08.3	place the magnetic field sensor a distance from the foil, then measure the distance and magnetic field strength move the sensor, measure the distance and magnetic field again make repeat measurements of the field at all the distances		1 1 1	AO1 4.7.2.1
08.4	a graph showing a negative relationship the graph shows that as distance increases, magnetic field strength decreases	accept straight or curved line with negative gradient	1 1	AO2 4.7.2.2
09.1	(towards) north/the north magnetic pole of the Earth there is a magnetic field around the Earth	further possible explanation: there is a gigantic south pole at magnetic north so the compass arrow head which is a N pole is attracted to the gigantic S pole at magnetic north	1 1	AO1 AO2 4.7.1.2

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09.2	the magnetic field around the wire is stronger than the magnetic field of the Earth the needle of the compass changed direction when the current was switched on		1 1	AO1 AO2 4.7.1.2
09.3	a compass needle is a magnet		1	AO1 4.7.1.2
10.1	geographic north is a point about which Earth spins magnetic north is the point to which a compass points		1 1	AO1 4.7.1.2
10.2	he used a compass to look at the direction in which the compass points as he moved it around the model of the Earth		1 1	AO3 4.7.1.2
10.3	new evidence/data show that old models are incorrect and need to change		1 1	AO2 4.7.1.2
10.4	so that other scientists can see/check/use their work/peer review		1	AO1 4.7.1.2
11.1	ultraviolet light has a range of wavelengths/there is a band of frequencies that we call ultraviolet light		1	AO1 4.6.2.1
11.2	red light has a lower frequency red light has a longer wavelength	accept converse	1 1	AO1 AO2 4.6.2.1

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11.3	increase the risk of (skin) cancer **or** causes premature aging	accept DNA damage/mutation	1	AO1 4.6.2.3
11.4	correct use e.g., • tanning • checking for forgeries • killing insects	accept alternative correct suggestions	1	AO1 4.6.2.4
12.1	acceleration = $\frac{\text{change in velocity}}{\text{time}}$	accept a = $\frac{\Delta v}{t}$	1	AO1 4.5.6.1.5
12.2	acceleration = $\frac{2.7 - 0.5}{0.4}$ = 5.5 m/s^2		1 1	AO2 4.5.6.1.5
12.3	force = mass × acceleration	accept F = ma	1	AO1 4.5.6.2.2
12.4	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
12.5	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