AQA Style

GCSE
COMBINED SCIENCE: TRILOGY

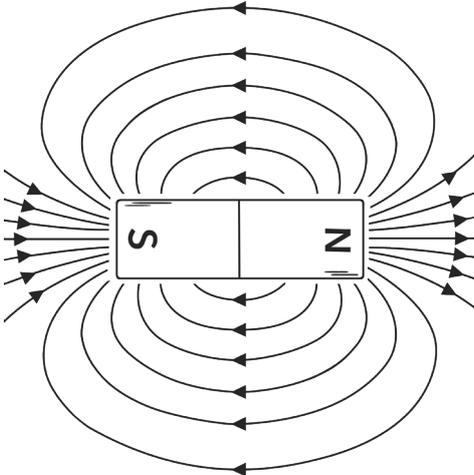Foundation Tier   Physics Paper 2

F

Mark Scheme

Question	Answers	Extra Information	Mark
01.1	**Letter** **Wave** A → (crossed to ultraviolet) B → (crossed to microwave) microwave ripple sound ultraviolet	**1** mark for each correct line. If more than one line is drawn from one box, award no marks for that box.	2
01.2	Any **one** from: • radio waves • microwaves • infrared • visible light		1
01.3	Any **one** from: • gamma rays • x-rays • ultraviolet		1
01.4	X		1
01.5	1 5	Answers in this order only.	1 1
01.6	1.1 × 4 = 4.4 (m/s)	An answer of 4.4 (m/s) with no working shown scores **2** marks.	1 1
Total			9

Question	Answers	Extra Information	Mark
02.1	3N	If more than one box is ticked, award no marks.	1
02.2	to the right	If more than one box is ticked, award no marks.	1
02.3	(dog 1) will accelerate/move/fall to the left/backwards		1
02.4	weight	Allow gravity/gravitational force.	1
02.5	the force of gravity/downward force is larger than air resistance/drag/upward force		1
02.6	0 (N)		1
Total			6

BEYOND SCIENCE

Question	Answers	Extra Information	Mark
03.1	iron	If more than one box is ticked, award no marks.	1
03.2	induced	If more than one box is ticked, award no marks.	1
03.3	place the compass near to the magnet and mark the direction (that the compass points)		1
	repeat in multiple places between the two poles then join the points up to show the field lines	Allow use of multiple compasses.	1
03.4	correctly drawn field lines on more than one side of the magnet arrow**s** to show the correct direction		1 1
03.5	X placed at one or both poles of the magnet	Do **not** allow an X drawn anywhere other than the poles.	1
Total			7

Question	Answers	Extra Information	Mark
04.1	evidence of subtraction of one length from another extension = 2 (cm)		1 1
04.2		If more than one line is drawn from a box, then award no marks for that box.	3
04.3	10.1 (cm)	An answer of 10.13… scores **1** mark. Accept answer written in the table instead of on the answer line.	2
04.4	circle around 12.0	Accept a clear indication that repeat 2 for a force of 3N has been selected.	1
04.5	the student measured the total length of the spring instead of the extension	Accept student did not calculate/work out extension.	1
04.6	a ruled line that ignores the anomalous result at 3N		1
04.7	force = spring constant × extension	Allow any correct rearrangement. Allow $F = k\,e$	1

Question	Answers	Extra Information	Mark
04.8	2 = 0.04 × spring constant	Values substituted into equation correctly.	1
	(spring constant =) $\dfrac{2}{0.04}$	Correct transformation.	1
	50 (N/m)	An answer of 50 (N/m) with no working shown scores **3** marks. Award **2** marks for $\dfrac{2}{0.04}$ without the first step.	1
Total			14

Question	Answers	Extra Information	Mark
05.1	(weight =) 1200 × 9.8	An answer of 11 760 (N) with no working shown scores **2** marks.	1
	11 760 (N)		1
05.2	work done = force × distance	Allow any correct rearrangement. Allow $W = fs$	1
05.3	(work done =) 11 760 × 5	Allow ecf from **05.1**	1
	58 800	An answer of 58 800 with no working shown scores **2** marks.	1
	J		1
05.4	an electromagnet can be turned on and off by switching the current on and off	Allow the electromagnet is <u>only</u> on/magnetic or will <u>only</u> pick up cars when the circuit is complete/when the current flows for **2** marks.	1
			1

Question	Answers	Extra Information	Mark
05.5	**Level 3:** There is a clear description of how the electromagnet is made **and** the number of coils is varied **and** the paperclips are counted. Steps are logically ordered and could be followed to obtain valid results. For six marks at least one additional detail is included, e.g. controls or processing data.		5-6
	Level 2: There is a clear description of how the electromagnet is made **and** the number of coils is varied **or** the paperclips are counted. For four marks at least one additional detail is included, e.g. controls or processing data		3-4
	Level 1: There are simple statements that describe how to make or use the electromagnet. Two marks can be given for two valid statements.		1-2
	No relevant content.		0
	Indicative content **Making the electromagnet:** • The wire is wrapped around the iron core/nail. • The wire is connected to the power supply/battery. • The power supply is switched on/current flows through the wire. **Using the electromagnet:** • The electromagnet is used to pick up paperclips. • The number of paperclips that the electromagnet holds is counted **or** the distance between the electromagnet and the paperclip when it is attracted is measured using a ruler. • The number of turns/coils/times the wire is wrapped around the nail is changed. • At least three different values for the number of turns on the coil are given, e.g. 5 coils, 10 coils, 15 coils. **Additional details:** • Measurements are repeated for each number of coils. • Control variables are mentioned, e.g. same size current, potential difference, same nail, identical paper clips, same length/resistance of wire. • The data is processed. A mean could be calculated or a graph of number of coils against number of paperclips drawn.		
Total			14

Question	Answers	Extra Information	Mark
06.1	measure the time taken from seeing the rock hit the water to hearing the sound		1
	$$\text{speed} = \frac{\text{distance travelled}}{\text{time}}$$	Allow a description of the calculation in words. Allow 5m for distance travelled.	1
06.2	the oscillations/vibrations of longitudinal waves are parallel to the direction of energy transfer	Allow direction of travel for energy transfer.	1
	the oscillations/vibrations of transverse waves are perpendicular to the direction of energy transfer	Allow direction of travel. If no other mark is awarded, allow 1 mark for oscillations/vibrations of longitudinal waves are parallel and oscillations/ vibrations of transverse waves are perpendicular.	1
06.3	yes/correct conclusion		1
	(because) the lily pad was not carried away from the direction of impact		1
	(so) the water was not moving away from the impact site		1
06.4	4		1
06.5	$$\text{period} = \frac{1}{4}$$	Allow ecf from **06.4**	1
	= 0.25		1
Total			10

BEYOND SCIENCE

Question	Answers	Extra Information	Mark
07.1	**Level 2:** There is a description of the motion of the car in at least two sections of the graph. For four marks, there must be data from the graph included in the answer.		3-4
	Level 1: There are simple statements that describe the motion of the car. Two marks can be given for two valid statements.		1-2
	No relevant content.		0
	Indicative content **Between A and B:** • the car moves at a constant speed • for 30s/280m/at 9.3m/s (280/30) • away from its starting position **Between B and C:** • the car is stationary • (so) the car's speed is 0 m/s/for 30s **Between C and D:** • the car is moving at a constant speed • for 30s/260m/at 8.7m/s (260/30) • away from its starting position **Between D and E:** • the car moves at a constant speed • for 60s/540m/at 9m/s (540/60) • towards its starting position		

BEYOND SCIENCE

Question	Answers	Extra Information	Mark
07.2	the distance the car travels under the braking force/braking distance		1
07.3	Any **two** from: • tiredness • drugs • alcohol • named distractions i.e. use of mobile phone • speed of the car		2
07.4	acceleration = $\dfrac{\text{change in velocity}}{\text{time taken}}$		1
07.5	(deceleration =) $\dfrac{17}{3.4}$ = 5 (m/s^2)	An answer of 5 (m/s^2) with no working shown scores **2** marks.	1 1
Total			10