Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	S N	allow s or south north	(1)

Question number	Answer	Additional guidance	Mark
(ii)	an explanation linking two from (strength of magnetic) field /force (1) (depends on) distance from the magnet (1)	 (magnets) attract / repel force / field is weaker when further away (from magnet) or reverse argument lines of force are further apart	(2)

Question number	Answer	Additional guidance	Mark
(iii)	a description to include four from move brick towards the car (1) until car (just) starts to move (1) measure distance of brick from car/magnet (1) repeat with 2 magnets (1) compare distances (for one magnet and for two magnets) (1) detail about procedure (1) conclusion or prediction (1)	 change distance between car and brick measure how close car gets to the brick how to attach second magnet(s) how to measure distance where to measure take several readings and find average if distance is bigger then it works	**(4)**

Q2.

Question number	Answer	Additional guidance	Mark
(i)	the Earth/world/planet has a magnetic field / core(1)	Earth/world/planet has a north (and south) pole	**(1)** **AO3**

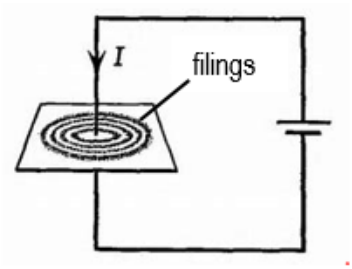
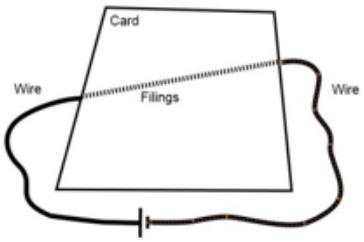
Question number	Answer	Additional guidance	Mark
(ii)	direction (of the field) has changed / rotated (1) (strength of the) field has **increased** (1)	(from 0 to) 36° from N to NE field is stronger (changed by) 16.52 (μT) numbers have increased (from 46.67 to 63.19)	**(2)** **AO3**

Question number	Answer	Additional guidance	Mark
(iii)	a description including **three** from use of equipment to measure distance (1) ruler / tape measure obtain a measurement (1) measure / record strength of the field (at a certain point) change the conditions (1) move the phone / magnet (to a different location) process the results (1) e.g. • draw a diagram • make a table • compare results/values • see when (field) stays constant	 measure the distance between phone and magnet rotate the phone/magnet	**(3)** **A03**

Q3.

Question number	Answer	Mark
	An answer that provides a description by making reference to: • (P) moves / spins (1) • (the two S-poles) repel / N(-pole) and S(-pole) attract (1)	**(2)**

Q4.

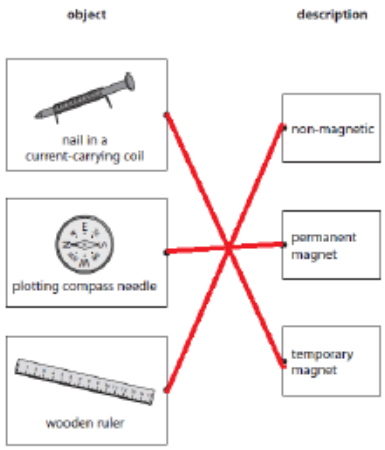
Question Number	Answer	Additional guidance	Mark
	An answer that combines four of the following points. MP1: Put wire {through card / near card / under card / over card / round rolled up card} (1) MP2: Put iron filings on card / around wire (1) MP3: Connect wire to power pack One wire is acceptable (1) MP4: Switch on or reference to current / charges flowing (in wire) NOT in filings (1) MP5: Filings attracted / moving / see if wire attracts filings (1) MP6: Pattern seen in filings – circles / lines / onion (1)	IGNORE use of apparatus not specified in the list (Iron nails etc)   marking points can be scored from a diagram filings show shape of field	**(4)**

Q5.

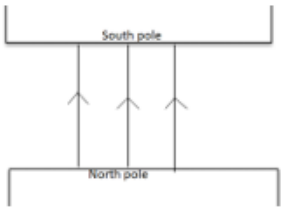
Question number	Answer	Additional guidance	Mark
i	circle shown around wire (1)	allow tolerance for translation of 3D to 2D ignore any multiplicity of those circles	**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
ii	arrow indicating a clockwise direction (for magnetic field line drawn for i) (1)		**(1)** **AO1**

Q6.

Question number	Answer	Additional guidance	Mark
		three links correct (2) one link correct (1)	**(2)** **AO1**

Q7.

Question Number	Answer	Additional guidance	Mark
	 MP1: any (vertical) line from pole to pole (1) MP2: at least two further equidistant straight, (vertical) lines from pole to pole (1) MP3: arrow on any line, north to south (1)	ignore lines outside of the magnets for MP1 and MP2 judge by eye any arrow south to north, no mark awarded for MP3	**(3)**

Q8.

Question number	Answer	Additional guidance	Mark
	an explanation linking any **two** of steel is magnetic (material) (1) aluminium is non-magnetic (material) (1) steel falls into container A / aluminium falls into container B (1)	 steel attracted / sticks to / carried round by magnet/roller) is not attracted / does not stick (to magnet roller) steel cans are carried further round than aluminium and fall into A steel hangs on for longer / aluminium falls quicker	**(2)**

Q9.

Question Number	Answer	Mark
	C cobalt **C** is the only correct answer. **A** is incorrect because aluminium is not magnetic. **B** is incorrect because carbon is not magnetic. **D** is incorrect because copper is not magnetic.	**(1)**

Q10.

Question number	Answer	Mark
	B copper	**(1)**

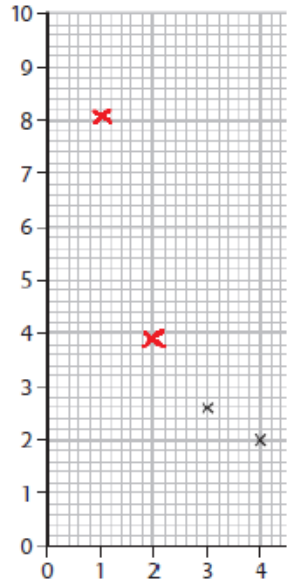
Q11.

Question Number:	Answer	Mark
	B | small | large **The only correct answer is B** ***A*** *is not correct because the current is small* ***C*** *is not correct because the distance from the wire is large* ***D*** *is not correct because the distance from the wire is large*	**(1)** AO 1 1

Q12.

Question Number:	Answer	Additional guidance	Mark
	a description to include: remove the magnet (from the paper clips)(1) paperclips no longer attracted to each other (1)	 accept no longer magnetic	**(2)** AO 3 1a AO 3 1b

Q13.

Question number	Answer	Additional guidance	Mark
i	 One mark for each point plotted correctly, to within ± 1 small square		**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
ii	smooth curve drawn fitting the plotted points (1)	judge by eye	**(1)** **AO2**

Question number	Answer	Additional guidance	Mark
iii	substitution using an attempt at calculation – any subtraction seen (1) e.g. 2(.0) – 1(.0) evaluation (1) (-) 1(.0) (mT)	 accept any number that rounds to 1.0 award full marks for correct answer without working	**(2)** **AO3**

Question number	Answer	Mark
iv	(size of) current	**(1)** **AO1**

Q14.

Question number	Answer	Additional guidance	Mark
(i)	An answer that provides a description by making reference to: • concentration/density (of iron filings) (1) • greatest at strongest field (1)	 (filings) close together / bunched up	**(2)**

Question number	Answer	Mark
(ii)	An answer that combines the following points to provide a logical description of the method: • use of (plotting) compass(es) (1) • (place) at various different points (around the magnet) (1) • the direction is the way the compass points (1)	**(3)**

Q15.

Question Number:	Answer	Additional guidance	Mark
	a description to include: use a compass (1) always points in the same direction / will point north (1)	 accept reasonable alternatives such as suspended magnet needles on cork in water	**(2)** AO 3 2a

Q16.

Question number	Answer	Additional guidance	Mark
(i)	(soft) iron (1)	allow (in this context) nickel (alloys) cobalt steel	**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
(ii)	would be magnetised (when switch is closed) (1) would be demagnetised when switch is open (1)	(is) magnetic (is) electromagnetic induced magnetism magnetism can be switched off accept for either mark not permanent magnet **or** temporary magnet	**(2)** **AO1**

Q17.

Question Number:	Answer	Mark
	B iron **The only correct answer is B** ***A*** *is not correct as copper is non-magnetic* ***C*** *is not correct as plastic is non-magnetic* ***D*** *is incorrect, as steel is only suitable for a permanent magnet*	**(1)** AO 1 1

Q18.

Question Number:	Answer	Additional guidance	Mark
(i)		N must be at the end of the bar, not at the end of the compass needle	**(1)** AO 3 3a

Question Number:	Answer	Additional guidance	Mark
(ii)	any two developments from: use a compass in various positions / more compasses (1) plot more points/mark direction of compass(point)/ join the dots (1) sprinkle/add iron filings (1) give more than one (magnetic field) line (1)	marks can be taken from text or diagram allow 'around' 'on', 'near' the magnet etc series of dots / several compasses end to end	**(2)** AO 3 3a