Mark Scheme

Q1.

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)**

Q2.

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

Q3.

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

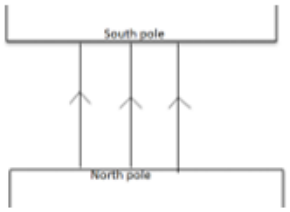
Q4.

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

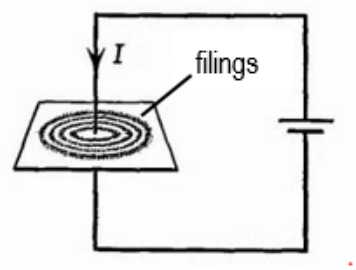
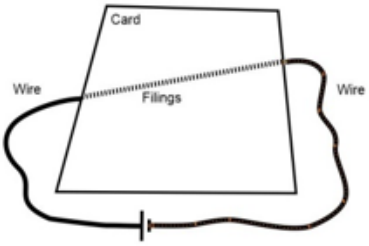
Q5.

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

Q6.

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)**

Q7.

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)

Q8.

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

Q9.

Question Number:	Answer	Additional Guidance	Mark
	a description to include: method of producing temporary induced magnetism (1) method of demonstrating the magnetic properties of the temporary magnet (1) method of demonstrating magnetic effect is temporary (1)	 place iron near / in contact with magnet / in magnetic field OR use magnet to pick up one paper clip OR use magnet to make iron a temporary magnet paper clip(s) attracted to iron OR use first paper clip to pick up another paper clip remove magnet and paper clips no longer attracted / fall off OR wait some / short time and iron bar no longer picks up / attracts paper clips	**(3)** AO 1 2

Q10.

Question Number	Answer	Mark
(i)	**The only correct answer is A**  **B is incorrect** because it is not tangential to the (circular) magnetic field lines produced by the current **C is incorrect** because it is not tangential to the (circular) magnetic field lines produced by the current **D is incorrect** because it is not tangential to the (circular) magnetic field lines produced by the current	(1)

Question Number	Answer	Additional guidance	Mark
(ii)	A description of the method that includes: **EITHER** (using single compass) record field at one location (1) find how field continues (1) connect the dots (to reveal overall shape of field / line) (1) **OR** arrange multiple compasses (1) over all of the card (1) direction of (all of) the compass needles indicates shape of field (1)	Marking points may be awarded from a diagram. mark where compass points **or** put dots at each end of needle / arrow move compass to new position / until needle over previous dot start from different position and repeat (idea of obtaining concentric circles) all the way round the wire	(3)

	OR sprinkle iron filings on card (before current is switched on) (1) switch on current/ tap card (1) pattern produced indicates shape of field (1)	 allow iron filings to arrange themselves	

Q11.

Question Number:	Answer	Additional Guidance	Mark
(i)	a description to include 4 of the following: • note position of pointer before current is switched on (1) • measure position of pointer when current in coil (1) • (use an ammeter to) measure current (1) • calculate the extension / stretch of the spring (1) • use force (of attraction) is proportional to extension / stretch (of spring) (1) • repeat with different currents (1)	 measure length of spring before current is switched on how far nail moves calculate force from spring constant and extension calibrate spring increase the current calculate the extension of the spring using new position of pointer minus starting position of pointer is worth 3 marks	**(4)** AO 2 2

Question Number:	Answer	Additional Guidance	Mark
(ii)	select and substitute (1) (E =) ½ x 24 x 0.12^2 evaluation (1) (E =) 0.17 (J)	 ½ x 24 x 12^2 max 1 mark accept answers that round down to 0.17 e.g. 0.1728 POT error (e.g. 1728) max 1 mark award full marks for correct answer without working	**(2)** AO 2 1