MARK SCHEME – Magnetism and Electromagnets

Year 9 Physics | Total: 45 marks

A semicolon (;) separates marking points. **allow** = accept this answer; **do not allow** = do not give credit. Accept any other correct scientific answer.

Q	Answer	Marks	Guidance
1	repel; attract; north; south; steel	5	In this order. copper and push not used
2	(a) attract; (b) repel; (c) repel	3	1 mark each
3(a)	closed curved lines from one end of the magnet to the other; lines closer together at the poles; arrows pointing from N to S	3	lines must not cross; at least 4 lines
3(b)	at the poles / ends	1	
3(c)	plotting compass	1	allow: compass
3(d)	steel paperclip and nickel coin	1	both needed
4(a)	iron	1	
4(b)	any two: more turns of wire; more cells / bigger current; use a thicker iron core	2	do not allow: bigger nail made of copper
4(c)	it can be switched off; so the car can be dropped / released	2	allow: strength can be changed for 1 mark
5(a)	number of turns (of wire)	1	
5(b)	number of paperclips picked up	1	
5(c)	any two: same current / number of cells; same core (nail); same size / type of paperclips; same wire	2	
5(d)	40 turns (7 paperclips)	1	
5(e)	more turns, more paperclips picked up	1	allow: about 3 more paperclips for every 10 turns
5(f)	18	1	allow: 17 to 19
6(a)	both have N and S poles / both attract magnetic materials / both have a magnetic field	1	
6(b)	electromagnet can be switched off (permanent magnet cannot) / electromagnet strength can be changed / electromagnet needs a current	1	
7(a)	the Earth has a magnetic field; the needle lines up with it	1	allow: Earth acts like a giant bar magnet
7(b)	iron	1	allow: iron and nickel
8	Crane: electromagnet; Fridge magnet: permanent; Door bell: electromagnet; Compass: permanent	2	All 4 correct = 2 marks; 2 or 3 correct = 1 mark
9(a)	like poles face each other; so they repel / push apart and lift the train	2	
9(b)	less friction; so it can go faster / is quieter / less wear	1	any one
10(a)	the electromagnet is switched on / becomes magnetic; and attracts the iron armature (which carries the hammer)	2	

10(b)	iron is a magnetic material (copper is not)	1	
10(c)	it springs back / is no longer attracted	1	
11(a)	circles around the wire	1	allow: rings / concentric circles
11(b)	the direction of the field reverses	1	
11(c)	the fields from each turn add together	1	
11(d)	it picks up more paperclips; because the current is bigger	2	
11(e)	the wire / cells get hot / could burn / cells run down quickly	1	
	Total	**45**	