Forces MS

Q1 (1 mark)
A push or pull (1)

Q2 (1 mark)
Newton / N (1)

Q3 (1 mark)
Friction (1)

Q4 (1 mark)
Moment (1)

Q5 (1 mark)
Gravity / gravitational force (1)

Q6 (2 marks)
Any two:
Gravity (1)
Magnetic force (1)
Electrostatic force (1)

Q7 (2 marks)
Any two:
Change speed (1)
Change direction (1)
Start moving (1)
Stop moving (1)
Change shape (1)

Q8 (2 marks)
Forces are equal and opposite (1)
Object stays still or continues at constant speed (1)

Q9 (1 mark)
Any one:
Newton meter (1)
Force meter (1)
Ruler (1)

Q10 (2 marks)
Any two:
Air resistance (1)
Water resistance (1)
Drag (1)

Q11 (3 marks)
Balanced forces are equal in size (1)

Act in opposite directions (1)
Unbalanced forces cause motion/change in motion (1)

Q12 (3 marks)
Arrows show direction of force (1)
Longer arrows show larger forces (1)
Opposite arrows can show balanced forces (1)

Q13 (3 marks)
Friction acts between surfaces (1)
Opposes motion (1)
Can slow objects down (1)

Q14 (3 marks)
Force causes spring to stretch (1)
Extension increases as force increases (1)
Spring returns to original shape if not overstretched (1)

Q15 (2 marks)

Two from:
Extension is proportional to force (1)
Only applies before limit of proportionality (1)
Straight-line relationship (1)

Q16 (3 marks)
Moment is turning effect of force (1)
Larger force gives larger moment (1)
Greater distance from pivot increases moment (1)

Q17 (4 marks)
Three from:

Air/water particles push against object (1)
Force opposes motion (1)
Known as resistance/drag (1)
Greater speed increases resistance (1)

Q18 (4 marks)
Forces are balanced (1)
Resultant force is zero (1)
Box will not accelerate (1)
Box stays still or moves at constant speed (1)

Q19 (4 marks)
Greater force produces greater extension (1)
Relationship is proportional at first (1)

Straight-line graph produced (1)
Eventually spring may not obey Hooke's Law - graph begins to curve (1)

Q20 (4 marks)
Handle is further from pivot/hinges (1)
Larger moment produced (1)
Less force needed to turn door (1)
Door rotates more easily (1)

Q21 (5 marks)
Gravity pulls parachutist downward (1)
Air resistance acts upward (1)
At first gravity is greater (1)
Speed increases (1)
Eventually forces become balanced/terminal velocity (1)

Q22 (5 marks)
Braking force acts opposite motion (1)
Friction between brakes and wheels (1)
Resultant force backwards (1)
Car slows down (1)
Eventually car stops (1)

Q23 (4 marks)

Four from:

Magnet exerts non-contact force (1)
Iron nails are attracted (1)
Magnetic field causes force (1)
Nails may become temporarily magnetised (1)
Force acts at a distance (1)

Q24 (6 marks)

Level 1 (1–2 marks)
Basic statements about forces (1–2)
Names a contact or non-contact force (1–2)

Level 2 (3–4 marks)
Contact forces act when objects touch (1)
Non-contact forces act at a distance (1)
Gives examples of both types of force (1)
Some explanation of effects on objects (1)

Level 3 (5–6 marks)
Contact forces require objects to touch (1)
Examples include friction, air resistance or tension (1)

Non-contact forces act without touching (1)
Examples include gravity, magnetic and electrostatic forces (1)
Both types of force can change motion or shape (1)
Clear comparison between contact and non-contact forces (1)

Model Answer:
Contact forces act when two objects touch each other. Examples include friction, air resistance and tension. These forces can slow objects down or change their shape. Non-contact forces act at a distance without objects touching. Examples include gravity, magnetic forces and electrostatic forces. Both contact and non-contact forces can change the speed, direction or shape of objects.

Q25 (6 marks)

Level 1 (1–2 marks)
Basic list of equipment or simple method (1–2)
Mentions spring or force (1–2)

Level 2 (3–4 marks)
Identifies key apparatus (1)
Describes a basic method (1)
Identifies some variables (1)
Mentions measuring extension or force (1)

Level 3 (5–6 marks)
Clear method using increasing weights and measuring extension (1)
Correct identification of independent and dependent variables (1)
Mentions control variables (e.g. same spring, ruler position) (1)
Results recorded in a table and possibly graph drawn (1)
Safety considerations included (e.g. weights falling, eye protection) (1)
Correct prediction that extension is proportional to force (1)

Model Answer:

You will need a clamp stand, spring, ruler, and a set of weights. The spring is attached to the clamp stand and the ruler is placed next to it to measure extension. A known weight is added to the spring and the new length is recorded. This is repeated by increasing the weight in equal steps. The independent variable is the force (weight added), and the dependent variable is the extension of the spring. Control variables include using the same spring, keeping the ruler in the same position, and measuring from the same starting point. Results should be recorded in a table and can be plotted on a graph of force against extension. Safety is important as weights should not be dropped and care should be taken to avoid injury. The expected pattern is that extension increases

proportionally with force, producing a straight-line graph up to the limit of proportionality.