

1.1 Forces interactions and motion

Name: _____ Class: _____ Date: _____

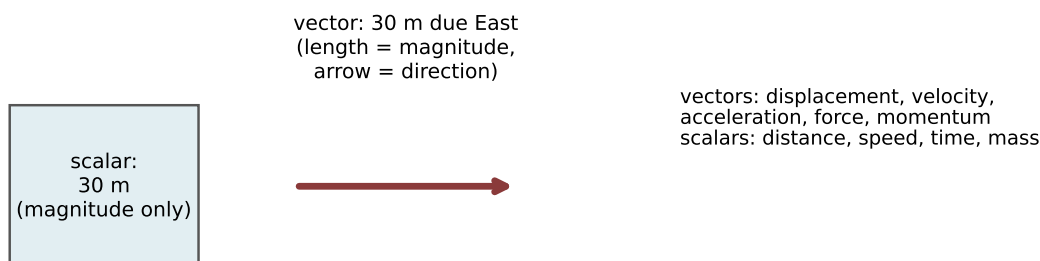
Total: 21 marks

Objective

Cover forces, interactions and motion (3.1.1–3.1.3): contact and field forces, scalars and vectors, weight $W = mg$, elastic distortion with $F = ke$, distance–time and velocity–time graphs, and Newton’s three laws with $F = ma$. Original practice for OxfordAQA 9203 topic 3.1.

1 Key knowledge and worked examples

■ Interactions and vectors



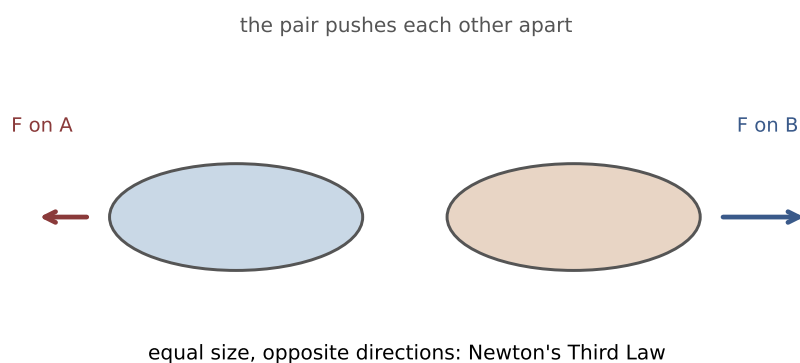
Non-contact: gravity, electrostatic, magnetic. Contact: friction, air resistance, tension, normal. Weight: $W = mg$.

■ Springs and graphs

$F = ke$ below the limit of proportionality; beyond it the distortion becomes inelastic (P). Distance–time gradient = speed; velocity–time gradient = acceleration, area = distance.

Worked check. A 3 kg mass at $g = 10 \text{ N/kg}$ hangs from a spring of $k = 60 \text{ N/m}$: $F = 30 \text{ N}$, extension $e = 30/60 = 0.5 \text{ m}$.

■ Newton's laws



2 Practice

2.1 Give one contact force and one non-contact force. [2]

2.2 Which two of these are vectors: mass, velocity, distance, acceleration? [2]

2.3 Calculate the weight of a 12 kg dog at $g = 10 \text{ N/kg}$. [2]

2.4 A spring stretches 4 cm under a 6 N load. Calculate k in N/m . [3]

2.5 State what the gradient and the area represent on a velocity–time graph. [2]

3 Exam-style questions

3.1 A cyclist accelerates from 4 m/s to 12 m/s in 8 s. Calculate the acceleration and the distance travelled. [4]

3.2 A 1200 kg car has a driving force of 3000 N and resistive forces of 600 N. Calculate its acceleration. [3]

3.3 Describe how two coplanar forces of 30 N East and 40 N North may be combined by scale drawing, and state the resultant's size. [3]
