

Newton's First and Second Laws

Chapter 8: Force and Laws of Motion · Topic 1

Key Concept

Inertia is the natural tendency of an object to resist a change in its state of motion, and it is directly proportional to an object's mass — heavier objects have more inertia and are harder to start or stop moving. Newton's Second Law explains why the same force produces greater acceleration on a lighter object than a heavier one, and it is used to calculate exact force requirements in engineering, from designing car brakes to calculating rocket thrust needed to reach orbit.

Quick Revision Notes

- Newton's First Law (inertia): objects resist changes to their motion unless acted upon by an unbalanced force.
- Inertia is proportional to mass — heavier objects have more inertia.
- Newton's Second Law: $F = ma$ (Force = mass $\times$ acceleration).
- The same force produces greater acceleration on a lighter object than a heavier one.

Practice Questions

- 1 Calculate the force needed to accelerate a 5kg object at 2 m/s^2 .
- 2 Explain why a heavier object is harder to push into motion than a lighter one.
- 3 Give a real-life example that demonstrates Newton's First Law (inertia).