Newton's laws and terminal velocity

Name _____ Class _____ Date _____

Newton's three laws explain how forces affect motion, from cars to skydivers.

KEY IDEAS

- **First law**: if the resultant force is zero, a stationary object stays still and a moving object keeps the same velocity.
- **Second law**: F = ma. Acceleration is proportional to the resultant force and inversely proportional to mass.
- **Third law**: when two objects interact, they exert equal and opposite forces on each other.

Section A · Recall and calculate

Grade 4–5

1 State Newton's First Law. [2]

2 Calculate the resultant force needed to accelerate a 1200 kg car at 2.5 m/s². [2]

3 A 60 N resultant force acts on a 15 kg trolley. Calculate its acceleration. [2]

Section B · Apply

Grade 5–6

4 A person pushes against a wall with a force of 200 N. Describe the force the wall exerts on the person. [2]

5 Describe how a skydiver reaches terminal velocity after jumping from a plane. [4]

Section C · Stretch

Grade 7+

6 Explain what is meant by inertial mass. (Higher) [2]

Exam-style question

AQA style

7 A student investigates how the force on a trolley affects its acceleration, using masses on a string over a pulley.

a Explain why the student moves masses from the trolley to the hanger to increase the force. [2]

b Suggest why light gates give better results than a stopwatch. [1]

c State the relationship the student should find between force and acceleration. [1]

d With a resultant force of 1.2 N, the trolley's acceleration is 0.8 m/s². Calculate the total mass being accelerated. [2]

e The student now keeps the force at 1.2 N and adds masses to the trolley. Describe how the acceleration changes as the mass increases. [2]

Total: _____ / 22

How confident am I?	Not yet	Nearly	Got it
I can state and apply Newton's three laws	☐	☐	☐
I can use F = ma	☐	☐	☐
I can explain terminal velocity	☐	☐	☐