Momentum

Name _____ Class _____ Date _____

Every moving object has **momentum**. In a closed system, momentum is conserved in collisions and explosions.

KEY EQUATION

$$p = m v$$

p = momentum (kg m/s)
m = mass (kg)
v = velocity (m/s)
In a closed system, total momentum before = total momentum after.

WORKED EXAMPLE

A 2 kg trolley moves at 3 m/s.
p = 2 × 3 = **6 kg m/s**

Section A · Recall and calculate

Grade 5–6

1 Calculate the momentum of a 70 kg runner moving at 5 m/s. [2]

2 State the law of conservation of momentum. [2]

3 Explain why momentum is a vector quantity. [1]

Section B · Collisions

Grade 6–7

4 A 3 kg trolley moving at 4 m/s collides with a stationary 1 kg trolley. They stick together. Calculate their velocity after the collision. [4]

5 A 0.02 kg bullet is fired at 400 m/s from a 4 kg rifle. Calculate the recoil velocity of the rifle. [3]

Section C · Physics only

Grade 7+

6 A 0.15 kg ball moving at 20 m/s is caught and stopped in 0.1 s. Calculate the average force on the hand. [3]

Exam-style question

AQA style

7 Cars have safety features such as crumple zones, seat belts and air bags.

a Explain how these features reduce the force on a passenger in a crash. [4]

b Give one other example of a safety feature that works in the same way. [1]

Total: _____ / 20

How confident am I?	Not yet	Nearly	Got it
I can use p = mv	☐	☐	☐
I can use conservation of momentum in collisions	☐	☐	☐
I can explain safety features using rate of change of momentum	☐	☐	☐