

How momentum is conserved in collisions

Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test checks momentum, conservation in collisions and explosions, impulse and safety. Answer every question, show your working and include units. The total is 20 marks. Use $g = 9.8$ N/kg where needed and a calculator.

Level: Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** HS-PS2-2, HS-PS2-3

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Momentum basics (2 marks)

- Define momentum. (1 mark)
- State its SI unit. (1 mark)

Question 2 Tennis ball (2 marks)

A tennis ball of mass 0.058 kg travels at 45 m/s. Calculate its momentum. (2 marks)

Question 3 Locking trolleys (3 marks)

A 4.0 kg trolley moving at 3.0 m/s hits a 2.0 kg trolley at rest and they lock together. Calculate their common velocity. (3 marks)

Question 4 Rifle recoil (3 marks)

A rifle of mass 4.0 kg fires a 0.020 kg bullet at 300 m/s. Calculate the recoil velocity of the rifle. (3 marks)

Question 5 Force on a trolley (3 marks)

A constant force of 30 N acts for 0.40 s on a 6.0 kg trolley that starts at rest.

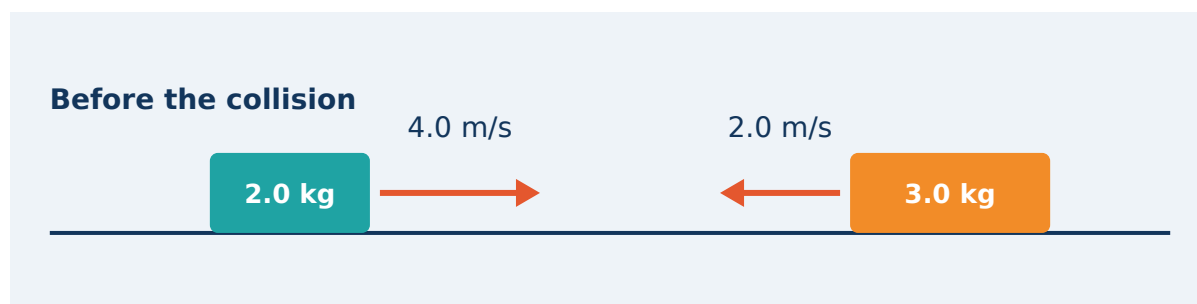
- Calculate the impulse. (1 mark)
- State the change in momentum. (1 mark)
- Calculate the final speed. (1 mark)

Question 6 Airbag (2 marks)

Explain how an airbag reduces the force on a driver in a crash. (2 marks)

Question 7 Opposite directions (3 marks)

Look at the diagram. Take right as positive.



Question 7: two trolleys moving towards each other.

- Calculate the total momentum before. (1 mark)
- The trolleys then lock together. Calculate their combined mass. (1 mark)
- Calculate their velocity after the collision. (1 mark)

Question 8 Catching a ball (2 marks)

Explain why a fielder pulls his hands back while catching a fast cricket ball. (2 marks)