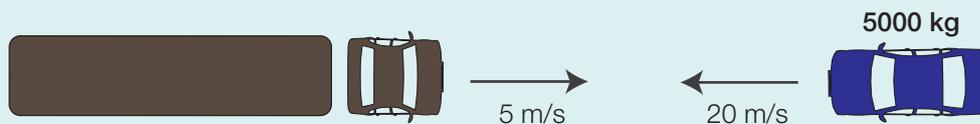


OVERALL MOMENTUM AT AN EVENT IS CONSERVED

Momentum Before Event = Momentum After Event

A 5,000 kg van collides with a heavy lorry head on. Both the car and the lorry stop. Calculate the mass of the lorry which impacts with the car if the car is moving at 20 m/s and the lorry is moving at 5 m/s at time of the crash.



Total momentum before the crash must equal total momentum after the crash. As both vehicles stop the momentum after is zero, so when the crash happens the momentum of the lorry must cancel out the momentum of the van

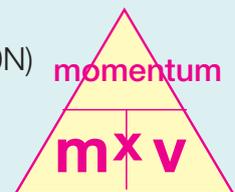
Momentum of van = 5000 kg x 20 m/s = 100,000 kgm/s

The lorry's momentum must equal the momentum of the van (100,000N)

$$\text{Mass} = \frac{\text{momentum}}{\text{speed}}$$

$$\text{Mass} = \frac{100,000}{5}$$

$$\text{Mass} = 20,000 \text{ kg}$$



QUESTIONS

1. Rearrange the momentum equation so you can calculate the velocity of a train carriage with a mass of 50,000 kg and a momentum of 150,000 kgm/s.
2. Calculate the mass of a sports car travelling at 75 km/s with a momentum of 150,000 kgm/s.
3. In an experiment a vehicle carrying a 10,000kg block was driven head on into a vehicle carrying larger mass in the opposite direction. The larger vehicle was driven backwards by the impact. What does this tell us about the 2 vehicles?
4. A child's red trolley toy runs directly into the back of a blue trolley. The momentum Of the red trolley equals 4kgm/s and the mass and speed of the blue trolley are 0.5 m/s and 5 kg. Calculate their combined momentum if the trolleys stick together on impact and continue to move in the same direction?