

Momentum

Momentum is a vector quantity in physics that gives us a measure of how difficult it is to stop something from moving.

Momentum is a VECTOR quantity. So it has a _____ & _____

Since momentum tells us how hard it is to stop something moving then it must depend on the _____ and _____ of the object.

$$p = mv$$



Mass = 6,000 kg Speed = 10 ms⁻¹

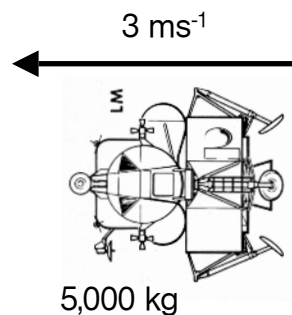
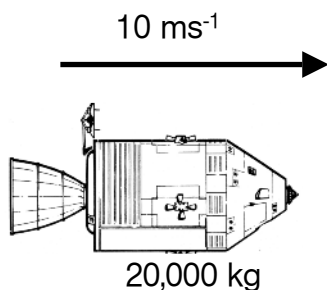


Mass = 60 kg Speed = 5 ms⁻¹



Mass = 0.01 kg Speed = 230 ms⁻¹

Momentum is a vector quantity



Examples.

Find the TOTAL momentum in the following situations.



Mass = 3,000 kg

Velocity = 15 ms⁻¹



Mass = 5,000 kg

Velocity = 20 ms⁻¹

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Mass = 70 kg

Velocity = 6 ms⁻¹

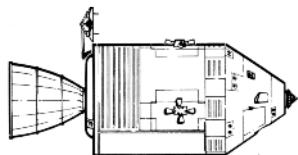


Mass = 50 kg

Velocity = 4 ms⁻¹

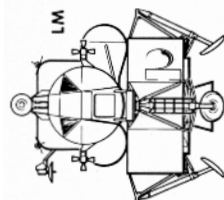
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Mass = 20,000 kg

Velocity = 4 ms⁻¹



Mass = 5,000 kg

Velocity = 16 ms⁻¹

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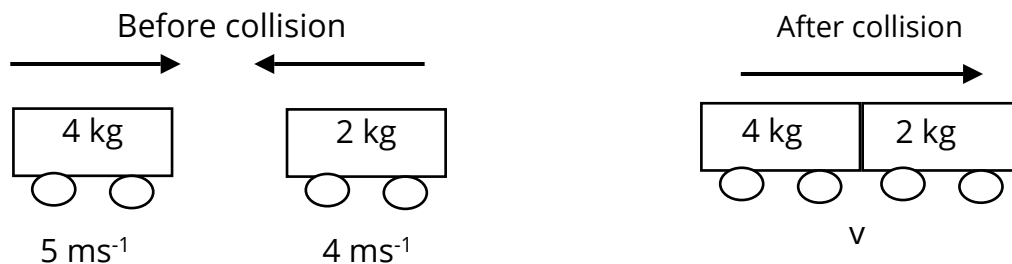
Conservation of Momentum

The **TOTAL** momentum before a collision equals the **TOTAL** momentum after a collision.

This is what is meant by the *Conservation of Momentum*.

Conservation of momentum can be used to determine the speeds of objects before or after collisions. Remember that momentum is a vector quantity and direction must be taken into account.

Example



Explosions



Elastic and inelastic collisions

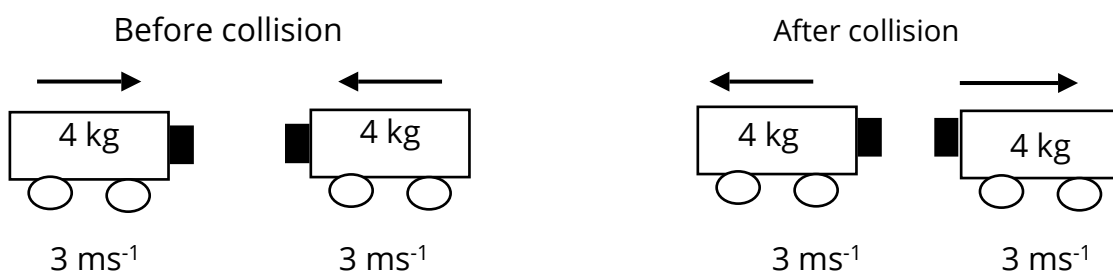
There are two types of collisions in physics.

They can be summarised in the table below.

Type of collision	MOMENTUM	KINETIC ENERGY
ELASTIC		
INELASTIC		

Elastic

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Inelastic collisions

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