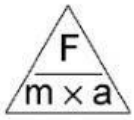
Force, mass, acceleration

Extension Sheet

If there is an unbalanced resultant force on an object, it accelerates.



$$\text{Acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

Force = **mass** × **acceleration**
(in N) (in kg) (in m/s^2)

Example
A car of mass 800 kg accelerates from rest to 10 m/s in 20 s.
a) What is the acceleration?
b) What is the force exerted?

Answer

$$\text{Acceleration} = \frac{\text{change in velocity}}{\text{time taken}} = \frac{10-0}{20} = 0.5 \text{ m/s}^2$$

$$\text{Force} = \text{mass} \times \text{acceleration} = 800 \times 0.5 = 400 \text{ N}$$

Name : _____
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Questions

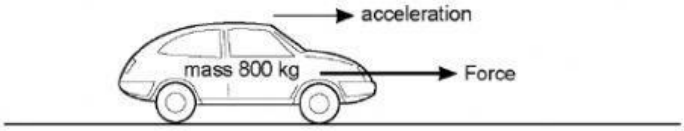
For each question show all your working clearly.

1. What force is needed to give a mass of 10 kg an acceleration of 2 m/s^2

2. What acceleration is given to a mass of 0.5 kg by a resultant force of 4 N?

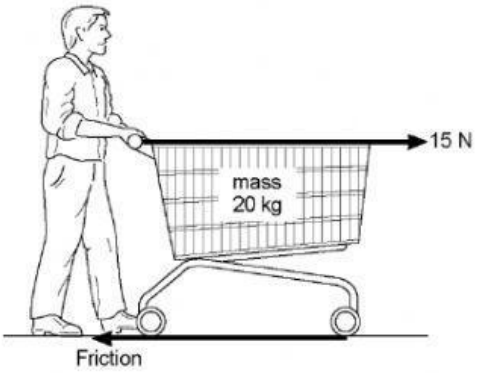
3. What is the mass of an object that accelerates at 3 m/s^2 when a force of 15 N is applied?

4. A car of mass 800 kg accelerates from 5 m/s to 25 m/s in 10 s.
a) Calculate the acceleration.
b) Calculate the resultant force exerted.



5. A car-driver of mass 60 kg is in a crash. He decelerates, from 20 m/s to rest, in 2 seconds. Calculate:
a) His deceleration.
b) The force exerted on him (by his seat and seat-belt).

6. A supermarket trolley has a mass of 20 kg. When pushed by a force of 15 N it accelerates at 0.5 m/s^2.
a) Calculate the resultant force on the trolley that gives it this acceleration.
b) What is the friction force on the trolley?



7. A car has a mass of 1000 kg and is travelling at 20 m/s.
The brakes then exert a steady force of 5000 N.
a) What is the deceleration?
b) How long does it take to stop the car?

LIVEWORKSHEETS