What exactly are forces?

- **WALT: Define what a force is and identify where forces are occurring**

- I must be able to describe what a force is and the effect of forces on objects
- I should be able to describe what a resultant force means
- I could explain what acceleration is and carry out some calulations

Last lesson we learnt that…..

- The extension of a spring will be proportional to the ……. on it

- That the elastic limit or limit of proportionality is ……

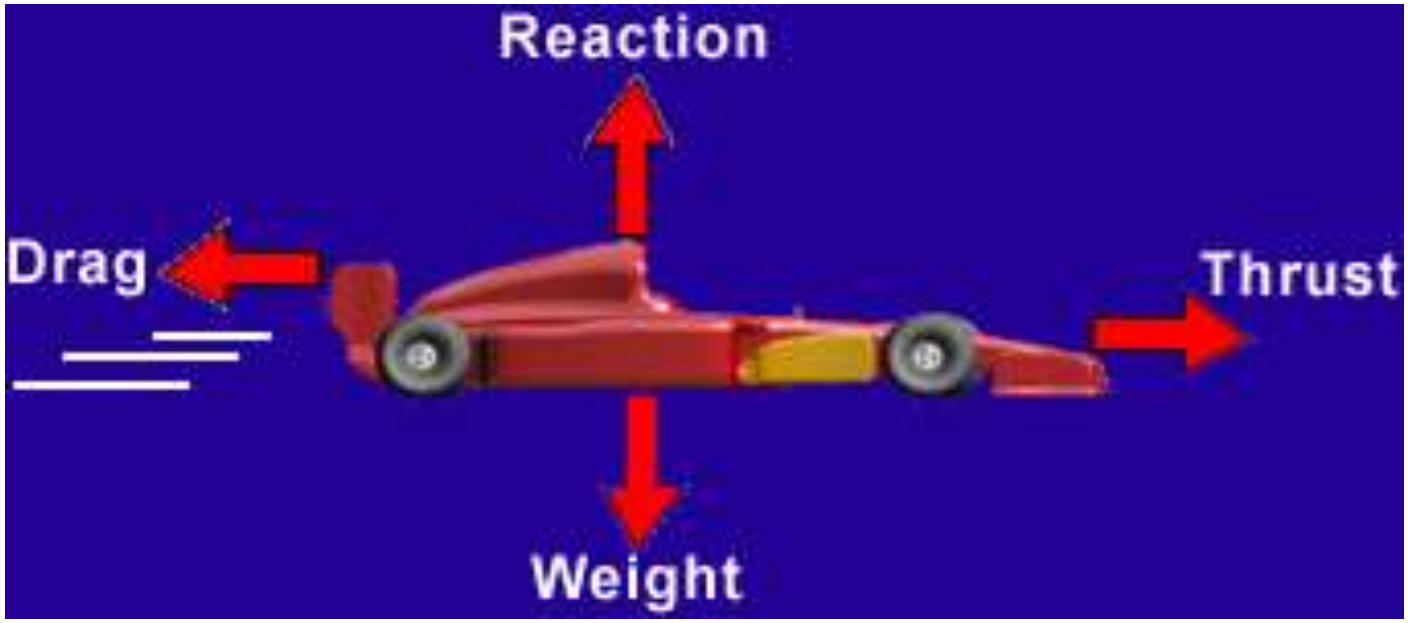
A force is a push or a pull

- Forces can:
  - Change the speed of things
  - Change the direction that something moves
  - Change the shape of things

FORCES ONLY ACT IN ONE DIRECTION

Car on table

- Net force zero if no movement
- If force applied (push) – net force is greater than zero
- Picture showing forces acting on moving car:



Read p.378 “Moving at a constant speed”

NEWTON’S FIRST LAW

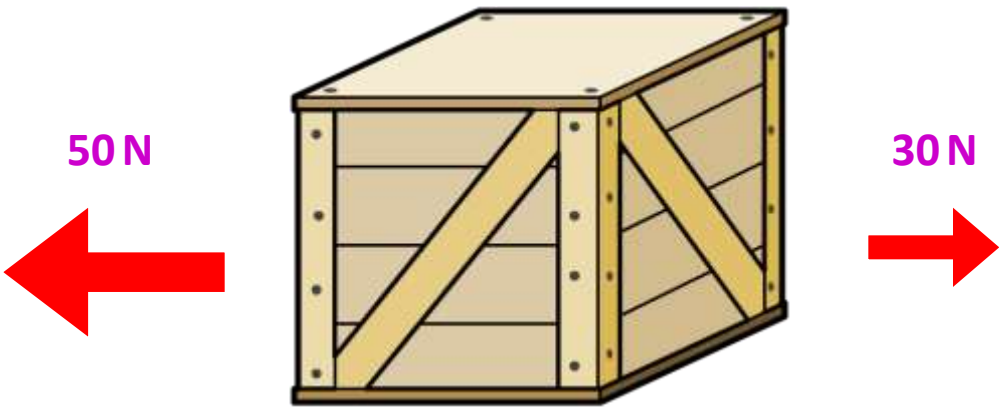
- If an object is speeding up or slowing down...there must be unbalanced forces acting upon it

- i.e. If resultant force is not zero – there will be some movement .....

What are resultant forces?

There are usually several different forces acting on an object. The overall motion of the object will depend on the size and direction of all the forces.

The motion of the object will depend on the **resultant force**. This is calculated by adding all the forces together, taking their direction into account.

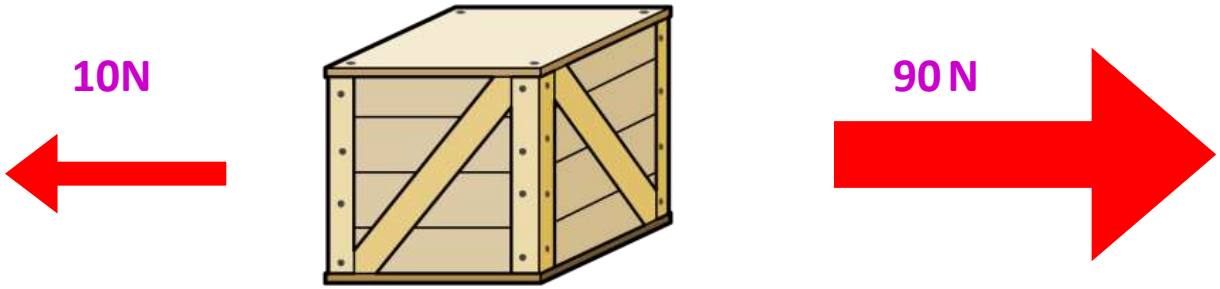


Resultant force on the crate = 50 N – 30 N

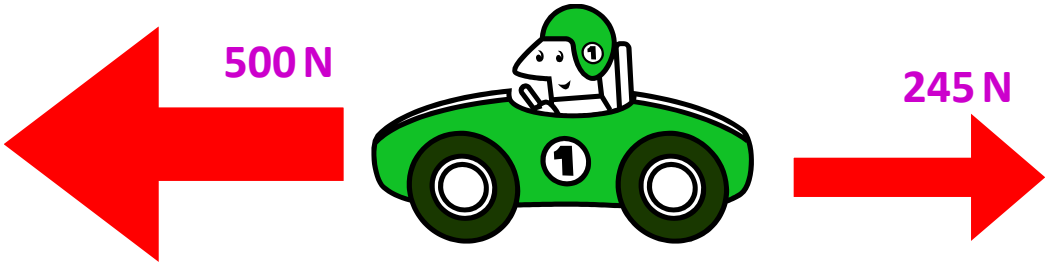
= **20 N to the left**

Calculate the resultant forces

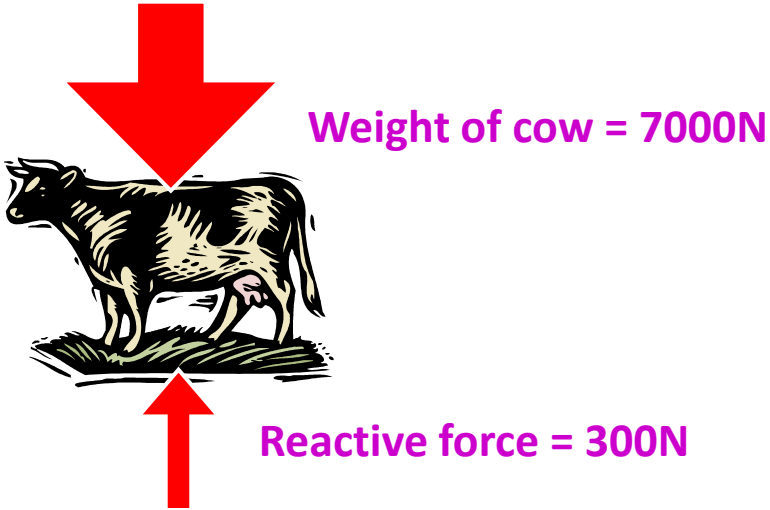
1. .



2..



3.



What can you say about the forces acting on a roller skater?

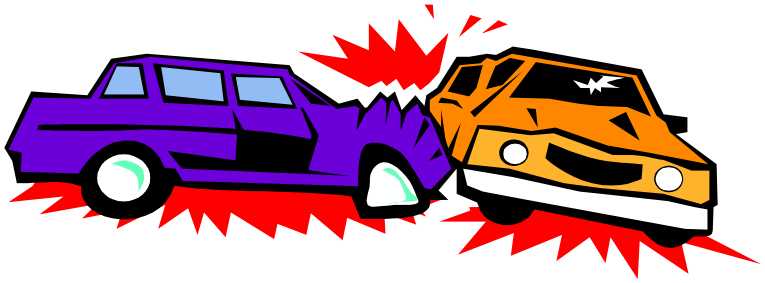
Why does a roller skater come to a stop if they don’t keep “skating”

What causes a car to come to a stop when you break?

Carry out exercise 26.4: Balanced and Unbalanced Forces – p. 381

We will learn more about the force of friction and how it can help and hinder us next lesson.

When a driver has to brake, it takes time for her to react. In that fraction of a second, the car can travel a long way….



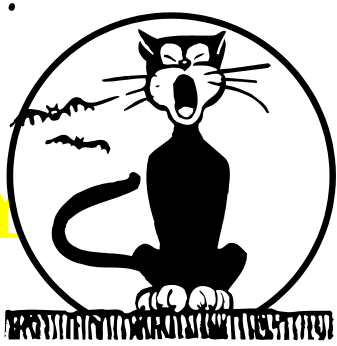
This is called the THINKING DISTANCE

A driver's reaction time is normally about 0.7 s.

When do you think this time might be slower?

DRUGS

SLEEPY



A car is travelling at 20 m/s.

The driver has a reaction time of 0.7 seconds.

How far does she travel *before* she starts to break (in metres)?

14 m

Test your thinking time – you have 1 minute

1. Working in pairs, one student holds a 50 cm or 100 cm ruler vertically, so that its bottom (0 cm) is just above the open hand of the other person.
2. Drop the ruler without warning and note the scale reading at which he/she catches it.
3. Swap over
4. Use the table below to estimate your thinking time.

scale reading (in cm)	thinking time (in s)
10	0.14
20	0.20
30	0.24
40	0.28
50	0.32
100	0.45

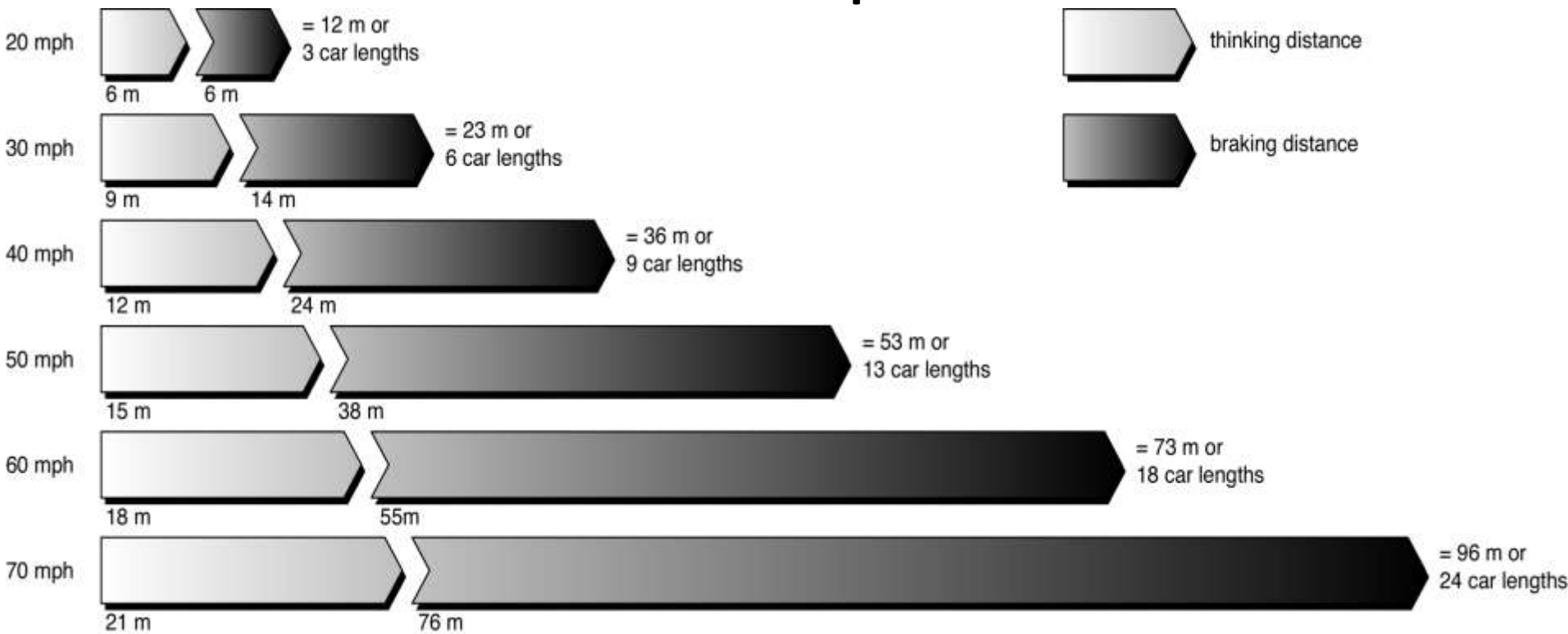
A person’s thinking time is usually about 0.6–0.7 seconds. Your estimate is likely to be less than this. Suggest why.

The BRAKING distance is the distance that the car will travel AFTER the brake has been pressed.

1. When the car is travelling faster.
2. If the car is heavier
3. If the road surface is wet or smooth. (On a wet surface, the braking distance is about TWICE that when it is dry). Why?
4. If the car is poorly maintained – with worn brakes or tyres – there will be less grip on the road.

TOTAL STOPPING DISTANCE = THINKING DISTANCE + BRAKING DISTANCE.

Thinking and stopping distances at different speeds



What do you notice?

So thinking distance as well as braking distance increases with speed

- Why do you think speed limits are important?
  - Did you notice the difference in stopping distance between a car travelling at 30 mph and a car travelling at 40 mph?