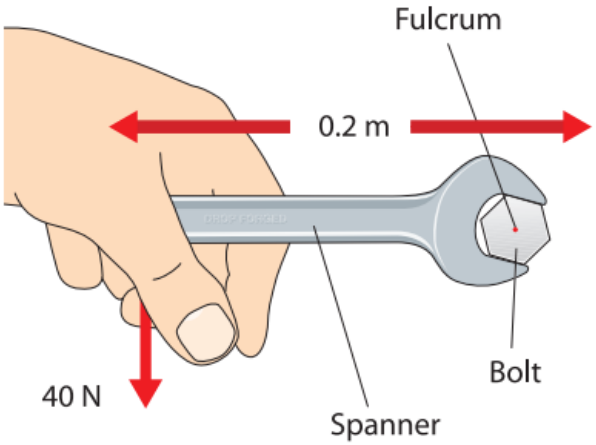
Moments

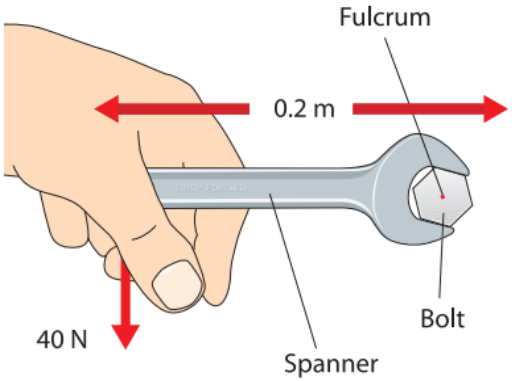
The moment of a force is a measure of its turning effect.



The turning effect of the spanner is shown in the picture. We turn the spanner with force to move the bolt.

The picture shows how a big force in the wrong place can't move the door but a small force in the right place can!

Learn this ⟶ Moment = Force x Distance



For this problem we need to find the moment of the spanner.

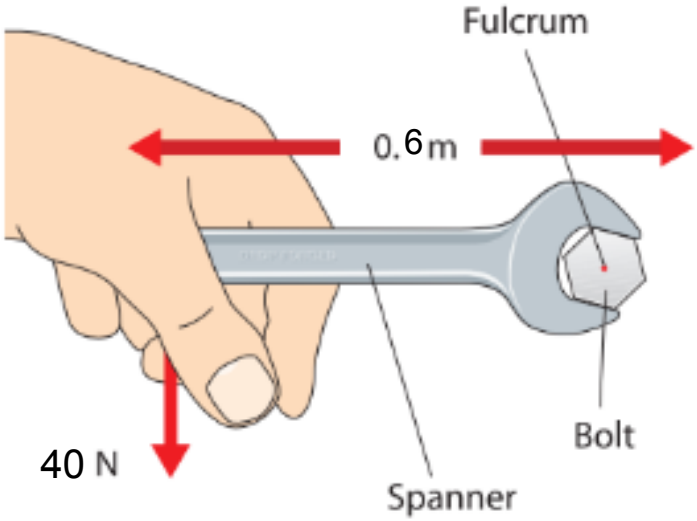
= Force x Distance

= 40 x 0.2

= **8Nm**

The fulcrum is the point that a lever turns on.

Try this one.....



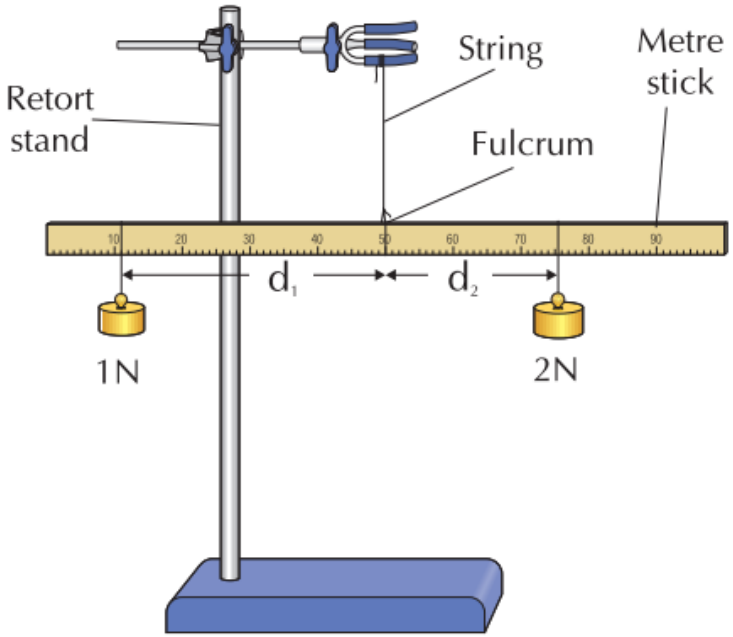
= Force x Distance

= 40 x 0.6

= 24 **Nm**

To Learn - A lever is any rigid body that is free to turn about a fixed point called a fulcrum or axis.

Experiment - to investigate the law of the lever

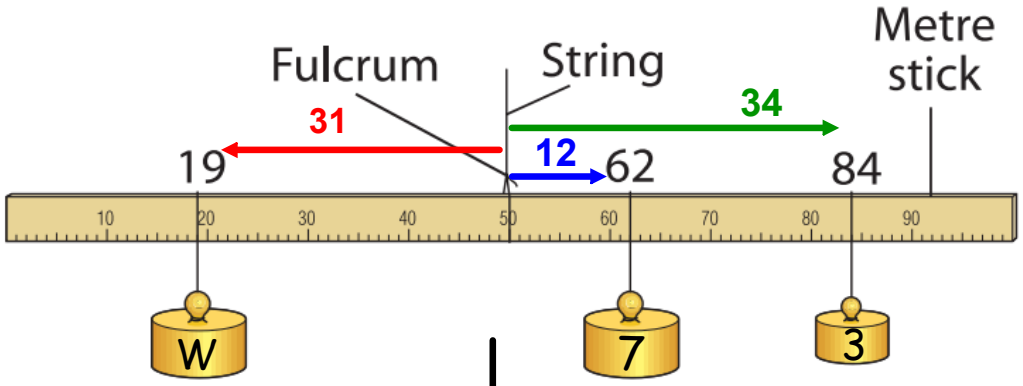


1. Set up the apparatus
2. Hang a 1N weight on one side and a 2N weight on the other.
3. Move the 2N weight till it is balanced.
4. Repeat 3 times and note the distances of the 1N and the 2N weight.

Learn ⟶ **Law of the Lever**

When a lever is balanced, the sum of the clockwise moments is equal to the sum of the anti-clockwise moments.

Calculate what 'W' is.....



Anti-Clockwise Moment

$M = D \times F$

$M = 31 \times W$

$M = 31W$

Clockwise Moment

$M = D \times F$

$12 \times 7 = 84$ $34 \times 3 = 102$

$102 + 84 = 186$ Moments

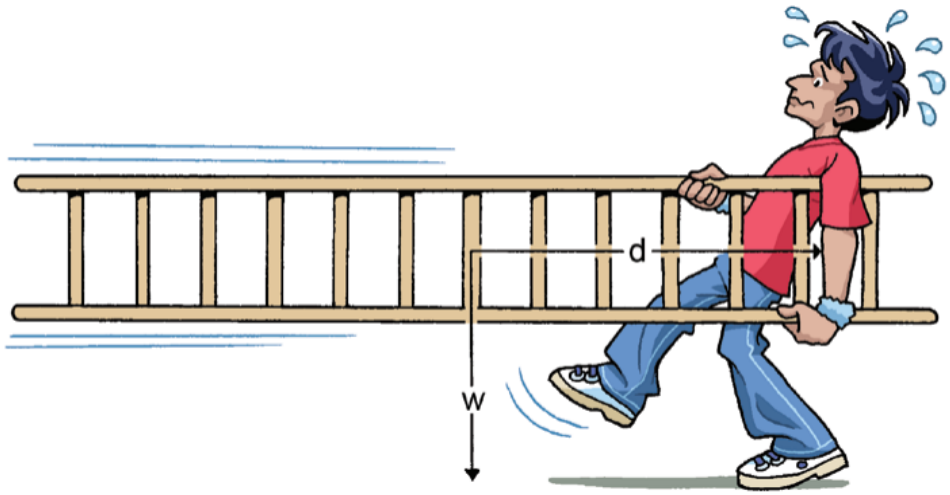
$$31W = 186$$

$$W = \frac{186}{31}$$

$$W = 6$$

Centre of Gravity

....is the point through which the weight appears to act.



Where should he hold the ladder to make it easier to carry?

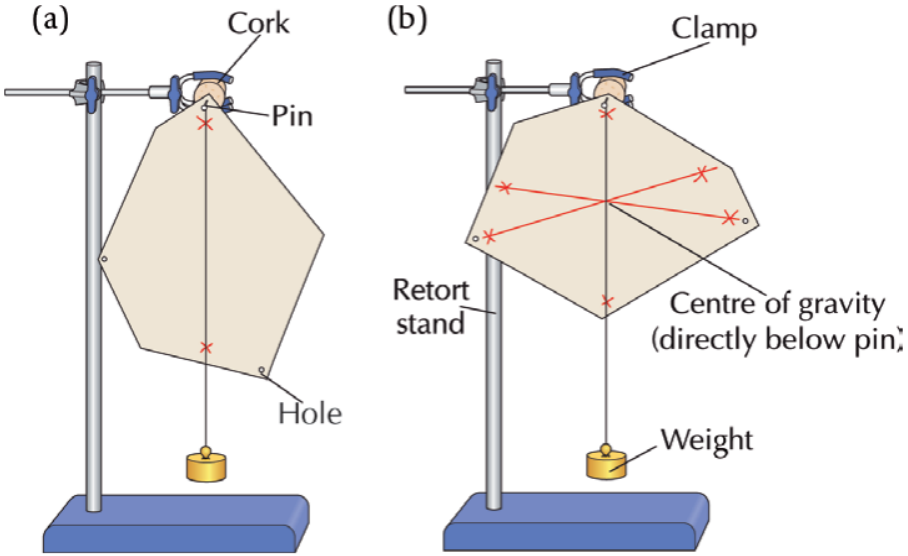
Experiment - to find the centre of gravity

1. Hang a piece of cardboard with a cork and pin on a retort stand.

2. Hang a 'plumb line' down from the cork and mark two 'x's along the line.

3. Hang the cardboard from a few different places and repeat the steps.

4. The point where all the lines meet is the centre of gravity of the cardboard.



Stability and Centre of Gravity

A **low centre of gravity** helps keep a bus stable.
It is difficult to push the bus over as it had a wide base, heavy parts are down low, it gets more narrow near the top and people are not allowed to stand upstairs.

It is easy to push this van over because it has a **high centre of gravity**.

A car with a **low centre of gravity** is more **stable** and drives better.
It can also drive faster because it is less likely to roll over.

If something is stable and not easy to push over we say it has **Stable Equilibrium.**

If something is not stable and is easy to push over we say it has **Unstable Equilibrium.**