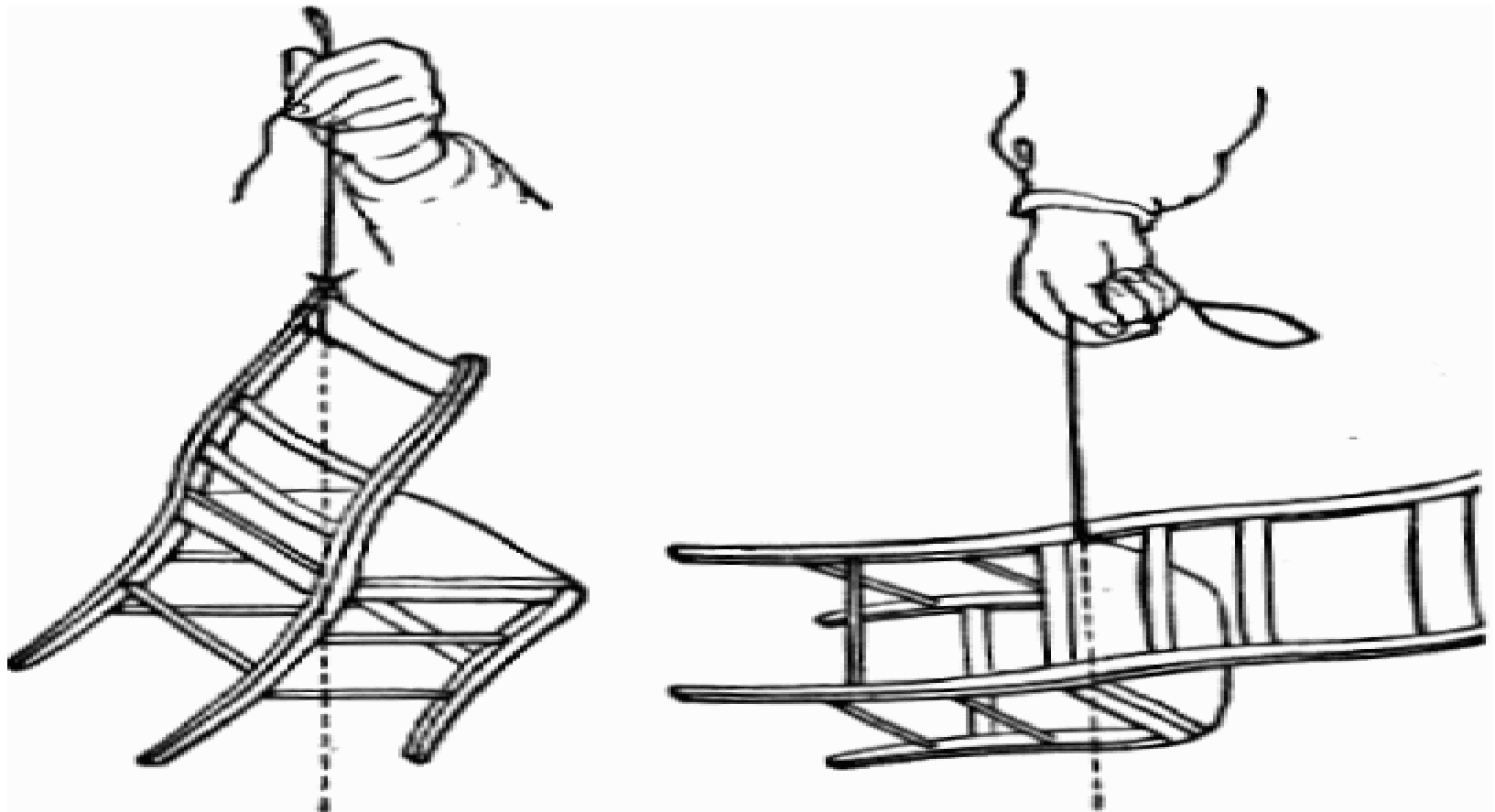




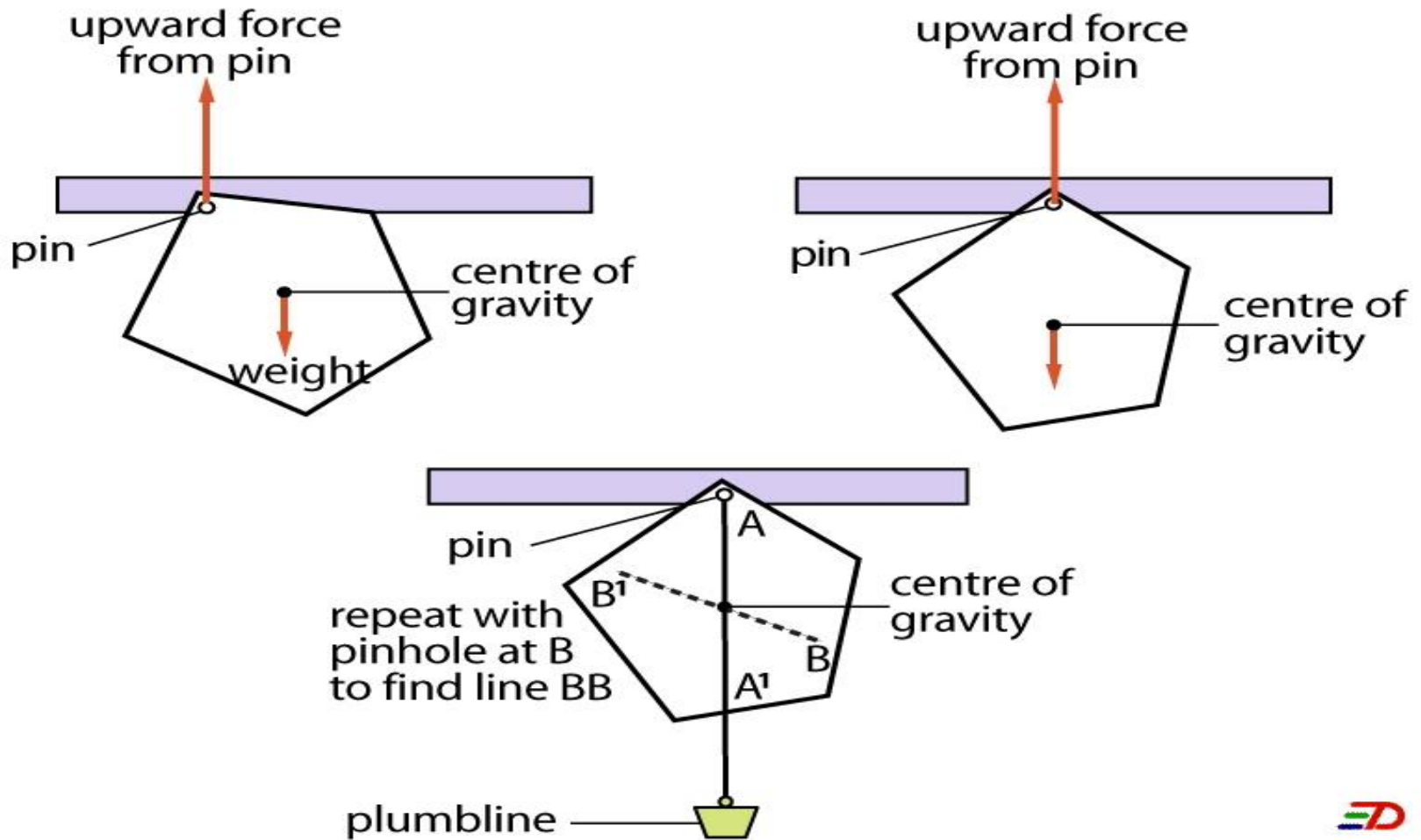
# Turning effect of levers

# Centre of gravity of a body



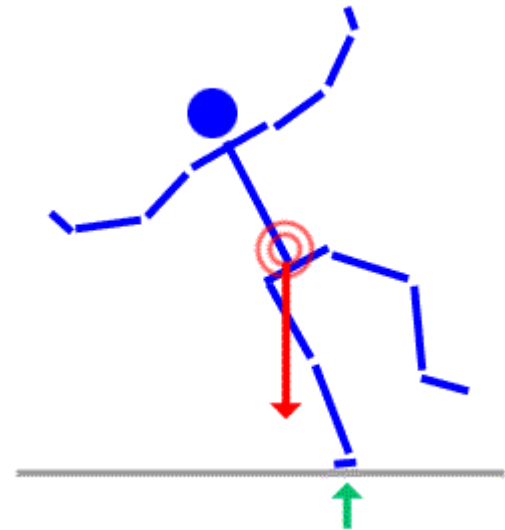
**Fig. 62 Determination of centre of gravity**

# Experiment to show centre of gravity



# What happens if you move the centre of gravity?

- If the centre of gravity is moved...
- A turning effect happens.....



# Levers

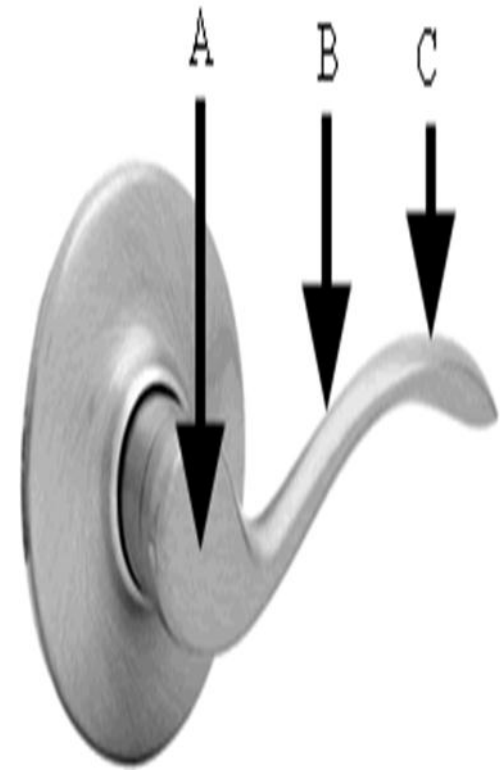
- **A Lever is** a rigid body that is free to turn about a fixed point.
- The fixed support point is called the **fulcrum** or pivot point.
- It's easier to turn a lever further from the fulcrum.





**FULCRUM**

**Man lifting a stone  
with a lever**





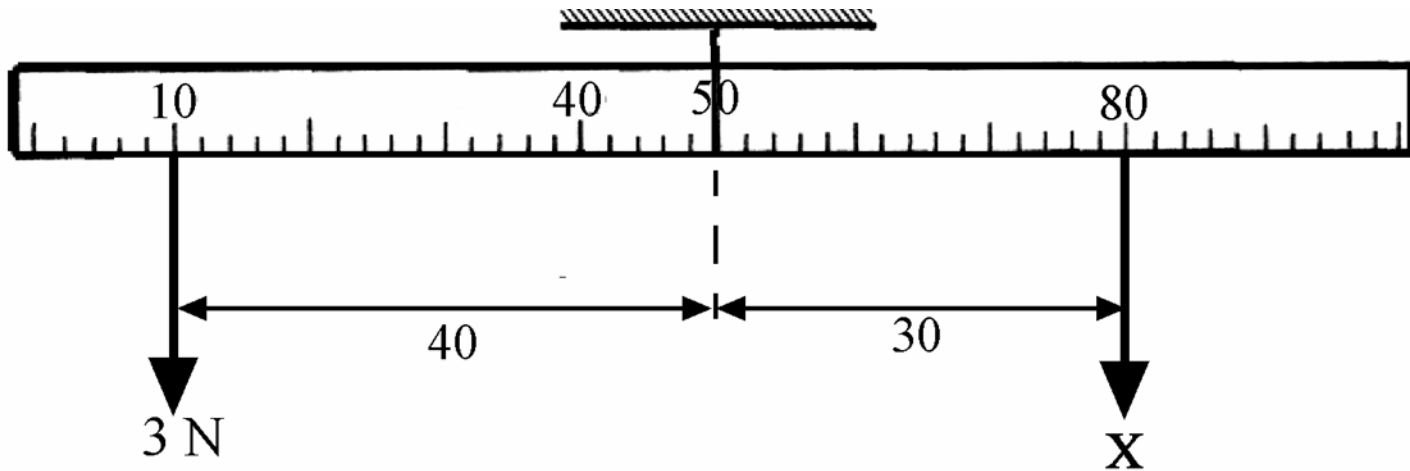
# Moments of Force

- Moment = turning effect of a force
- Moment (Nm) = force (N) x distance from the centre of gravity (m)

# The law of the lever

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

$$\begin{array}{l} \text{Moments on left} = \text{Moments on right} \\ \text{Force} \times \text{Distance from cog} = \text{Force} \times \text{Distance from cog} \end{array}$$



- A uniform meter stick, suspended at its midpoint is balanced as shown.
- Calculate force X.

○ Moments on left

= Moments on right

Force x Distance

= Force x Distance

3 N x 40 cm

= X x 30 cm

120

= 30X

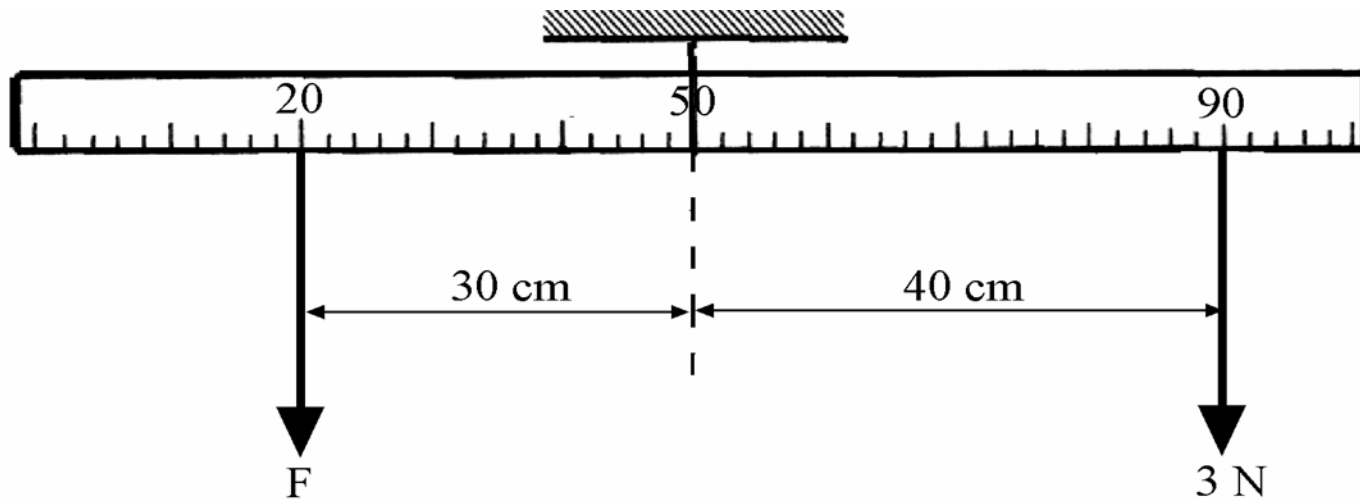
120

= X

30

4 N

= X



- The diagram shows a meter stick suspended from its center of gravity. A force of 3 N acts on the stick at the 90 cm mark and a force of  $F$  N acts on the stick at the 20 cm mark. The meter stick is balanced horizontally.
- Calculate force  $F$

○ Moments on left

= Moments on right

Force x Distance

= Force x Distance

$F \times 30 \text{ cm}$

=  $3 \text{ N} \times 40 \text{ cm}$

$30F$

=  $120 \text{ cm}$

$F$

=  $\frac{120}{30}$

$F$

=  $4 \text{ N}$

# Equilibrium:

- Equilibrium means how stable an object is
- An object is in stable equilibrium if it does not fall over easily
- An object is said to be in unstable equilibrium if it will topple over easy – when a small force is added to it

The **stability** of an object depends on the following:

- Centre of gravity needs to be as low as possible
- Area at the bottom needs to be as big as possible







- What is wrong with these buildings?
- Centre of gravity is off

Which ball is more stable –  
move it on its side?

