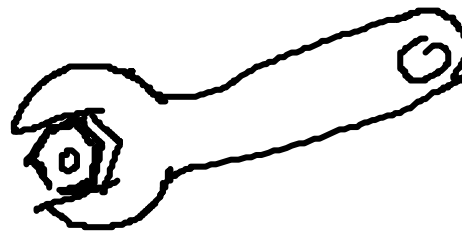# Turning Effect of a Force          Dr K M Hock
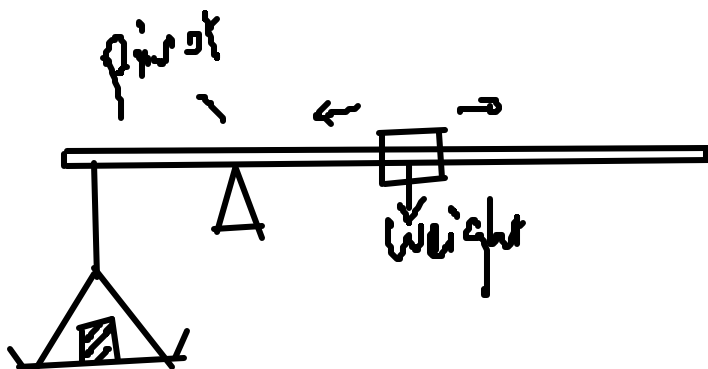
= Moment.
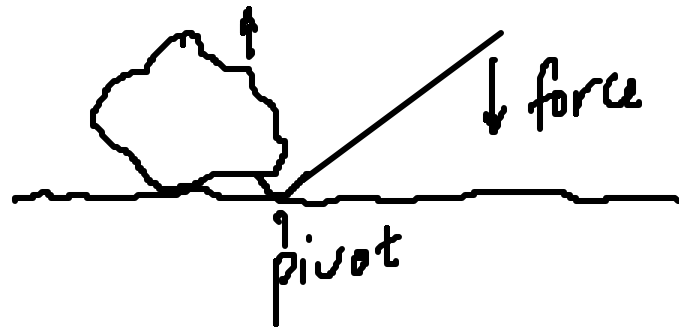


pivot

Effect is bigger if force is further from pivot.



Can use this effect to produce bigger force (but over smaller distance).



pivot

weight
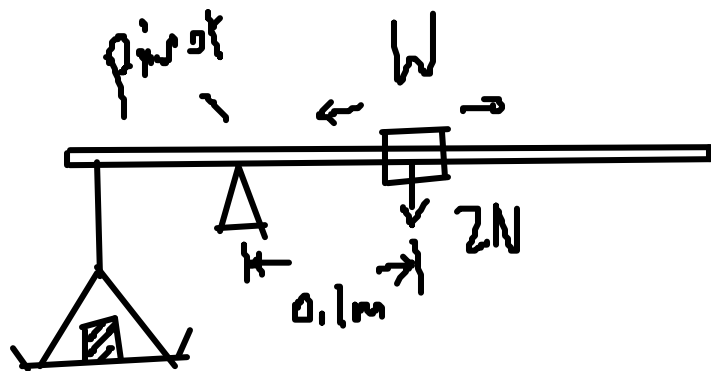
Adjust distance to balance different objects.

Can use it to weigh things.

# Moment of a Force                    Dr K M Hock

## To measure/Calculate turning effect:



## Moment due to force about pivot

$$= 2N \times 0.1m$$
$$= 0.2\ Nm$$

## Moment due to force about pivot

$$= 100N \times 1.2m$$
$$= 120\ Nm$$



line of action of force.

---
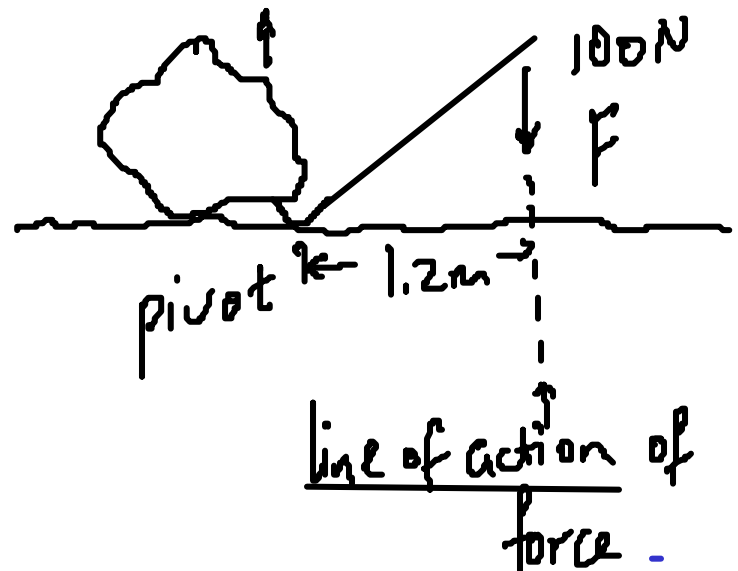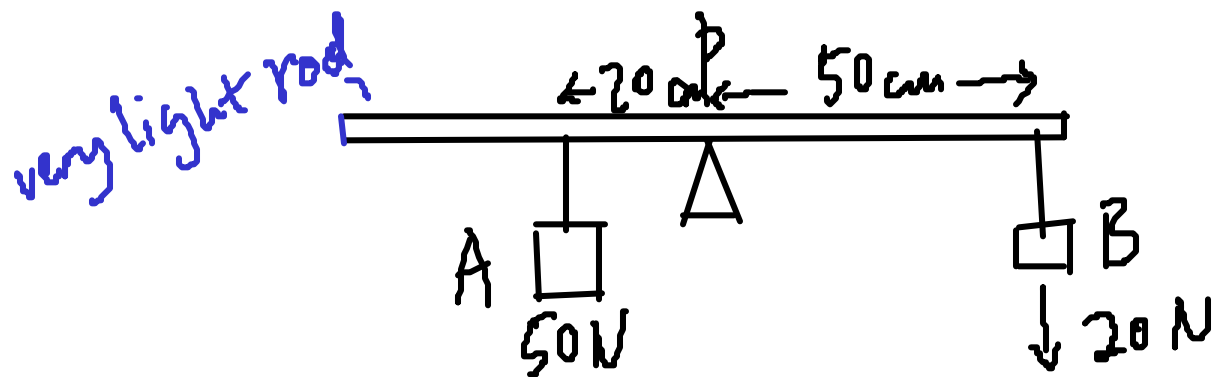
Moment of a force
= force × perpendicular distance from pivot
to <u>line of action</u> of the force

# Principle of Moment
Dr K M Hock



very light rod →

←20 cm→ ←— 50 cm —→

A □
50N

□ B
↓ 20 N

A tries to turn rod anti-clockwise
→       "      "    moment

B tries to turn rod clockwise
→       "      moment

If these opposing moments are equal,
then rod is balanced.

---

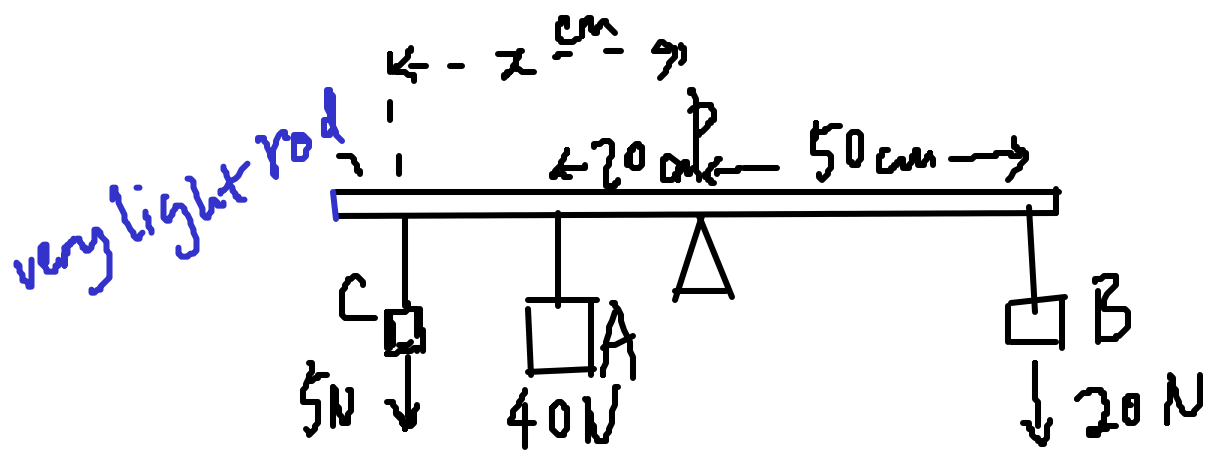Principle of moments

anti-clockwise = clockwise moments

---

↳ for combined turning effect to be zero.

e.g. 50N × 20 cm = 20N × 50cm

# Moments examples                    Dr K M Hock

e.g. Find $x$ for rod to be balanced.



Ans.                    clockwise      =    anti-clockwise moment

$$\underset{(B)}{20N \times 50cm} = \underset{(C)}{5N \times x \, cm} + \underset{(A)}{40N \times 20 \, cm}$$

$$1000 \qquad = 5x \qquad + 800$$

$$200 \qquad = 5x$$

$$x = \frac{5x}{40}$$

# Centre of Gravity                    Dr K M Hock

e.g.  gum ⟶ ◠        C        metre
                                      rule
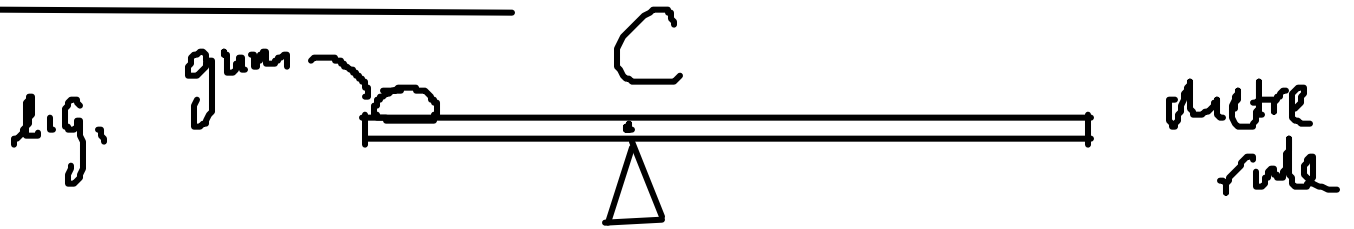
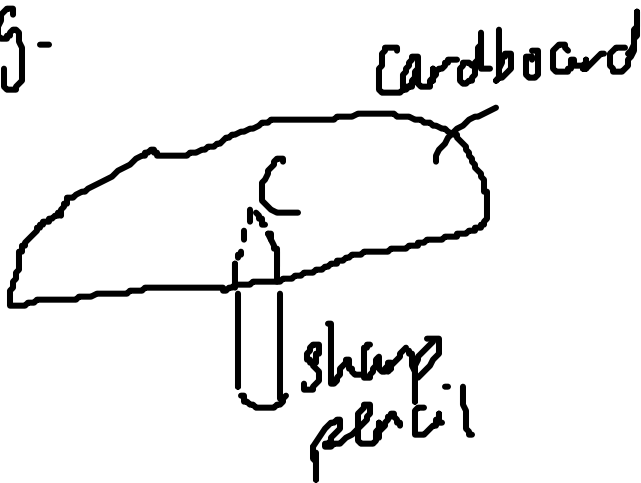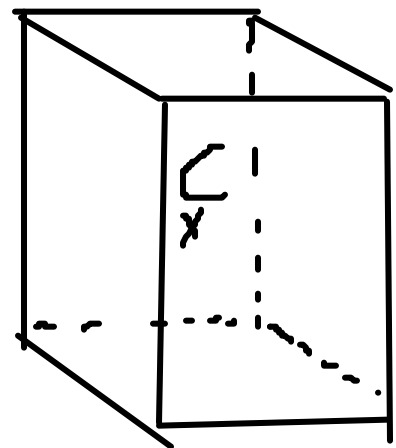If I am very careful, I may balance it on a sharp edge at a point, C.

C
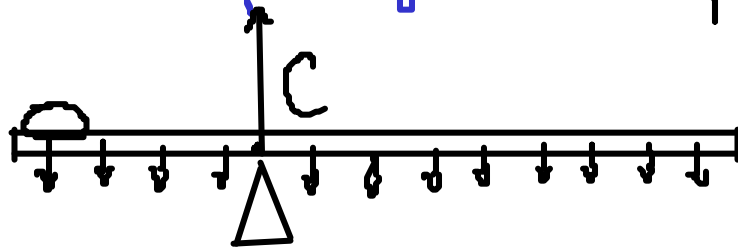
— as if all weight of ruler acts at single point C.

e.g.-          cardboard        e.g. box.

C

sharp pencil

C
x

## Centre of Gravity

Point at which all weight of a body appears to act.

# Stability

Dr K M Hock

box

← push, and box tilts about A

─ Centre of gravity

rough floor

30°

C

A

W

If tilt until C tips ver. over A, box falls

C

W

A

If C is lower, must tilt more before falling

→ more stable.

rough floor

50°

C

─ rock

A

W