Moment

Definition: When a force is acting on an object, the force is in a moment.

Why?

$$E \rightarrow \boxed{F} \rightarrow a \rightarrow v \rightarrow x = \Delta t$$

↳ We are going to analyse the effects of forces on objects.

Center of Mass:

To analyse what the effect is of a force on an object, we use the center of mass. The middel point where the mass is centered.

Law of Moment:

$$\boxed{M = F \cdot r}$$

M is the Moment in $[Nm]$
r is the arm length in $[m]$
F is the force in $[N]$

Equillibrium:

$$\boxed{M_1 = M_2}$$

↙   ↘

$$\boxed{F_1 \cdot r_1 \quad = \quad F_2 \cdot r_2}$$
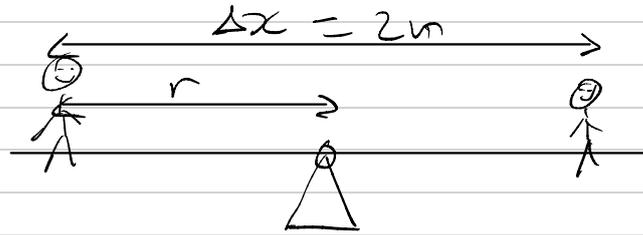
$$FE \rightarrow (m_1 \cdot g_1) \cdot r_1 = (m_2 \cdot g_2) \cdot r_2$$

$$10 \cdot 9,81 \cdot 10 = 10 \cdot 9,81 \cdot 10$$

$$981 \, Nm = 981 \, Nm$$

Recap Question:

2 persons are sitting on a wip. Both of them
are in balance with each other. They each weight
170 kg. The distance between each other is 2
meter. Calculate the Moment of both person's.

$$\Delta x = 2m$$

r

$m_1 = 170 \text{ kg}$
$m_2 = 170 \text{ kg}$
$\Delta x = 2 m$
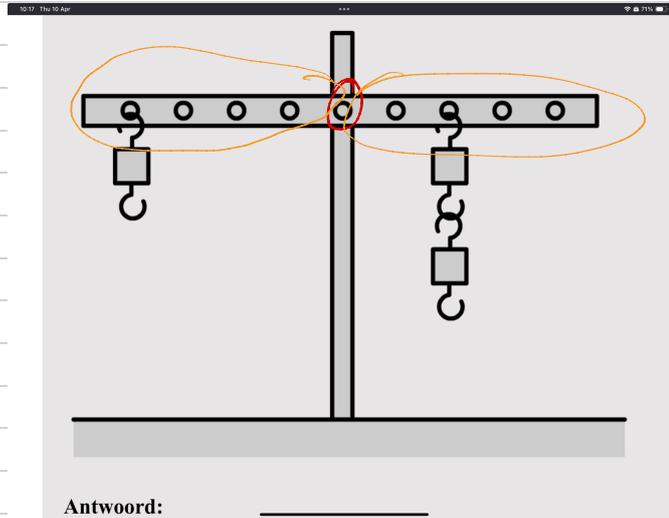$r_1 = \dfrac{\Delta x}{2} = \dfrac{2}{2} = 1 m$

$r_2 = 1m$

$M_1 = F_g \cdot r$

$M_1 = (m \cdot g) \cdot r =$

$M_1 = 70 \cdot 9,81 \cdot 1 = 686,7 \quad Nm$

$$M_1 = M_2$$
$$686,7 = 686,7$$

3 weights are connected to a metal plate. 1 on the left side and 2 on the right side. They're in balance. each weight is 50 g. See picture below. The Distance between the holes is 2,5 cm. Proof that they're in balance.

Antwoord: _____

$M_1 = M_2$

$F_1 \cdot r_1 = F_2 \cdot r_2$

$(m_1 \cdot g_1) \cdot r_1 = (m_2 \cdot g_2) \cdot r_2$

$m_1 = 50g = 0,05\ kg$
$m_2 = 2 \cdot 50g = 100\ g = 0,1\ kg$

$r_1 = 10\ cm = 0,1\ m$
$r_2 = 5\ cm = 0,05\ m$

$0,05 \cdot 9,81 \cdot 0,1 = 0,1 \cdot 9,81 \cdot 0,05$

$0,04905\ Nm = 0,04905\ Nm$