Physics
Torque

A torque, τ, is caused by a force, F, acting at a distance, d, from the centre of rotation (X)

$$\tau = Fd$$

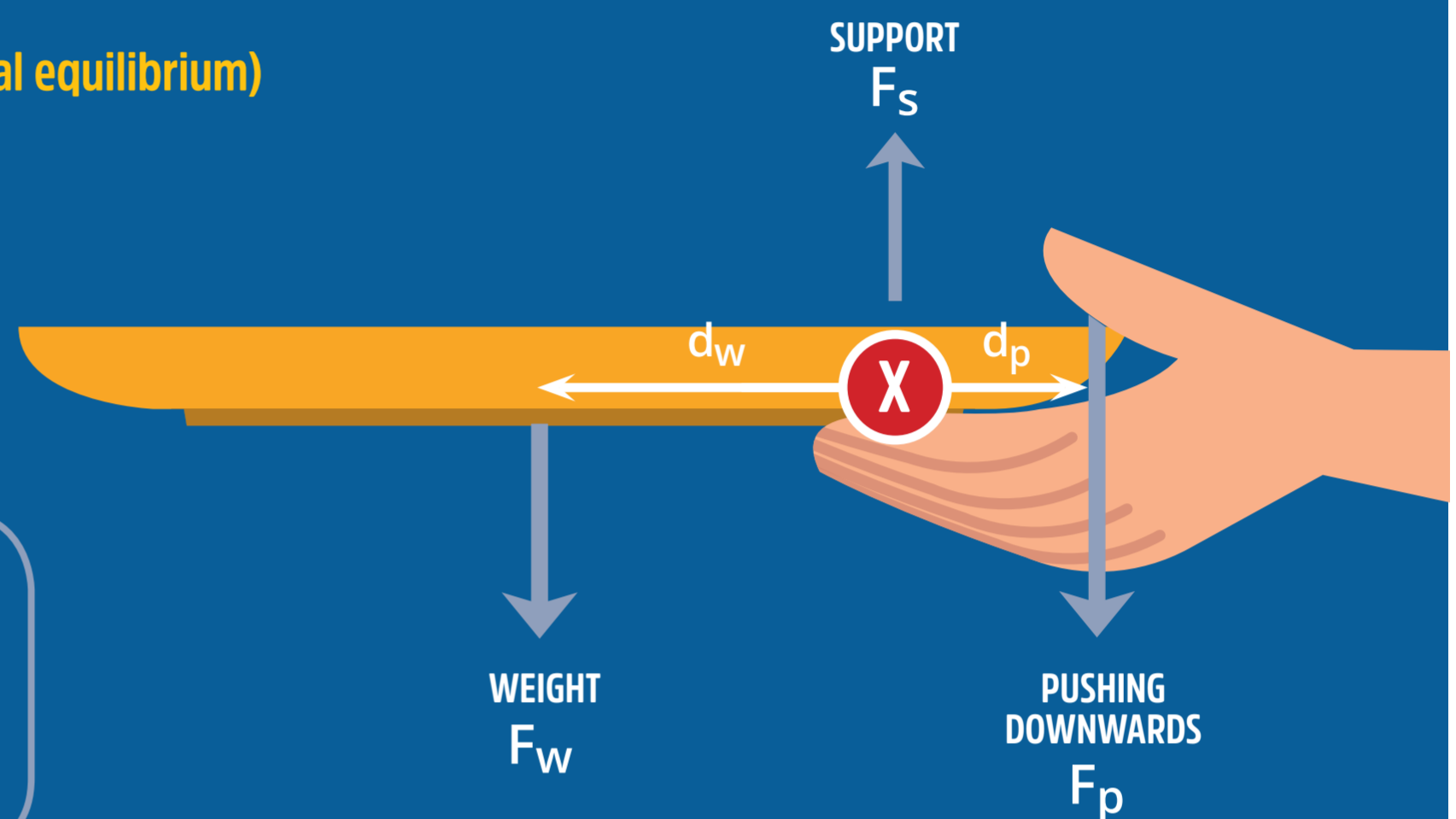**EXAMPLE 1:** When everthing is balanced (mechanical equilibrium)
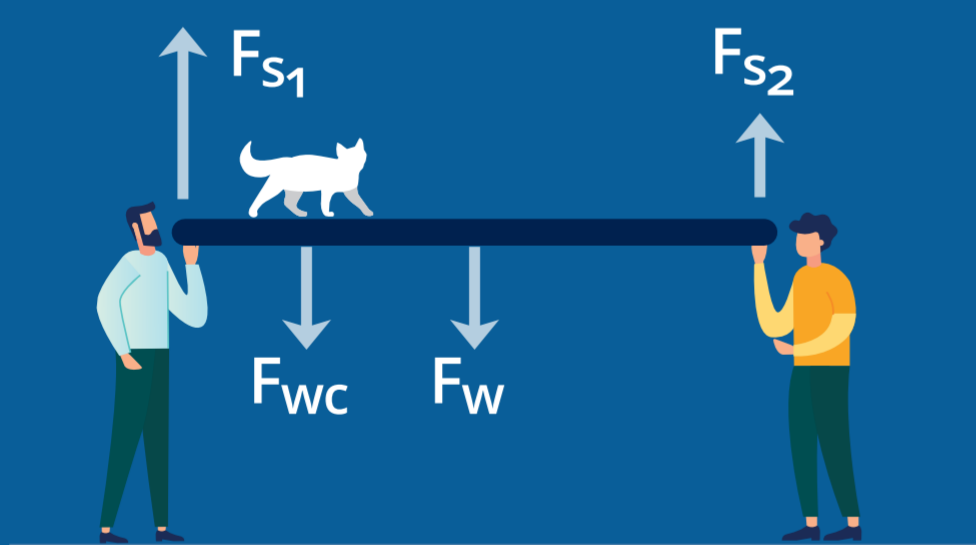
$$F_s = F_w + F_p$$
$$F_p d_p = F_w d_w$$

Mechanical equilibrium requires two conditions
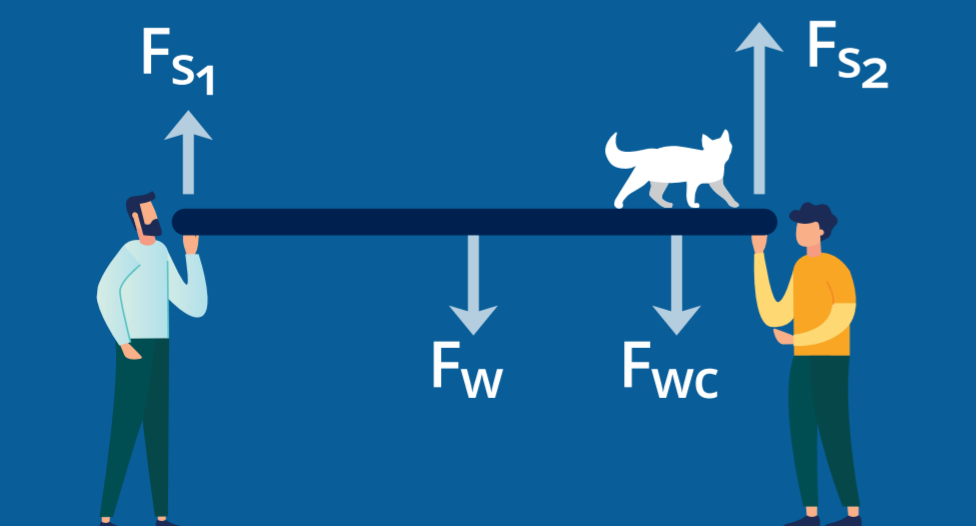
$$F_{up} = F_{down} \text{ (no movement)}$$
$$\tau_{clockwise} = \tau_{anticlockwise} \text{ (no rotation)}$$

SUPPORT F_s

d_w d_p
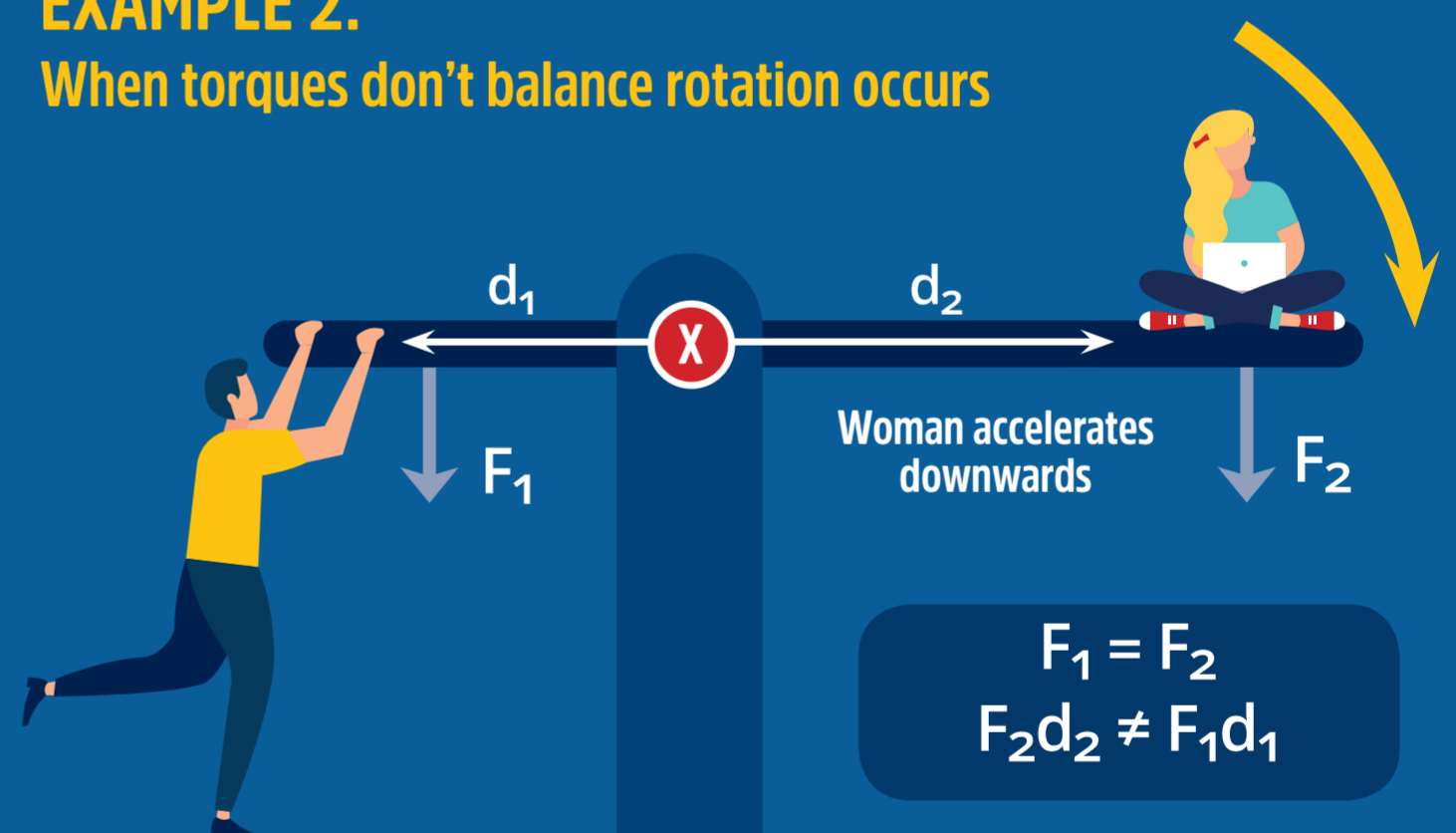
WEIGHT F_w

PUSHING DOWNWARDS F_p

Mechanical Equilibrium of Plank

F_{s_1} F_{s_2}

F_{wc} F_w

Support forces F_{s_1} and F_{s_2} vary as the cat walks across

F_{s_1} F_{s_2}

F_w F_{wc}

EXAMPLE 2:
When torques don't balance rotation occurs

d_1 d_2

F_1

Woman accelerates downwards F_2

$$F_1 = F_2$$
$$F_2 d_2 \neq F_1 d_1$$

EXAMPLE 3

$$F_{db} d_{db} + F_w d_w \neq F_b d_b$$

F_b

d_b d_{db}

d_w

F_w F_{db}

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