

Physics - Key Stage 4 - Forces

Physics Only Review

Mr Saville



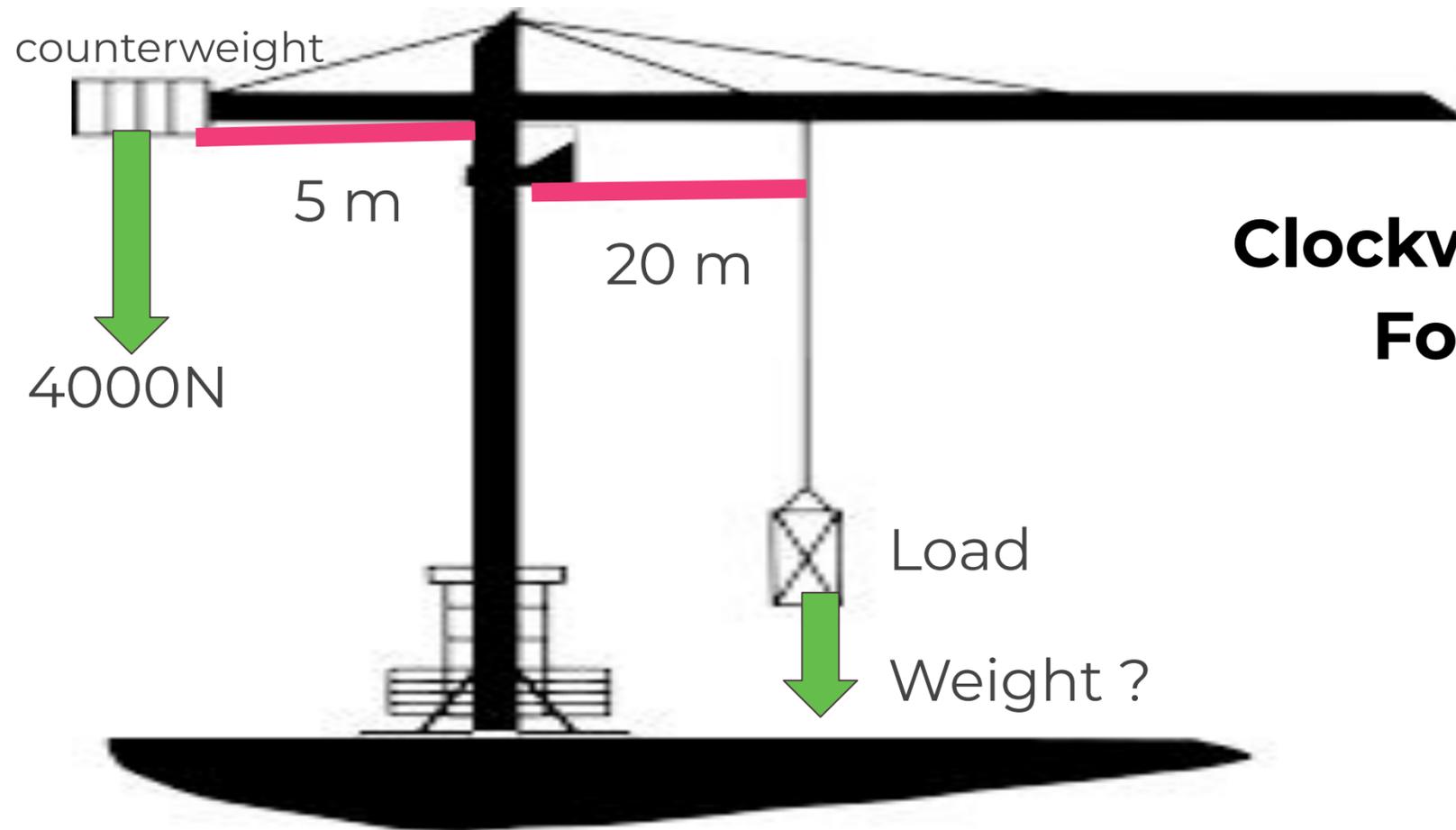
OAK
NATIONAL
ACADEMY

Independent Practice

- 1) A crane applies a 8 kN force on a load that is 40m from the pivot. Calculate the moment of the force.
- 2) A boy with a weight of 680 N sits on a seesaw 140 cm away from the pivot. Calculate the moment of the force.
- 3) A force of 1.4 kN is applied on a load that is 244 cm away from the pivot. Calculate the moment of the force.
- 4) A fork-lift truck with a load of 2 kN causes a moment of 8000 Nm. Calculate the distance from the pivot.
- 5) A spanner tightens a bolt with a moment of 320 Nm. Calculate the force needed to loosen the bolt when you hold the spanner 40 cm away from the pivot.



The crane is balanced. The weight of the counterweight is 4000 N. What is the weight of the load?



Clockwise moment = Anticlockwise moment
Force x distance = Force x distance

Credit: no attribution required



Independent Practice

1. A force of 800 N is applied to a gear (A) wheel of radius 0.25 m to turn another gear (B) wheel of radius 0.5 m radius. Calculate the moment of each gear.
1. A force of 1250 N is applied to a gear (A) wheel of radius 1 m to turn another gear (B) wheel of radius 0.5 m radius. Calculate the moment of each gear.
1. A force of 270N is applied to a gear (A) wheel of radius 0.10 m to turn another gear (B) wheel of radius 0.5 m radius. Calculate the moment of each gear.



Independent work

1. Describe how gear systems work.

2. Explain how the force can be multiplied by a gear system.

3. How much will a 24 : 12 gear ratio

a) speed up the rotation?)

b) multiply the moment (careful)



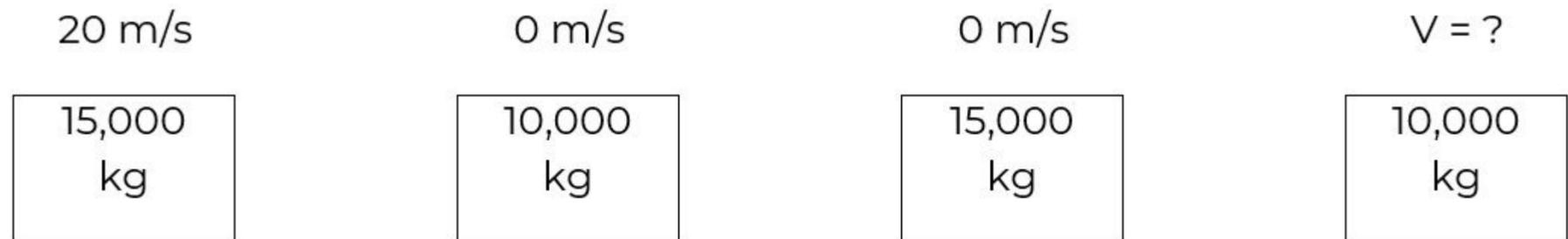
HT ONLY - Independent Practice

1. A large dam has a wall of 120 m. What is the pressure at the bottom of the dam?
($g = 9.8 \text{ N/kg}$ and density of water = 1000 kg/m^3)
2. A glass of water is 20 cm tall. What is the pressure at the bottom of the glass?
3. A diver experiences a pressure of 620000 Pa. At what depth is the diver at? ($g = 9.8 \text{ N/kg}$ and density of water = 1000 kg/m^3)
4. A diver experiences 320000 Pa of pressure on his body. If the density of seawater is 1025 kg/m^3 , then how deep is he swimming? ($g = 9.8 \text{ N/kg}$)



HT ONLY - Independent Practice

1. A bus travelling at 20 m/s collides with a stationary lorry. The bus has a mass of 15,000 kg and the lorry has a mass of 10,000 kg. If the final velocity of the bus is 0 m/s, what is the final velocity of the lorry?



1. Two buses, each with a mass of 20,000 kg collide head-on. Before the collision bus 1 had a velocity of 20 m/s and bus 2 had a velocity of 16 m/s. If bus 1 has a final velocity of 0 m/s, what is the final velocity of bus 2?



Independent Practice

1. Find the force needed to cause a change in the momentum of a fly by 0.6 kg m/s in 1.2 s .
2. Find the force need to cause a change in momentum of a car by 2000 kg m/s in 5 seconds.
3. Calculate the change in momentum on a car that exerts a 800 N force when stopping the car in 3 seconds.
3. In a car safety test collision with a wall, a car with a mass of 1250 kg stopped completely in 0.05 s . If the force exerted by the wall was $2.5 \times 10^5 \text{ N}$, how fast was the car travelling initially?

