

NAME AND SURNAME _____

EXAM B

1) A force of 160 N stretches a spring 0,050m from its equilibrium position. What is the spring constant? 3 points

SOLUTION:

$$F = k \cdot x \Rightarrow k = \frac{F}{x}$$

$$k = \frac{160 \text{ N}}{0,050 \text{ m}} = 3\,200 \text{ N/m}$$

2) If a spring has a spring constant of 2 N/m and it is stretched 5 cm, what is the force applied? 3 points

SOLUTION:

$$x = 5 \text{ cm} \cdot \frac{1 \text{ m}}{100 \text{ cm}} = 0,05 \text{ m}$$

$$F = k \cdot x$$

$$F = 2 \text{ N/m} \cdot 0,05 \text{ m} = 0,1 \text{ N}$$

3) If you use a spring whose constant is 32,67 N/m and hang a 4,9 N load from it, how far will it stretch? Convert your answer to cm. 4 points

SOLUTION:

$$F = k \cdot x \Rightarrow x = \frac{F}{k}$$

$$x = \frac{4,9 \text{ N}}{32,67 \text{ N/m}} = 0,15 \text{ m} \cdot \frac{100 \text{ cm}}{1 \text{ m}} = 15 \text{ cm}$$

4) A 5 kg cart accelerates to 4,4 m/s². What is the force acting on the cart? 3 points

SOLUTION:

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$$F = m \cdot a$$

$$F = 5 \text{ kg} \cdot 4,4 \text{ m/s}^2 = 22 \text{ N}$$

5) A force of 5,6 N acts on a 0,35 kg cart. What is the acceleration of the cart?

3,5 points

SOLUTION:

$$F = m \cdot a \Rightarrow a = \frac{F}{m}$$

$$a = \frac{5,6 \text{ N}}{0,35 \text{ kg}} = 16 \text{ m/s}^2$$

6) Jonathan has an engine that can provide a force of 5,6 N. He wants to place the engine on a cart so it accelerates at 3,5 m/s². What should the combined mass of the cart and engine be to achieve this acceleration?

3,5 points

SOLUTION:

$$F = m \cdot a \Rightarrow m = \frac{F}{a}$$

$$m = \frac{5,6 \text{ N}}{3,5 \text{ m/s}^2} = 1,6 \text{ kg}$$

7) A woman has a mass of 60 kg. How much does she weigh on Earth if the acceleration due to gravity is 10 m/s²?

5 points

SOLUTION:

$$W = m \cdot g$$

$$W = 60 \text{ kg} \cdot 10 \text{ m/s}^2 = 600 \text{ N}$$

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8) An orange weighs about 1 N on Earth ($g = 9,8 \text{ m/s}^2$). What is the mass of the orange? 5 points

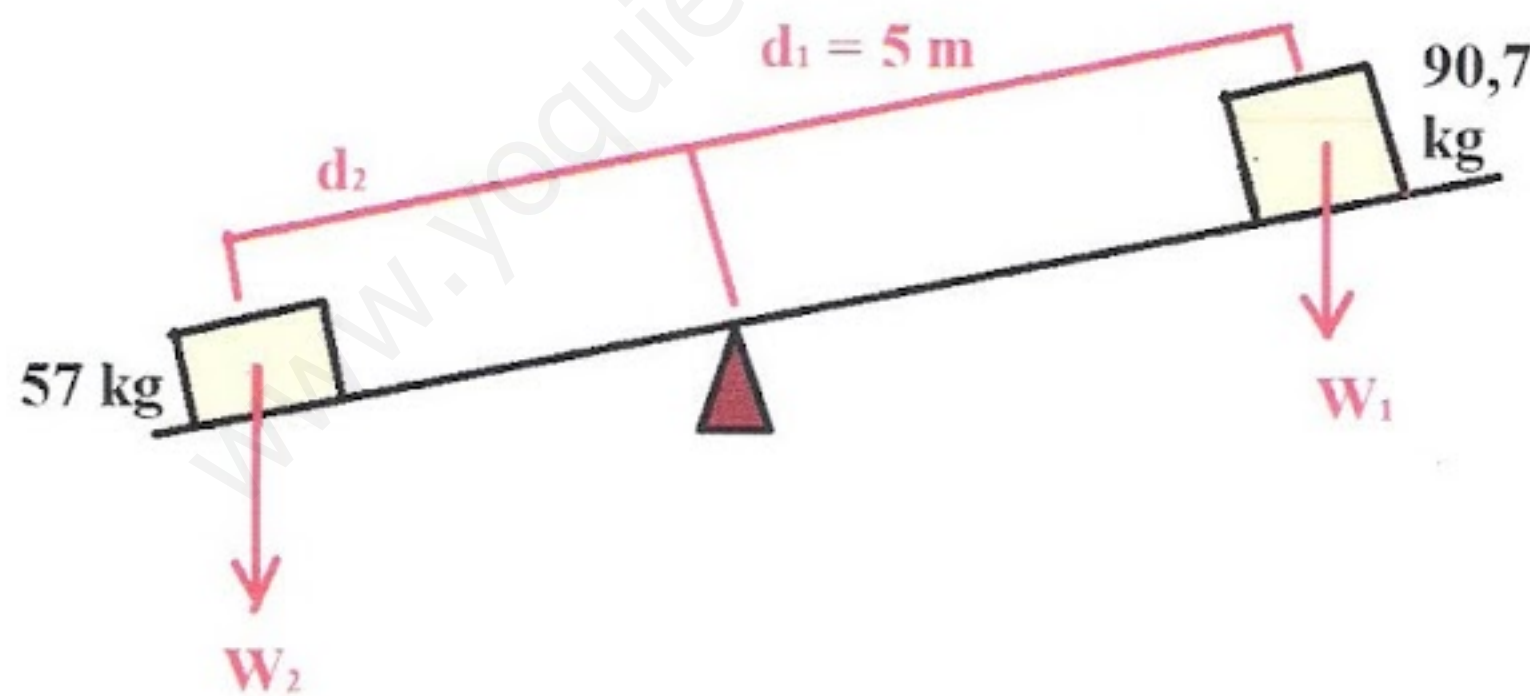
SOLUTION:

$$W = m \cdot g \Rightarrow m = \frac{W}{g}$$

$$m = \frac{1 \text{ N}}{9,8 \text{ m/s}^2} = 0,102 \text{ kg} \cdot \frac{1000 \text{ g}}{1 \text{ kg}} = 102 \text{ g}$$

9) Peter weighs 90,7 kg and is located on a seesaw 5 m from the fulcrum. How far from the fulcrum should Anna, whose mass is 57 kg, sit to balance the lever? 10 points

SOLUTION:



$$W_1 \cdot d_1 = W_2 \cdot d_2$$

$$90,7 \cdot 9,8 \cdot 5 = 57 \cdot 9,8 \cdot d_2$$

$$453,5 = 57d_2$$

$$\frac{453,5}{57} = d_2$$

$$7,96 \text{ m} = d_2$$