

FORCES EXAM

2nd ESO D

NAME AND SURNAME _____

EXAM A

1) What is the force required to stretch a spring whose constant value is 100 N/m by an amount of 0,50 m? 3 points

SOLUTION:

$$F = k \cdot x$$

$$F = 100 \text{ N/m} \cdot 0,5 \text{ m} = 50 \text{ N}$$

2) What is the spring constant of a spring if a force of 7,5 N is applied and causes a compression of 2,8 cm? 4 points

SOLUTION:

$$x = 2,8 \text{ cm} \cdot \frac{1 \text{ m}}{100 \text{ cm}} = 0,028 \text{ m}$$

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

$$k = \frac{7,5 \text{ N}}{2,8 \text{ cm}} = 267,86 \text{ N/m}$$

3) What will be the extension of a spring whose constant is 10 N/m if the load hanging from it weighs 4 N? 3 points

SOLUTION:

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

$$x = \frac{4 \text{ N}}{10 \text{ N/m}} = 0,4 \text{ m} \cdot \frac{100 \text{ cm}}{1 \text{ m}} = 40 \text{ cm}$$

4) A 0,3 kg cart accelerates 2,5 m/s². What is the force acting on it? 3 points

SOLUTION:

$$F = m \cdot a$$

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$$F = 0,3 \text{ kg} \cdot 2,5 \text{ m/s}^2 = 0,75 \text{ N}$$

5) What is the acceleration of a 2 kg brick thrown with a force of 4 N? 3,5 points

SOLUTION:

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

$$a = \frac{4 \text{ N}}{2 \text{ kg}} = 2 \text{ m/s}^2$$

6) A cart accelerates to $4,4 \text{ m/s}^2$ when the engine exerts a force of 6,3 N. What is the cart mass? 3,5 points

SOLUTION:

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

$$m = \frac{6,3 \text{ N}}{4,4 \text{ m/s}^2} = 1,43 \text{ kg}$$

7) How much would a 60 kg woman weigh on the Moon if the acceleration due to gravity is $1,6 \text{ m/s}^2$? 5 points

SOLUTION:

$$W = m \cdot g_{\text{MOON}}$$

$$W = 60 \text{ kg} \cdot 1,6 \text{ m/s}^2 = 96 \text{ N}$$

8) If your weight on Earth is 240 N. What is your mass? 5 points

Datum: $g = 9,8 \text{ m/s}^2$.

SOLUTION:

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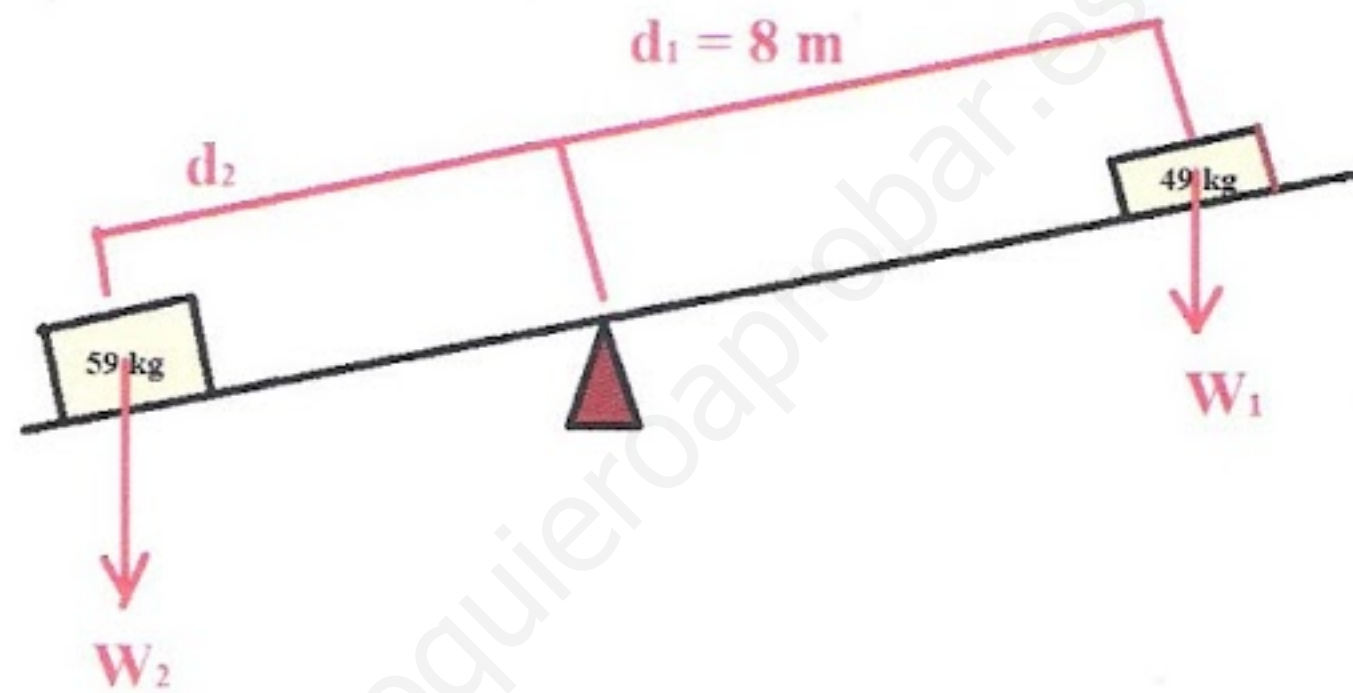
$$W = m \cdot g \Rightarrow m = \frac{W}{g}$$

$$m = \frac{240 \text{ N}}{9,8 \text{ m/s}^2} = 24,49 \text{ kg}$$

9) The fulcrum of a 16 m seesaw is placed in the middle, Jason, who weighs 49 kg is seated 8 m from the fulcrum. How far from the fulcrum should Laura sit, if she weighs 59 kg, to balance it?

10 points

SOLUTION:



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

$$49 \cdot 9,8 \cdot 8 = 59 \cdot 9,8 \cdot d_2$$

$$392 = 59d_2$$

$$\frac{392}{59} = d_2$$

$$6,64 \text{ m} = d_2$$