

Answer on Question #42111-Physics-Mechanics- Kinematics-Dynamics

Two people are pushing a 35 kg box. One person pushes with a force F_1 of 45 North and the other person pushes with a force F_2 of 60 N South. What is the resulting force on the box?

Solution

The resulting force on the box is

$$F = F_2 - F_1 = 60 - 45 = 15 \text{ N South.}$$

Answer: 15 N South.

A cat is running with a horizontal velocity of 2 m/s. It can't stop in time and flies off the edge of a 1.5 m high counter. All of the following statements are true about the cat except

- a. its acceleration in the x-direction is -9.8 m/s^2
- b. its velocity in the x-direction just before it hits the ground is 2 m/s
- c. its initial velocity in the y-direction is zero
- d. its velocity in the x-direction just before it hits the ground is zero

Solution

d. its velocity in the x-direction just before it hits the ground is zero. False: its velocity in the x-direction is always 2 m/s.

Answer: d.

Which object would have more kinetic energy, a 50 kg person running 10 m/s or a 50 kg person running 15 m/s?

Solution

The kinetic energy of first object is

$$K_1 = \frac{m_1 v_1^2}{2} = \frac{50 \cdot 10^2}{2} = 2500J.$$

The kinetic energy of first object is

$$K_2 = \frac{m_2 v_2^2}{2} = \frac{50 \cdot 15^2}{2} = 5625J.$$

$$K_2 > K_1.$$

Answer: a 50 kg person running 15 m/s has more kinetic energy.

Two weightlifters are each able to lift 120 kg. One is able to lift it in $t_1 = 1.2$ seconds and the other is able to lift it in $t_2 = 1.8$ seconds. Which person generated more power?

Solution

The power is $P = \frac{W}{t}$, where W is the work and t is time to do it. In both cases the work is the same, so

$$P_1 = \frac{W}{t_1} > P_2 = \frac{W}{t_2}.$$

Answer: 1-st person.

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