

Preliminary Quiz Linear Forces

Key

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. A 200N box is sitting on a flat table, What is the normal force?
 a. 200 c. 9.8
 b. 20 d. not enough information
- _____ 2. A 50kg box has a weight of _____ on Earth.
 a. 50 c. 9.8
 b. 500 d. not enough information
- _____ 3. It is theorized that an ant can fall from any height and not be injured. If a 0.01kg ant is falling is at terminal velocity (not getting any faster) due to air resistance (F_{air}). What are the following:
 Fg:
 Fair:
 Fnet:
- a. Fg: 0 Fair: 0.1 Fnet: 0
 b. Fg: 0.1 Fair: 0 Fnet: 0.1
 c. Fg: 0.1 Fair: 0.1 Fnet: 0
 d. Fg: 0 Fair: 0 Fnet: 0

$50 \cdot 10 = 500N$

$F_g = 0.01 \cdot 10 = 0.1N$
 $F_{air} = 0.1N$
 $F_{net} = 0$



- _____ 4. What is the weight of the box on Earth?
 a. 10 kg b. 10 N c. -100 kg d. -100 N
- _____ 5. What is acceleration of the box?
 a. -0.1 b. -1 c. -2 d. -3
- _____ 6. What is net force on the 10kg box?
 a. 0 N b. -10 N c. 20N d. -30N
- _____ 7. The international space station (ISS) travels at a constant speed around the Earth making approximately 15.5 orbits a day? Which of the following statements is true
 I. The ISS needs to fire thrusters to maintain this speed. *False*
 II. The ISS has no forces acting on it which is why it maintains this speed
 a. I only c. Both I and II
 b. II only d. Neither I or II

$10 \cdot 10 = 100$

$\frac{-10}{15} = -1/m/s^2$

Gravity of Earth

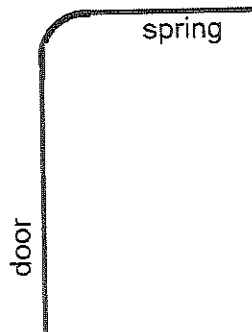
Name: _____

8. A box is accelerating at 3m/s^2 . The mass is doubled and the force is quadrupled. What is the new acceleration?
- a. 1.5
 b. 3
 c. 6
 d. 27

$3 \times 4 = 12 \text{ m/s}^2$
 $12 \div 2 = 6 \text{ m/s}^2$

Short Answer

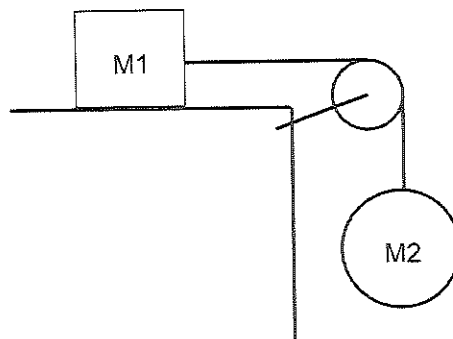
9.



$300 \text{ kg} \times 10 = 3000 \text{ N}$
 2850
 50

Shown above is a track of a garage door. Garage doors have a spring that is used to make it easier to lift the garage door which would otherwise be impossible for the average human to lift with all their strength. If a 300 Kg garage door needs to be lifted with a minimum of 50N, what is the tension on the spring? Ignore the rolling friction of the track.

10.



- a. Derive a formula for the acceleration of the block M1 sliding across a frictionless surface using the variables, M1, M2, and g.

$a = \frac{\Sigma F}{m} \rightarrow a = \frac{m_2 g}{m_1 + m_2}$

- b. A second M1 is placed on top of the existing M1, how does the
- i. tension of the string change?

ii. acceleration change (Slower/ 1/2 slower/ faster/ 2 times faster)

Same, Just more slower