

Newton's Laws: Forces cause motion Version C

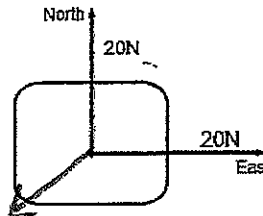
Multiple Choice

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

$25 \uparrow$
 $35 \downarrow$
 $a = \frac{-10}{15} =$

1. (#3-2) A 25N horizontal force northward and a 35N horizontal force southward act concurrently on a 15kg object on a frictionless surface. What is the magnitude of the objects acceleration?
 a. 0.67 m/s²
 b. 1.7 m/s²
 c. 2.3 m/s²
 d. 4.0 m/s²

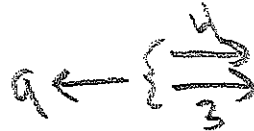
2.



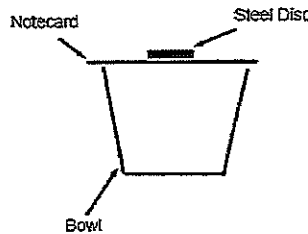
$\sqrt{20^2 + 20^2}$
 $= 28$

(#3-2) A 20N force due north and a 20N force due east act concurrently on an object, as shown above. The additional force necessary to bring the object into a state of equilibrium is

- a. 20N Northeast
 b. 20N southwest
 c. 28N northeast
 d. 28N southwest
3. (#3-2) A 3N force and a 4N force are acting on an object. Which force could not produce an equilibrium state with these two forces.
 a. 1N
 b. 7N
 c. 9N
 d. 4N



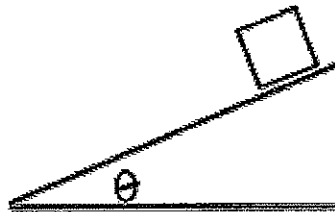
4. (#3-2)



a 1N metal disk rests on a index card that is balanced on top of a glass bowl. What is the net force acting on the metal disk?

- a. 1N
 b. 2N
 c. 0N
 d. 9.8N
5. (#3-1) A carpenter hits a nail with a hammer. Compared to the magnitude of the force the hammer exerts on the nail, the magnitude of the force the nail exerts on the hammer during contact is
 a. equal
 b. greater
 c. the same
 d. Force(N)/9.8

6.



(#3-3) The block shown above is sliding down an incline, if the angle is increased, the coefficient of (μ_k/μ_s) will _____?

- a. μ_k , increase
- b. μ_k , remain the same.
- c. μ (static), decrease
- d. μ (static), remain the same

7. (#3-2) Lizzie stands on a scale in an elevator. If the scale on the elevator reads 600N when Lizzie is riding upward at a constant 4m/s, what is the reading on the scale when the elevator is at rest?

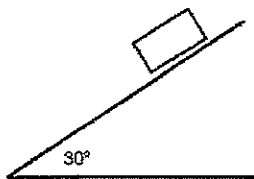
- a. Less than 600
- b. 600N
- c. more than 600
- d. zero

8. A 10kg box is sliding down a frictionless 18° ramp. What is the acceleration of the box down the ramp?

- a. 9.8m/s^2
- b. 0.54m/s^2
- c. 6.6m/s^2
- d. 3.0m/s^2

$a = \frac{\sum F}{m} = \frac{Mg \sin \theta}{m}$

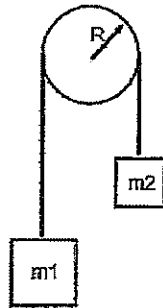
9.



(#3-2) Which of the following diagrams represent the forces acting on this block resting on an incline plane.

a.
 b.
 c.
 d.

10.



$$a = \frac{\Sigma F}{M} = \frac{m_1 g - m_2 g}{m_1 + m_2}$$

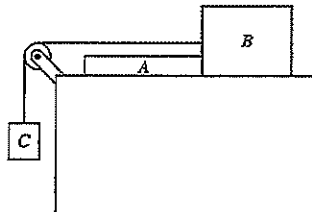
(#3-2) Two masses are hanging on a frictionless pulley (ignore mass of string). If $m_1 > m_2$ which of the following would correctly describe the acceleration?

- a. $a = g \frac{(m_1 - m_2)}{(m_1 + m_2)}$
- b. $a = g \frac{(m_2)}{(m_1)}$
- c. $a = g \frac{(m_1 + m_2)}{(m_1 - m_2)}$
- d. $a = g (m_2 - m_1)$

11. An elevator carrying a person of mass m is moving upward and slowing down. How does the magnitude F of the force exerted on the person by the elevator floor compare with the magnitude mg of the gravitational force?

- a. $F < mg$
- b. $F = mg$
- c. $F > mg$
- d. F can be greater than or less than mg depending on the speed of the elevator.

12.

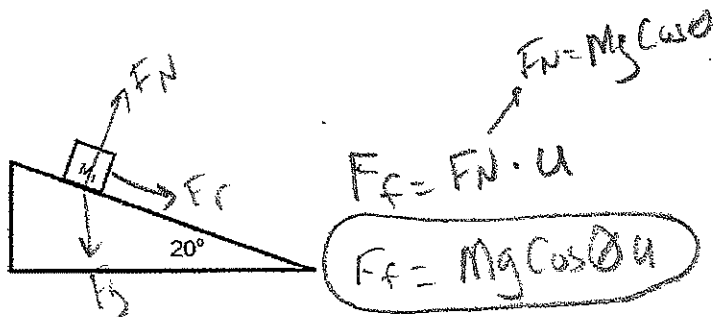


The following blocks are located on a block above. The surface is frictionless except block A is attached to the table and can not move. Which of the following formulas represents the tension on the wire.

- a. $m_B g$
- b. $m_C g$
- c. $\frac{m_A m_C}{m_A + m_B} g$
- d. $\frac{m_B m_C}{m_A + m_B} g$

Short Answer

13.



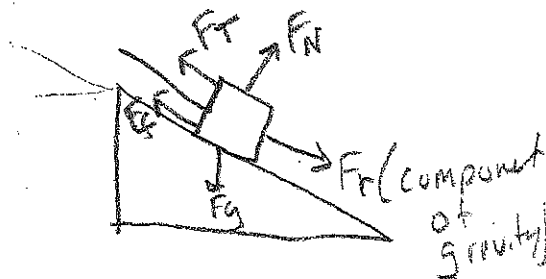
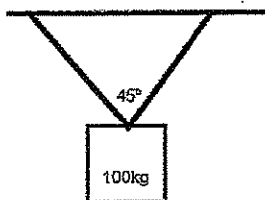
a. Based upon the drawing provided, using only symbols, M_1 , g , uK , and trig functions, derive a formula expressing the Force of friction.

b. If the block is suspended from a wire parallel to the ramp, holding the block on the ramp. Sketch this version of the block and wire, labeling all the forces.

c. Write out a variable equation solving for F_T . *see above*

14. $F_T + F_f = F_g$
 $F_T = F_g - F_f$

$F_T = Mg \sin \theta - Mg \cos \theta u$



A block is suspended by two identical wires at an angle seen above. Below you will find two student hypothesis about the tension on each wire. Justify or nullify any or all parts of each student statement. If possible, draw a picture of what would accurately describe the student's hypotheses.

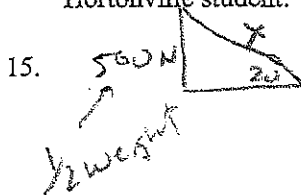
Student A: The tension of the each wire is 500N due to the fact that the weight of the block is 1000N. Dividing the weight between each wire gives the force of 500N per wire.

True! weight = 1000N False! to get this

Student B: The force on each wire equals 1000N due to the force of gravity pulley down equally on each wire.

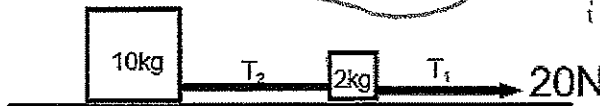
False, only vertical component of wire acts to oppose gravity

Hortonville student: Calculate the force of tension on each wire.



$\sin(20) = \frac{500}{X}$
 $X = 1461N$ each

$\sin 20 = \frac{Y}{1000}$
 $Y = 342$



Student hypothesis: The force on T_2 is greater than T_1 . Justify or nullify this statement.

No Friction

Calculate the acceleration of this system.

$a = \frac{\Sigma F}{m} = \frac{20}{12} = 1.67 m/s^2$

False, $T_1 > T_2$. Rope T_1 ($F=ma$) is pulling 2ks so $\uparrow F$ required

