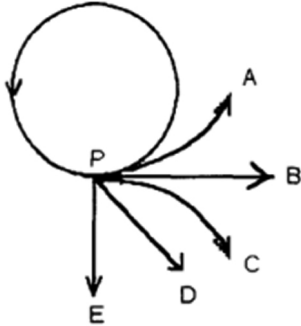


TALLER DE LEYES DE NEWTON PARA EL MOVIMIENTO

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) A girl attaches a rock to a string, which she then swings counter-clockwise in a horizontal circle. The string breaks at point P in the figure, which shows a bird's-eye view (as seen from above). Which path (A-E) will the rock follow? 1) _____

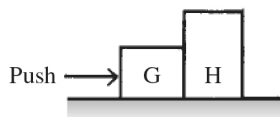


- A) Path A B) Path B C) Path C D) Path D E) Path E

- 2) If you pound a feather with a hammer, which one feels a greater force? 2) _____
A) If the feather moves, then it felt the greater force. Otherwise the force was the same on both.
B) always the feather
C) The size of the force is always exactly the same on both of them.
D) always the hammer

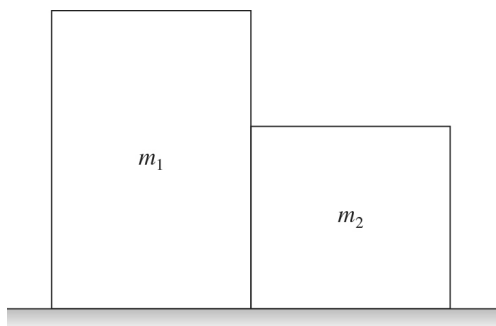
- 3) An elevator suspended by a vertical cable is moving downward but slowing down. The tension in the cable must be 3) _____
A) equal to the weight of the elevator.
B) greater than the weight of the elevator.
C) less than than the weight of the elevator.

- 4) You push on box G that is next to box H, causing both boxes to slide along the floor, as shown in the figure. The reaction force to your push is 4) _____



- A) the acceleration of box G.
B) the upward force of the floor n box G.
C) the push of box H on box G.
D) the push of box G against you.
E) the push of box G on box H.

5) The figure shows two boxes, with $m_1 > m_2$, that are on a level frictionless surface. We can apply a horizontal force \vec{F} either toward the right on m_1 or toward the left on m_2 . The magnitude of the force that the boxes exert on each other is



- A) larger if \vec{F} is applied toward the left.
- B) zero newtons in either case.
- C) larger if \vec{F} is applied toward the right.
- D) the same in either case.

5) _____

6) A person who normally weighs 700 N is riding in an elevator that is moving upward but slowing down at a steady rate. If this person is standing on a bathroom scale inside the elevator, what would the scale read?

- A) more than 700 N
- B) 700 N
- C) less than 700 N
- D) It could be more or less than 700 N, depending on whether the magnitude of the acceleration is greater than or less than 9.8 m/s^2 .

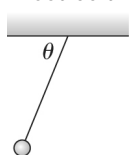
6) _____

7) The acceleration due to gravity is lower on the Moon than on Earth. Which one of the following statements is true about the mass and weight of an astronaut on the Moon's surface, compared to Earth?

- A) Both mass and weight are less.
- B) Mass is less, weight is the same.
- C) Both mass and weight are the same.
- D) Mass is the same, weight is less.

7) _____

8) Inside of a train a ball of weight W is hanging by a light wire at rest from the ceiling. The wire makes an angle θ with the ceiling, as shown in the figure. Which one of the following conditions must be true about the tension T in the wire?

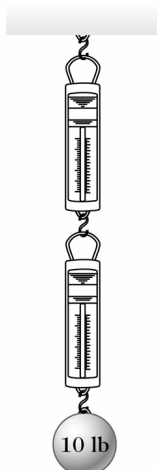


- A) $T \cos \theta = W$
- B) $T = ma$
- C) $T \tan \theta = W$
- D) $T = W$
- E) $T \sin \theta = W$

8) _____

9) In the figure, a 10-lb weight is suspended from two spring scales, each of which has negligible weight. Which one of the following statements about the readings in the scales is true?

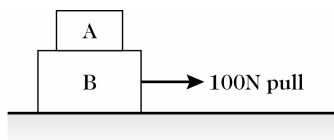
9) _____



- A) The lower scale will read zero, the top scale will read 10 lb.
- B) Each scale will read 5 lb.
- C) Each scale will show a reading between one and 10 lb, such that the sum of the two is 10 lb. However, exact readings cannot be determined without more information.
- D) The top scale will read zero, the lower scale will read 10 lb.
- E) None of these is true.

10) Two blocks, A and B, are being pulled to the right along a horizontal surface by a horizontal 100-N pull, as shown in the figure. Both of them are moving together at a constant velocity of 2.0 m/s to the right, and both weigh the same.

10) _____

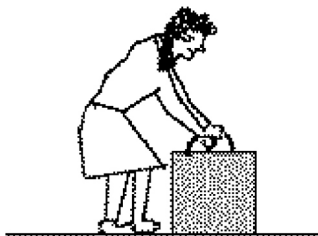


Which of the figures below shows a correct free-body diagram of the horizontal forces acting on the upper block, A?

- A)
- B)
- C)
- D)
- E)

11) As shown in the figure, a woman is straining to lift a large crate, but without success because it is too heavy. We denote the forces on the crate as follows: P is the magnitude of the upward force being exerted on the crate by the person, C is the magnitude of the vertical contact force on the crate by the floor, and W is the weight of the crate. How are the magnitudes of these forces related while the person is trying unsuccessfully to lift the crate?

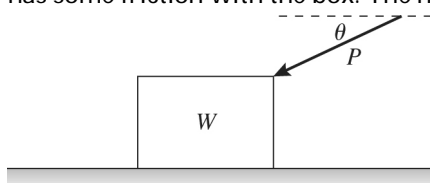
11) _____



- A) $P + C = W$ B) $P = C$ C) $P + C < W$ D) $P + C > W$

12) A push of magnitude P acts on a box of weight W as shown in the figure. The push is directed at an angle θ below the horizontal, and the box remains at rest. The box rests on a horizontal surface that has some friction with the box. The normal force on the box due to the floor is equal to

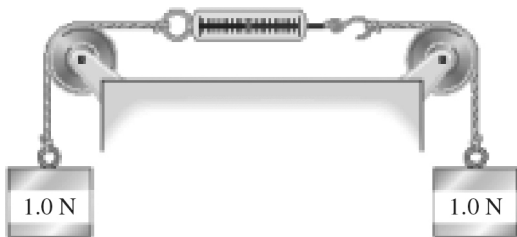
12) _____



- A) $W + P \cos \theta$.
 B) $W - P \sin \theta$.
 C) $W + P \sin \theta$.
 D) $W + P$.
 E) W .

13) In the figure, what does the spring scale read? The pulleys are ideal and the strings and scale are also massless.

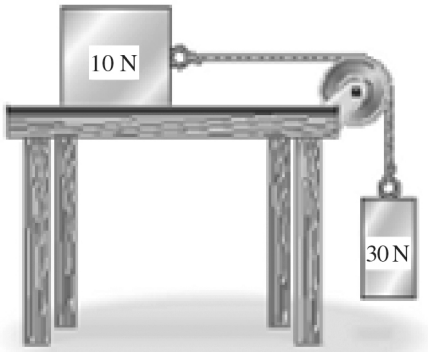
13) _____



- A) 0.00 N
 B) exactly 1.0 N
 C) exactly 2.0 N.
 D) more than 19.6 N
 E) 0.50 N

14) Two boxes are connected to each other by a string as shown in the figure. The 10-N box slides without friction on the horizontal table surface. The pulley is ideal and the string has negligible mass. What is true about the tension T in the string?

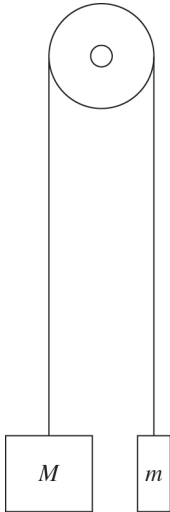
14) _____



- A) $T = 20\text{ N}$ B) $T < 30\text{ N}$ C) $T = 30\text{ N}$ D) $T = 10\text{ N}$ E) $T > 30\text{ N}$

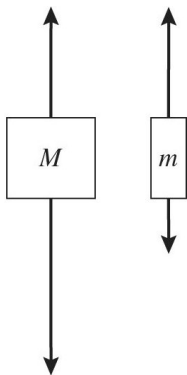
15) Two objects of unequal masses, M and m ($M > m$), are connected by a very light cord passing over an ideal pulley of negligible mass. When released, the system accelerates, and friction is negligible.

15) _____

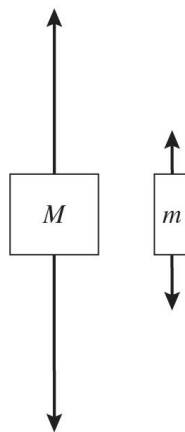


Which one of the following free-body diagrams most realistically represents the forces acting on the two objects in the moving system?

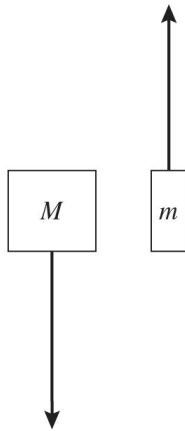
A)



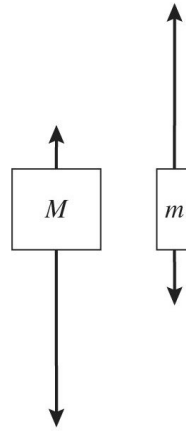
B)



C)



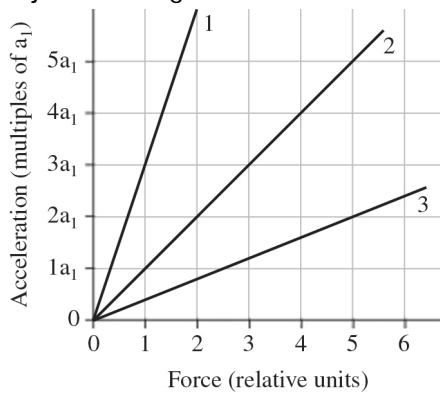
D)



- 16) An astronaut weighs 99 N on the Moon, where the acceleration of gravity is 1.62 m/s^2 . How much does she weigh on Earth? 16) _____
 A) 600 N B) 16 N C) 99 N D) 440 N E) 61 N

- 17) Calculate the average force a bumper would have to exert to bring a 1200-kg car to rest in 15 cm when the car had an initial speed of 2.0 m/s (about 4.5 mph). 17) _____
 A) $6.5 \times 10^5 \text{ N}$
 B) $5.4 \times 10^4 \text{ N}$
 C) $1.6 \times 10^4 \text{ N}$
 D) $1.8 \times 10^4 \text{ N}$
 E) $3.2 \times 10^4 \text{ N}$

- 18) The figure shows an acceleration-versus-force graph for three objects pulled by wires. If the mass of object 2 is 36 kg, what are the masses of objects 1 and 3? 18) _____



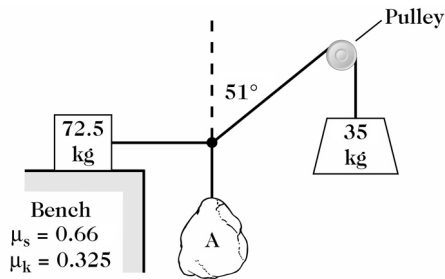
- A) 72 kg and 18 kg B) 12 kg and 72 kg C) 90 kg and 12 kg D) 12 kg and 90 kg

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 19) Three objects are connected by weightless flexible strings as shown in the figure. The pulley has no appreciable mass or friction, and the string connected to the block on the horizontal bench pulls on it parallel to the bench surface. The coefficients of friction between the bench and the block on it are $\mu_s = 0.66$ and $\mu_k = 0.325$. You observe that this system remains at rest.

19) _____

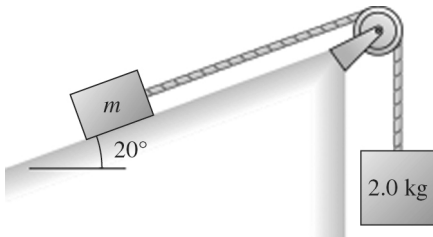
- (a) Find the mass of the hanging object A.
 (b) What is the magnitude of the friction force on the block on the bench?



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 20) The figure shows a block of mass m resting on a 20° slope. The block has coefficients of friction $\mu_s = 0.64$ and $\mu_k = 0.54$ with the surface of the slope. It is connected using a very light string over an ideal pulley to a hanging block of mass 2.0 kg . The string above the slope pulls parallel to the surface. What is the minimum mass m so the system will remain at rest when it is released from rest?

20) _____



A) 3.6 kg

B) 2.1 kg

C) 3.3 kg

D) 1.3 kg