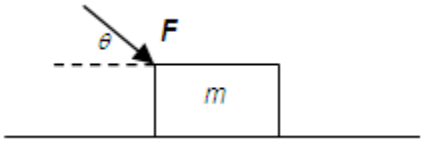
Forces Test
AP Physics B

Name _____
2-3a 3b-4 5-6a 6b-7

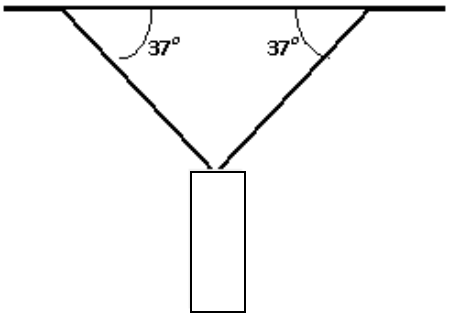
Multiple Choice: For the following questions, mark the best answer on your scantron. Each question is worth 1 point. NOTA means "none of these answers". Write on this test, it is your copy.

1. A horizontal, uniform board of weight 125 N is supported by vertical chains at each end. A person weighing 500 N is sitting on the board. The tension in the right chain is 250 N. What is the tension in the left chain?
   a. 250 N b. 375 N c. 500 N d. 625 N e. 875 N

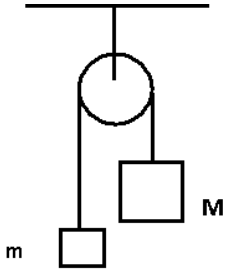
2. A force F is pushing at a downward angle θ on a block of mass m as shown below. The magnitude of the normal force exerted on the block by the surface beneath it is
   a. mg
   b. mg - Fsinθ
   c. mg + Fsinθ
   d. mg - Fcosθ
   e. mg + Fcosθ



3. A 100N traffic light is supported by two ropes (at 37°) as shown below. What are the tensions in the rope? (Use the constants sheet for your trigonometry)
   a. 30 N
   b. 50 N
   c. 63 N
   d. 66 N
   e. 83 N



4. In the Atwood machine shown, if M = 3 kg and m = 1 kg, what is the tension in the string? (Ignore friction)
   a. 10 N
   b. 15 N
   c. 20 N
   d. 25 N
   e. NOTA

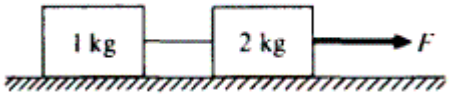


5. An object slides on a level surface to the right. It slows and comes to a stop with a constant acceleration of 2.45 m/s^2. What is the coefficient of kinetic friction between the object and the floor?

a. 0.25 b. 0.41 c. 0.50 d. 4.9 e. Impossible question

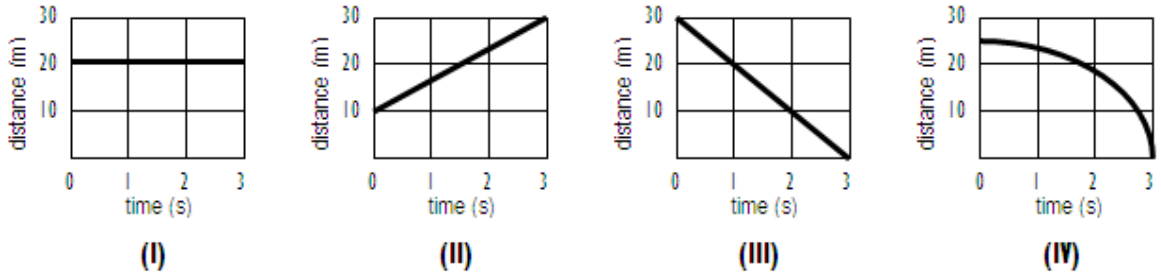
6. When the frictionless system shown above is accelerated by an applied force of magnitude the tension in the string between the blocks is

   a. 2F b. F c. (2/3) F d. (1/2)F e. (1/3)F



7. In terms of its fundamental units, 1 N is equivalent to a
   a. kg·m/s b. kg^2·m/s c. kg·m^2/s d. kg^2·m^2/s e. NOTA

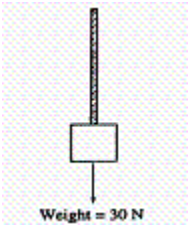
8. A constant, non-zero net force acts on a body. Which of the following distance vs. time graphs is possible?



a. I only b. II only c. III only d. IV only e. I, II, and III

9. Two toy cars (16 kg and 2 kg) are released simultaneously on an inclined plane that makes an angle of 30° with the horizontal. Make a statement which best describes their acceleration after being released. No Friction.
   a. The 16-kg car accelerates 8 times faster than the 2-kg car.
   b. The 16-kg car accelerates 4 times faster than the 2-kg car.
   c. The 2-kg car accelerates 8 times faster than the 16-kg car.
   d. Both cars accelerate at the same rate.
   d. NOTA

10. A rope of negligible mass supports a block that weighs 30 N, as shown below. The breaking strength of the rope is 50 N. The largest acceleration that can be given to the block by pulling up on it with the rope without breaking the rope is most nearly
   a. 6 m/s^2
   b. 6.7 m/s^2
   c. 10 m/s^2
   d. 15 m/s^2
   e. 16.7 m/s^2



11. If we know an object is moving at constant velocity, we may assume:
   a. the net force acting on the object is zero.
   b. there are no forces acting on the object.
   c. the object is accelerating.
   d. the object is losing mass.

12. You are standing in a moving bus, facing forward, and you suddenly fall forward. You can imply from this that the bus driver:
   a. decreased velocity. b. increased velocity. c. turned left d. turned right

13. A fly hits a windshield on a moving car. Compared to the force that the fly applies to the windshield, the force that the windshield applies to the fly is
   a. greater b. less c. the same d. impossible to know without more info

14. A 20 kg box rests on a horizontal floor. The coefficient of static friction is μs = 0.30 while the coefficient of kinetic friction is μk = 0.20. When a horizontal force of 50 N is applied to the box, the force of friction acting on the box is most nearly
   a. 40 N b. 50 N c. 60 N d. 100 N e. NOTA

15. An object, of mass M, is suspended by a string from the ceiling inside an elevator. The elevator is traveling upward with a constant speed. The tension in the string is

   a. equal to Mg b. less than Mg c. greater than Mg d. impossible question

AP Physics
Newton's Laws

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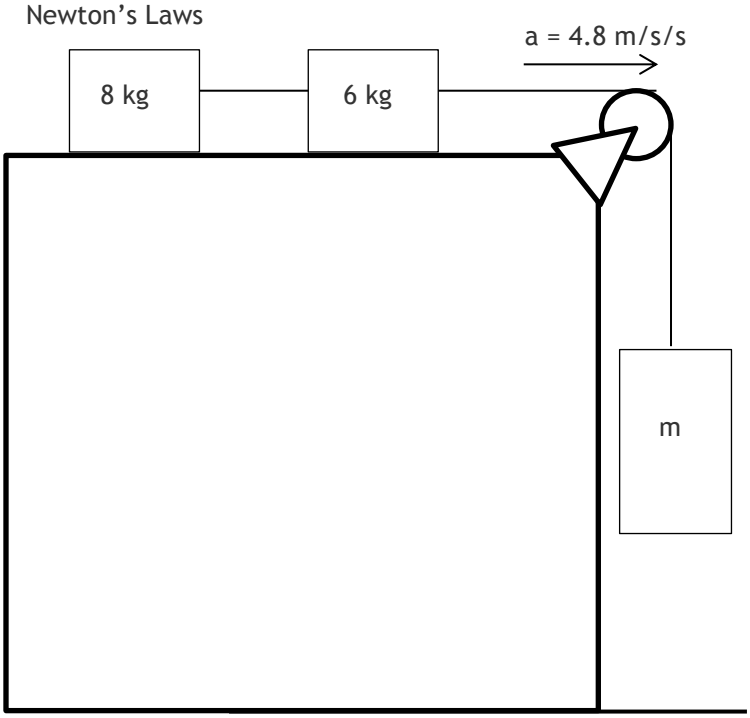


Two boxes of mass 8 kg and 6kg connected by a string, sit on top of a FRICTIONLESS table. The 6kg object is also connected to an unknown mass, m, which hangs off the edge of the table. When the masses are released, they accelerate at a rate of 4.08 m/s/s.

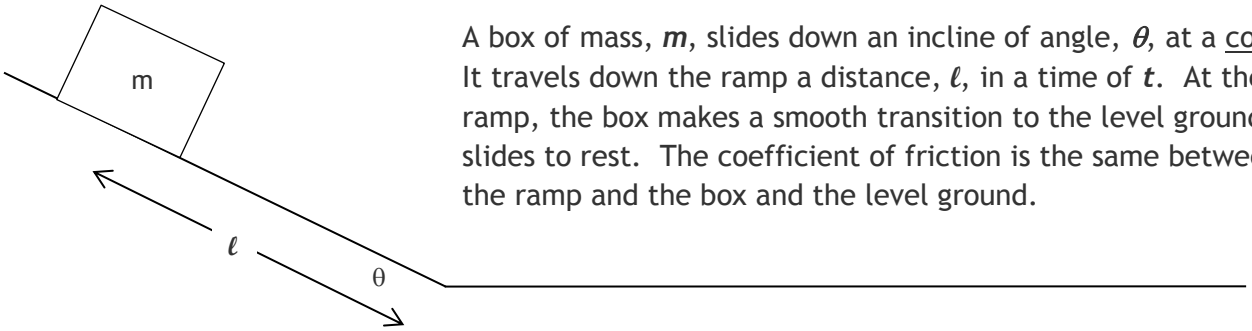
a) Draw a free body diagram for the 6kg object. (Use the dot below)

●

b) Determine the value of the hanging mass.

c) Determine the tension in EACH string.

d) If the string is cut between the 6kg and 8kg mass, what is the new acceleration of the 6 kg object?



A box of mass, m, slides down an incline of angle, θ, at a constant speed. It travels down the ramp a distance, ℓ, in a time of t. At the bottom of the ramp, the box makes a smooth transition to the level ground where it slides to rest. The coefficient of friction is the same between the box and the ramp and the box and the level ground.

a) Determine the constant speed of the box down the ramp. Express your answer in terms of mathematical functions and the variables: m, ℓ, θ, t, g.

b) Determine the coefficient of friction. Express your answer in terms of mathematical functions and the variables: m, ℓ, θ, t, g.

c) Determine the acceleration of the box while it coasts to a stop. Express your answer in terms of mathematical functions and the variables: m, ℓ, θ, t, g.

d) Determine the distance traveled by the box once it leaves the ramp. Express your answer in terms of mathematical functions and the variables: m, ℓ, θ, t, g.