Dynamics
Assignment 3

Name:_____

Multiple Choice. Circle the correct answer. For those questions involving calculations, working **MUST** be shown to receive credit.

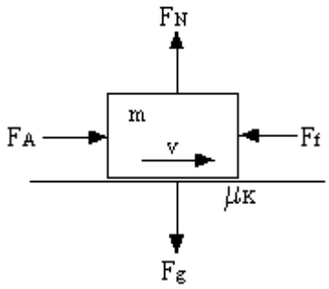
1. What force is required to compress a spring with a force constant of 290.0 N/m a total of 12.3 mm?
   (A) 0.357 N
   (B) 3.57 N
   (C) 35.7 N
   (D) 3580 N

2. A spring has a spring constant k = 200.0 N/m. An applied force of 5.2 N will stretch it how far from the rest position?
   (A) 0.026 cm
   (B) 2.6 m
   (C) 38.5 m
   (D) 1040 m

3. A student exerts a force of 12 N to compress a spring 2.54 cm. Determine the springconstant for the spring.
   (A) 0.21 N/m
   (B) 0.30 N/m
   (C) 4.7 N/m
   (D) 4.7×10^2 N/m

4. The force of friction always acts in a direction opposite to what?
   (A) applied force
   (B) net force
   (C) normal force
   (D) motion

5. Study the force system diagram pictured below and select the factor which would NOT influence the amount of kinetic friction.
   (A) Applied force, F_A
   (B) Coefficient of kinetic friction, μ_k
   (C) Gravitational field strength, F_g.
   (D) Normal force, F_N

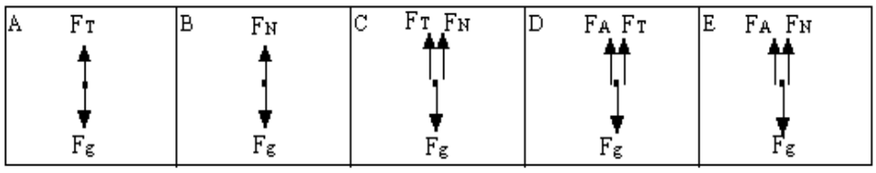


6. Which of the following statements concerning friction is true?
   (A) For two given surfaces, the coefficient of static friction is generally greater than the coefficient of kinetic friction.
   (B) Friction is a force that is unavoidable and serves no practical purpose.
   (C) Friction always acts in the direction of motion.
   (D) The frictional force always acts oppositely to the applied force.

7. If you were placed in the middle of a large room on a totally frictionless surface, which of the following is true?
   (A) It would be impossible to get to a wall.
   (B) It would be difficult to get to a wall.
   (C) It would be a simple task to get to a wall.
   (D) It would take a very long time to get to a wall, but you would eventually be able to do it.

8. If the frictional force is equal but opposite to the applied force and assuming that all other forces may be ignored, what must be true about the object?
   (A) It may be at rest or moving at uniform velocity
   (B) It must be accelerating
   (C) It must be at rest
   (D) It must be slowing down

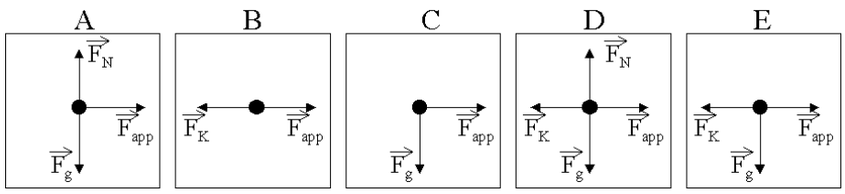
9. An elevator is suspended by a cable and moves upward. Which of the following free-body diagrams best represents the forces acting on the elevator?



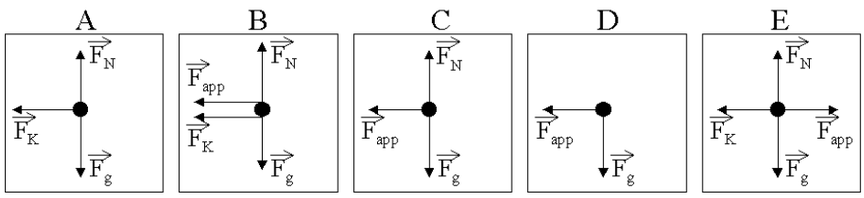
10. A fisher suspends a fish on a Newton spring scale in an elevator. When does the scale show the highest reading?
(A) when the elevator moves downward at a constant speed.
(B) when the elevator moves downward with increasing speed.
(C) when the elevator moves upward with decreasing speed.
(D) when the elevator moves upward with increasing speed.

11. Which of the following is NOT an example of "inertia"?
(A) A person's head jerks back as the car he is riding in accelerates forward.
(B) A person's head jerks forward as the car he is riding in suddenly stops.
(C) A person is pressed up against the car door as the car turns a corner.
(D) All of the above are examples of inertia.

12. Which free-body diagram best represents a wagon being pulled along a horizontal surface?



13. Which free-body diagram best represents a car in a skid with its brakes locked up?



14. According to Newton's third law, what force is responsible for moving you forward when you walk across a floor?
(A) the force applied by your feet on the floor
(B) the force of friction of your feet on the floor
(C) the force of the floor applied against your feet
(D) the force exerted upward by the floor on your feet (i.e., the normal force)

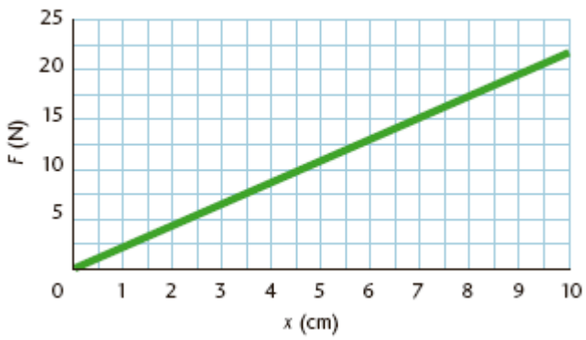
15. Which of the following situations would produce the greatest acceleration?
(A) 3.0-N force acting west and a 5.0-N force acting east on a 2.0-kg object.
(B) A 8.0-N force acting west and a 5.0-N force acting east on a 3.0-kg object.
(C) A 8.0-N force acting west and a 12.0-N force acting east on a 4.0-kg object.
(D) A 1.0-N force acting west and a 9.0-N force acting east on a 5.0-kg object.

16. A 1.5-kg cart is pulled with a force of 7.3 N at an angle of 40° above the horizontal. If a kinetic friction force of 3.2 N acts against the motion, what is the the cart's acceleration along the horizontal surface?
(A) 1.6 m/s^2
(B) 2.4 m/s^2
(C) 2.7 m/s^2
(D) 5.0 m/s^2

17. A 2.0-kg object is pulled horizontally by a force of 6.3 N along the floor where the coefficient of kinetic friction is 0.24. What is the object's acceleration?
(A) 0.80 m/s^2
(B) 1.6 m/s^2
(C) 2.0 m/s^2
(D) 5.5 m/s^2

18. A spring is 14.0 cm long when no force is applied to it. An applied force of 20.0 N extends the spring to a total length of 17.0 cm. Calculate the spring constant. **{2}**

19. Below is a graph of *F* versus *x* for an elastic spring. Determine the spring constant. **{2}**



20. A spring with k = 1200 N/m is hung vertically from a stand and a mass of 50.0 kg is suspended from it. How much will the spring stretch? (Draw an FBD) **{4}**

21. A 50-kg student rides a pogo stick to school. If she compresses the spring 0.25 m on an average bounce and the spring's k = 2200 N/m, find her acceleration on the bounce moving upward. Draw a FBD for this problem. **{5}**

22. A horizontal force of 7.104 N is applied to a block of wood with a mass of 1.2 kg. The coefficient of friction between the block and the surface on which it is resting is $\mu = 0.40$. What is the acceleration of the block? (Include a free-body diagram) **{4}**

23. An applied force of 6.2 N acts on a 2.1-kg object, pushing it horizontally across a surface where the coefficient of kinetic friction is 0.15. Determine the object's acceleration. **{4}**

24. A force of 1.2 N is applied to an object of mass 1.5 kg. It accelerates at 0.50 m/s^2. Determine the force of friction that is acting and the coefficient of kinetic friction involved. Include a free-body diagram. **{5}**

25. A box of mass 4.5 kg is pushed across a rough surface (μ_K = 0.18) for a distance of 2.0 m by a constant force of 10.0 N. If the object reaches a speed of 2.0 m/s by the end of the push, what was its speed at the beginning of the push? Include a free-body diagram.(Assume 2 significant digits.)

{5}

26. Two children pull a toy truck of mass 2.4 kg along a rough horizontal surface. One child pulls with a force of 8.4 N [N] and the other pulls with a force of 3.6 N [S]. The coefficient of friction involved is 0.18. Find the object's acceleration. **{4}**

27. A hockey puck of mass 200.0 g slides along the ice with a speed of 1.2 m/s when it reaches a rough section where the coefficient of kinetic friction is 0.25. How long will it take the puck to stop sliding? Include a free-body diagram. (Assume 2 significant digits.) **{5}**