PHYSICS 11

Dynamics Test (A)

Name:_____
Date:_____

/50

[10] Multiple-choice questions. 1 mark each.

1. Force is a _____ quantity and its unit is _____.

A. vector, Newton
B. scalar, kilogram
C. scalar, Newton
D. vector, kilogram

2. Force of friction is _____ proportional to normal force and _____ proportional to the coefficient of friction.

A. directly, inversely
B. inversely, directly
C. directly, directly
D. inversely, inversely

3. A 5.00 kg object accelerates at a rate of _____ when acted upon by a net force of 120 N.

A. $14.2 \frac{m}{s^2}$
B. $24 \frac{m}{s^2}$
C. $4.9 \frac{m}{s^2}$
D. $12.2 \frac{m}{s^2}$

4. The units associated with the coefficient of kinetic friction are:

A. Newton
B. N/ms^2
C. None
D. N/m

5. A 223-kg crate is pushed horizontally with a force of 710.0 N. If the coefficient of friction is 0.20, what is the acceleration of the crate?

A. $44.6\ m/s^2$
B. $437\ m/s^2$
C. $5.1\ m/s^2$
D. $1.2\ m/s^2$

6. A 15.0 kg object is pushed by a force of 25.0 N [right] and moves along a strictly horizontal surface with acceleration of 0.40 m/s^2 [right]. What force of friction is this object experiencing?

A. 19 N [left]
B. 19 N [right]
C. 6.0 N [left]
D. 59.0 N [left]

7. A spring is pulled with a force of 28.0 N [right]. The spring extends horizontally by 20 cm [right]. What is the spring constant of this particular spring?

A. 560 N/m
B. 5.6 N/m
C. 1.4 N/m
D. 140 N/m

8. A 70.0 kg person in a weightless environment will have

A. mass of 0 kg, weight of 0N and force of gravity 0N
B. mass of 70 kg, weight of 70N and force of gravity 0N
C. mass of 70 kg, weight of 0N and force of gravity 0N
D. mass of 70 kg, weight of 0N and force of gravity 686N

9. How many liters of water can a 0.50 kg container with capacity of 50.0 L hold, if the rope on which the container is suspended can withstand tension of only 3.3×10^2 N?

A. 34 L
B. 33 L
C. 16 L
D. 32 L

10. A 800 g object requires exactly 3.1 N of pulling force to start moving along a horizontal surface. What is the coefficient of kinetic friction between the surfaces of contact?

A. < 0.40
B. 0.40
C. < 0.39
D. > 0.40

[10] Fill in the blanks so the statements read true.

a) Newton's _____ law states that any object that is not acted upon by an unbalanced force will either remain at rest or continue moving at constant velocity.

b) Newton's _____ law states that for every action force there is _____ force of equal _____ and _____ in direction.

c) _____ is a natural tendency of an object to either remain at rest or continue moving at constant velocity. This quantity depends on the _____ of the object.

d) _____ _____ is specific to each spring and depends on the material, size and other properties of the spring.

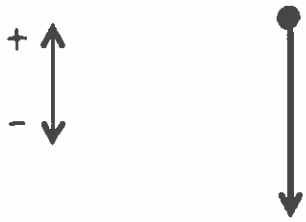
e) An object that is in translational _____ will either stay at _____ or continue moving at _____ _____.

f) It takes approximately _____ s for the light to reach the Earth's surface after it reflects from the Moon's surface. (Speed of light is approximately 3.00×10^8 m/s).

[5] Clearly identify whether the given statement is true or false. If the statement is false, correct it so it is true.

	The object is experiencing free-fall.
	The object is experiencing force of gravity of 49 N [down].
	The object will hit the ground with greater velocity than its initial velocity.
	The object is experiencing acceleration of 9.8 N/kg.
	The horizontal component of the object's displacement vector is zero while the vertical component of the object's displacement is greater than zero.

Free-body diagram of a 5.0 kg object on Earth:



Short answer:
Use the GRASS method to answer the following questions. Pay attention to significant digits. Use scientific notation where appropriate. Remember to include units and direction when needed.

[6] **1.** A very heavy box of books with mass 32.0 kg is on a horizontal floor. The box is pushed to the right by a force of 400.0 N. The coefficient of kinetic friction between the box and the floor is 0.35. What is the acceleration of the box?

[2] **2.** What is the minimum force of tension required to keep a 35.0-kg object in translational equilibrium if the object is suspended on a rope and it does not touch the ground. **State your assumptions and justify your answer. What laws did you use?**

[3] 3. On Earth, a scale shows that your weight is 608 N. What is your mass?

[5] 4. A block hang from a ceiling by a massless rope. A second block is attached to the first block and hangs below it on another piece of massless rope. If each of the two blocks has a mass of 3.5 kg, what is the tension in each rope? **Include a free body diagram for each block and ensure that all involved foces are proportional in your FBDs.**

[7] **5.** Erika is on an elevator and presses the button to go down. When the elevator first starts moving, it has an acceleration of 2.5 m/s^2 [down]. Erika and the elevator have a combined mass of 1251 kg.

a) Draw a free body diagram for the elevator with Erika in it.

b) What is the tension in the cable that provides the upward force of the elevator car?

[2] **6.** What is the normal force experienced by a 54.0 kg object that rests on a horizontal surface and is pulled strictly upwards with a force of 120.0 N?