Honors Physics
2016-17

Honors Physics
First Semester Review

Name _____

You will be given the following equations.

$$v = \frac{\Delta d}{\Delta t}$$

$$a = \frac{\Delta v}{\Delta t}$$

$$F_{net} = m \cdot a$$

$$F_g = m \cdot g = weight$$

$$g = 9.8\, m/s^2$$

$$A^2 = A_x^2 + A_x^2$$

$$\theta = \tan^{-1}\frac{y}{x}$$

$$Ax = A\cos\theta$$

$$Ay = A\sin\theta$$

$$W = F \cdot d$$

$$PE = mgh$$

$$KE = \frac{1}{2}mv^2$$

$$E_i + W = E_f$$

$$TME = KE = PE$$

Unused Variable	Equation
d	$v_f = v_i + at$
a	$d = \frac{v_i + v_f}{2}t$
v_f	$d = v_i t + \frac{1}{2}at^2$
v_i	$d = v_f t - \frac{1}{2}at^2$
t	$v_f^2 = v_i^2 + 2ad$

Notes / Things to remember:

1. On multiple choice questions, make sure to read all the choices especially if the first choice seems correct. The correct answer could be "all of the above"
2. Read all problems carefully, **look at axes labels on graphs**, don't assume anything.
3. You can write on the test so draw pictures and diagrams to help you solve problems.

Answer the following questions on a separate sheet of paper if you need more space.

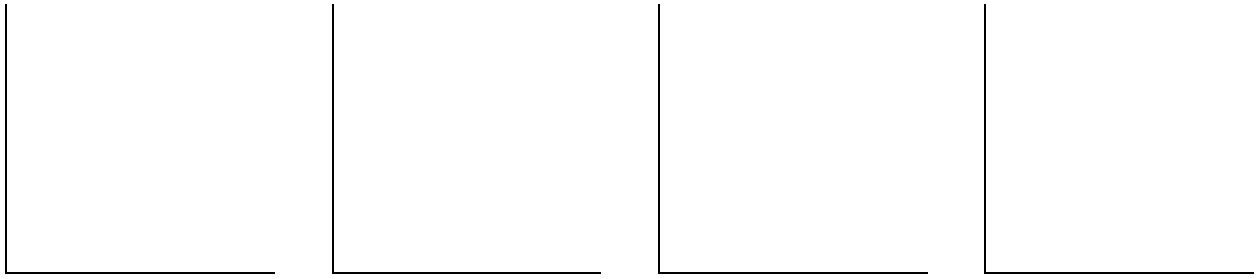
Graphical Analysis and Scientific Reasoning:

1. Why is physics is the most basic science?
2. Describe in detail the steps that are part of the scientific method.
3. What test is used to determine if a scientific hypothesis is a valid hypothesis?

4. Be able to analyze a scenario and identify the following:

   a) Independent Variable
   b) Dependent Variable
   c) What axes are each graphed on?
   d) What variables need to be held constant?

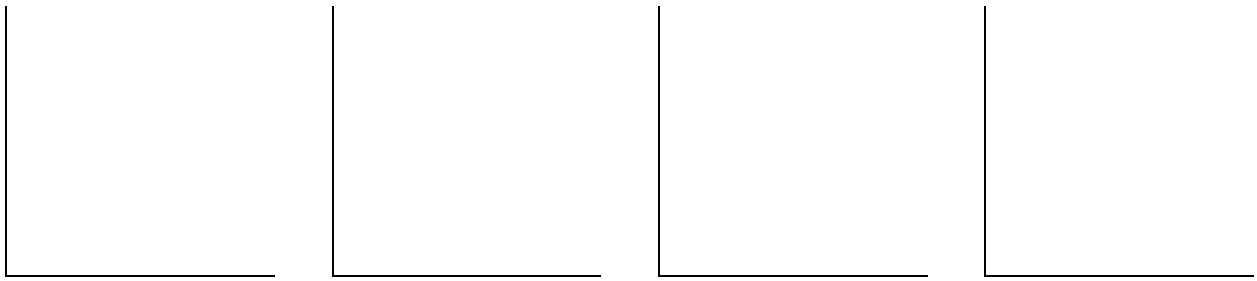
5. On the axis below, draw the relationship indicated and write the corresponding general equation on the line below:



Inversely Proportional | No Relationship | Directly Proportional | Directly Proportional to x^2

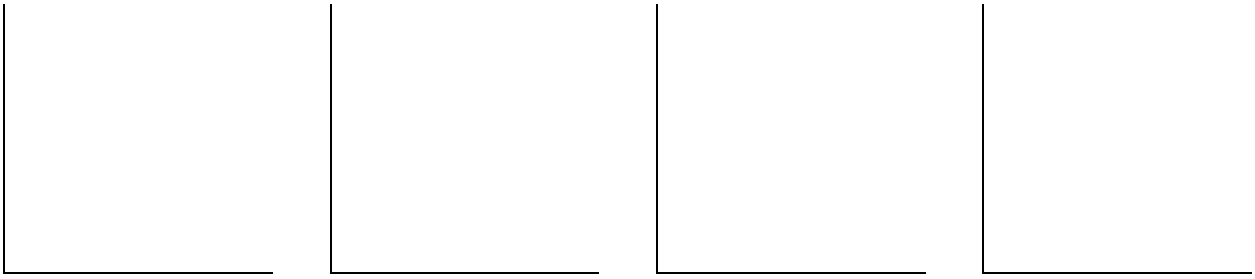
Motion

6. On the axis below, draw the distance time graph for the indicated scenario if the object is:



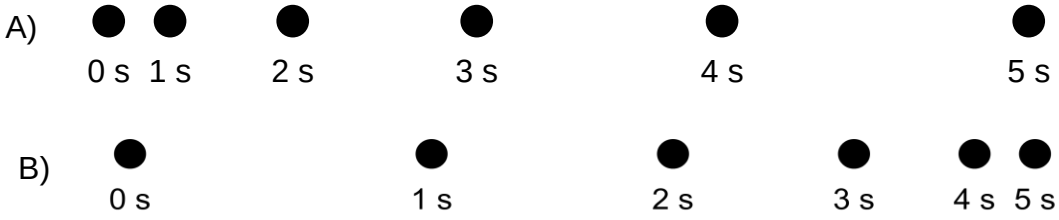
speeding up | At rest | Constant Velocity | Slowing down

7. On the axis below, draw the velocity time graph for the indicated scenario if the object is:



speeding up | At rest | Constant Velocity | Slowing down

8. The diagram below shows the position of a skateboarder moving on the sidewalk each second.



Which of the following statements accurately describes the skateboarder's motion when:

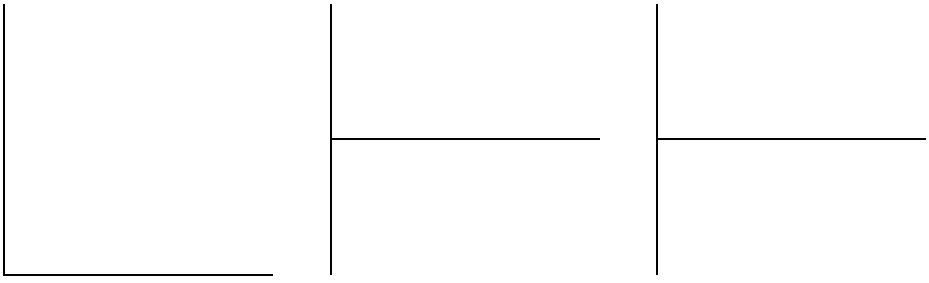
a. The skateboarder is slowing down.
b. The skateboarder is speeding up.
c. The skateboarder is accelerating.

9. A car is moving in a straight line and steadily increases its speed from 2 m/s to 4 m/s in the first second and from 4 m/s to 6 m/s in the next second. What is the car's acceleration?

10. An object moving with a velocity of 10 m/s accelerates to a velocity of 40 m/s in 6 seconds. The acceleration is:

Freefall

11. Draw the displacement time graph, velocity time graph, and acceleration time graph for an object that is thrown straight up in the air:



On each graph, indicate the top of the path and state what the value is at that point.

12. The velocity of a projectile at the peak (top) of its path is?

13. The acceleration of a projectile at the peak (top) of its path is?

14. Neglecting friction, a freely falling body starting from rest in 4 seconds will fall a distance of:

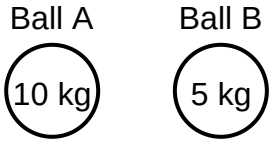
15. A ball is dropped from the roof of the building and falls freely without air resistance. What is its velocity after 7 seconds?

16. A ball is thrown straight up with an initial velocity of 60 m/s. After 2 seconds, what is the acceleration of the ball?

17. A ball initially at rest falls under the influence of gravity falls for 6 seconds. How far does it fall?

18. If the two balls to the right were dropped from the same height (Neglecting air resistance), which ball will

a. have the greatest acceleration?
b. have the greatest velocity after 6 seconds?
c. have the greatest force of gravity?
d. hit the ground first.



Vectors and Forces and Newton's Laws

1. Indicate which of the following are a vector(V) or a scalar(S)

___Mass ___Force ___Acceleration ____ Distance ____Speed ____Velocity ____Temperature

2. Two forces of 3 N and 9 N acting on a single point.
   a) What is the minimum value of the vector sum?_____
   b) What is the maximum value of the vector sum_____
   c) How did you obtain the answers above?

   d) Draw a diagram of the two vectors whose sum is between "A" and "B"

Newton's Laws

3. State the law of inertia (Newton's first Law)

4. State Newton's second Law

5. State Newton's third Law

6. A 50-kilogram sky diver falls with a wind resistance force of 240 Newton's What is the approximate value of her net force? (Draw a free body diagram)

7. For the following scenarios, what net force is required? Zero or non zero?
   a. Getting a box that is at rest to start moving.
   b. To keep the box moving with a constant velocity
   c. To stop the box from moving
   d. To change the box's direction while keeping its speed constant
   e. To make the box speed up
   f. To make the box slow down

Questions 9 and 10 refer to the following situation.

Two skaters are on a frozen pond standing still facing one another. Skater A (50 Kg) pushes off skater B (35Kg) with a force of 10 N.

8. The force exerted by skater B on skater A will be?

9. During the push, what are the accelerations of each skater?

10. If a group of students is in a tug-of-war, the winning group exert the _____ force on the rope as the losers. However, the winners exert _____ force against the _____. Explain in detail the above scenario.

11. If an object is moving to the left, what forces can be acting toward the right?

12. Draw a free body diagram for the following situations:

    A book sitting on the desk
    A book sliding to the right with a friction force
    A book being pushed to the right at constant velocity with a friction force

13. How much force is needed to accelerate a 6-kg block of ice from rest to a speed of 12 m/s in 4 seconds?

14. The force required to give a mass of 15 kg an acceleration of 3.0 m/sec^2 is:

15. A man pushes a block of ice across a horizontal surface with a force of 20 Newton's. The resulting acceleration is 2.0 m/sec^2. What is the mass of the block of ice?

16. The gravitational force of the earth on an object is often called its_____. What is the force of gravity on a 46 kg physics student?

Honors Physics

Projectiles:

1. Describe the horizontal motion of a projectile.

2. Describe the vertical motion of a bomber problem.

3. ~~Describe the vertical motion of a cannon problem.~~

4. ~~Describe the Velocity at the peak of a cannon problem.~~

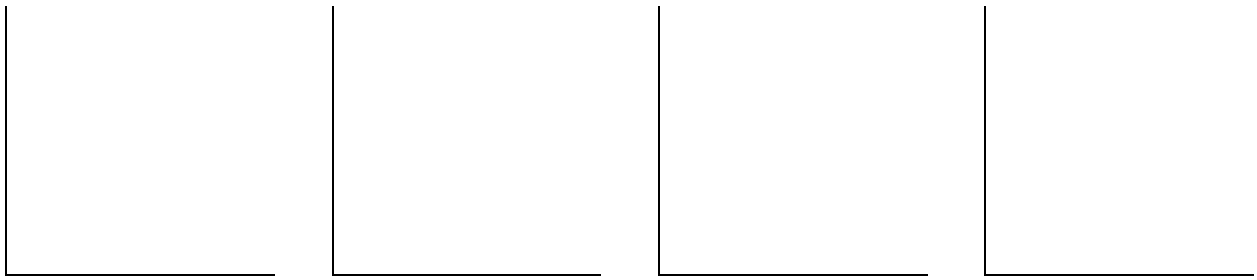
5. ~~What could be done in order to obtain the longest possible range of a projectile using some sort of projectile shooter.~~

6. Two tennis balls of equal mass are rolled off the edge of the lab desk. If the balls have different speeds and leave the edge of the table at the same instant.
   a. Which sphere will hit the ground first?
   b. Which sphere will land furthest from the base?

7. A cliff diver dives off a cliff that is 20.0 m high. There are several rocks at the bottom of the cliff that extend out into the water. In order to clear the rocks, the diver must get a running start off the cliff with a velocity of 5.0 m/s. How far from the base of the cliff does the diver land?

   .

8. ~~A projectile is shot from a marble launcher with the same initial velocity. Draw the path of the projectile for each of the situations below:~~



Shot Horizontally off the desk | Shot at 20 degrees | Shot at 45 degrees | Shot at 70 degrees