Kinematics Test _____ / 60

Name _____ Date _____ Class Period _____

Multiple Choice (2 pts each) (write your answers in CAPITAL letters in the space provided below)

1.	**6.**	**11.**
2.	**7.**	**12.**
3.	**8.**	**13.**
4.	**9.**	**14.**
5.	**10.**	**15.**

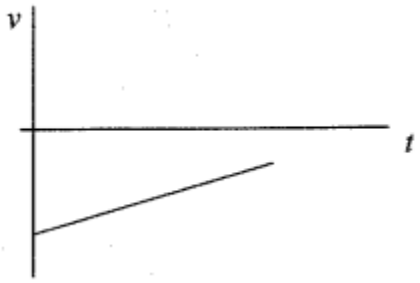
1. A student is testing the kinematic equations for uniformly accelerated motion by measuring the time it takes for light-weight plastic balls to fall to the floor from a height of 3 m in the lab. The student predicts the time to fall using *g* as 9.08 m/s^2 but finds the measured time is 35% greater. Which of the following is the most likely cause of the large acceleration?

a. The acceleration due to gravity is 70% greater than 9.08 m/s^2 at this location
b. The acceleration due to gravity is 70% less than 9.08 m/s^2 at this location
c. Air resistance increases the downward acceleration
d. The acceleration of the plastic balls in not uniform
e. The plastic balls are not truly spherical

2. The velocity-time graph **at right** represents a car on a freeway. North is defined as the positive direction. Which of the following describes the motion of the car?

a. The car is traveling north and slowing down
b. The car is traveling south and slowing down
c. The car is traveling north and speeding up
d. The car is traveling south and speeding up

a.



3. A ball rolls horizontally with a speed *v* off of a table a height *h* above the ground. Just before the ball hits the ground, what is its speed?

a. $\sqrt{2gh}$
b. $v\sqrt{2gh}$
c. $\sqrt{v^2 + 2gh}$
d. v
e. $v + \sqrt{2gh}$

4. A 0.2 kg rock is dropped into a lake from a few meters above the surface of the water. The rock reaches terminal velocity in the lake after 5 s in the water. During the final 3 s of its descent to the lake bottom, the rock moves at a constant speed of 4m/s. Which of the following can be determined from the information given? Select two answers.

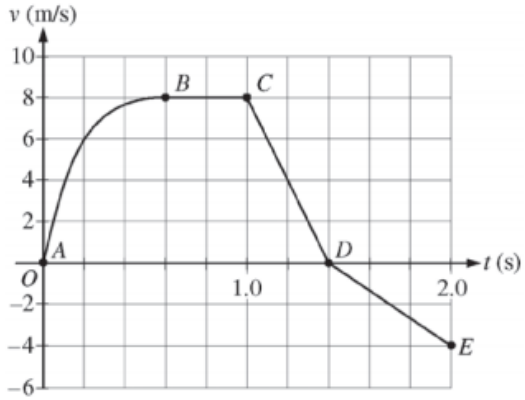
a. The speed the rock as it enters the lake
b. The distance the rock travels in the first 5 s of its descent in the water
c. The acceleration of the rock 2 s before it reaches the bottom
d. The change in potential energy of the rock-Earth-water system during the final 3 s of the rock's descent

5. A projectile is fired horizontally from a height of 20 meters above the ground, with an initial velocity of 7.0 m/s. How far does the projectile travel horizontally before it reaches the ground?

a. 7m
b. 14m
c. 140m
d. 3.5m
e. 20m

6. If a car is moving in the negative direction (to the left) and the driver applies the brakes, what is the direction of the acceleration?
    a. To the left
    b. To the right
    c. Neither; the car is stopped
    d. Neither; the car is moving at a constant velocity

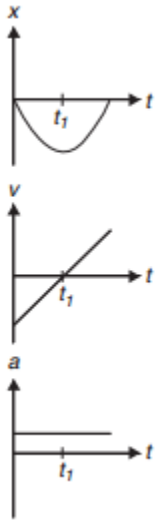
7. The graphs **at right** represent the position, *x*, velocity *v,* and acceleration *a,* as a function of time *t* for a marble moving in one dimension. Which of the following could describe the motion of the marble?
    a. Rolling along the floor and bouncing off of a wall
    b. Rolling down one side of a bowl and then rolling up the other side
    c. Rolling up a ramp and then rolling back down
    d. Falling and then bouncing elastically off a hard floor



8. Which of the segments **above** travels the farthest distance?
    a. AB
    b. BC
    c. CD
    d. DE

9. During a hard sneeze, your eyes might shut for 0.50s. If you are driving a car at 90 km/h during such a sneeze, how far does the car move during that time?
    a. 2.5 m
    b. 12.5 m
    c. 25 m

10. An object is dropped from rest from the top of a 400m cliff on Earth. If air resistance is negligible, what is the distance the object travels during the first 6 s of its fall?
    a. 30 m
    b. 60 m
    c. 120 m
    d. 180 m
    e. 360 m



11. For the graph **at left**, where is the car's acceleration changing?
    a. AB
    b. BC
    c. CD
    d. DE

12. A plane starting at rest at one end of a runway undergoes a uniform acceleration of 4.8 m/s^2 for 15 s before takeoff. How long must the runway be for the plane to be able to take off?
    a. 250 m
    b. 540 m
    c. 1080 m
    d. 2056 m

13. When startled, an armadillo will leap upward. Suppose it rises 0.544 m in the first 0.200 s. What is its speed at this point?
    a. 1.20 m/s
    b. 3.30 m/s
    c. 5.50 m/s
    d. 12.5 m/s

d. 250 m

14. An object of unknown mass is initially at rest and dropped from a height *h.* It reaches the ground with a velocity v_1. The same object is then raised again to the same height *h* but this time is thrown downward with velocity v_1 It now reaches the ground with a new velocity v_2. How is v_2 related to v_1 ?
    a. $v_2 = v_1/2$
    b. $v_2 = v_1$
    c. $v_2 = \sqrt{2}\, v_1$
    d. $v_2 = 2v_1$
    e. $v_2 = 4v_1$

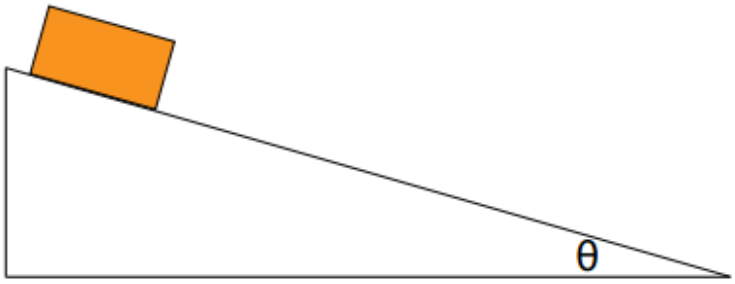
15. If air resistance is negligible, the speed of a 2 kg sphere that falls from rest through a vertical displacement of 0.2 m is most nearly
    a. 1 m/s
    b. 2m/s
    c. 3 m/s
    d. 4 m/s
    e. 5 m/s

Free Response (15 pts each)

1. Develop a method to determine the acceleration of an Olympic skier during the first few seconds of a race.

2. An object slides one meter down a frictionless ramp of constant slope as shown at right (not to scale). A student measures the time it takes for the object to travel various displacements using a stopwatch. Three consecutive trials are measured, and the data is recorded as shown below.

Displacement (m)	Avg. Time (s)
0	0
0.2	0.68
0.4	0.98
0.6	1.18
0.8	1.38
1	1.52



a. Make a displacement versus time graph for the data.
b. Find the average acceleration of the data.
c. Describe, in a clearly written paragraph, two ways that you could use this data to tell you how fast the block is moving at t = 0.5s.