Phy 111 Exam 1 February 10, 2015

Name___________________________________ Section______ University ID_____________________

Please fill in your computer answer sheet as follows:
1) In the NAME grid, fill in your last name, leave one blank space, then your first name.
2) Write your ID number in the IDENTIFICATION NUMBER section of the sheet.
3) Write your recitation section number in the spaces K,L in the SPECIAL CODES section. Single digits should be preceded by a 0 (e.g. section 1 is written as 01).
4) Fill in the circles on the sheet corresponding to the letters or numbers of your name, ID and section with a #2 pencil.

Unless otherwise specified in a problem, take \( g = 9.80 \text{ m/s}^2 \)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Suppose that an object travels from one point in space to another. Make a comparison between the displacement and the distance traveled.
   A) The displacement can be either greater than, smaller than, or equal to the distance traveled.
   B) The displacement is always equal to the distance traveled.
   C) If the displacement is equal to zero, then the distance traveled will also equal zero.
   D) The displacement is either less than or equal to the distance traveled.
   E) The displacement is either greater than or equal to the distance traveled.

2) The position, \( x \), of an object is given by the equation \( x = A + Bt + Ct^2 \), where \( t \) refers to time. What are the dimensions of \( A \), \( B \), and \( C \)?
   A) distance/time, distance/time, distance/time
   B) distance, time, time
   C) distance, distance, distance
   D) distance, time, time
   E) distance, distance/time, distance/time

3) If the position versus time graph of an object is a horizontal line, the object is
   A) at rest.
   B) moving with infinite velocity.
   C) moving with constant non-zero acceleration.
   D) moving with constant non-zero velocity.
   E) none of the above

4) A car is moving with a constant acceleration. At \( t = 5.0 \) s its velocity is 8.0 m/s and at \( t = 8.0 \) s its velocity is 12.0 m/s. What is its displacement in that interval of time?
   A) 50. m  B) 20. m  C) 10. m  D) 30. m  E) 40. m

5) An airplane starts from rest and accelerates at 10.8 m/s². What is the magnitude of its velocity at the end of a 400. m-long runway?
   A) 93.0 m/s  B) 65.7 m/s  C) 186 m/s  D) 4320 m/s  E) 37.0 m/s

6) To determine the height of a bridge above the water, a person drops a stone and measures the time it takes for it to hit the water. If the time is 2.3 s, what is the height of the bridge?
   A) 10 m  B) 32 m  C) 26 m  D) 14 m  E) 52 m

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7) When vectors \( \vec{A} \) and \( \vec{B} \) are added together they form vector \( \vec{C} \) and these vectors satisfy the relationship \( A^2 + B^2 = C^2 \). Which statement is true for these vectors?

A) Vectors \( \vec{A} \) and \( \vec{B} \) must be anti-parallel.
B) The magnitude of \( \vec{A} \) is the negative of the magnitude of \( \vec{B} \).
C) Vectors \( \vec{A} \) and \( \vec{B} \) must be perpendicular.
D) Vectors \( \vec{A} \) and \( \vec{B} \) must have the same magnitudes.
E) Vectors \( \vec{A} \) and \( \vec{B} \) must be parallel.

8) Under which of the following conditions would a car have a westward acceleration?

A) As a car travels westward with constant velocity.
B) As a car travels eastward with increasing velocity.
C) As a car travels eastward with constant velocity.
D) As a car travels eastward with decreasing velocity.
E) As a car travels westward with decreasing velocity.

9) A plane has an airspeed of 142 m/s. A 30.0 m/s wind is blowing southward at the same time as the plane is flying. What must be the heading (direction of the nose) of the plane in order to move due east relative to the ground?

A) 12.2° north of east
B) 12.2° south of east
C) 77.8° north of east
D) 77.8° south of east
E) due east

10) A car moves from the point \((3.0 \text{ m})\hat{x} + (5.0 \text{ m})\hat{y}\) to the point \((8.0 \text{ m})\hat{x} - (7.0 \text{ m})\hat{y}\) in 2.0 s. What is the magnitude of the average velocity of the car?

A) 6.5 m/s  B) 3.3 m/s  C) 4.5 m/s  D) 13 m/s  E) 9.0 m/s

11) A pilot drops a bomb from a plane flying horizontally at a constant speed. Neglecting air resistance, when the bomb hits the ground the horizontal location of the plane will

A) be over the bomb.
B) depend on the mass of the bomb when it was released.
C) depend on the speed of the plane when the bomb was released.
D) be in front of the bomb.
E) be behind the bomb.

12) A jumper in the long-jump goes into the jump with a speed of 12 m/s at an angle of 20° above the horizontal. How long is the jumper in the air before returning to the Earth?

A) 1.3 s  B) 0.42 s  C) 0.84 s  D) 0.21 s  E) 1.6 s

13) A rock is thrown from ground level at some angle above the horizontal with a certain velocity. It reaches its highest point and starts falling down. What is the magnitude of the velocity of the rock right before it hits the ground?

A) It is equal to its initial horizontal velocity.
B) It is equal to the magnitude of its initial velocity.
C) It is equal to its initial vertical velocity.
D) 0
E) Cannot be determined without additional information.
14) A 3.0-kg and a 5.0-kg box rest side-by-side on a smooth (frictionless), level floor. A horizontal force of 32 N is applied to the 3.0-kg box pushing it against the 5.0-kg box, and, as a result, both boxes slide along the floor. How large is the contact force between the two boxes?

A) 12 N  B) 24 N  C) 32 N  D) 20 N  E) 0 N

15) An object is being acted upon by three forces and moves with a constant velocity. One force is 60.0 N along the x-axis, the second is 75.0 N along the y-axis. What is the magnitude of the third force?

A) 96.0 N  B) 48.0 N  C) 135 N  D) 15.0 N  E) 67.5 N

16) A 45.0-kg person steps on a scale in an elevator. A short time later he looks at the scale and sees that the scale reads 0 N. What is the magnitude of the acceleration of the elevator?

A) 4.91 m/s²  B) 46.9 m/s²  C) 0 m/s²  D) 9.80 m/s²  E) 0.206 m/s²

17) Two identical masses are attached by a light string that passes over a small pulley, as shown in the Figure above. The table and the pulley are frictionless. The masses are moving

A) with an acceleration less than g.
B) with an acceleration equal to g.
C) with an acceleration greater than g.
D) at constant speed.
E) with an acceleration that cannot be determined without additional information.

18) A packing crate slides down an inclined ramp at constant velocity. Thus we can deduce that

A) it is not acted on by appreciable normal force.
B) a frictional force is acting on it.
C) a net upward force is acting on it.
D) a net downward force is acting on it.
E) it is not acted on by appreciable gravitational force.

19) A child pulls a 3.00-kg sled across level ground at constant velocity with a light rope that makes an angle 30.0° above horizontal. The tension in the rope is 5.00 N. Assuming the acceleration of gravity is 9.81 m/s², what is the coefficient of friction between the sled and the ground?

A) 0.188  B) 0.103  C) 0.161  D) 0.0441  E) 0.0851

20) A mass of 40.0 grams is attached to a vertical spring with a spring constant \( k = 20.0 \text{ N/m} \) and lowered slowly until the spring stops stretching. How much does the spring stretch?

A) 0.00200 m  B) 0.0196 m  C) 0.0816 m  D) 0.200 m  E) 0.800 m
Answer Key
Testname: SPRING2015_EXAM1

1) D  
2) E  
3) A  
4) D  
5) A  
6) C  
7) C  
8) D  
9) A  
10) A  
11) A  
12) C  
13) B  
14) D  
15) A  
16) D  
17) A  
18) B  
19) C  
20) B