Physics 120 Practice Midterm Exam

Name_____

1) Two identical objects A and B fall from rest from different heights to the ground. If object B takes *twice* as long as A to reach the ground, what is the ratio of the heights from which A and B fell? Neglect air resistance.
   A) 1 : 4 B) 1 : $\sqrt{2}$
   C) 1 : 8 D) 1 : 2

2) A person is standing on an incline having a slope of 20° (with respect to the horizontal direction). The component of the force of gravity (*mg*) that is parallel to the surface is
   A) *mg* cos(20) B) *mg* sin(70)
   C) *mg* tan(20) D) *mg* sin(20)

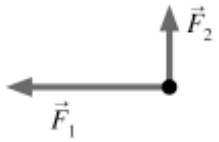
3) You go on a long trip and try to determine your average velocity by using the miles on your car's tripometer and the time the trip required. Why would the answer using this information most likely <u>not</u> be correct?

4) What is the minimum number of vectors (none of which have the same magnitude) for which it is theoretically possible that the sum of those vectors can be equal to zero?

5) At object starts moving at $t = 0$, and its position is given by $x = bt^3 - Ct^2$. At what time (other than $t = 0$) is the instantaneous velocity equal to the average velocity? Assume $b = 4.2\ \text{m/s}^3$ and $C = 3.6\ \text{m/s}^2$.
   A) 0.43 s B) 0.30 s
   C) 0.51 s D) 0.39 s

6) Vector $\vec{A}$ has length 1 units and directed to the north. Vector $\vec{B}$ has length 8 units and is directed to the south. Calculate the magnitude and direction of $\vec{A} + \vec{B}$.
   A) 7 units, north
   B) 9 units, south
   C) 7 units, south
   D) 9 units, north

7) The figure shows two forces acting on an object. They have magnitudes $F_1 = 8.4$ N and $F_2 = 2.8$ N. What third force will cause the object to be in equilibrium?



   A) 8.8 N at 162° counterclockwise from $\vec{F}_1$
   B) 5.6 N at 108° counterclockwise from $\vec{F}_1$
   C) 5.6 N at 162° counterclockwise from $\vec{F}_1$
   D) 8.8 N at 108° counterclockwise from $\vec{F}_1$

Solve the problem. (Use $g = 9.8\ \text{m/s}^2$.)

8) A 179 N force is needed to slide a 50.0 kg box across a flat surface at a constant velocity. What is the coefficient of kinetic friction between the box and the floor?
   A) 0.37 B) 0.42
   C) 0.34 D) 0.31

9) A plane flying at 70.0 m/s suddenly stalls. If the acceleration during the stall is $9.8\ \text{m/s}^2$ directly downward, the stall lasts 5.0 s, and the plane was originally climbing at 25° to the horizontal, what is the velocity after the stall?
   A) 80 m/s at –37°
   B) 66 m/s at –17°
   C) 66 m/s at +17°
   D) 80 m/s at +37°

10) The acceleration is always the slope of the "velocity versus time" graph and the velocity is always the slope pf the "position versus time" graph.

Answer Key
Testname: MIDTERM 1 MC

1) A
2) D
3) Unless the trip was along a perfect straight line, the distance on the tripometer would not be your displacement. The quantity calculated would thus be your average speed, not your average velocity.
4) It is possible with Three (or more) vectors. Three is the minimum number for which the condition may be satisfied.
5) A
6) C
7) A
8) A
9) B
10) TRUE