Prince Sultan University

Department of Mathematics and General Sciences

Physics I (PHY105)

First Major Exam

Term 142

Date: Monday 9/3/2015

Name:

Student ID #:

Section # or time:

Instructor's name:

Instructions:

1. Examination time: **1 hour**.
2. Write your name before starting with the questions.
3. **Switch off your mobile phone** and put any books and notes away.
4. Check that you have **5 pages** in total.
5. You may use a calculator but you may not borrow one.
6. Assume the acceleration of gravity $\boldsymbol{g = 9.8\ m/s^2}$.

Good luck!

	Mark
Part 1	
Part 2	
Total	

Part 1 (8 points):

Indicate the answer choice that best completes the statement or answers the question

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Q1. If x is position, v is velocity, a is acceleration, and t is time, which of the following equations is **not** dimensionally correct?

a) $x/v = t$ b) $a = v/t + 4\,v^2/x$ c) $x^2 = at^2$ d) $v = 2at$

Q2. Which one of the choices below represents the preferred practice regarding significant figures when calculating 2×400.1

a) 800.2 b) 0.80×10^3 c) 8.002×10^2 d) 8×10^2

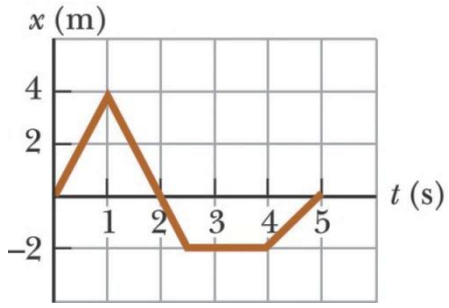
Q3. If an object is moving eastward and slowing down, then the direction of its acceleration vector is

a) eastward b) westward c) northword d) not enough info

Q4. A tennis player moves in a straight-line path. His position versus time is shown in the figure. What is his average velocity in the time interval from 0 to 4 s.

a) -0.5 m/s b) 0.5 m/s

c) -2 m/s d) 2 m/s



Q5. A certain car has a fuel efficiency of 20.0 miles per gallon (mi/gal). Express this efficiency in kilometers per liter (km/L). (Note: 1 mi = 1.609 km, 1 gal = 3.786 L)

a) 8.50 km/L b) 51.8 km/L c) 9.35 km/L d) 47.1 km/L

Q6. A stone thrown straight up returns back to its starting point in 2 seconds. With what speed was the stone thrown?

a) 4.9 m/s b) 9.8 m/s c) 19.6 m/s d) 2 m/s

Q7. Consider the two vectors $\vec{A} = 3\hat{x} - \hat{y}$ and $\vec{B} = 4\hat{x} + \hat{y}$, then $\vec{A} \cdot \vec{B}$ is equal to:

a) $12\,\hat{x} - \hat{y}$ b) $7\hat{x}$ c) 11 d) 10

Q8. The velocity of a tiger at a certain moment is $(-6\ \mathrm{m/s})\,\hat{x}$. Its velocity 12 seconds later becomes $(6\ \mathrm{m/s})\,\hat{y}$. What is the magnitude of tiger's acceleration during this period?

a) 2.83 m/s^2 b) 1.0 m/s^2 c) 0 m/s^2 d) 0.71 m/s^2

Part 2 (7 points):

Solve the following two problems in the provided space. **Show your solutions** in detail and include units.

Q1. (4 points) A diver jumps off the end of a diving board with an initial speed of 2 m/s at an angle of 20° above the horizontal. The diver reaches water after 1 second.

a) Write the initial velocity of the diver in vector form.

b) Calculate the initial height of the diver from water

c) Calculate the horizontal distance he covers

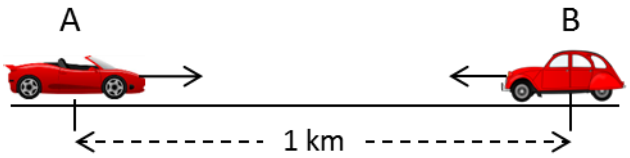
d) Calculate his speed and direction of motion just before he enters water

Q2. (3 points) Two cars 1 km apart start to move toward each other along a straight line, as shown. Car A starts from rest and accelerates at 1 m/s^2 while car B also starts from rest but it accelerates at 1.5 m/s^2.

a) How long will it take the two cars to meet?

b) Where are they going to meet?

c) What is the speed of car A when it meets car B?



Scratch sheet

Name: