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Lab #0 - Review

A. Scientific Notation

(Fill in the blanks, and connect numbers on left with arrows to "real life" examples on right)

		scientific notation
1.	0.216 m	
2.	25.60 m	
3.	0.0001 m	
4.	12,800,000 m	

real life
~length of a piece of paper
~size of a human cell
~diameter of Earth
~_____ you fill it in!

If you enter the number 10.2E2 into a calculator, what number does that represent?

B. More Scientific Notation

5. $(10^6) + (10^6) =$

6. $(10^4)(10^6) =$

7. $(10^6)^2 =$

8. $(10^6)^{-1} =$

9. $\frac{(12\times10^6)}{(4\times10^{-3})} =$

10. There are 3×10^8 people in the USA. One out of every 5×10^4 gets infected with the West Nile Virus every year. How many people in the USA get infected with West Nile every year?

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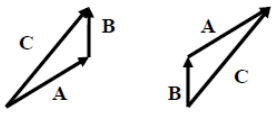
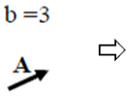
C. Vectors: Vectors are mathematical objects consisting of magnitude and direction. They can be represented graphically or symbolically.

1) Fill in the boxes with possible or "reasonable" answers - be prepared to discuss what other answers might also be possible.

Rule name	graphically	symbolically
Vector addition		$\vec{A} + \vec{B} = \vec{C}$
Negative vector	(Show us $\vec{B}$, and $-\vec{B}$)	$-\vec{B}$
Vector subtraction		$\vec{D} = \vec{A} - \vec{B}$
Vector addition is commutative		
Multiplication of a vector by (+) number		
Multiplication of a vector by a (-) number		$\vec{B} = -4\vec{A}$

Now give an example where you might use one of these relationships in your life outside of this class. Please explain which of these rules you used and how it can be helpful.

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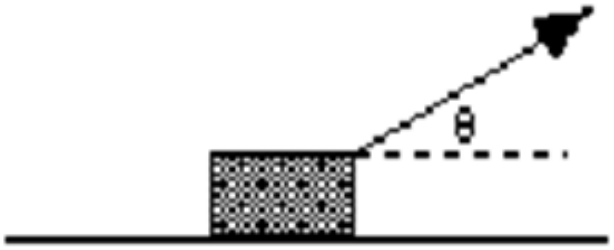
2. Fill in the boxes with “reasonable” answers. Be as specific as you can and be prepared to discuss your reasoning for your answer.

A 25 N force pulls the box at 30°.



Draw and calculate the x-component of the force pulling the box.

Draw and calculate the y-component of the force pulling the box.

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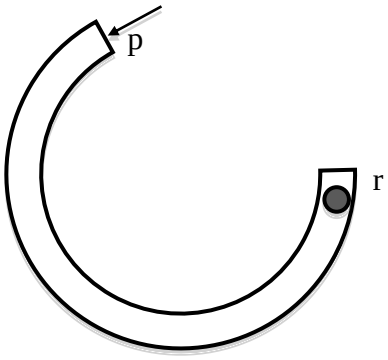
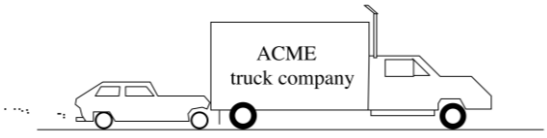
D) Newtonian Puzzlers

1) You are looking straight down at a tabletop, with a hollow circular channel (tube) anchored to it.
A marble is shot into the tube at high speed at point "p". The marble shoots through the tube and exits at point "r".
Neglect any friction, and neglect any effects of air.
Sketch in the figure (with a dashed line) the path you expect the ball would follow after it exits the tube at "r" and moves across the frictionless table top.



2) You exert a constant horizontal force on a large box. As a result, the box moves across a horizontal floor at a constant speed "v_0". If you now double the constant horizontal force that you exert on the box to push it on the same horizontal floor, describe how the box then moves? (**neglect air resistance**) (Briefly but clearly explain your reasoning)

3) A large truck breaks down out on the road and receives a push back into town by a small compact car as shown in the figure below.



While the car, still pushing the truck, is speeding up to get up to cruising speed, how does the amount of force with which the car pushes on the truck compare with the amount of force with which the truck pushes back on the car? (Briefly but clearly explain your reasoning)