

Worksheet # 1
Algebra Physics I, Spring 2021

Name: _____ Date: _____

Direction for completing the worksheet are on the last page.

Multiple Choice Questions

- 1) Physics can best be described as the study of
 - A) Structure of matter.
 - B) Valence electrons.
 - C) Atoms and the nucleus.
 - D) Matter, Energy and their interaction
 - E) None of the above

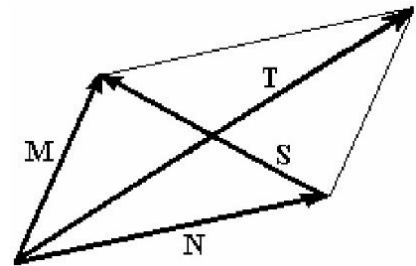
- 2) Which of the 4 fundamental forces keeps the protons and neutrons bond in the nucleus of the atom?
 - A) Strong force
 - B) Weak force
 - C) Electromagnetic force
 - D) Gravitational force
 - E) The force

- 3) What does a light year measure?
 - A) Time
 - B) Speed
 - C) Acceleration
 - D) Distance
 - E) None of the above

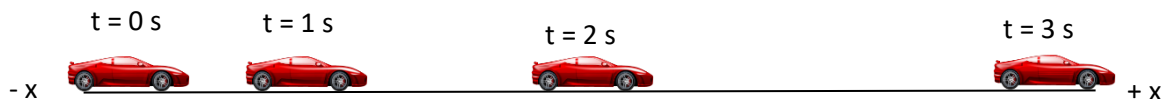
- 4) Which of the following statements is a true statement?
 - A) A vector can have positive or negative magnitudes.
 - B) A vector's magnitude cannot be more than the magnitude of one of its components.
 - C) A vector's magnitude cannot be less than the sum of the magnitude of its components.
 - D) If the x -component of a vector is smaller than its y -component, then that vector is in the opposite direction to its y -component.
 - E) The magnitude of a vector cannot be zero unless all of its components are zero.

- 5) Velocity vector \vec{C} is given in component form by $\vec{C} = (-50 \text{ m/s})\hat{x} + (80 \text{ m/s})\hat{y}$, what is the magnitude and direction (α & β) of vector \vec{C} ?

- 6) Vector \vec{A} is along the x -axis and vector \vec{B} is along the y -axis. Which one of the following statements is correct with respect to these vectors?
- A) The x -component of vector \vec{A} is equal to the x -component of vector \vec{B} .
 - B) Vector \vec{A} does not have any component along the y -axis and vector \vec{B} does not have any component along the x -axis.
 - C) The x -component of vector \vec{A} is equal and opposite to the x -component of vector \vec{B} .
 - D) The y -component of vector \vec{B} is equal and opposite to the y -component of vector \vec{A} .
 - E) The y -component of vector \vec{A} is equal to the y -component of vector \vec{B} .
- 7) Vectors \vec{M} and \vec{N} satisfy the equation $\vec{M} + \vec{N} = 0$. These vectors satisfy one of the following statements.
- A) Vectors \vec{M} and \vec{N} are at right angles to each other.
 - B) Vectors \vec{M} and \vec{N} point in the same direction.
 - C) The magnitude of \vec{M} is the negative of the magnitude of \vec{N} .
 - D) The magnitude of \vec{M} is twice the magnitude of \vec{N} .
 - E) Vectors \vec{M} and \vec{N} have the same lengths.
- 8) Refer to the figure, what expression below best describes what vector \vec{S} is equal to in terms of vectors \vec{M} and \vec{N} ?



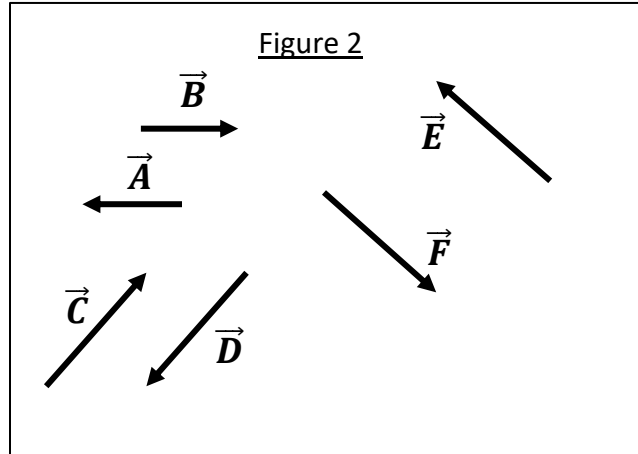
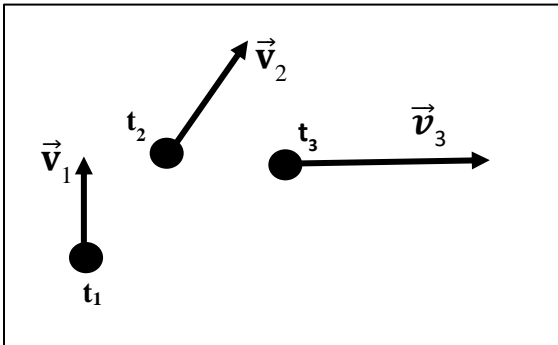
- A) $\vec{M} + \vec{N}$.
 - B) $\vec{M} - \vec{N}$.
 - C) \vec{M} .
 - D) \vec{N} .
 - E) None of the other choices is correct.
- 9) The time (t) and position are given for a car shown below, what can be said about its motion?



- A) Not moving
- B) Constant velocity
- C) Constant positive acceleration
- D) Constant negative acceleration
- E) Don't know but it's a cool car!

10) The velocity vectors of a truck are shown below for three instances in time, which acceleration vector in figure 2 best represents the acceleration of the truck from

- A) Time 1 (t_1) to time 2 (t_2)?
- B) Time 2 (t_2) to time 3 (t_3)?



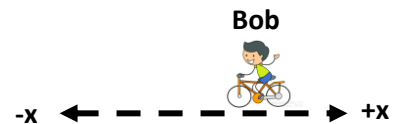
11) Suppose that Cathy is on her bike and is moving with a constant velocity. Which statement is true concerning Cathy's acceleration?

- A) The acceleration must be constantly increasing.
- B) The acceleration must be constantly decreasing.
- C) The acceleration must be a constant non-zero value.
- D) The acceleration must be equal to zero.
- E) The acceleration could be increasing, or it could be decreasing.

12) Suppose that Cathy is on her bike and is moving with a constant acceleration. Which statement is true concerning Cathy's velocity?

- A) The velocity must be constantly increasing.
- B) The velocity must be constantly decreasing.
- C) The velocity could be increasing or decreasing.
- D) The velocity must be equal to zero.
- E) The velocity is constant

13) Bob is on his bike and is speeding up, he is moving in the negative x direction, what direction is Bob's acceleration?



14) A car accelerates from some initial velocity at a rate of 2 m/s^2 , if the car is speeding up, after 4 seconds it will have increased its velocity by

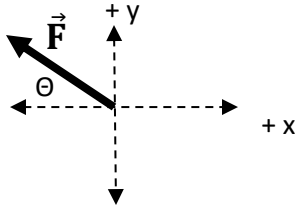
15) Cathy walks from her house to Mike's house in 10 minutes (600 s) the position vectors for her trip are shown below what was Cathy's average velocity for the trip?

$$\vec{r}_f = (+400 \text{ m})\hat{x} + (+500 \text{ m})\hat{y}$$

$$\vec{r}_i = (-100 \text{ m})\hat{x} + (+100 \text{ m})\hat{y}$$

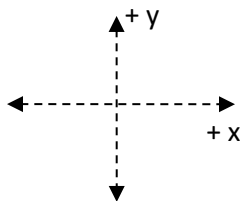
Questions that solutions are to be Uploaded (Problems 16 – 20)

- 16) What is the vector \vec{F} in component form, given its magnitude of 600 N and direction of 35° above the negative x-axis?



- 17) If you have two force vectors $\vec{F}_1 = (1,000 \text{ N})\hat{x} + (800 \text{ N})\hat{y}$ and $\vec{F}_2 = (-200 \text{ N})\hat{x} + (-400 \text{ N})\hat{y}$,

A) Draw the two force vectors in the x-y coordinate system, with their bases at the origin.



B) what is the magnitude of the resultant vector ($\vec{R} = \vec{F}_1 + \vec{F}_2$)

- 18) Mike is going to take his dog for a walk, Mike starts from his house and walks $|\mathbf{x}_1| = 2,000 \text{ m}$ at an angle of $\alpha_1 = 30^\circ$ relative to the East (x) axis, heading north east, then $|\mathbf{x}_2| = 1,400 \text{ m}$ at an angle of $\alpha_2 = 110^\circ$ relative to the East (x) axis, heading north west, where he ends up at a lake, what is the magnitude and direction (α and β) of the resultant vector for Mike's trip?

$$\vec{R} = \vec{x}_1 + \vec{x}_2$$

- 19) A car is slowing down on a straight, horizontal road at a rate of 3 m/s^2 , if the car after 5 seconds of slowing down has a final velocity of 10 m/s , what was the initial velocity of the car before it started to slow down?

- 20) A ladybug slows down for 8 second as it flies, the ladybug's change in velocity is given by the velocity vectors, what is the magnitude and direction (α and β) of acceleration of the ladybug?

$$\begin{aligned} \vec{v}_f &= (+2 \text{ m/s})\hat{x} + (-2 \text{ m/s})\hat{y} \\ \vec{v}_i &= (+12 \text{ m/s})\hat{x} + (+18 \text{ m/s})\hat{y} \end{aligned}$$

Worksheet Instructions

Multiple Choice Questions - Answer all multiple-choice question from the choice given in the quiz, these questions will be graded by Canvas. There maybe some variation in numerical values due to rounding.

Questions that Solutions must be uploaded - For the questions that must be handwritten solutions and uploaded, follow the instructions below.

- 1) Work out all problems in the “Upload” section. You only need to upload the solutions for the problems in the “Upload” section.
- 2) Uses paper or tablet to show all your work.
- 3) Mark each question clearly by the problem number and circle your final answer.
- 4) Make sure you write your solutions clearly and neatly, if it cannot be read or understood it is wrong.
- 5) Write out all variables that are used (symbols work fine) and all equation used. The equations should be in their fundamental form before any algebra or simplification is done.
- 6) Show all major steps in solving the equations, with any substitutions or simplifications.
- 7) All numbers must have units!
- 8) Upload all work/solutions in the correct order as one pdf file to this Canvas quiz.

❖ **The solutions that are uploaded MUST be your work, identical uploads will result in both worksheets getting a zero!**

Note: Canvas will grade your multiple-choice question immediately, but your final score will be determined when your uploaded solutions are graded by the instructor.