

AP Physics 1 Summer Assignment

Please email Dr. Shen before June 11 to get the following:

1. A digital version of the textbook
2. e-Homework registration instruction and class key

Your AP Physics-1 summer assignments are:

1. Read textbook Chapter 1 and finish e-Homework by **Friday 8/27/2021**
2. Finish the following packet and submit your work via email by **Friday 8/27/2021**

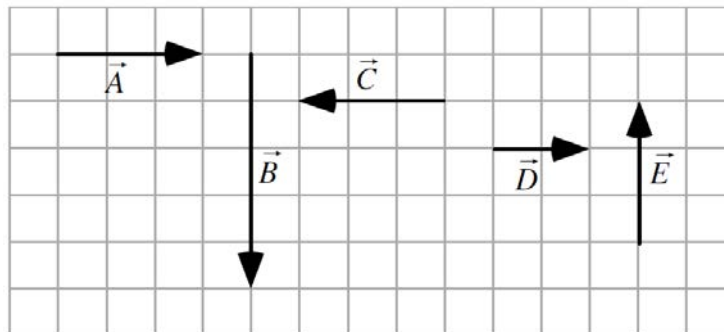
Please contact Dr. Shen at yshen@briarcliffschools.org as soon as possible. Enjoy the summer and look forward to having you in September!

Dr. Yiqing Shen

Vector Addition and Subtraction –Graphic Method

Revisit Section 1.6 if necessary

1. Five vectors are shown superimposed on the grid.

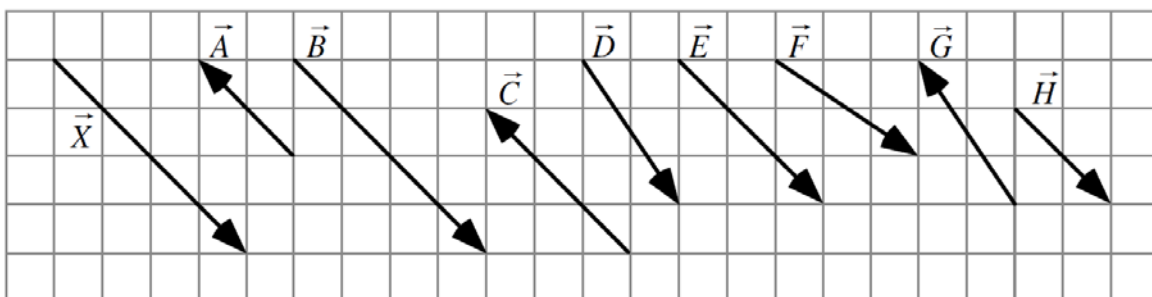


Rank the magnitudes (lengths) of the vectors.

					OR			
1	2	3	4	5		All	All	Cannot
Greatest				Least		the same	zero	determine

Explain your reasoning.

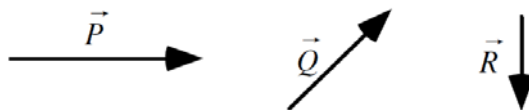
2. Nine vectors are shown superimposed on the grid.



(a) List all of the vectors that have the same direction as vector \vec{X} .

(b) List all of the vectors that have the same direction as vector $-\vec{X}$.

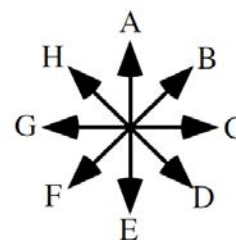
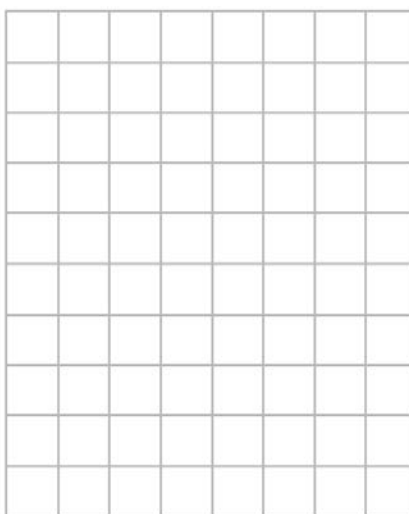
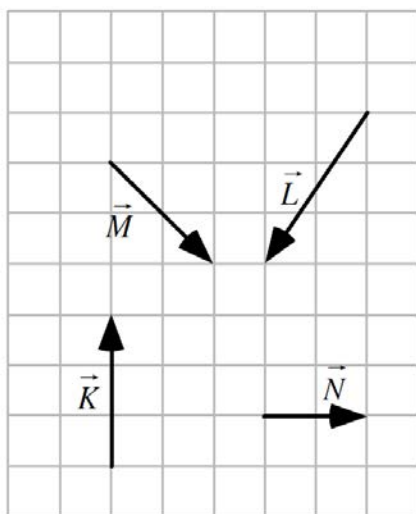
3. Three vectors, labeled \vec{P} , \vec{Q} , and \vec{R} are shown below.



Write an expression using the vectors \vec{P} , \vec{Q} , and \vec{R} for the resultant vectors shown.

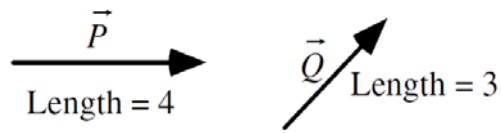
<p><i>Example</i></p> <p>$\vec{X} = \vec{P} + \vec{Q}$</p>	<p>A</p> <p>$\vec{A} =$</p>	<p>B</p> <p>$\vec{B} =$</p>
<p>C</p> <p>$\vec{C} =$</p>	<p>D</p> <p>$\vec{D} =$</p>	<p>E</p> <p>$\vec{E} =$</p>

4. Shown at left below are vectors labeled \vec{K} , \vec{L} , \vec{M} , and \vec{N} , with length in arbitrary units, superimposed on a grid.

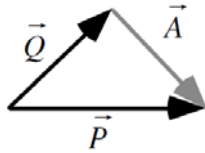


On the grid on the right, construct a graphical representation of $\vec{J} = \vec{K} + \vec{L} + \vec{M} + \vec{N}$ with labels for each vector, and indicated the direction of \vec{J} : _____ (closest to one of the directions listed on the direction rosette above).

5. Two vectors, labeled \vec{P} and \vec{Q} are shown below. The length (magnitude) of each vector is given in arbitrary units.



A student constructs the figure shown below to figure out the sum of the vectors \vec{P} and \vec{Q} . The student contends that the lighter arrow \vec{A} represents the vector sum of the vectors \vec{P} and \vec{Q} .

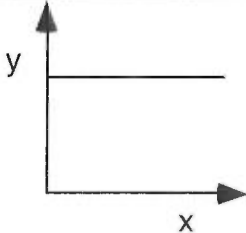
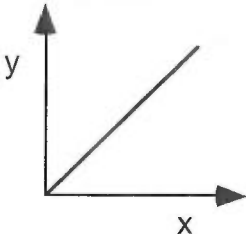
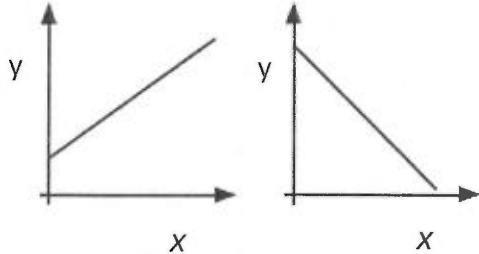
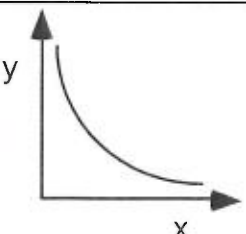
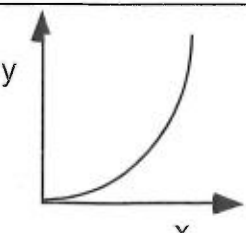


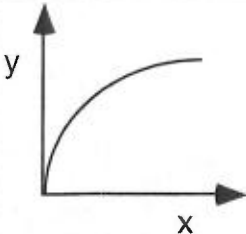
What, if anything, is wrong with the student's work? If something is wrong, identify it, and explain how to correct it. If his/her work is correct, explain why.

Graphic and Algebraic Representations

When scientists set up experiments they often attempt to determine how a given variable affects another variable. A graph is one of the most effective representations of the relationship between two variables. The independent variable (one controlled by the experimenter) is usually placed on the x -axis. The dependent variable (one that responds to changes in the independent variable) is usually placed on the y -axis. It is important for you to be able interpret a graphical relationship and express it in a written statement and by means of an algebraic expression.

Read the summary of frequently used relationships below:

Graphic representation	Written relationship	Algebraic representation
	As x increases, y remains the same. There is no relationship between the variables.	$y = b$, or y is constant
	As x increases, y increases proportionally. y is directly proportional to x .	$y = mx$
	y is linearly related to x . left: As x increases, y increases at a constant rate. right: As x increases, y decreases at a constant rate.	$y = mx + b$
	As x increases, y decreases. y is inversely proportional to x .	$y = m\left(\frac{1}{x}\right)$
	y is proportional to the square of x .	$y = mx^2$

	y is proportional to the square-root of x .	$y = m\sqrt{x}$
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Practice:

6. Which of these equations are consistent with the statement “If x doubles, then y also doubles.” There might be multiple answers.

A. $y = 2x$

Answer: _____

B. $y = 3x$

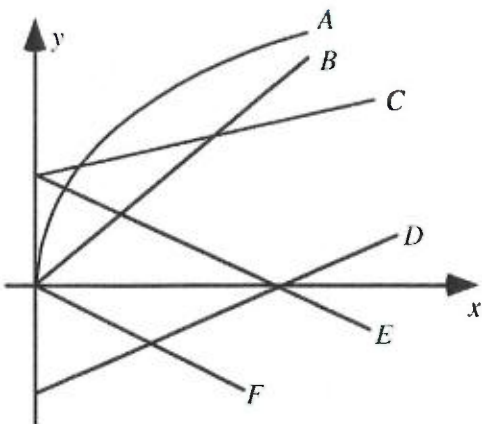
Explain your reasoning.

C. $y = 2x + 7$

D. $y = -4x$

E. $y = x^2$

7. Six y - versus x - graphs are shown on a single set of axes. Which of these graphs are consistent with the statement “If x doubles, then y also doubles.” There might be multiple answers.



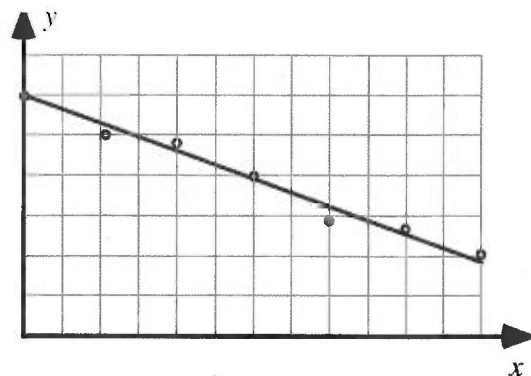
Answer: _____

Explain your reasoning.

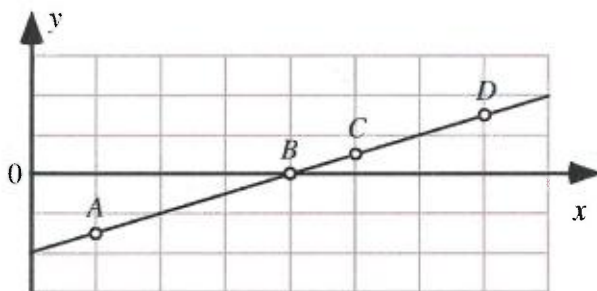
8. A student makes the following claim about some data that he and his lab partners have collected:

"Our data show that the value of y decreases as x increases. We found that y is inversely proportional to x ."

What, if anything, is wrong with this statement? If something is wrong, identify and explain how to correct all errors. If this statement is correct, explain why.



9. Four points are labeled on a line.

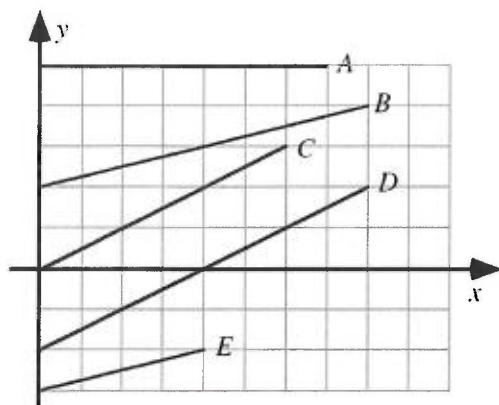


Rank the magnitudes (sizes) of the slopes of the line at the labeled points.

				OR			
1	2	3	4		All	All	Cannot
Greatest			Least		the same	zero	determine

Explain your reasoning.

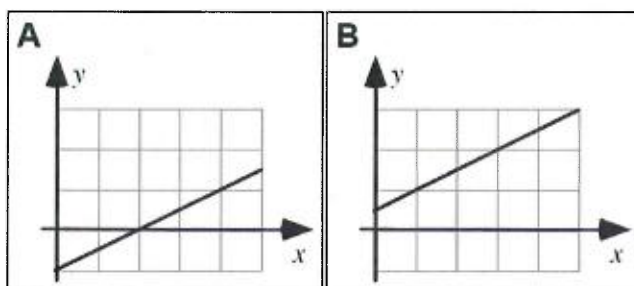
10. Shown are several lines on a graph.



Rank the slopes of the lines in this graph.

<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	OR	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>	<input style="width: 80%;" type="text"/>
1 Greatest	2	3	4	5 Least		All the same	All zero	Cannot determine

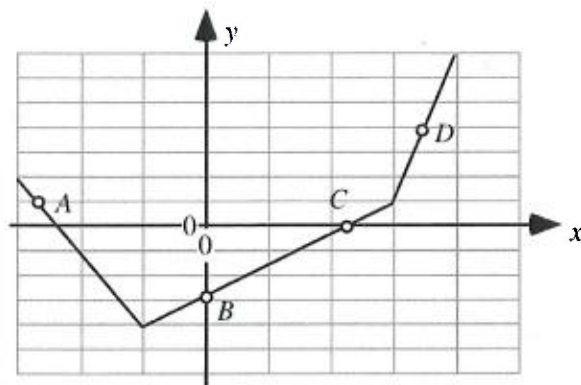
11. Shown are two graphs.



Is the slope of the graph (i) *greater in Case A*, (ii) *greater in Case B*, or (iii) *the same in both cases*? _____

Explain your reasoning.

Problems 12-13: Four points are labeled on a graph.



12. Rank the magnitudes (sizes) of the slopes of the graph at the labeled points.

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	OR	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4		All	All	Cannot
Greatest			Least		the same	zero	determine

Explain your reasoning.

[Hint: If a point belongs to a straight line, the slope of the point is the slope of the line.]

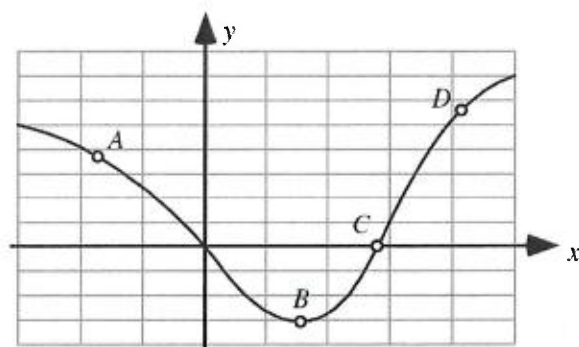
13. Rank the slopes of the graph at the labeled points.

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	OR	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4		All	All	Cannot
Greatest			Least		the same	zero	determine

Explain your reasoning.

[Hint: Problems 12 and 13 are different. The magnitude of slope is a quantity without negative sign. Slope can be positive or negative.]

14. Four points are labeled on a graph.



Rank the slopes of the graph at the labeled points.

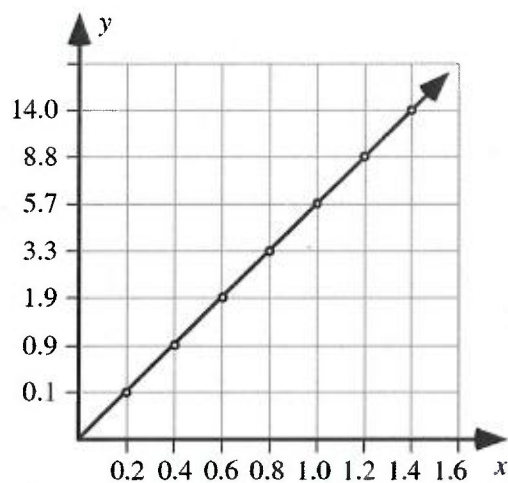
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	OR	<input type="text"/>	<input type="text"/>	<input type="text"/>
1	2	3	4		All	All	Cannot
Greatest			Least		the same	zero	determine

Explain your reasoning.

[Hint: If a point is on a curve, draw a tangent line at that point first. The slope of the point is the slope of the tangent line.]

15. A student uses data from a table to make a graph as shown.

x	y
0.2	0.1
0.4	0.9
0.6	1.9
0.8	3.3
1.0	5.7
1.2	8.8
1.4	14.0



What, if anything, is wrong with this graph? If something is wrong, identify and explain how to correct all errors. If this statement is correct, explain why.

