PHYSICS IN MOTION
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Unit 1F
Mathematical Resolution of Vectors
Note-Taking Guide and Questions to Consider TEACHER

Main Ideas, Key Points, Questions:

After watching the video segment, write down key points, main ideas, and big questions.

Objective(s):

- *Add one-dimensional vectors mathematically, recognizing that signs indicate direction.*
- *Add two-dimensional vectors mathematically using the Pythagorean theorem.*

Notes:

During the video segment, use words, phrases, or drawings to take notes.

Summary:

After watching the video segment, write at least three sentences explaining what you learned. You may ask yourself: "If I was going to explain this to someone else, what would I say?"

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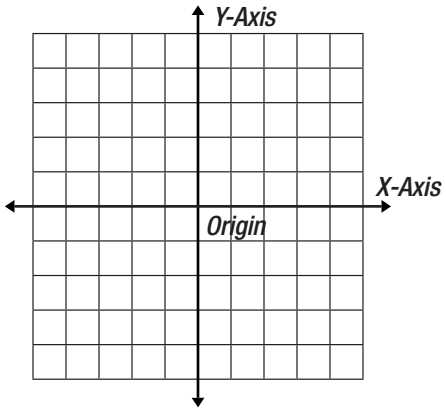
Answer the following.

1. **On the diagram below, label the x-axis, y-axis, and origin.**



2. **What are the four cardinal directions?**

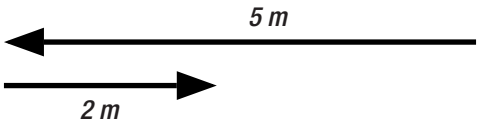
north, east, south, west

3. **A car drives 150 m to the east then backtracks 30 m to the west. Describe the mathematical operation you will use to determine the net movement of the car.**

You must subtract the 30 m from the 150 m because it is in the opposite direction.

4. **Using vector arrows and the tip-to-tail method, draw a diagram of a person walking 5 m to the west then 2 m to the east. What is the net movement of the person from start to finish?**

The resultant is 3 m to the west.



5. **What is the sum of two or more vectors called?**

The sum of two or more vectors is called the resultant.

6. **If two vectors are in opposite directions, how would you show this in a component table?**

If two vectors are in opposite directions, they must have opposite signs in the component table.

questions continued on next page

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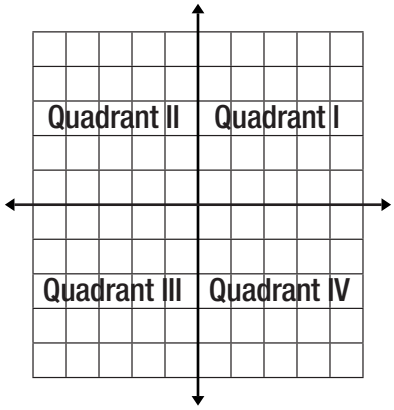
Answer the following.

7. On the diagram below, label quadrants I-IV.



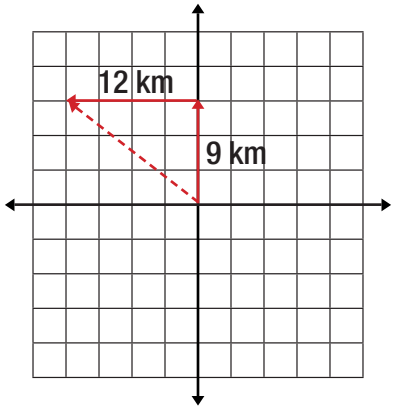
8. A resultant vector has x- and y-components that are negative. In what quadrant would this resultant vector lie?

If both the x- and y-components are negative,

the resultant would be located in quadrant III.

9. A cyclist rides his bike 9 km to the north and 12 km to the west.

a. Draw a diagram showing the net movement of the cyclist.



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Answer the following.

b. In what quadrant does the cyclist finish his trip?

quadrant II (NOTE: This can be solved in one of two ways — the student can either look at the graph above or recognize that the vertical displacement is positive and the horizontal displacement is negative.)

c. What is the magnitude of the net movement of his trip?

Vector	x-component	y-component
1	*0 km*	*+ 9 km*
2	*- 12 km*	*0 km*
TOTAL	***- 12 km***	***+ 9 km***

To find the magnitude, we must use the Pythagorean theorem because we are adding two vectors that are perpendicular to each other.

$$R = \sqrt{(\Sigma x)^2 + (\Sigma y)^2}$$
$$R = \sqrt{(-12\ km)^2 + (-9\ km)^2}$$
$$R = \sqrt{144\ km^2 + 81 km^2}$$
$$R = \sqrt{225\ km^2}$$
$$R = 15\ km \text{ north of west}$$