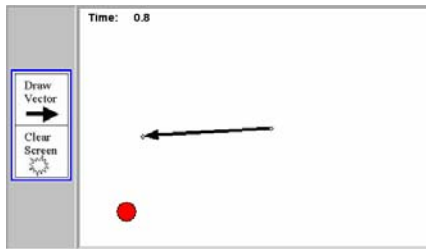
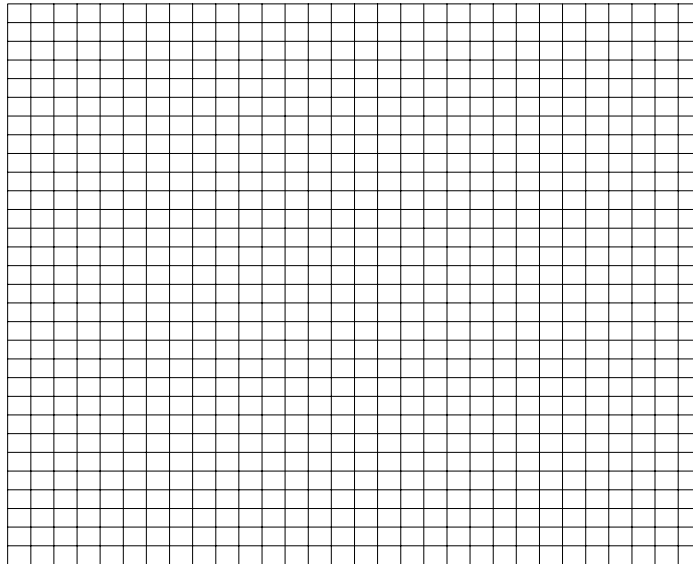


Worksheet for Exploration 3.1: Addition of Displacement Vectors



Suppose that you use a radar system to track an airplane (the red circle) and the airplane travels according to the animation shown.

- a. Draw a vector for the displacement of the airplane from $t = 0$ to $t = 8$ s. To do this, click the "Draw Vector" button. When a vector appears, drag it to the position of the airplane at $t = 0$ s. Then play the animation, stop it at $t = 8$ s, and adjust the tip of the vector until it is at this position.
 - i. Using the vector as a guide select appropriate numbers for the horizontal and vertical axes on the sample graph below.



- ii. In addition to working in the animation, copy the vector to the sample graph. (This way you will have a permanent record of your work). You can sketch by hand.

- iii. For each vector see if you can indicate the horizontal and vertical components of the displacement vector. These could be labeled Δx_{0-8} and Δy_{0-8}
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- b. Now draw a displacement vector for the airplane from $t = 8$ s to $t = 16$ s. Use the same procedure as before. Be sure to click the "Draw Vector" button so that you can have a new vector to work with. You should see both the first displacement vector and the second displacement vector.
 - i. On the same sample graph also display this vector as you did for the vector in part a.
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- c. Now draw a displacement vector for the airplane from $t = 0$ to $t = 16$ s. Use the same procedure as before. What do you notice? To add vectors like this, you can connect the vectors from tail to head. The result, called the resultant vector, is the vector drawn from the tail of the first vector to the head of the last vector.
 - i. Again sketch the vector and indicate the horizontal and vertical components.
 - ii. Check the correct answer. How does your result compare to the correct answer?