NAME: KEY

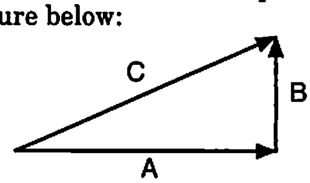
Vector Components

Thinking about vectors as a magnitude and a direction is the most natural and obvious way, but it turns out that it is not always the easiest way. When we are dealing with vectors in this class, we will usually deal with the *components* of the vector. Each vector has two components. We could call them the East and North components, or the horizontal and vertical components, or even the x and y components.

Components The parts of a vector that are going East/West and North/South. Or we could say the part of a vector that is going vertical and the part of a vector that is horizontal.

Remember that we have to give two pieces of information to describe a vector. Instead of thinking of a vector as a magnitude and a direction, we can think of how much of the vector going left or right and how much of the vector is going up or down.

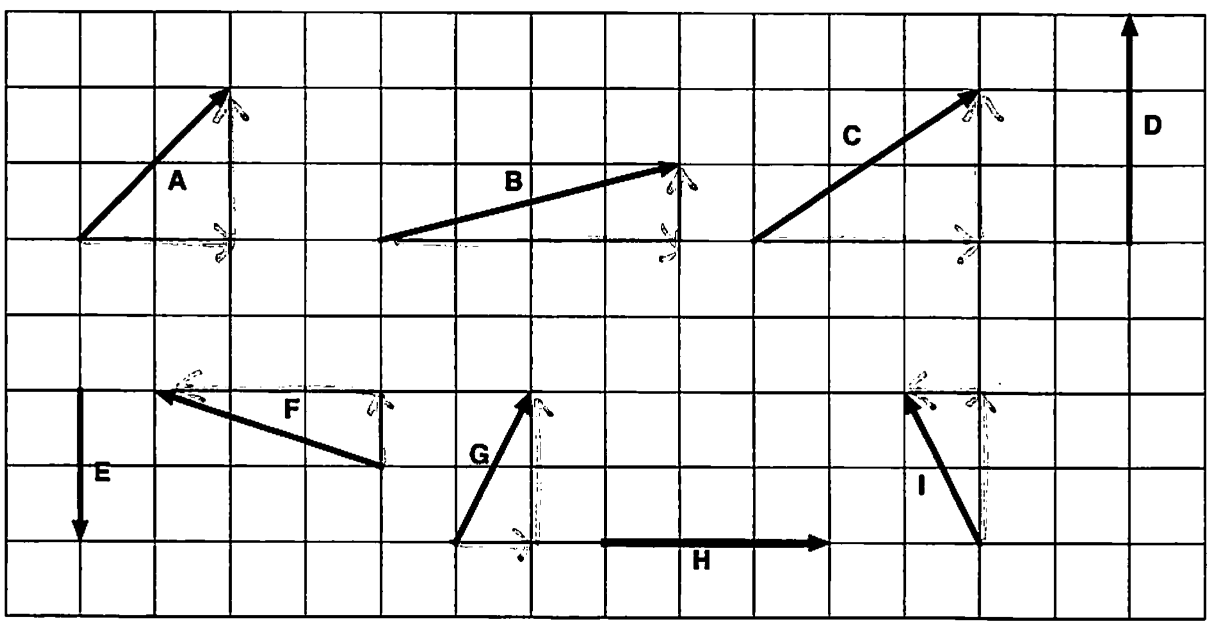
Put another way, the components of a vector are the two special perpendicular vectors that add up to the vector we want. Look at the picture below:



Notice how **C** is the resultant of **A** + **B**. Also notice how **A** and **B** are perpendicular to each other and that **A** is going to the right and **B** is going up. We could describe **A** as being due East or horizontal or perhaps just say in the "x"-direction. Likewise, We could describe **B** as being due North or vertical or perhaps just say in the "y"-direction. **A** and **B** are the components of **C**. The magnitude of the vector is just the length of vector **C**.

When we use vectors, we decide whether to use East/North or horizontal/vertical or x/y based on the wording of a problem.

1. Some vectors are shown in the grid below. Give the x and y components of each vector.



A_x = 2 & A_y = 2 B_x = 4 & B_y = 1 C_x = 3 & C_y = 2

D_x = 0 & D_y = 3 E_x = 0 & E_y = -2 F_x = -3 & F_y = 1

G_x = 1 & G_y = 2 H_x = 3 & H_y = 0 I_x = -1 & I_y = 2

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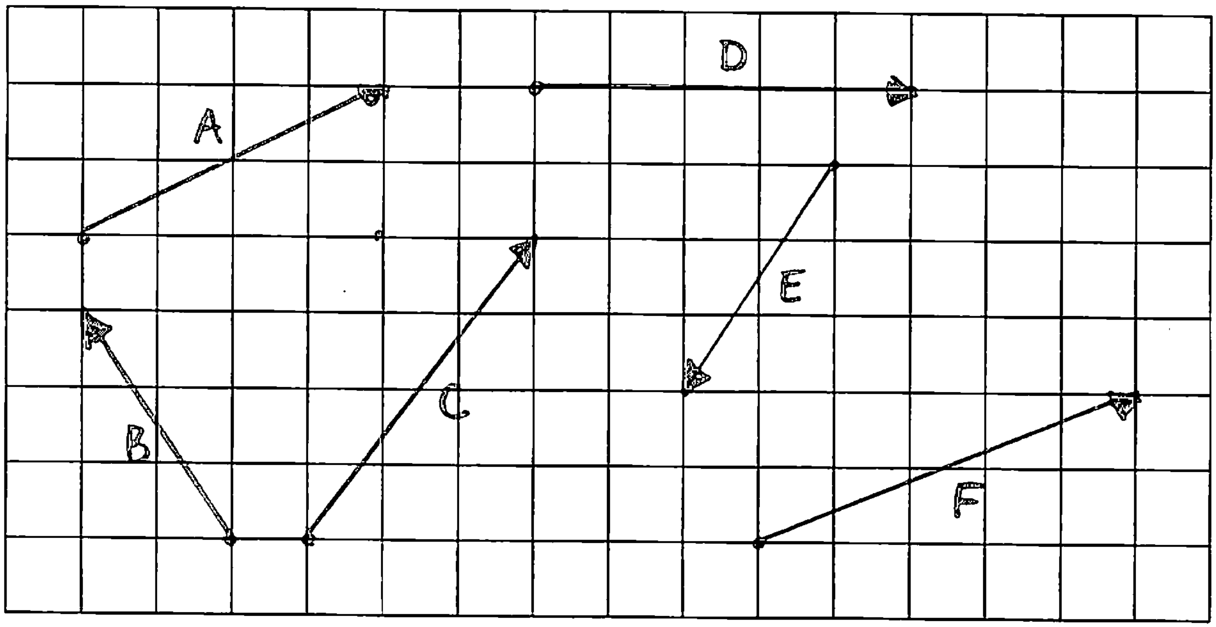
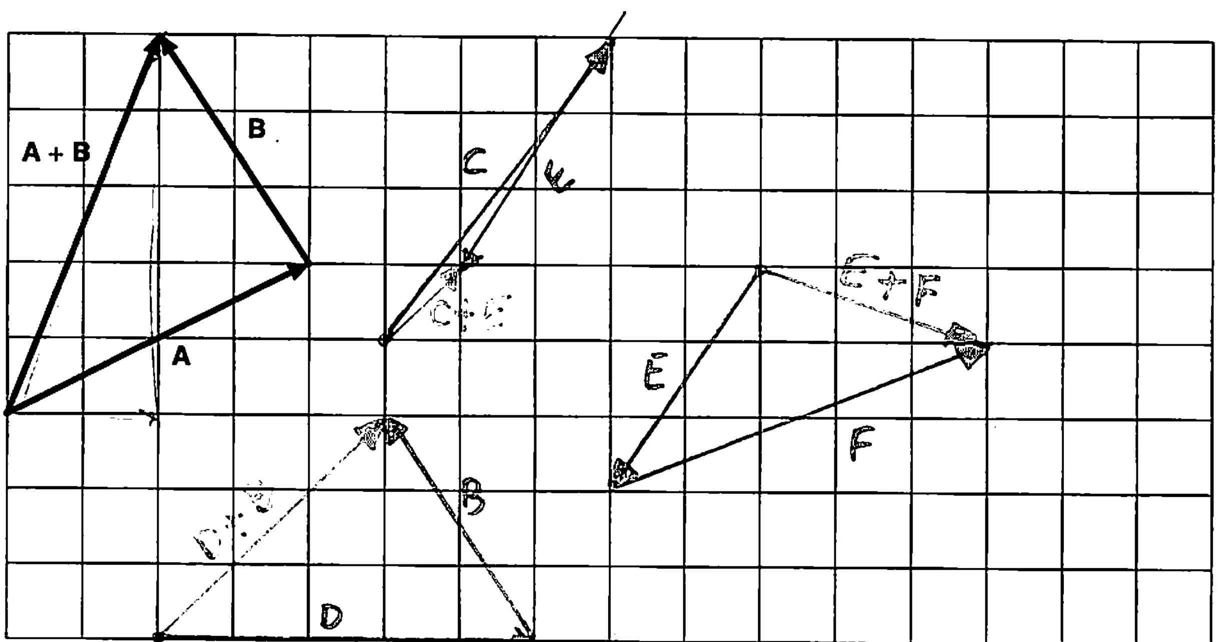
2. In the space below, draw the vectors with the following components.

A: $A_x = 4$ and $A_y = 2$. B: $B_x = -2$ and $B_y = 3$. C: $C_x = 3$ and $C_y = 4$.

D: $D_x = 5$ and $D_y = 0$. E: $E_x = -2$ and $E_y = -3$. F: $F_x = 5$ and $F_y = 2$.



3. One of the really nice things about using the components of vectors is that it is really easy to add them - all you do is add up the components! Using the vectors described in problem 2 above, show how you would add up the vectors and then give the components of the resultant. The first one is partially done for you as an example.



$(A+B)_x =$ 2 & $(A+B)_y =$ 5 $(C+E)_x =$ 1 & $(C+E)_y =$ 1

$(D+B)_x =$ 3 & $(D+B)_y =$ 3 $(E+F)_x =$ 3 & $(E+F)_y =$ −1