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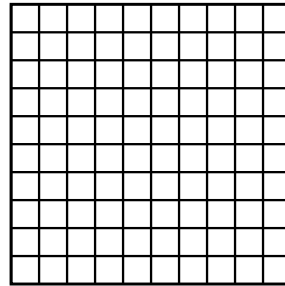
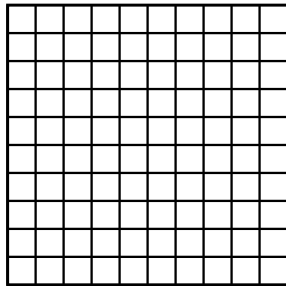
## PHYS 1210 Group Work Sheet

### Vectors

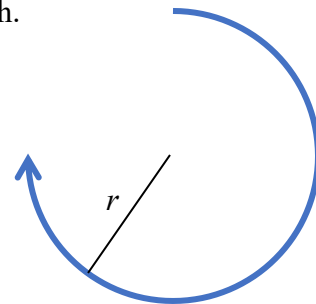
With your group, discuss how to answer these questions and write your group answer in the space provided.

Vector  $\vec{A}$  can be expressed in  $(x, y)$  components as  $\vec{A} = (2.00 \text{ m/s}, 5.00 \text{ m/s}) = (2.00\hat{i} + 5.00\hat{j})\text{m/s}$ . Vector  $\vec{B} = (1.00 \text{ m/s}, -3.00 \text{ m/s}) = (1.00\hat{i} - 3.00\hat{j})\text{m/s}$ .

1. Draw vectors  $\vec{A}$  and  $\vec{B}$  in the grid.
2. Graphically add  $\vec{A} + \vec{B}$  in the grid.




3. Find  $\vec{A} + \vec{B}$  by adding the components together.
4. A pony on a lead of length  $r = 5.0$  meters trots  $\frac{3}{4}$  of the way around a complete circle.
  - a. What distance did the pony travel? This is its path length.
  - b. How far is the pony from where it started?
  - c. We can define coordinates as we find useful. Let's place the origin  $(0, 0)$  at the center of the circle containing the pony's path, set the  $+x$  direction as  $\rightarrow$ , and the  $+y$  direction as  $\uparrow$ .
    - i. What is the position vector of the start of the pony's path?
    - ii. What is the position vector of the end of the pony's path?



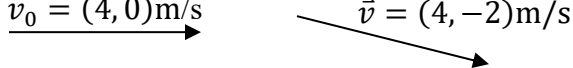
iii. What is the pony's displacement vector?

5. From the illustrated initial and final velocity vectors  $\vec{v}_0$  and  $\vec{v}$ , specify the vector of the change in velocity  $\Delta\vec{v} = \vec{v} - \vec{v}_0$  (sketch and components).


a.  $\vec{v}_0 = (4, 0)\text{m/s}$   $\vec{v} = (3, 0)\text{m/s}$



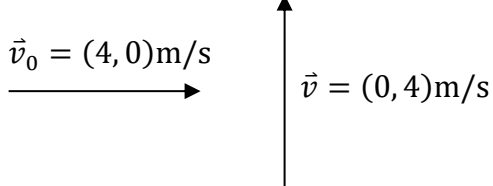
b.  $\vec{v}_0 = (4, 0)\text{m/s}$   $\vec{v} = (4, -2)\text{m/s}$



c.  $\vec{v}_0 = (4, 0)\text{m/s}$   $\vec{v} = (5, 0)\text{m/s}$



d.  $\vec{v}_0 = (4, 0)\text{m/s}$   $\vec{v} = (0, 4)\text{m/s}$



Define vectors  $\vec{A} = (10\hat{i} + 30\hat{j})$  N and  $\vec{B} = (0.50\hat{i} + 0.1\hat{j})$  m.

6. What are the magnitudes of the vectors?

A: \_\_\_\_\_ B: \_\_\_\_\_

7. What is the dot product of vectors  $\vec{A}$  and  $\vec{B}$  as defined above?

8. What is the angle between vectors  $\vec{A}$  and  $\vec{B}$  as defined above?