Name: _____

HW 1: Chapter 1

Physics 201

1. Unit Conversions Practice

Use the given conversion factor to convert each of the following values into the requested units. Show your work, including proper cancellation of units.

A. Convert **72.0 km** to **meters**
Conversion factor:
1 kilometer = 1000 meters

B. Convert **55.0 mi/h** to **m/s**
Conversion factors:
1 mile = 1609 meters
1 hour = 3600 seconds

C. Convert **1.25 ft^3** to **in^3**
Conversion factor:
1 foot = 12 inches

D. Convert **5.00×10^5 cm^2** to **m^2**
Conversion factor:
1 meter = 100 centimeters

E. Convert **2.50 gallons** to **liters**
Conversion factor:
1 gallon = 3.785 liters

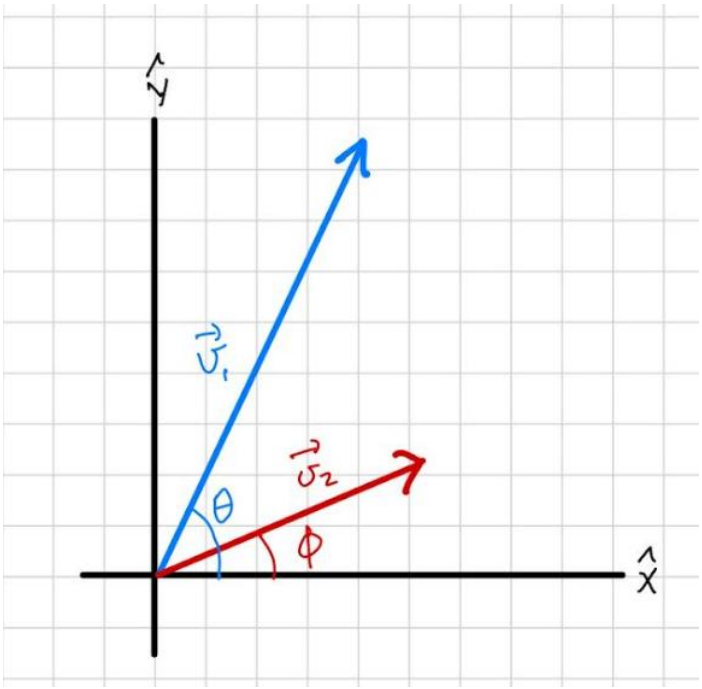
F. Convert **0.075 kg/cm^3** to **g/mL**
Conversion factors:
1 kilogram = 1000 grams
1 cm^3 = 1 mL

2. Vector addition A.

In the diagram below there are two vectors.

A. Draw each vector's decomposition and label the x and y components.
B. Calculate the magnitudes of each component for each vector.
C. Find the x and y magnitudes of the resultant vector.
D. Which quadrant is the resultant vector in?
E. Find the magnitude of the resultant vector.
F. Find the angle of the resultant vector from the positive x axis going counterclockwise.

$$v_1 = 20\frac{m}{s} \qquad v_2 = 10\frac{m}{s} \qquad \theta = 70^0 \qquad \phi = 30^0$$

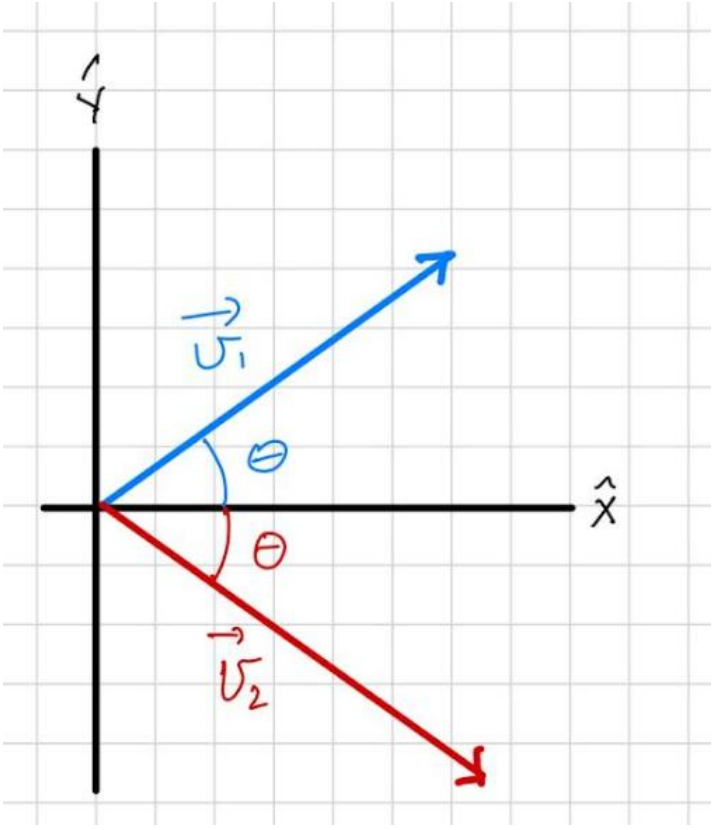


3. Vector addition B.

In the diagram below there are two vectors.

A. Draw each vector's decomposition and label the x and y components.
B. Calculate the magnitudes of each component for each vector.
C. Find the x and y magnitudes of the resultant vector.
D. Which quadrant is the resultant vector in?
E. Find the magnitude of the resultant vector.
F. Find the angle of the resultant vector from the positive x axis going counterclockwise.

$$v_1 = 20\frac{m}{s} \qquad v_2 = 20\frac{m}{s} \qquad \theta = 45^0 \qquad \phi = -\theta = -45^0$$



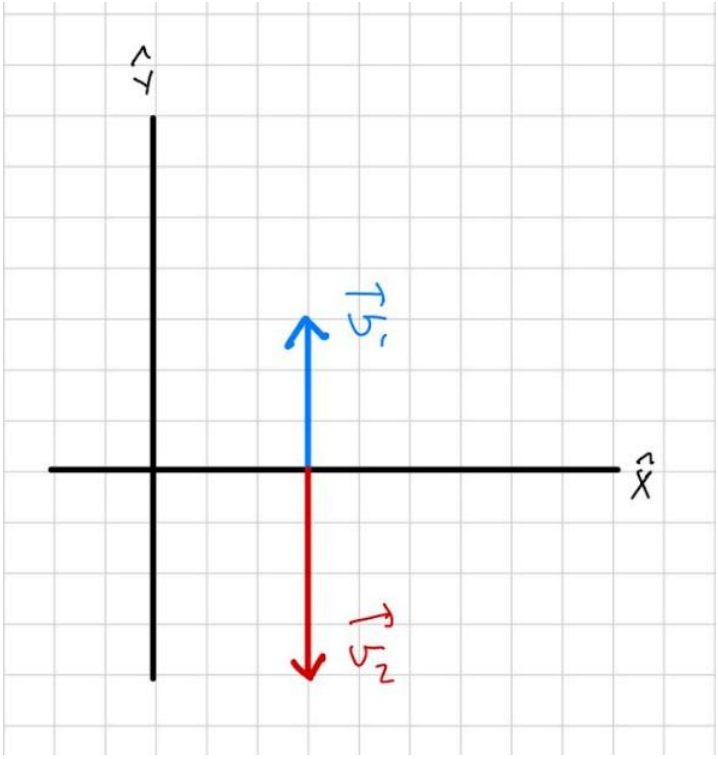
Note: The magnitudes of both angles are the same. But one is measured clockwise and the other counterclockwise.

4. Vector addition C.

In the diagram below there are two vectors.

A. Draw each vector's decomposition and label the x and y components.
B. Calculate the magnitudes of each component for each vector.
C. Find the x and y magnitudes of the resultant vector.
D. Which quadrant is the resultant vector in?
E. Find the magnitude of the resultant vector.
F. Find the angle of the resultant vector from the positive x axis going counterclockwise.

$$v_1 = 10\frac{m}{s} \qquad v_2 = 10\frac{m}{s} \qquad \theta = 90^0 \qquad \phi = 270^0$$



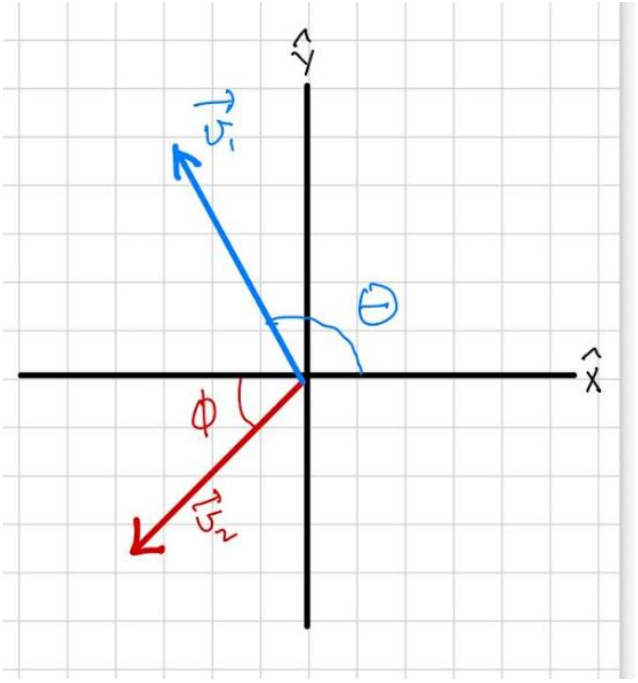
Note: θ and ϕ belong to $\vec{v}_1$ and $\vec{v}_2$ respectively.

5. Vector addition D.

In the diagram below there are two vectors.

A. Draw each vector's decomposition and label the x and y components.
B. Calculate the magnitudes of each component for each vector.
C. Find the x and y magnitudes of the resultant vector.
D. Which quadrant is the resultant vector in?
E. Find the magnitude of the resultant vector.
F. Find the angle of the resultant vector from the positive x axis going counterclockwise.

$$v_1 = 10\frac{m}{s} \qquad v_2 = 10\frac{m}{s} \qquad \theta = 120^0 \qquad \phi = 45^0$$



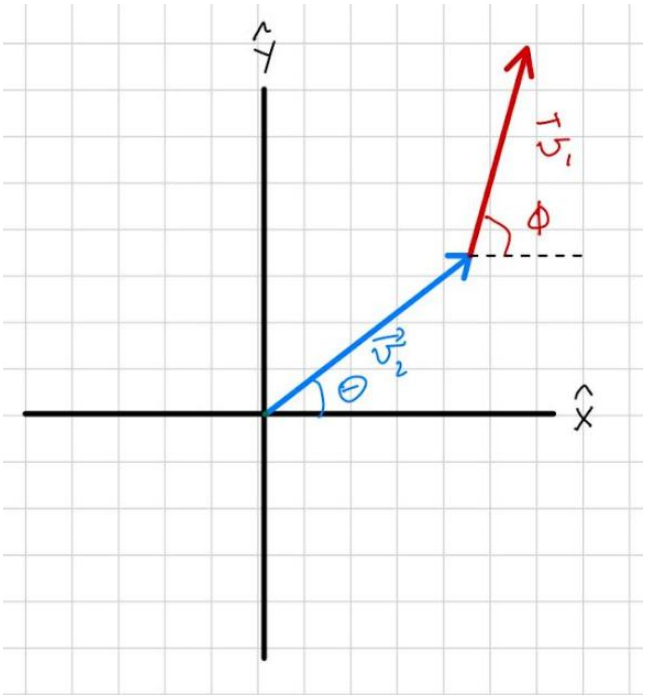
Note: One angle is measured from the positive x axis, but the other is measured from the negative x axis.

6. Vector addition E.

In the diagram below there are two vectors.

A. Draw each vector's decomposition and label the x and y components.
B. Calculate the magnitudes of each component for each vector.
C. Find the x and y magnitudes of the resultant vector.
D. Which quadrant is the resultant vector in?
E. Find the magnitude of the resultant vector.
F. Find the angle of the resultant vector from the positive x axis going counterclockwise.

$$v_1 = 10\frac{m}{s} \qquad v_2 = 10\frac{m}{s} \qquad \theta = 45^0 \qquad \phi = 60^0$$



Note: This problem might look weird but follow the recipe and you will arrive at the answer.