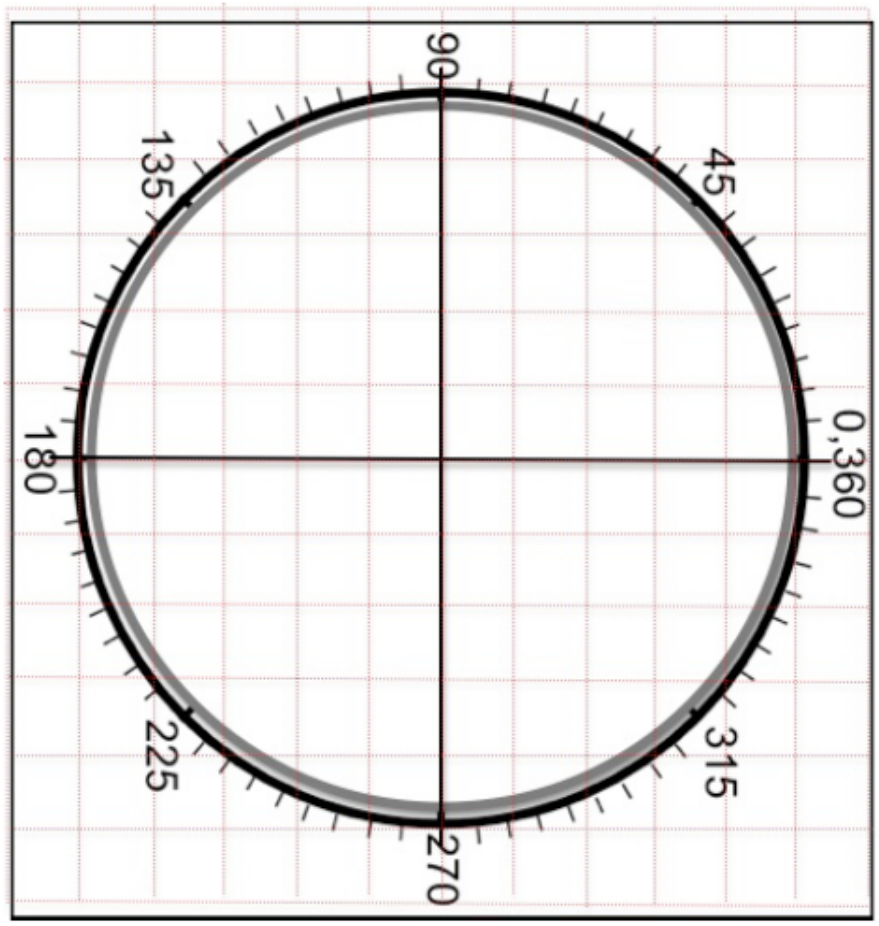
Vectors Worksheet

As you work through the steps in the lab procedures, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Procedure A: Finding the equilibrant of two known forces

Use the grid below to draw the force diagram. Label each force and angle appropriately.



Complete the table below. (Measure all angles between 0° and 360°, counterclockwise from the $+x$-axis.)

Data Table 1

Force	**Mass (kg)**	**Force (N)**	**Angle (degrees)**	***x*-component (N)**	***y*-component (N)**
F_1	0.150		60		
F_2	0.150		300		
$R = F_1 + F_2$			Resultant =		
			Equilibrant =		

What is the calculated value of F_3 (equilibrant) needed to balance the two forces F_1 and F_2?

magnitude $F_{3,\texttt{calc}} =$ _____

direction $\theta_{3,\texttt{calc}} =$ _____°

What is the experimental value of F_3 (equilibrant) needed to balance the two forces F_1 and F_2?

magnitude $F_{3,\texttt{exp}} =$ _____

direction $\theta_{3,\texttt{exp}} =$ _____°

What is the percent difference between calculated and experimental values of the magnitude of F_3?

percent difference = _____%

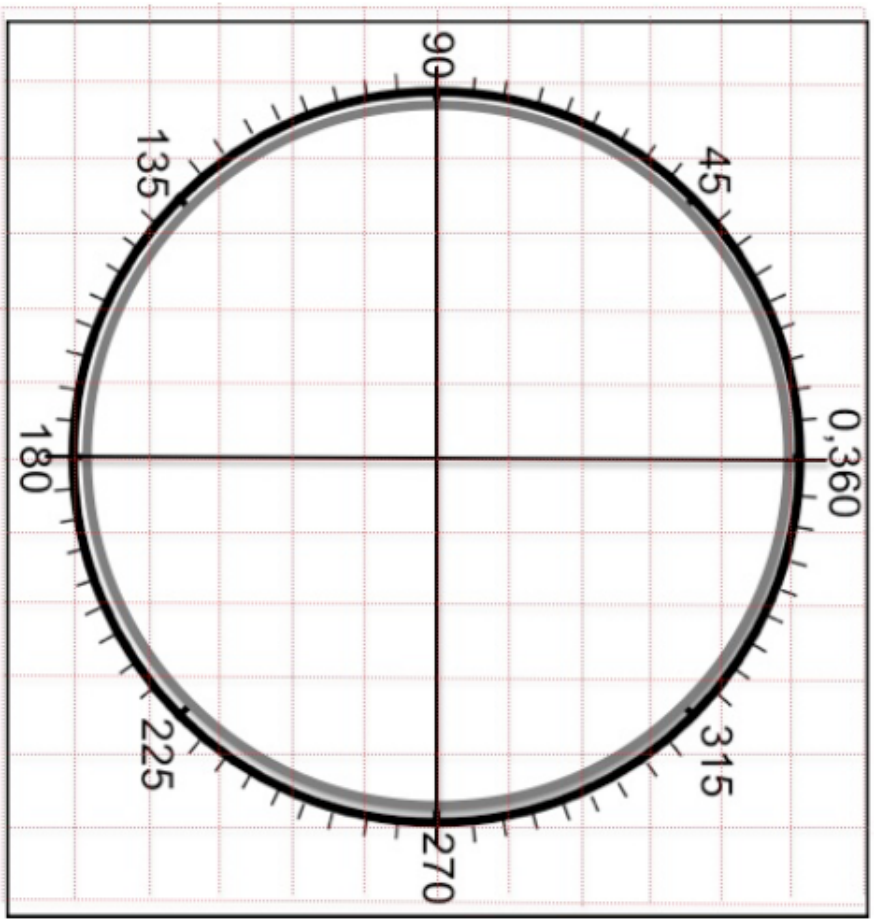
What is the percent difference between the calculated and experimental values of θ_3?

percent difference = _____%

CHECKPOINT 1: Force diagram and calculations

Procedure B : Determining the placement of two unknown forces

Use the grid below to draw the force diagram. Label each force and angle appropriately.



Complete the table below. (Measure all angles between 0° and 360°, counterclockwise from the $+x$-axis.)

Data Table 2

Force	**Mass (kg)**	**Force (N)**	**Angle (degrees)**	***x*-component (N)**	***y*-component (N)**
F_1	0.300		150		
F_2					
$R = F_1 + F_2$			Resultant =		
			Equilibrant =		

What is the calculated value of F_3 (equilibrant) needed to balance the two forces F_1 and F_2?

magnitude $F_{3,\texttt{calc}} =$ _____

direction $\theta_{3,\texttt{calc}} =$ _____°

What are the experimental values of F_2 and F_3?

magnitude $F_{2,\texttt{exp}} =$ _____

direction $\theta_{2,\texttt{exp}} =$ _____°

magnitude $F_{3,\texttt{exp}} =$ _____

direction $\theta_{3,\texttt{exp}} =$ _____°

What is the percent difference between the chosen and experimental values of the magnitude of F_2?

percent difference = _____%

What is the percent difference between the chosen and experimental values of θ_2?

percent difference = _____%

What is the percent difference between the calculated and experimental values of the magnitude of F_3?

percent difference = _____%

What is the percent difference between the calculated and experimental values of θ_3?

percent difference = _____%

CHECKPOINT 2: Force diagram and calculations