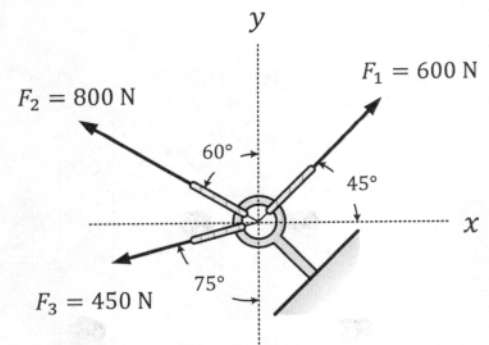


### Question 1:

(2 Marks)

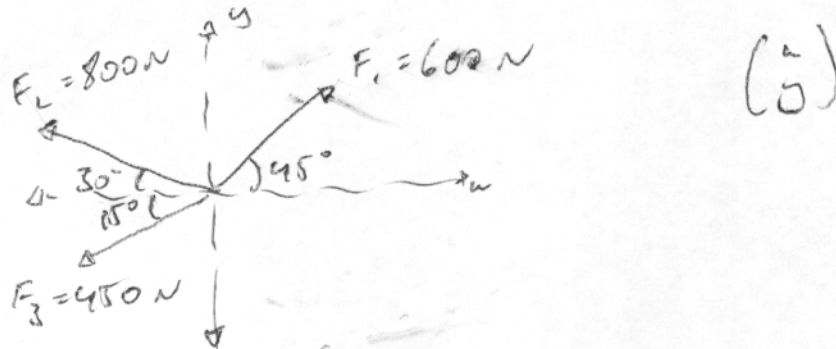
Three concurrent forces act on the eye bolt as shown. Determine the following:

(Proceed according to the steps provided in solution boxes and record your final answers in the answer box provided at the end)



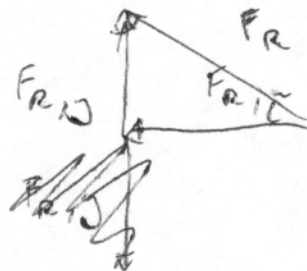
### Solution:

(a) Calculate the magnitude  $|F_R|$  of the resultant force



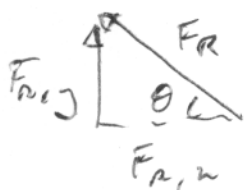
$$\begin{aligned}
 F_R &= F_1 + F_2 + F_3 \\
 &= \begin{pmatrix} 600 \cos 45 \\ 600 \sin 45 \end{pmatrix} + \begin{pmatrix} -800 \cos 30 \\ 800 \sin 30 \end{pmatrix} + \begin{pmatrix} -450 \cos 15 \\ -450 \sin 15 \end{pmatrix} \\
 &= \begin{pmatrix} -703.22 \dots \\ 707.79 \dots \end{pmatrix}
 \end{aligned}$$

$$\begin{aligned}
 \therefore |F_R| &= \sqrt{703.22^2 + 707.79^2} \\
 &= 997.7 \text{ N}
 \end{aligned}$$



X4ESYIPU 1

Continue your working for part (a) here:

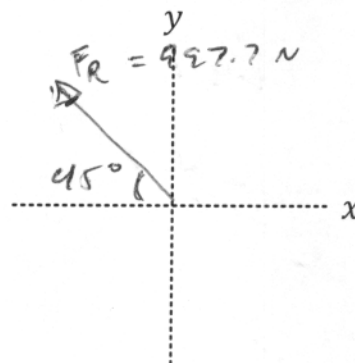


(b) Calculate the angle ( $\theta$ ) of the resultant force  $|F_R|$  measured clockwise from the positive x-axis

$$\theta = \tan^{-1} \left( \frac{F_{R,y}}{F_{R,x}} \right) = -45.18^\circ$$

$$\therefore \theta = 225^\circ \text{ CW from the positive x-axis}$$

(c) show the resultant force (both magnitude and direction) on the axis provided below



Answers:

$|F_R| =$

997.7 N

$\theta =$

225°

