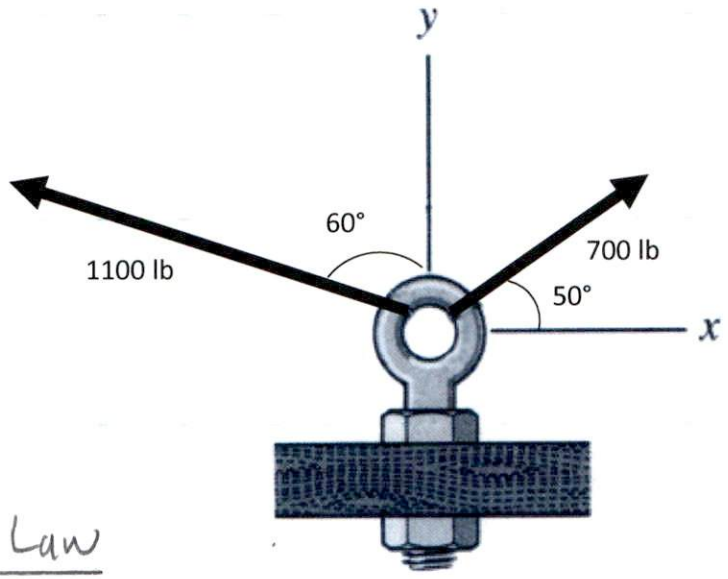
CMGT 350	Quiz #2	Fall 2022

SHOW ALL WORK FOR FULL CREDIT. DO YOUR OWN WORK.

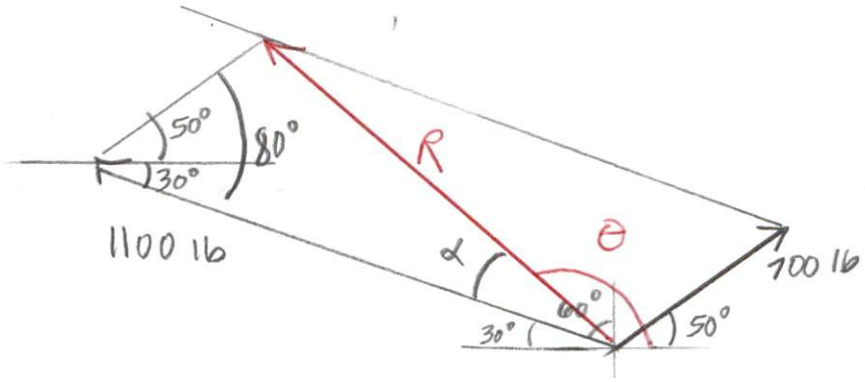
Name: Solution

1. Determine the magnitude and direction of the resultant for the two forces acting on the screw eye using either the parallelogram Law or the triangle rule.



Parallelogram Law

Solution.



SAS Law of Cosines

$$R = \sqrt{700\,lb^2 + 1100\,lb^2 - 2(700\,lb)(1100\,lb)\cos 80^\circ}$$

$$= 1197\,lb$$

$$\frac{\sin\alpha}{700\,lb} = \frac{\sin 80^\circ}{1197\,lb} \qquad \alpha = \sin^{-1}\left(\frac{700\,lb \sin 80^\circ}{1197\,lb}\right) = 35^\circ$$

$$\theta = 180^\circ - 30^\circ - 35^\circ = 115^\circ$$

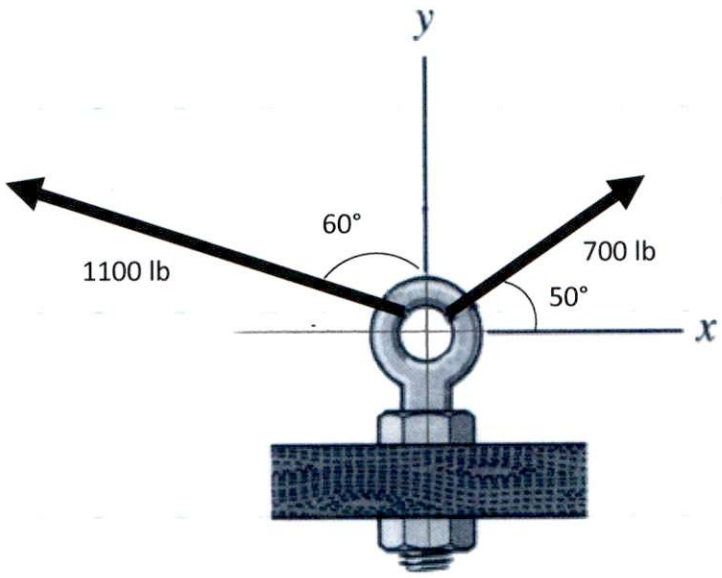
$$R = 1197\,lb \angle 115^\circ$$

CMGT 350	Quiz #2	Fall 2022

SHOW ALL WORK FOR FULL CREDIT. DO YOUR OWN WORK.

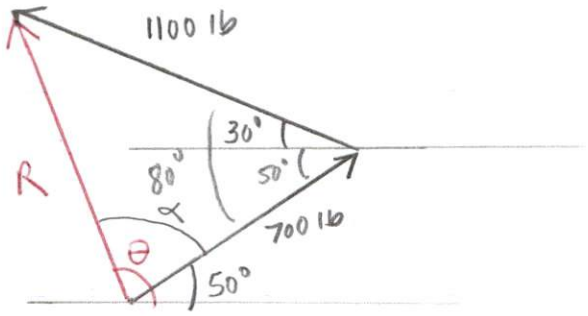
Name: _____

1. Determine the magnitude and direction of the resultant for the two forces acting on the screw eye using either the parallelogram Law or the triangle rule.



Solution.

Triangle Rule
Head-to-Tail



Law of Cosines

$$R = \sqrt{700\text{ lb}^2 + 1100\text{ lb}^2 - 2(700\text{ lb})(1100\text{ lb})\cos 80^\circ}$$

$$= \sqrt{1{,}700{,}000 - 267{,}418.1936}$$

$$= 1197\text{ lb}$$

Law of Sines

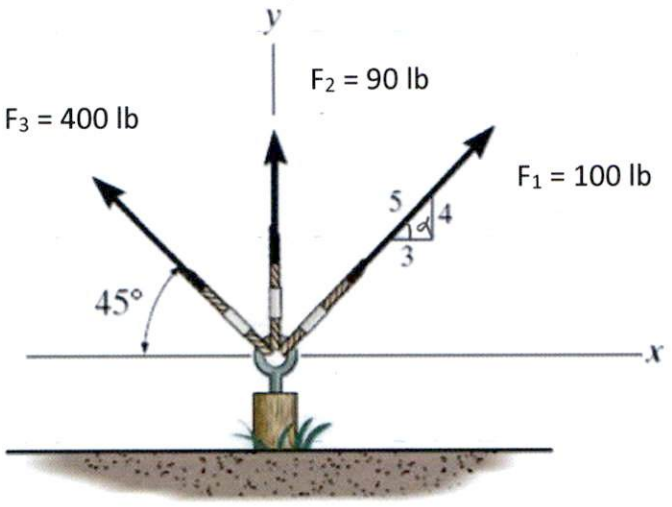
$$\frac{\sin\alpha}{1100\text{ lb}} = \frac{\sin 80^\circ}{1197\text{ lb}}$$

$$\alpha = \sin^{-1}\left(\frac{1100\text{ lb}\sin 80^\circ}{1197\text{ lb}}\right) = 65^\circ$$

$$\theta = 50^\circ + 65^\circ = 115^\circ$$

$R = 1197\text{ lb} \angle 115^\circ$

2. Determine the magnitude and direction of the resultant for the forces acting on the tent stake by completing the following. Round all answers to whole numbers. All angles are to be measured CCW from the + x-axis.



$\tan\alpha = \frac{4}{3}$

$\alpha = \tan^{-1}\frac{4}{3} = 53°$

Force (lb)	Direction (Θ°)	F_x = F CosΘ	F_y = F SinΘ
100	53°	60	80
90	90°	0	90
400	135°	−283	283
		ΣF_x −223	ΣF_y 453

Magnitude

$R_x = \Sigma F_x =$ −223 lb = 223 lb ←

$R_y = \Sigma F_y =$ 453 lb = 453 lb ↑

Resultant lies in QUAD 2

$R = \sqrt{R_x^2 + R_y^2} =$ $\sqrt{223\text{ lb}^2 + 453\text{ lb}^2} = 505$ lb

Direction

$\alpha = \tan^{-1}\left|\frac{R_y}{R_x}\right| = \tan^{-1}\left|\frac{453}{223}\right| = 64°$

$\Theta =$ 180° − 64 = 116°

ANS

R = 505 lb ∠ 116°