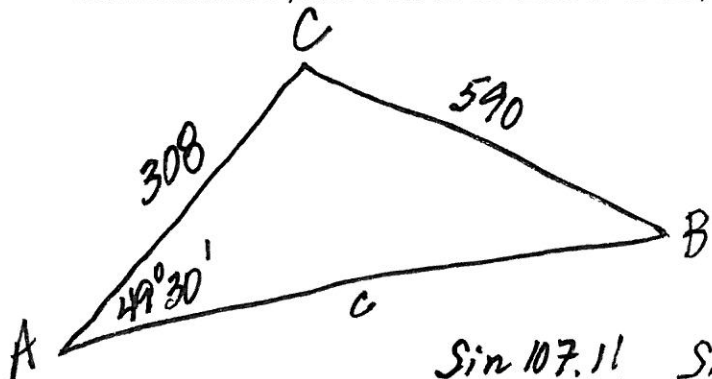


1. To determine the distance between two points, A and B, a surveyor chooses a point C that is 308 yards from A and 590 yards from B. If $\angle BAC$ is $49^\circ 30'$, approximate the distance between A and B.



$$\frac{\sin 49^\circ 30'}{590} = \frac{\sin B}{308}$$

$$m\angle B \approx 23.39^\circ$$

$$m\angle C = 180 - 49.5 - 23.39 = 107.11^\circ$$

$$\frac{\sin 107.11}{c} = \frac{\sin 49.5}{590}$$

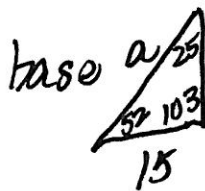
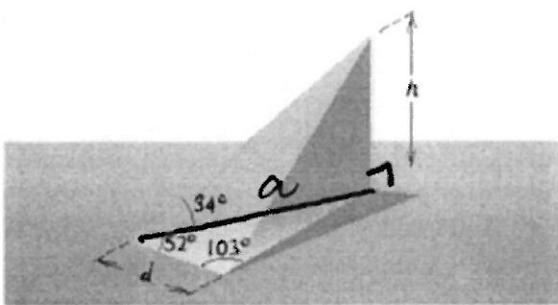
$$c \approx 741.6 \text{ or } 742 \text{ yds}$$

2. Find $\|a\|$ if $a = (-4, -8)$.

$$(-4, -8) \quad \|a\| = \sqrt{(-4)^2 + (-8)^2}$$

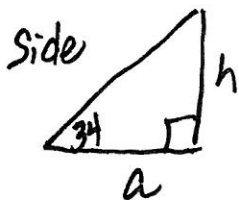
$$= \sqrt{16 + 64} = \sqrt{80} \text{ or } 4\sqrt{5}$$

3. The volume V of the right triangular pyramid shown in the figure is $\frac{1}{3} Bh$, where B is the area of the base and h is the height of the pyramid. Approximate h , if $d = 15$.



$$\frac{\sin 25}{15} = \frac{\sin 103}{a}$$

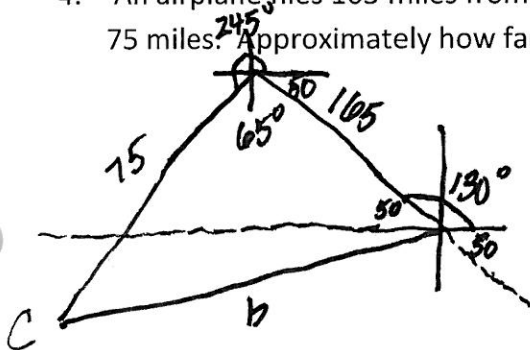
$$a \approx 34.5833$$



$$\tan 34 = \frac{h}{34.5833}$$

$$h = 23.33$$

4. An airplane flies 165 miles from point A in the direction 130° and then travels in the direction 245° for 75 miles. Approximately how far is the airplane from A?

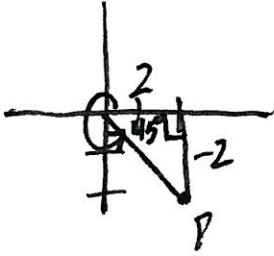


$$360 - 245 - 50 = 65^\circ$$

$$b = \sqrt{165^2 + 75^2 - 2(165)(75)\cos 65}$$

$$= 149.6 \text{ or } 150 \text{ mi.}$$

5. Find the smallest positive angle θ from the positive x-axis to the vector OP that corresponds to \mathbf{a} if $\mathbf{a} = (2, -2)$.



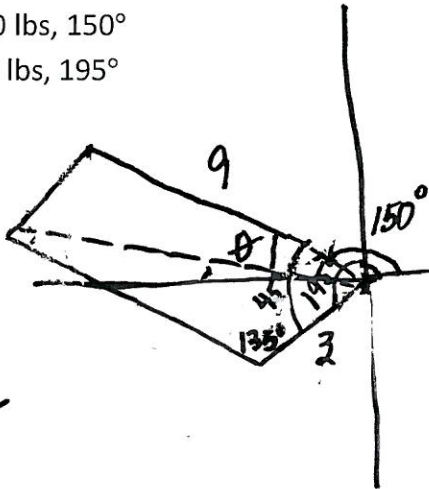
$$360 - 45 = 315^\circ$$

-or-

$$315 \cdot \frac{\pi}{180} = \frac{7\pi}{4}$$

6. The magnitudes and directions of two forces acting at a point P are given. Approximate the direction of the resultant vector.

- a) 9.0 lbs, 150°
 b) 3.0 lbs, 195°



$$195 - 150 = 45^\circ ; 180 - 45 = 135^\circ$$

$$C = \sqrt{9^2 + 3^2 - 2(9)(3)\cos 135}$$

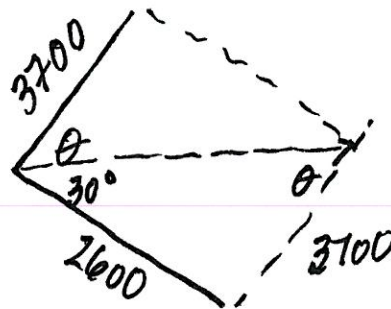
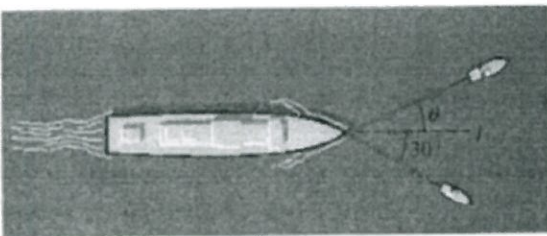
$$C \approx 11.32$$

$$\frac{\sin 135}{11.32} = \frac{\sin \theta}{3}$$

$$150 + 10.8 = 160.8 \approx 161^\circ$$

$$\theta \approx 10.8$$

7. Two tugboats are towing a large ship into port, as shown in the figure. The larger tug exerts a force of 3,700 pounds on its cable, and the smaller tug exerts a force of 2,600 pounds on its cable. If the ship is to travel on a straight line l , approximate the angle θ that the larger tug must make with l .



$$\frac{\sin 30}{3700} = \frac{\sin \theta}{2600}$$

$$\theta \approx 20.6^\circ \approx 21^\circ$$