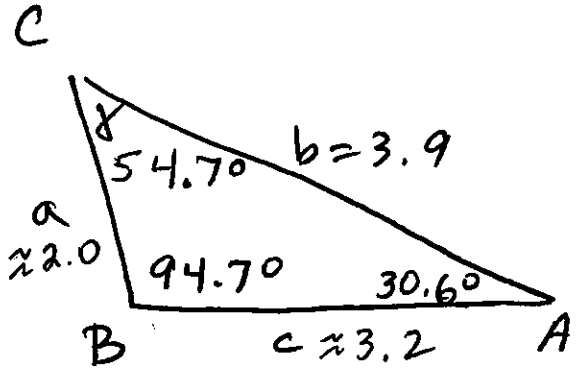
Practice

§7.1 LAW OF SINES

SOLVE THE TRIANGLE.

① $\beta = 94.7°$, $\alpha = 30.6°$, $b = 3.9$



- $\gamma = 180° - 94.7° - 30.6°$
  $= 54.7°$

- Find a.

$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

$$\frac{\sin 30.6°}{a} = \frac{\sin 94.7°}{3.9}$$

$$\frac{3.9 \sin 30.6°}{\sin 94.7°} = a$$

$$a \approx 2.0$$

- Find c

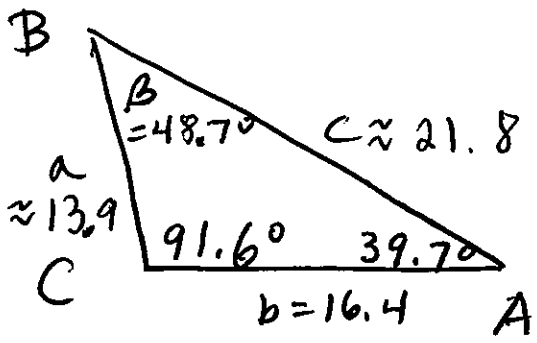
$$\frac{\sin C}{c} = \frac{\sin B}{b}$$

$$\frac{\sin 54.7}{c} = \frac{\sin 94.7}{3.9}$$

$$c = \frac{3.9 \sin 54.7}{\sin 94.7}$$

$$c \approx 3.2$$

② $\alpha = 39.7°$, $\gamma = 91.6°$, $b = 16.4$



- Find β

$$\beta = 180° - 91.6° - 39.7°$$

$$\beta = 48.7°$$

- Find c

$$\frac{c}{\sin C} = \frac{b}{\sin \beta}$$

$$\frac{c}{\sin 91.6°} = \frac{16.4}{\sin 48.7°}$$

$$c = \frac{(16.4)\sin 91.6°}{\sin 48.7°}$$

$$c \approx 21.8$$

Find a

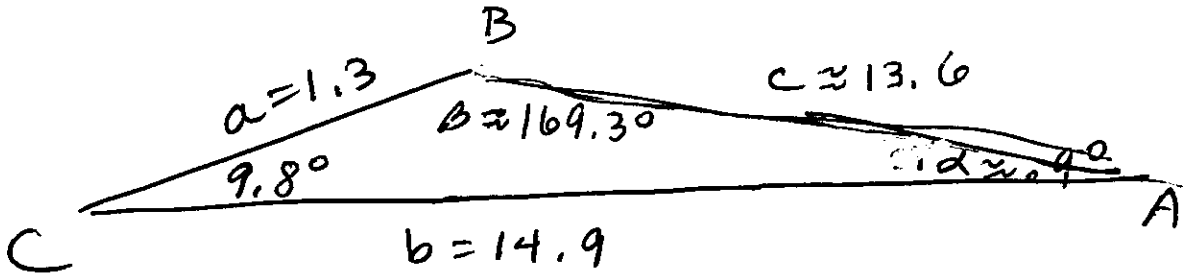
$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{a}{\sin 39.7°} = \frac{16.4}{\sin 48.7°}$$

$$a = \frac{(16.4)\sin 39.7°}{\sin 48.7°} \approx 13.9$$

9.1 Law of Cosines

(3) $a = 1.3,\ b = 14.9,\ \gamma = 9.8°$



Find c

$c^2 = a^2 + b^2 - 2ab\cos C$

$c^2 = (1.3)^2 + (14.9)^2 - 2(1.3)(14.9)\cos 9.8°$

$c \approx 13.6$

Find α

$$\frac{\sin\alpha}{a} = \frac{\sin\gamma}{c}$$

$$\frac{\sin\alpha}{1.3} = \frac{\sin 9.8}{13.6}$$

$$\sin\alpha = \frac{1.3\sin 9.8}{13.6}$$

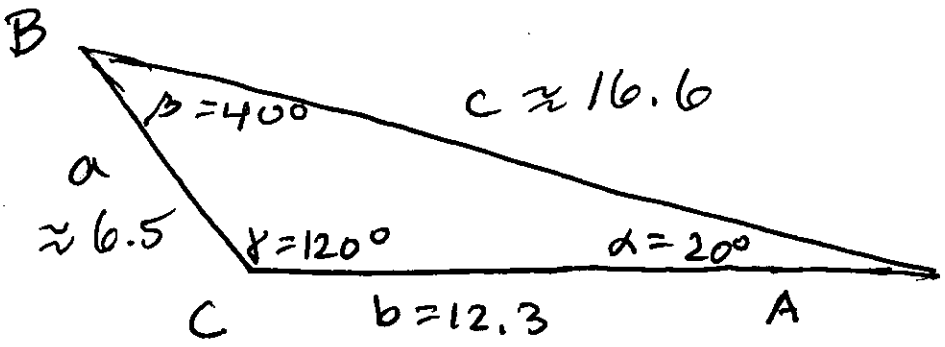
$$\alpha = \sin^{-1}\left(\frac{1.3\sin 9.8}{13.6}\right) \approx .9°$$

Find β

$\beta = 180° - \alpha - \gamma$

$= 180 - 9.8 - .9 = 169.3°$

④ $b = 12.3$, $\alpha = 20°$, $\gamma = 120°$



Find β

$\beta = 180° - 120° - 20° = 40°$

Find c

$$\frac{c}{\sin\gamma} = \frac{b}{\sin\beta}$$

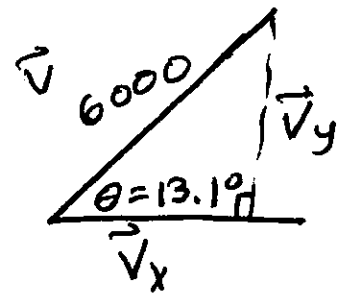
$$c = \frac{b \sin\gamma}{\sin\beta} = \frac{12.3 \sin 120°}{\sin 40°} \approx 16.6$$

Find a $\quad \frac{a}{\sin\alpha} = \frac{b}{\sin\beta}$

$$a = \frac{b\sin\alpha}{\sin\beta} = \frac{(12.3)\sin 20°}{\sin 40°} \approx 6.5$$

§7.3 Find the magnitude of the horizontal and vertical components for each vector $\vec{v}$ with the given magnitude and given direction angle θ.

⑤ $|\vec{v}| = 6000$, $\theta = 13.1°$



$\sin 13.1° = \frac{|\vec{v}_y|}{6000}$

$|\vec{v}_y| = 6000 \sin 13.1°$

$|\vec{v}_y| \approx 1,359.9$

$|\vec{v}_x| = 6000 \cos 13.1°$

$\approx 5,843.9$

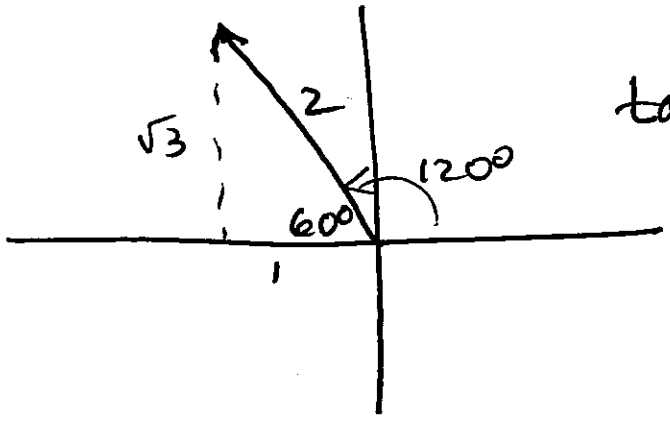
Find the magnitude and direction angle of each vector.

⑥ $\vec{v} = \langle -1, \sqrt{3} \rangle$

$|\vec{v}| = \sqrt{(-1)^2 + (\sqrt{3})^2}$

$= \sqrt{1+3} = \sqrt{4} = 2$

$\boxed{|\vec{v}| = 2}$

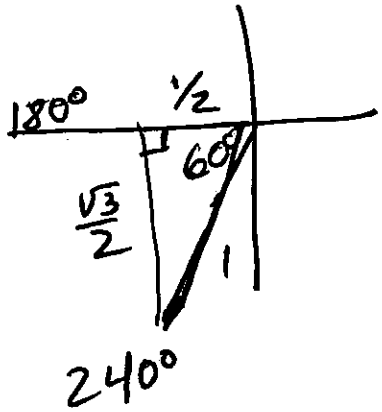


$\tan\theta = \frac{y}{x} = \frac{\sqrt{3}}{-1}$

$\boxed{\theta = 120°}$

⑦ $\langle -1/2, -\sqrt{3}/2 \rangle$

$\theta = 240°$



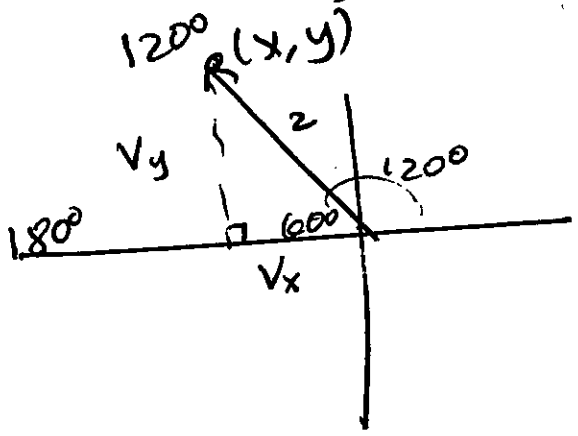
$|\vec{v}|^2 = (-1/2)^2 + (-\frac{\sqrt{3}}{2})^2$

$= \frac{1}{4} + \frac{3}{4} = 1$

$|\vec{v}| = 1$

⑧ Find the convergent form for each vector $\vec{v}$ with the given magnitude and direction angle θ.

$|\vec{v}| = 12, \quad \theta = 120°$



$\sin 120° = \frac{|\vec{v}_y|}{2}$

$y = |\vec{v}_y| = 12 \sin 120°$

$= 12 \frac{\sqrt{3}}{2} = 6\sqrt{3}$

$\cos 128 = \frac{|\vec{v}_x|}{2}$

$x = |\vec{v}_x| = 12 \cos 120°$

$= 12(-1/2) = -6$

$\langle -6, 6\sqrt{3} \rangle$