Find the x and y components of 3.0 N 61° S of W

$$\vec{F}_{2x} = F_2 \cos\theta$$
$$= (3.0\text{ N})(\cos 241°)$$
$$= -1.45\text{ N}$$

$$\vec{F}_{2y} = F_2 \sin\theta$$
$$= (3.0\text{ N})(\sin 241°)$$
$$= -2.62\text{ N}$$

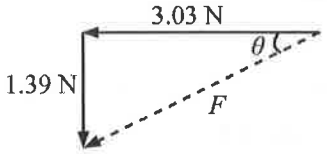
Add x components

$$\vec{F}_x = (-1.58\text{ N}) + (-1.45\text{ N})$$
$$= -3.03\text{ N}$$

Add y components

$$\vec{F}_y = 1.23\text{ N} + (-2.62\text{ N})$$
$$= -1.39\text{ N}$$

Add F_x and F_y, using Pythagoras theorem



$$F_{net} = \sqrt{(F_x)^2 + (F_y)^2}$$
$$= \sqrt{(3.03\text{ N})^2 + (1.39\text{ N})^2}$$
$$= 3.3\text{ N}$$
$$\tan\theta = \frac{F_y}{F_x}$$
$$= \frac{1.39\text{ N}}{3.03\text{ N}}$$
$$\theta = 25°$$

$\vec{F}_{net}$ = 3.3 N 25° S of W
or 3.3 N 65° W of S (3.3 N 205°)

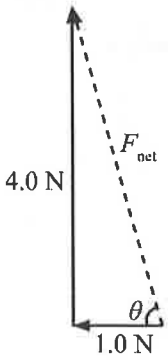
6. Add the horizontal (x) forces:

$$\vec{F}_x = 2.0\text{ N} + (-3.0\text{ N})$$
$$= 1.0\text{ N west}$$

Add the vertical (y) forces:

$$\vec{F}_y = 4.0\text{ N}$$

Add Fx and Fy, using Pythagoras theorem.



$$F_{net} = \sqrt{(F_x)^2 + (F_y)^2}$$
$$= \sqrt{(1.0\text{ N})^2 + (4.0\text{ N})^2}$$
$$= 4.1\text{ N}$$
$$\tan\theta = \frac{F_y}{F_x}$$
$$= \frac{4.0\text{ N}}{1.0\text{ N}}$$
$$\theta = 76°$$

$\vec{F}_{net}$ = 4.1 N 76° N of W
or 4.1 N 14° W of N (4.1 N 104°)

Lesson 2—Newton's First Law of Motion

PRACTICE EXERCISES ANSWERS AND SOLUTIONS

1.
$$\vec{F}_{net} = m\vec{a}$$
$$\vec{a} = \frac{\vec{F}_{net}}{m}$$
$$= \frac{9.0\text{ N}}{20.0\text{ kg}}$$
$$= 0.45\text{ m/s}^2\text{ east}$$

2. Magnitude of force is

$$\vec{F}_{net} = m\vec{a}$$
$$\vec{a} = \frac{\vec{F}_{net}}{m}$$
$$= \frac{15.0\text{ N}}{8.0\text{ m/s}^2}$$
$$= 1.9\text{ kg}$$

