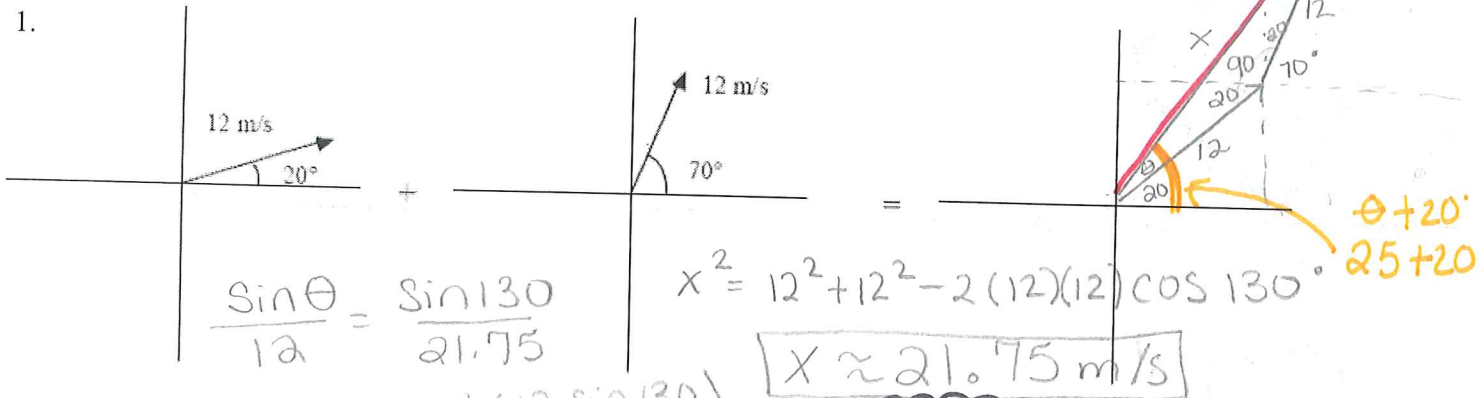Name _Key_

Draw the in resultant with the correct angle.

Add the following vectors. and find the direction.
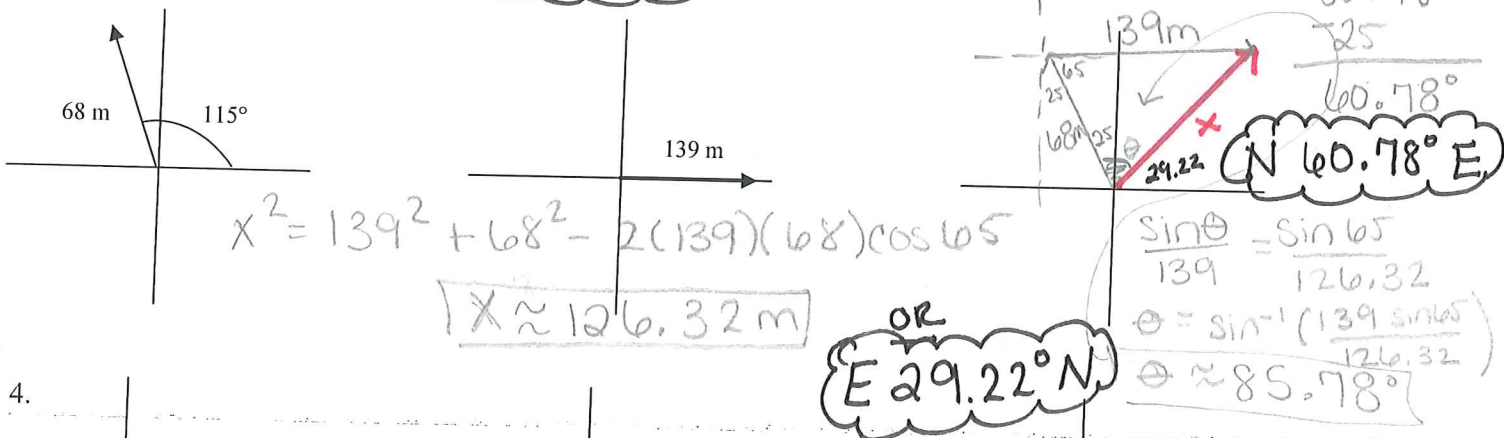
1.

12 m/s   20°

+

12 m/s   70°

=

12 / 90° / 70° / 20° / X / 12 / 20°

$$x^2 = 12^2 + 12^2 - 2(12)(12)\cos 130°$$

$$\boxed{X \approx 21.75 \text{ m/s}}$$

θ + 20°
25 + 20

$$\frac{\sin\theta}{12} = \frac{\sin 130}{21.75}$$

$$\theta = \sin^{-1}\left(\frac{12\sin 130}{21.75}\right)$$

$$\theta \approx 25.00 \,+20$$

∴ **E 45° N**

2.

50 m   135°

+

90°   30 m

=

30 m / 45° / 50 m / 45° / X

81.37 8.6

W 8.6° S

$$x^2 = 30^2 + 50^2 - 2(30)(50)\cos 45$$

$$\boxed{X \approx 35.76 \text{ m}}$$

$$\frac{\sin\theta}{50} = \frac{\sin 45}{35.76}$$

$$\theta = \sin^{-1}\left(\frac{50\sin 45}{35.76}\right)$$

$$\theta \approx 81.37°$$

3.

68 m   115°

+

139 m

=

139 m / 65° / 25° / 68 / 25° / X / 29.22

85.78
-25
60.78°

N 60.78° E

$$x^2 = 139^2 + 68^2 - 2(139)(68)\cos 65$$

$$\boxed{X \approx 126.32 \text{ m}}$$

OR
E 29.22° N

$$\frac{\sin\theta}{139} = \frac{\sin 65}{126.32}$$

$$\theta = \sin^{-1}\left(\frac{139\sin 65}{126.32}\right)$$

$$\theta \approx 85.78°$$

4.

200°   100 N

+

35°   30 N

=

100 / 30 / X

$$x^2 = 100^2 + 30^2 - 2(100)(30)\cos 55$$

$$\boxed{X = 86.36 \text{ N}}$$

$$\frac{\sin\theta}{30} = \frac{\sin 55}{86.36}$$

$$\theta = \sin^{-1}\left(\frac{30\sin 55}{86.36}\right)$$
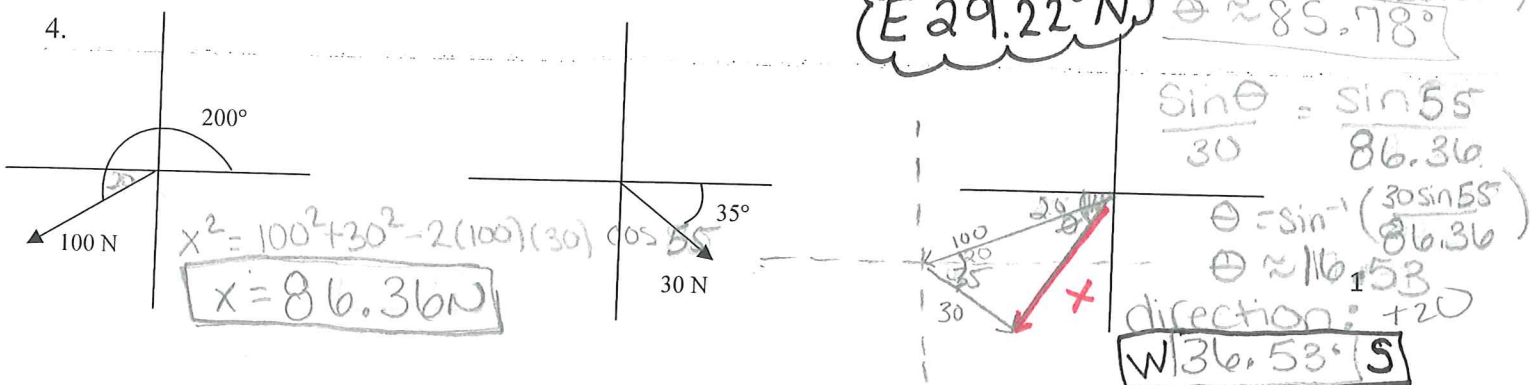
$$\theta \approx 116.53$$

direction: +20

$$\boxed{\text{W 36.53° S}}$$

1

Show the following direction and magnitude on separate paper. Use drawings to scale.

5. Heading of S 25° W for 10 miles, then N 40°E for 20 miles.

6. Heading of N50°W for 15 miles then N50°E for 10 miles

7. An airplane is traveling at a speed of 360 miles per hour going west. A wind of 60 miles per hour is coming from the south east. What is the resultant speed of the plane? What is the heading the plane is actually going? Make a drawing and estimate the solution and then justify using mathematics. Use the scale 1cm = 30 mph.

8.

A sail boat is traveling 35 miles per hour towards the west as a wind is blowing 15 miles per hour towards the southeast. How fast is the boat actually going and in what direction? Make a drawing and estimate the solution and then justify using mathematics. Use the scale 1 cm = 5 mph.

5.) S 25°W for 10 miles then 1 cm = 2 miles
N 40° E for 20 miles
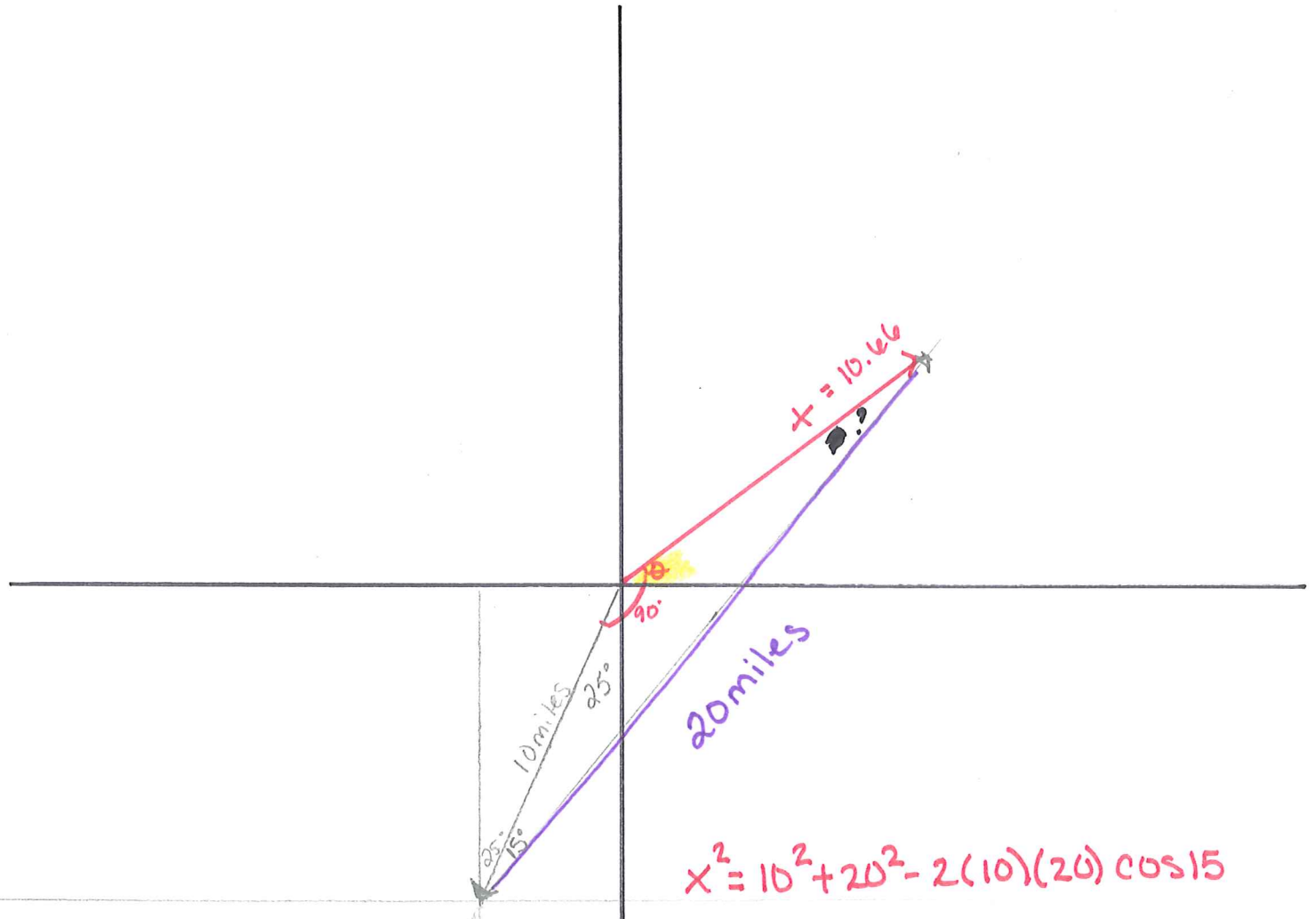
$x^2 = 10^2 + 20^2 - 2(10)(20)\cos 15$

$x \approx 10.66\,\text{miles}$

$\dfrac{\sin ?}{10} = \dfrac{\sin 15}{10.66}$

$? = 14.05°$

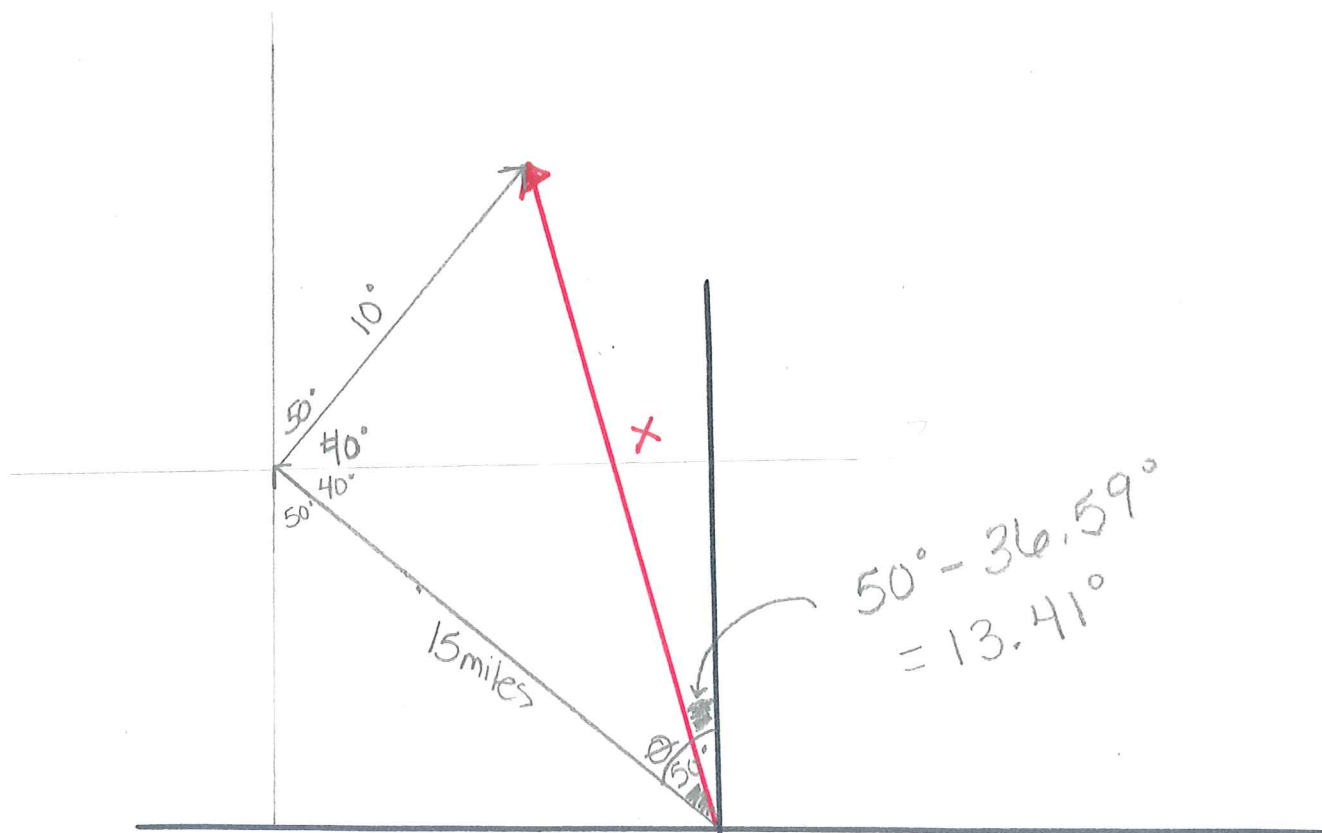$25 + 90 + \theta = 150.95$ What?

$\theta \approx 35.95°$

$\boxed{E\ 35.95°\ N}$

$\dfrac{\sin \theta}{20} = \dfrac{\sin 15}{10.66}$

$\theta \approx \sin^{-1}\left(\dfrac{20\sin(15)}{10.66}\right)$

$\theta \approx 29.05°$

Ambiguous case ⊙ !!
Darn it, sorry.

6.)

$$x^2 = 15^2 + 10^2 - 2(15)(10) \cos 80°$$

$$X \approx 16.52 \text{ miles}$$
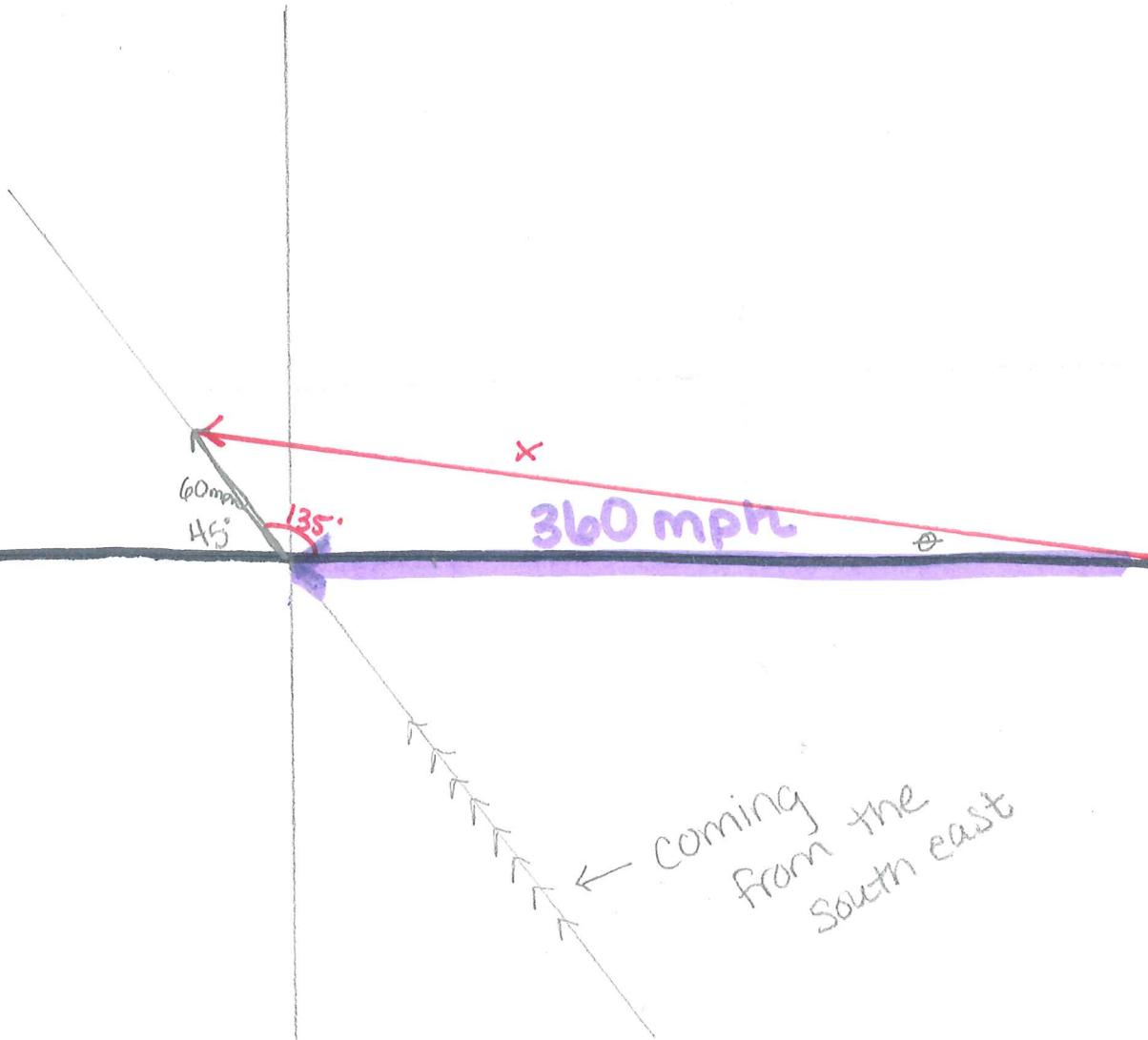
$$\frac{\sin \theta}{10} = \frac{\sin 80}{16.52}$$

$$\theta = \sin^{-1}\left(\frac{10 \sin 80}{16.52}\right)$$

$$\theta \approx 36.59°$$

∴ N 13.41° W

7.)

60mph

45°

135°

x

360 mph

θ

← coming from the south east

$x^2 = 60^2 + 360^2 - 2(60)(360) \cos 135$

$x = 404.66 \, mph$
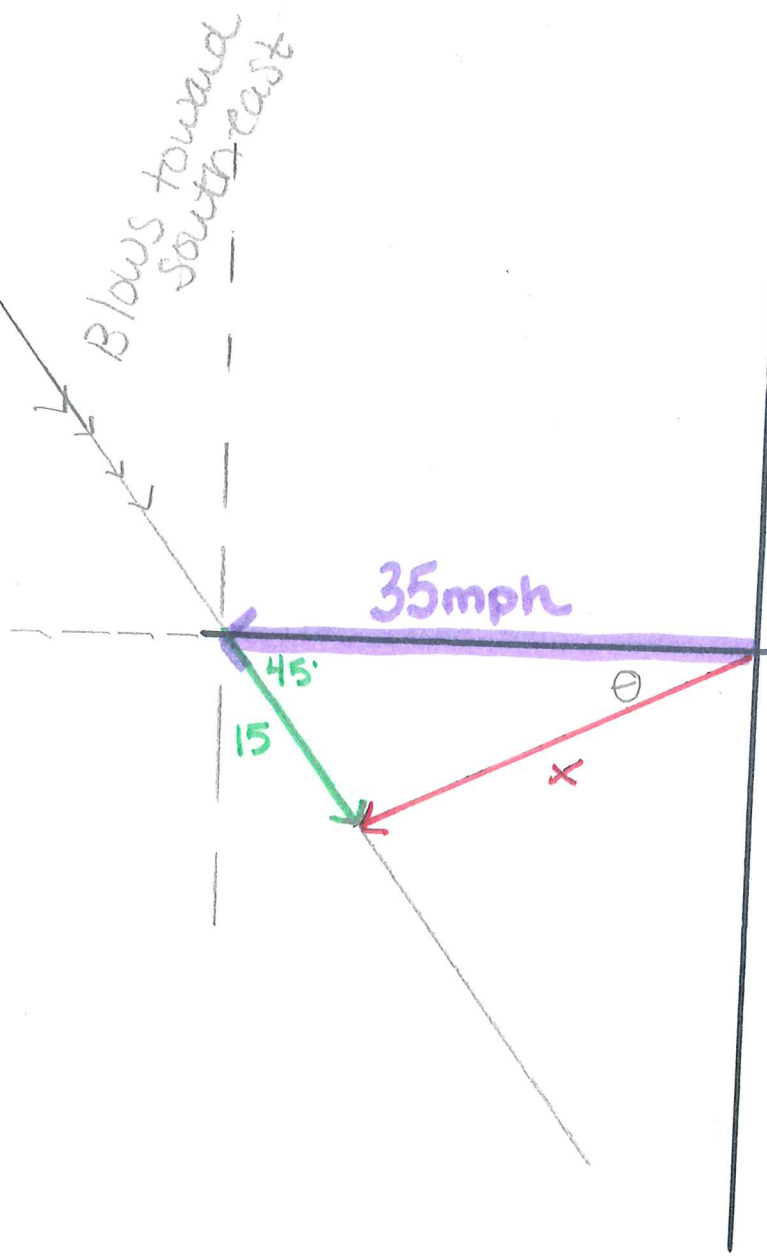
$\dfrac{\sin \theta}{60} = \dfrac{\sin 135}{404.66}$

$\theta = \sin^{-1} \left(\dfrac{60 \sin 135}{404.66} \right)$

$\theta \approx 6.02°$

W 6.02° N

8.)

Blows toward southeast

35mph

45°

15

θ

x

$$x^2 = 35^2 + 15^2 - 2(35)(15)\cos45$$

$$\boxed{x \approx 26.60 \text{ mph}}$$

$$\frac{\sin\theta}{15} = \frac{\sin45}{26.60}$$

$$\theta = \sin^{-1}\left(\frac{15\sin(45)}{26.60}\right)$$

$$\boxed{\theta \approx 23.50°}$$

W 23.5° S