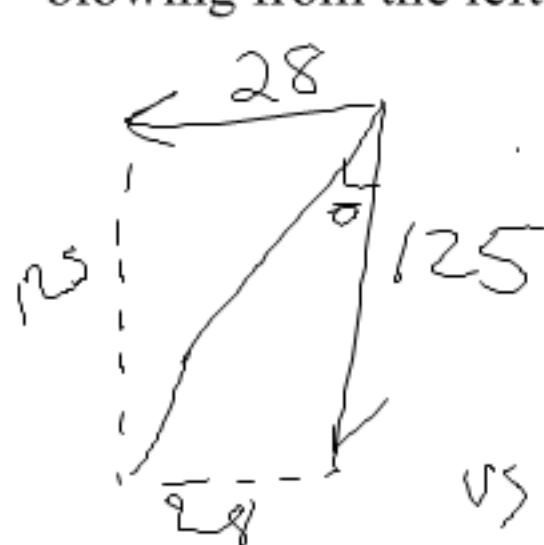


1. A pitcher can throw a ball with a velocity of 125 km/h. If he throws the ball with that velocity when a crosswind of 28 km/h is blowing from the left, what is the velocity of the ball?



$$\tan \theta = \frac{28}{125}$$

$$\sin 12.63 = \frac{28}{v_s}$$

$$v_s = \frac{28}{\sin 12.63}$$

128.5 km/h @ 12.63° rt.

Manjiv

2. A pilot wants to fly a plane at a velocity of 475 km/h northward. A wind is blowing westward at a velocity of 81 km/h. What velocity must the pilot maintain to achieve the desired velocity?

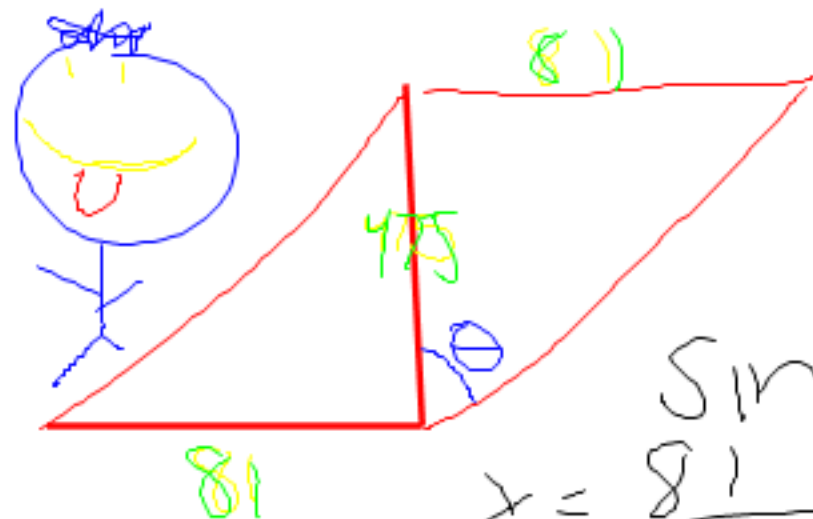
481.854 km/h @

9.6774° E of N

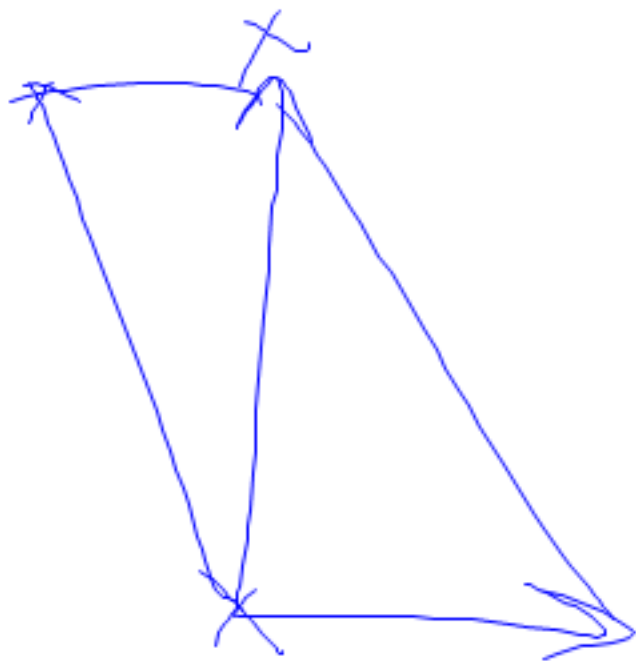
$$\tan \theta = \frac{81}{475}$$

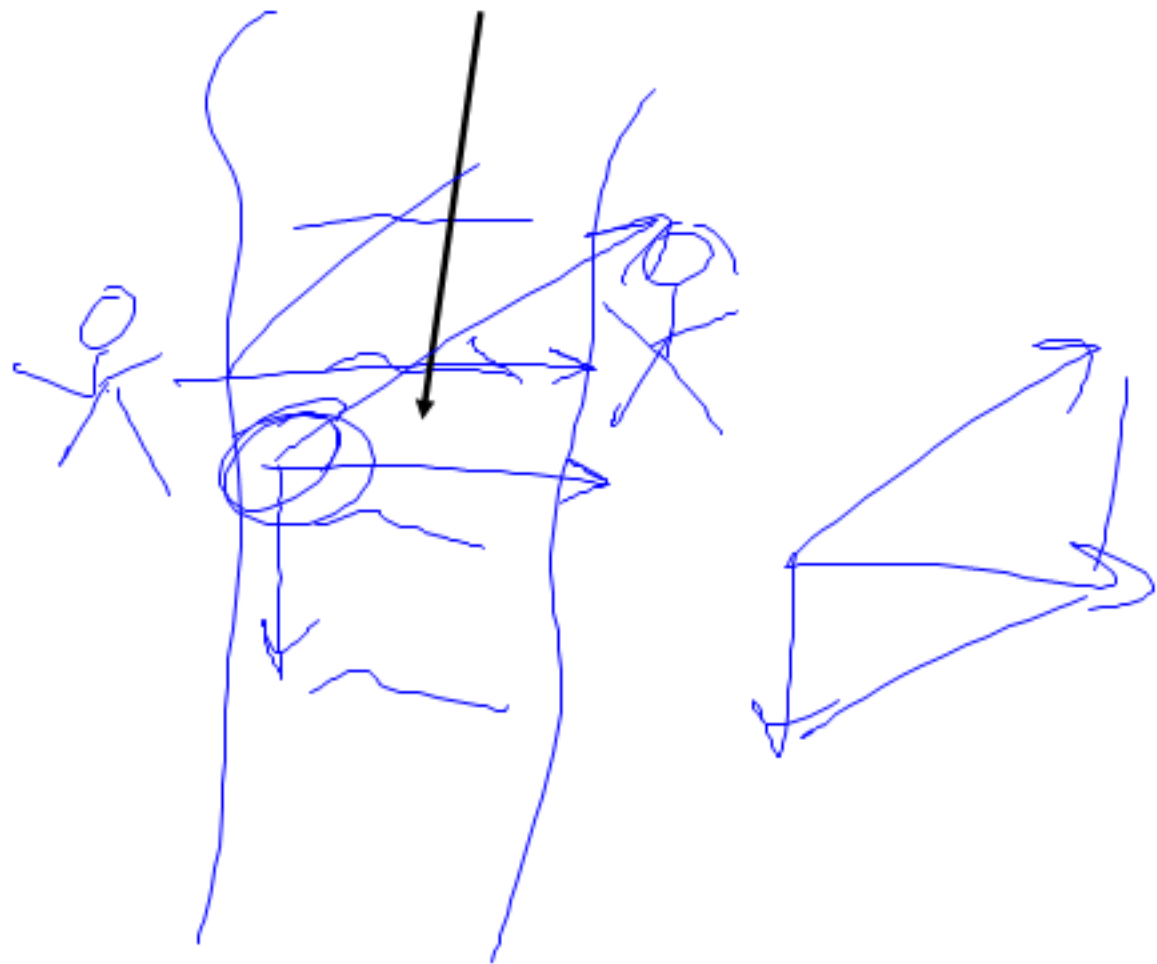
$$\theta = \tan^{-1} \left(\frac{81}{475} \right)$$

$$\theta = 9.6774^\circ$$



$$\sin(9.6774) = \frac{81}{x}$$
$$x = \frac{81}{\sin(9.6774)} = 481.854$$



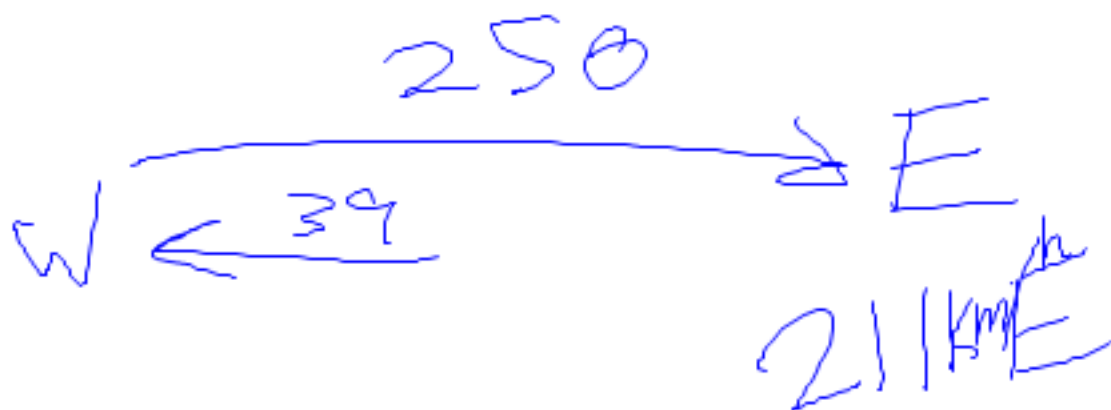


3. A small plane is traveling toward the east at 144 km/h. It encounters a wind blowing toward the east at 39 km/h. What is the resultant velocity of the plane?

$$\begin{array}{r} 144 \text{ km/h E} \\ + 39 \text{ km/h E} \\ \hline 183 \text{ km/h E} \end{array}$$

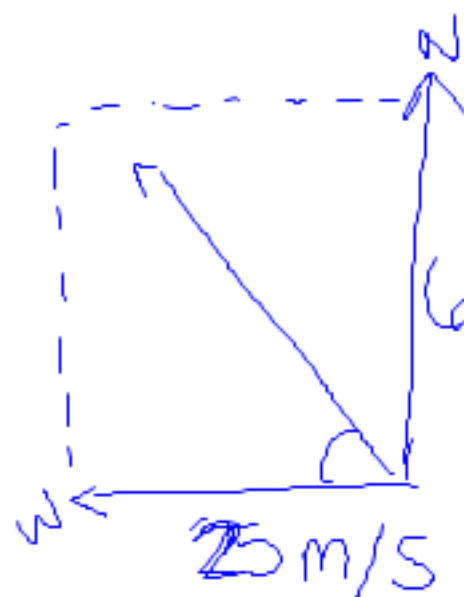
Answer

4. Suppose a boat is traveling 250. km/h across the ocean due east. If a wind is blowing 39.0 km/h due west. Find the resultant velocity of the boat.



Sam

5. A Frisbee is thrown with a velocity of 25.0 m/s due west. There is a wind blowing 6 m/s due north. What will the resultant velocity of the Frisbee be?



$$\tan \theta = \frac{6}{25}$$

$$\theta = \tan^{-1} \left(\frac{6}{25} \right)$$

$$6 \text{ m/s } \theta = 13.5^\circ$$

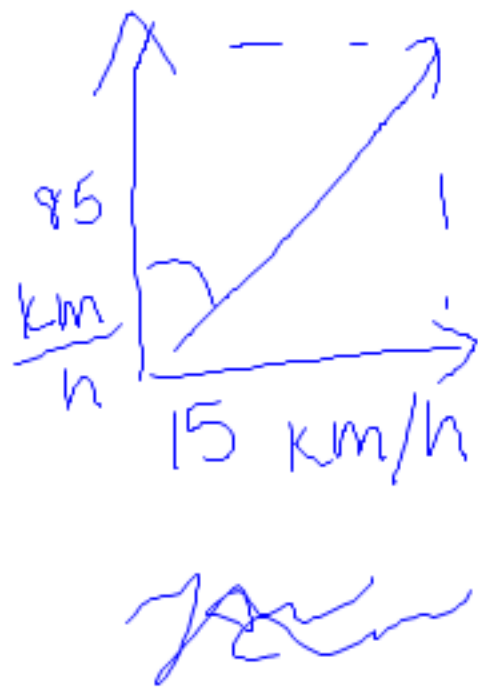
$$\sin 13.5 = \frac{6}{V_R}$$

$$V_R = \frac{6}{\sin 13.5}$$

Answer

$$V_R = 25.7 \text{ m/s } @ 13.5^\circ \text{ N of W}$$

6. A soccer goalie can throw a soccer ball with a velocity of 85.0 km/h. If he throws the ball with that velocity when a crosswind of 15.0 km/h is blowing from the left, what is the velocity of the ball?



$$\tan \theta = \frac{15}{85}$$

$$\theta = \tan^{-1}\left(\frac{15}{85}\right)$$

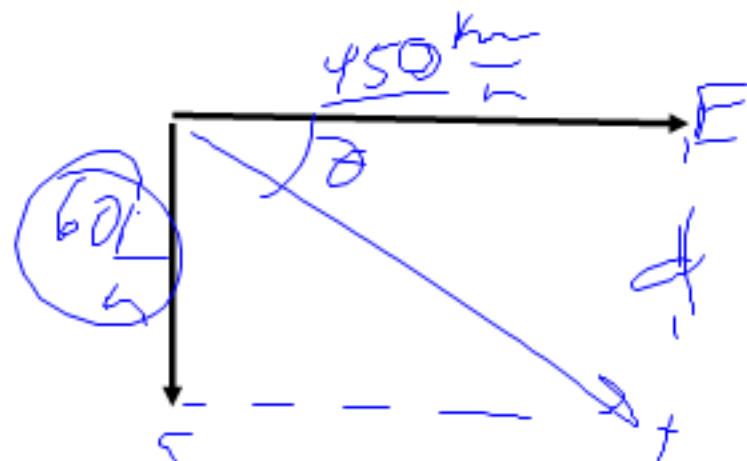
$$\theta = 10^\circ$$

$$\sin 10^\circ = \frac{15}{V_R}$$

$$V_R = \frac{15}{\sin 10^\circ} = 86.4$$

86.4 km/h @ 10° to the R.

7. An airplane pilot flies at 450 km/hr due east toward the ocean. A wind is blowing 60 km/hr due south. The ocean is 1250 km away. a) What is the resultant velocity of the plane. b) How long does it take the plane to reach its destination (which is due east 1250 km away)? c) How far south does the plane end up from its destination?



$$\tan \theta = \frac{60}{450}$$

$$\theta = \tan^{-1} \left(\frac{60}{450} \right) =$$

$$7.6^\circ$$

$$\sin 7.6^\circ = \frac{60}{V_R}$$

$$V_R = \frac{60}{\sin 7.6^\circ}$$

$$V_R = 453.7 \text{ km/h @ } 7.6^\circ \text{ S of E}$$

b) $V = 450 \frac{\text{km}}{\text{h}}$
 $d = 1250 \text{ m}$
 $t = \frac{d}{V} = \frac{1250}{450}$
 $T = 2.75 \text{ hr}$

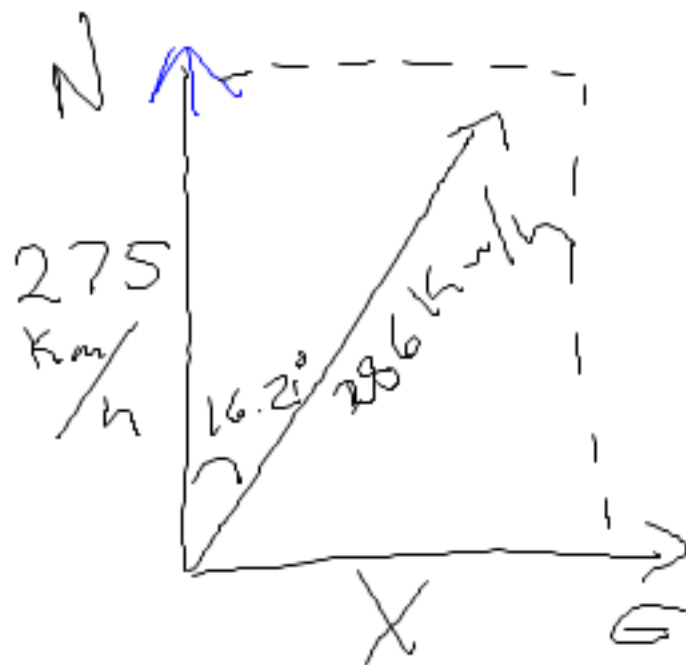
c) $V = 60 \frac{\text{km}}{\text{h}}$
 $T = 2.75$
 $d =$

$$V = \frac{d}{t} \quad d = Vt$$

$$d = 60(2.75)$$

$$d = 165 \text{ km}$$

8. A plane flies at 275 km/h due north. Its resultant velocity is 286 km/h at 16.2° E of N? Find the velocity of the eastward wind that is affecting the plane.



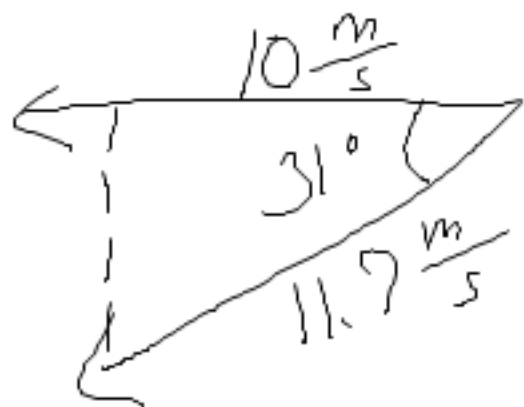
$$\tan(16.2) = \frac{x}{275}$$

$$x = 275 \cdot \tan(16.2)$$

$$x = 79.89 \text{ km/h E}$$

Kathy

9. A Frisbee is thrown at 10 m/s due west. The resultant velocity of the Frisbee is 11.7 m/s at 31° south of west. Find the velocity of the southward wind affecting the Frisbee?



$$\sin(31) = \frac{x}{11.7}$$
$$11.7 \sin(31) = x$$
$$6 \frac{\text{m}}{\text{s}} \text{ S}$$

10. You decide that you want to swim across a river to see your friend on the other side. If the river is 62 m wide, you swim directly across the river at 5 m/s, and the downstream velocity of the river is 2 m/s, a) What will be your resultant velocity? b) How long will it take you to reach the other side? and c) How far downstream will you end up?



$$\begin{aligned} \tan \theta &= \frac{2}{5} & \sin 21.8^\circ &= \frac{2}{5} \\ \theta &= \tan^{-1} \frac{2}{5} & X &= \frac{2}{\sin 21.8^\circ} \\ \theta &= 21.8^\circ & X &= 5.4 \end{aligned}$$

b) $T = ?$

$$d = 62 \text{ m}$$

$$V = 5$$

$$V = \frac{d}{T} \quad T = \frac{d}{V} = \frac{62}{5}$$

$$T = 12.4 \text{ s}$$

a) $5.4 \frac{\text{m}}{\text{s}}$ @ 21.8° downstream

c) $d =$ $v = \frac{d}{t}$

$$T = 12.4 \text{ s}$$

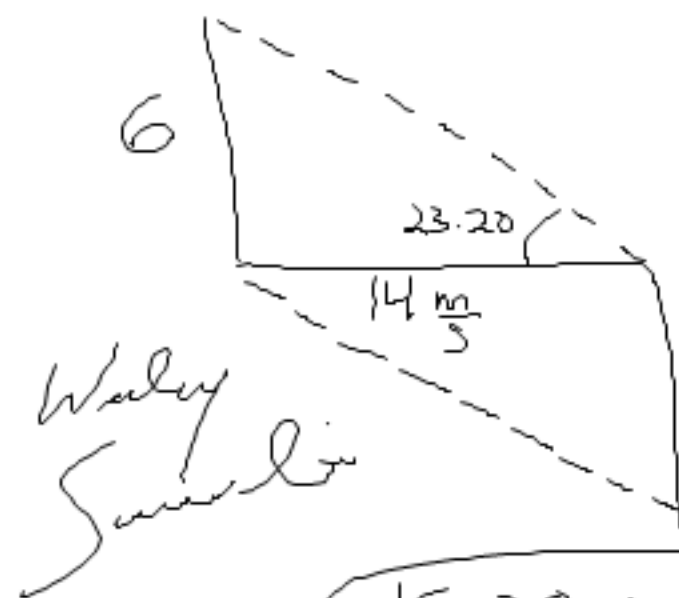
$$V = 2 \frac{\text{m}}{\text{s}}$$

$$d = v \cdot T$$

$$= 2(12.4)$$

$$d = 24.8 \text{ m}$$

11. A sailor wants to sail his boat directly across a lake (due west) at 14 m/s. The wind is blowing at 6 m/s due south. With what velocity must the sailor sail in order to achieve his desired velocity?



$$\tan^{-1}\left(\frac{6}{14}\right) = 23.20$$

$$\sin 23.20 = \frac{6}{x}$$

$$6 \frac{\text{m}}{\text{s}} \frac{1}{\sin 23.20} = 15.23$$

15.23 $\frac{\text{m}}{\text{s}}$ @ 23.20° N of W