- 1) A river flows at a speed of 12 m/s from north to south. A powerboat can move at a constant maximum speed of 23 m/s in still water.
 - a. What is the maximum velocity of the boat upstream (upstream means traveling against the current)? <u>11 m/s N</u>
 - b. What is the maximum velocity of the boat downstream? <u>35 m/s S</u>
 - c. If the boat were headed east across the river at its maximum speed, what would the resultant velocity of the boat be?



26 m/s, 28° S of E

2) A plane is travelling toward the east with a velocity of 120 km/h. It encounters a wind blowing toward the east at 0.20 km/min. What is the velocity of the plane in km/h?

Both vectors are east, so they are added together; however, they must both be in identical units.

$$? \frac{km}{h} = 0.20 \frac{km}{\min} \times \frac{60 \frac{\min}{1 h}}{1 h} = 12 \frac{km}{h}$$

$$12 \frac{km}{h} + 120 \frac{km}{h} = 132 \frac{km}{h} \text{ or } 130 \frac{km}{h}$$

$$130 \text{ or } 132 \text{ km/h} \text{ (East)}$$

3) A girl walks 26 m at an angle of 39° W of S.

a. How far west of her starting point is she? $\Theta = 39^{\circ} \quad c = 26 \quad a = west = ? \quad b = south = ?$ $sin 39^{\circ} = \frac{west}{26} \quad west = 16 m$ 16 m(W)



b. How far south of her starting point is she?

$$\cos 39^\circ = \frac{south}{26}$$
 south = 20. m

20. m(S)

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- 4) A pitcher can throw a ball at a velocity of 125 km/h straight ahead (draw this down on your paper). If he throws the ball straight when a cross-wind is blowing at 28 km/h to the left,
 - a. What will be the magnitude of the ball's resultant velocity?



b. The direction of the ball will be off 13 to the (left), right).

Using the diagram above... $tan \Theta = \frac{28}{125} \quad \Theta = 13^{\circ}$

5) A plane heads due north, but because of a wind blowing to the west, the plane flies at a **resultant** velocity of 620 mi/h, 22° W of N. What was the velocity of the wind?

$$\Theta = 22^{\circ} \quad c = 620 \quad a = west = ?$$

$$\sin 22^{\circ} = \frac{west}{620} \quad west = 230 \text{ mph W}$$

230 mph W