3) A pilot wants to fly from town A to town B which is due North of town A. There is a wind blowing from the direction S30°W at a speed of 30km/hr. The airspeed of the plane is 250km/hr.
A) What direction should the plane fly?
B) What is the ground speed of the plane?

First lets look at what the wind is doing.

There is a wind blowing from the direction S30°W
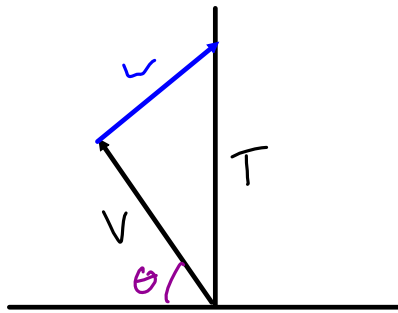The vector representing the wind is drawn below. (notice the direction)
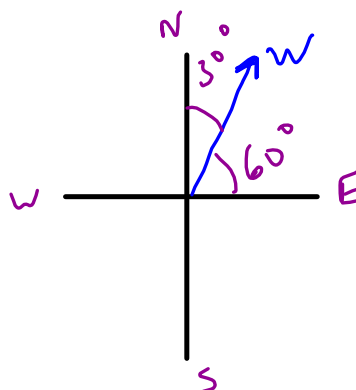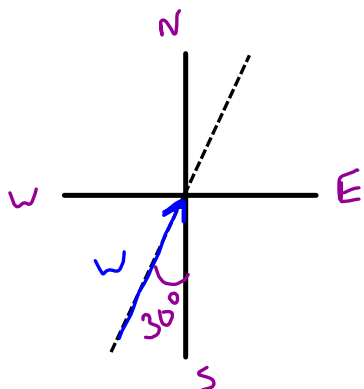
The vector for the wind is given by.
w = < 30 sin (30), 30 cos(30)> if using the picture on the left or
w = <30 cos(60), 30 sin(60) > for the picture on the right
w = <15, 15$\sqrt{3}$ >

v is the path(vector) of the plane

w is the vector for the wind

T is the resulting path(vector) of the plane with the effect of the wind.

now the speed of the plane is 250 km/hr so we can write the vector for the plane (v) as the following.

note where theta is in the picture.

$$V = \langle -250\cos\theta, 250\sin\theta \rangle$$

$$T = \langle 0, x \rangle$$

$$w = \langle 15, 15\sqrt{3} \rangle$$

From the picture we see that:

$$T = V + w$$

$$\langle 0, x \rangle = \langle -250\cos\theta + 15, 250\sin\theta + 15\sqrt{3} \rangle$$

now solve for x and theta.

$$0 = -250\cos\theta + 15$$

$$\cos\theta = \frac{15}{250}$$

$$\theta = 86.56°$$

Thus the direction is

N 3.44° W

or

W 86.56° N

not standard response.

$$x = 250\sin\theta + 15\sqrt{3}$$

$$x = 275.53$$

Since $|T| =$ speed

and $|T| = \sqrt{0 + x^2}$

$$= \sqrt{x^2} = |x|$$

speed $= 275.53$ Km/hr