Answer on Question#38419 – Physics – Mechanics, Kinematics, Dynamics
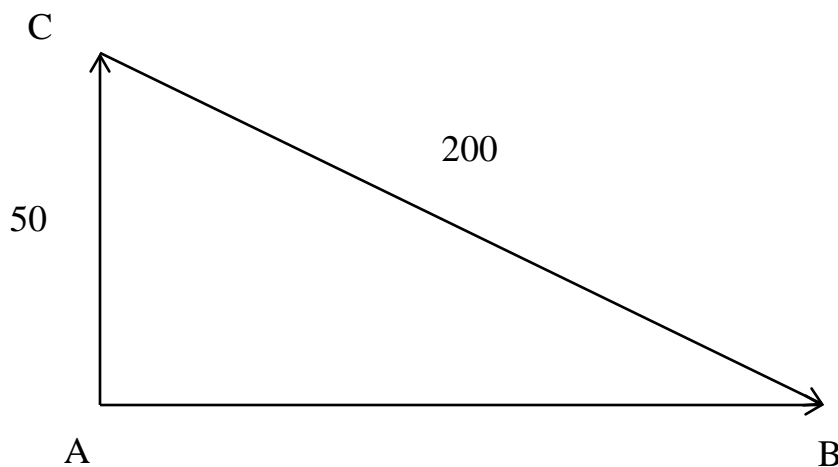
Suppose we have 3 vectors:

$\overrightarrow{AC}$ – wind blowing to the North, $\left|\overrightarrow{AC}\right| = 50$;

$\overrightarrow{CB}$ –plane's velocity, $\left|\overrightarrow{CB}\right| = 200$;

$\overrightarrow{AB}$ – resultant velocity vector.

$$\overrightarrow{AB} = \overrightarrow{AC} + \overrightarrow{CB}$$

Using Pythagorean theorem we get:

$$\left|\overrightarrow{AB}\right| = \sqrt{200^2 - 50^2} = \sqrt{37500} = 50\sqrt{15}$$

So the **groundspeed** of the plane is $50\sqrt{15} \approx 194\ km/h$.

The **direction** is:

$$\alpha = \text{atan}\frac{50}{50\sqrt{15}} \approx 14.5°$$

So the pilot should point the plane $14.5°$ to the south of east (see the scheme above).

Since the groundspeed is $50\sqrt{15}$ km/h so she needs $t = \frac{500}{50\sqrt{15}} = \frac{10}{\sqrt{15}} \approx 2.6$ hours (or **2 hours 35 minutes**) to cover 500 km.