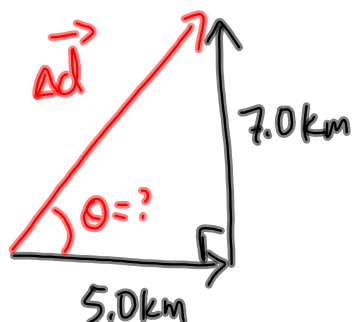


## A Mathematical Solution



$$c^2 = a^2 + b^2$$

$$c^2 = (5.0\text{km})^2 + (7.0\text{km})^2$$

$$\boxed{c = 8.6\text{ km}} \leftarrow \text{magnitude.}$$

SOH/CAH/TOA

$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan\theta = \frac{7.0\text{km}}{5.0\text{km}}$$

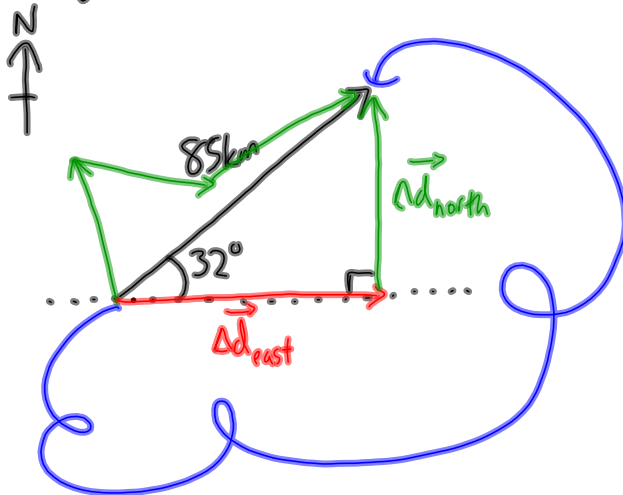
$$\vec{\Delta d} = 8.6\text{km} [\text{E}54^\circ\text{N}]$$

$$\theta = \tan^{-1}\left(\frac{7.0}{5.0}\right)$$

$$\boxed{\theta = 54^\circ}$$

## Components of Vectors

A plane flies 85 km [E32°N]. What are the easterly and northerly components of its displacement?



Components  
are two perpendicular  
vectors

Easterly:

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 32^\circ = \frac{|\Delta \vec{d}_{\text{east}}|}{85 \text{ km}}$$

$$|\Delta \vec{d}_{\text{east}}| = (85 \text{ km}) \cos 32^\circ$$

$$|\Delta \vec{d}_{\text{east}}| = 72 \text{ km}$$

Northerly Component:

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 32^\circ = \frac{|\Delta \vec{d}_{\text{north}}|}{85 \text{ km}}$$

$$|\Delta \vec{d}_{\text{north}}| = (85 \text{ km}) \sin 32^\circ$$

$$|\Delta \vec{d}_{\text{north}}| = 45 \text{ km}$$