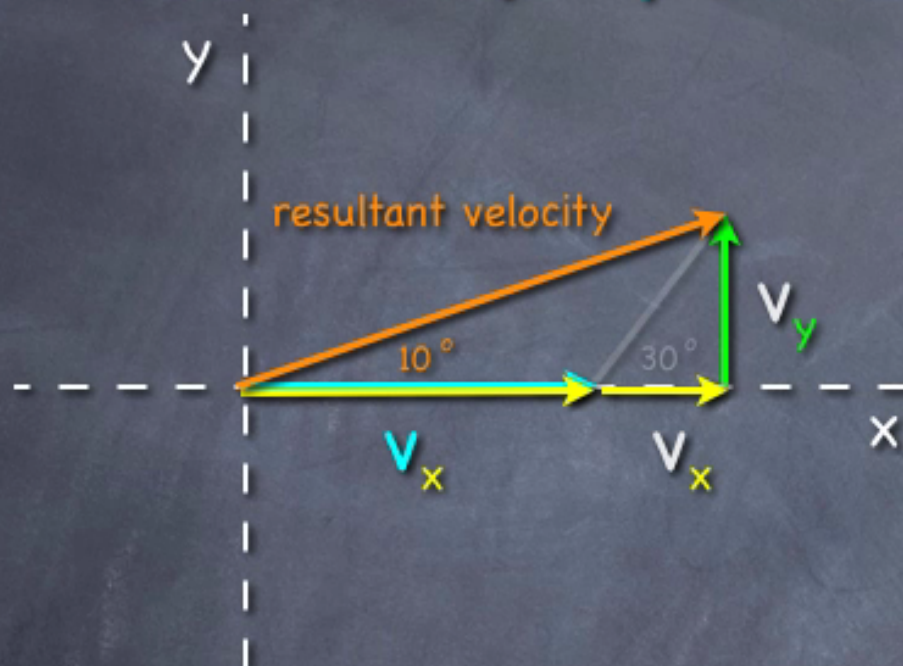


Math - Vector Analysis D

click screen to learn

Now, let's try a quantitative example of adding vectors.



airplane velocity

$$v_a = 250 \text{ mi/hr}$$

due East

$$\mathbf{V}_a = V \cos 0^\circ \hat{x} + V \sin 0^\circ \hat{y}$$

Vector Component Notation

wind velocity

$$v_w = 125 \text{ mi/hr}$$

30° North of East

$$\mathbf{V}_w = V \cos 30^\circ \hat{x} + V \sin 30^\circ \hat{y}$$

magnitude

$$V = \sqrt{(358 \text{ mi/hr})^2 + (63 \text{ mi/hr})^2} = 364 \text{ mi/hr}$$

direction

$$\theta = \tan^{-1} \frac{62.5 \text{ mi/hr}}{358 \text{ mi/hr}} = 9.90^\circ$$

Vector Components

x

y

$$\mathbf{V}_a = 250 \text{ mi/hr} \hat{x} + 0 \text{ mi/hr} \hat{y}$$

$$\mathbf{V}_w = 125 \cos 30^\circ \text{ mi/hr} \hat{x} + 125 \sin 30^\circ \text{ mi/hr} \hat{y}$$

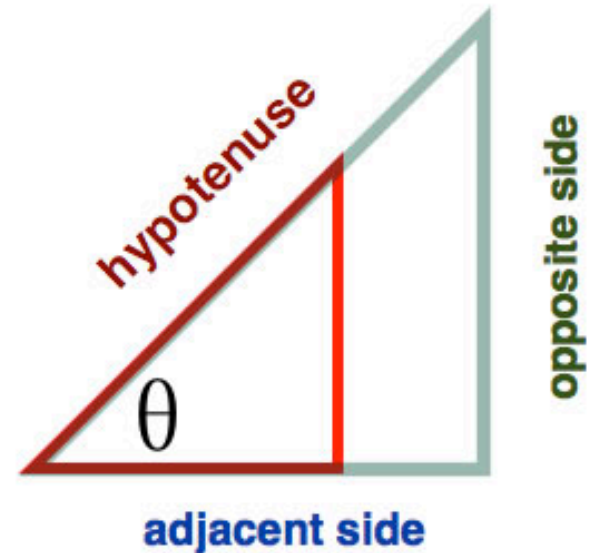
$$\mathbf{V} = 358 \text{ mi/hr} \hat{x} + 62.5 \text{ mi/hr} \hat{y}$$

done

Trigonometry

is the mathematics that deals with the ratios of the lengths of the sides of similar right triangles.

*Can you see the relationships between similar sides of the **red** and **green** triangle?*



*The **two** triangles are **similar**, their respective sides are in proportion to one another.*

*There are only **six possible ratios** with any right triangle. **Three** of which are*

opposite side
hypotenuse

adjacent side
hypotenuse

opposite side
adjacent side

*Each of **these ratios** is a function of the angle θ we can name them*

$$\sin(\theta) = \frac{\text{opposite side}}{\text{hypotenuse}}$$

$$\cos(\theta) = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\tan(\theta) = \frac{\text{opposite side}}{\text{adjacent side}}$$

