

$$\sin(49) = \frac{7.5}{h}$$

$$\sin(49) \sin(49)$$

$$h = 9.937$$

Inverse Trigonometry

$$\sin^{-1}(x) = \theta$$

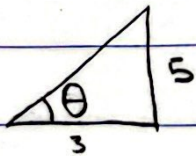
\uparrow \uparrow \nwarrow
 ratio of sides angle x

Inverse Sin (θ)

$$\arcsin(x) = \theta$$

* note: $\sin^{-1}x \neq \frac{1}{\sin x}$

Inverse Trig Examples

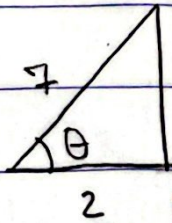


What is θ ?

$$\tan \theta = 5/3$$

$$\arctan(\tan \theta) = \theta$$

$$\theta = \arctan(5/3) = 59.04^\circ$$



$$\arccos(2/7) = \theta = 73.398^\circ$$

3.1-3.4

Vector: magnitude & direction - 30 mph; \uparrow 30 mph; $\vec{v} = 30$

Scalar: magnitude - 30 mph

Vector Notation: \vec{v} or \vec{V}

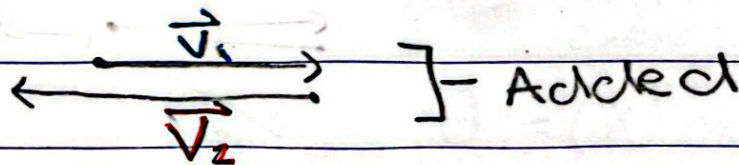
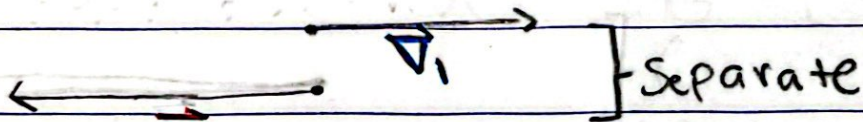
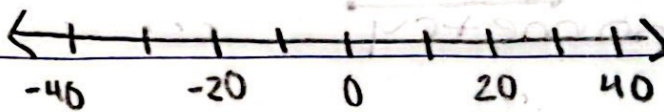
$$\vec{v} = (-3, 5) \rightarrow \vec{v}_x = -3, \vec{v}_y = 5$$

Adding Vectors

1. Same direction

↳ 30 km east, 40 km west

side to side
1 dimension



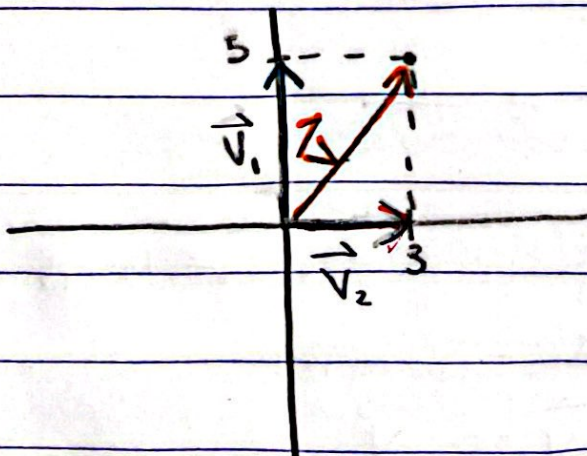
2. Perpendicular / Orthogonal

↳ 5 units up, 3 units right

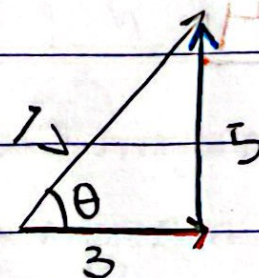
(0, 5)

(3, 0)

side to side
up and down
2 dimensions



$$\vec{V}_1 + \vec{V}_2 = \vec{V} = (3, 5)$$



$$V^2 = 3^2 + 5^2$$

$$V = \sqrt{9 + 25}$$

$$V = \sqrt{34}$$

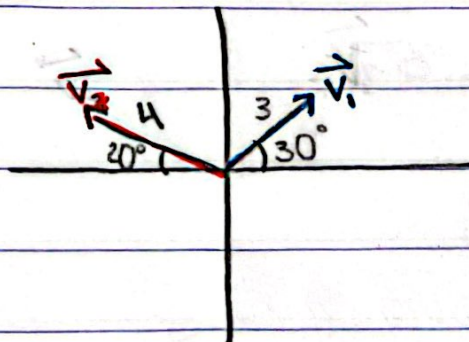
$$\theta = \arctan\left(\frac{5}{3}\right) = \boxed{59^\circ}$$

$V = 5.83$ units at an angle of 59°

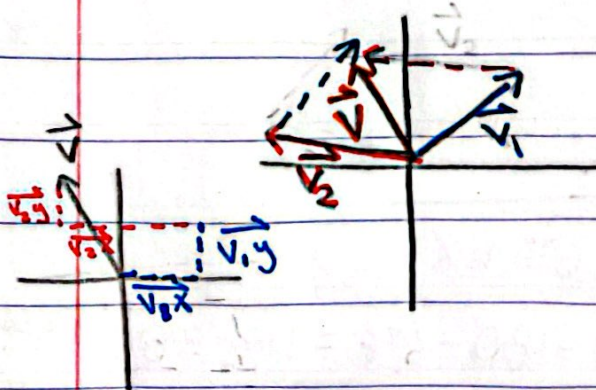
3. Diagonal Vectors

↳ 3 units \vec{V}_1 at 30° north of east,

4 units \vec{V}_2 at 20° north of west



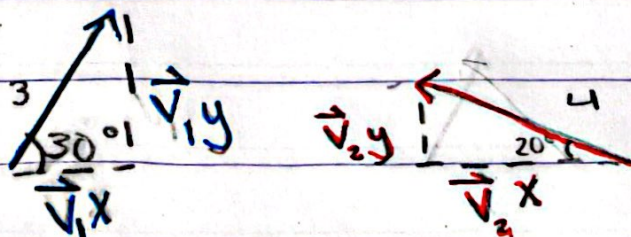
a) tail to tip method



* must start at origin

* can move either

move one vector to the end of the other



$$\cos(30) = \frac{V_{1x}}{3} \rightarrow$$

$$3 \cos(30) = V_{1x} = \boxed{2.59}$$

$$\sin(30) = \frac{V_{1y}}{3} \rightarrow 3 \sin(30) = V_{1y} = \boxed{1.5}$$

→ same for V_2

$$V_{1x} = 2.59$$

$$V_{1y} = 1.5$$

$$V_{2x} = -3.76$$

$$V_{2y} = 1.37$$

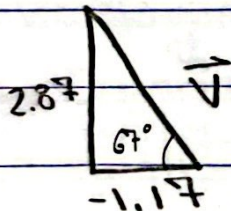
$$V_x = V_{1x} + V_{2x}$$

$$V_x = 2.59 - 3.76 = -1.17$$

$$V_y = V_{1y} + V_{2y}$$

$$V_y = 1.5 + 1.37 = 2.87$$

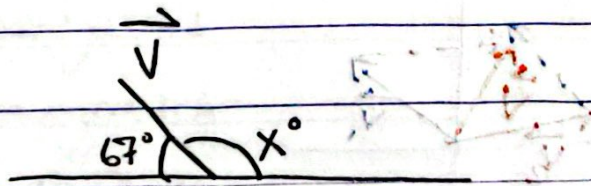
$$\vec{V} = (-1.17, 2.87)$$



$$\text{magnitude of } \vec{V} = \sqrt{(-1.17)^2 + (2.87)^2} = 3.1$$

$$\text{direction of } \vec{V} = \arctan\left(\frac{2.87}{-1.17}\right) = 67^\circ$$

north
of west



$$180 = 67 + X$$

$$X = 180 - 67 = 113^\circ = 67^\circ \text{ north of west}$$