

Elementary Statics
Equation Sheet #1: Trigonometry, Two Dimensional Vectors

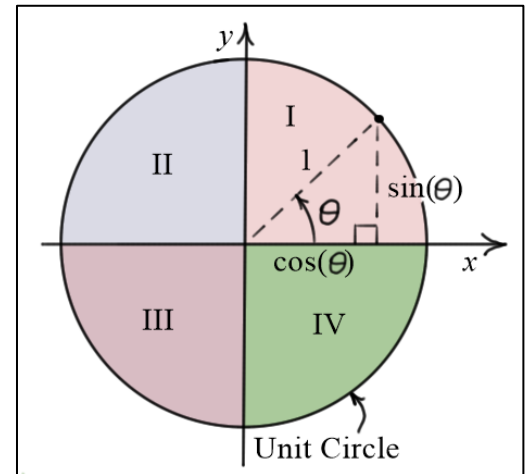
Trigonometry:

1. Right triangles:

$$r^2 = x^2 + y^2 \quad \sin(\theta) = (y/r) \quad \cos(\theta) = (x/r) \quad \tan(\theta) = (y/x)$$

2. Trigonometric function values for commonly used angles

	0	30°	45°	60°	90°
sin(θ)	0	1/2	√2/2	√3/2	1
cos(θ)	1	√3/2	√2/2	1/2	0



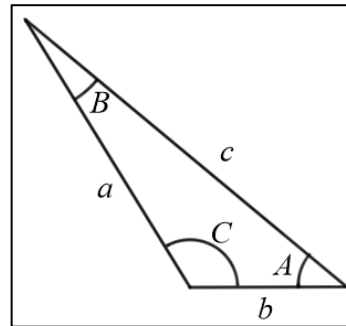
3. Non-right Triangles:

Law of Sines:
$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c}$$

Law of Cosines:
$$a^2 = b^2 + c^2 - 2bc \cos(A)$$

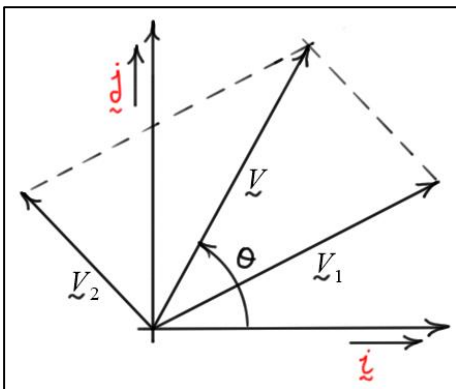
$$b^2 = a^2 + c^2 - 2ac \cos(B)$$

$$c^2 = a^2 + b^2 - 2ab \cos(C)$$



Two Dimensional (2D) Vectors:

1. Parallelogram Law of Addition:
$$\underline{V} = \underline{V}_1 + \underline{V}_2$$



2. 2D vector components:
$$\underline{V} = \underline{V}_x + \underline{V}_y = (V \cos(\theta)) \underline{i} + (V \sin(\theta)) \underline{j}$$

3. 2D vector magnitude/direction:
$$|\underline{V}| = \sqrt{V_x^2 + V_y^2} ; \quad \theta = \tan^{-1}(V_y/V_x)$$

4. 2D vector addition:
$$\underline{V} = \underline{V}_1 + \underline{V}_2 = (V_{1x} + V_{2x}) \underline{i} + (V_{1y} + V_{2y}) \underline{j}$$

