Cheatsheet - Trigonometry

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1. Intro

If $B = 90$, then AC is called the **hypotenuse**, the side **opposite** of θ is BC and the remaining side, AB, is **adjacent** to θ. Angle A is written as $\angle \mathrm{BAC}$, $\angle A$ or just A.

Each side of a triangle is named based on the lowercase letter of the angle opposite of the side.

$$a = \mathrm{BC}$$
$$b = \mathrm{AC}$$
$$c = \mathrm{AB}$$

The total degree of all angles is always $180°$

$$A + B + C = 180°$$

2. Convert Degree to Radiant

$$360° = 2\pi \ \text{rads}$$

To convert x degrees to radians y:

$$x \cdot \frac{\pi}{180} = y$$

For example, $255°$:

$$225 \cdot \frac{\pi}{180} \approx 3.93 \ \text{rads}$$

And in reverse:

$$3.93 \cdot \frac{180}{\pi} \approx 225°$$

3. Trigonometrical Ratios

sine, *cosine* and *tangent* are trigonometric functions that can be applied to **right-angled triangles** to determine the degree of an angle. The degree of an angle is independent from the length of each side.

$$\sin \theta = \frac{\text{side opposite to } \theta}{\text{hypotenuse}} = \frac{\mathrm{BC}}{\mathrm{AC}}$$

$$\cos \theta = \frac{\text{side adjacent to } \theta}{\text{hypotenuse}} = \frac{\mathrm{AB}}{\mathrm{AC}}$$

$$\tan \theta = \frac{\text{side opposite to } \theta}{\text{side adjacent to } \theta} = \frac{\mathrm{BC}}{\mathrm{AB}}$$

sine and *cosine* are always less than one.

$$\sin x \leq 1$$
$$\cos x \leq 1$$

The ratio of an angle can be reversed.

$$\sin 45° = 0.70710678$$
$$\sin^{-1} 0.70710678 = 45°$$

4. Pythagoras, sine and Cosine Rule

For any **right-angled** triangle, the following theorem applies:

$$a^2 + b^2 = c^2$$
$$\sqrt{a^2 + b^2} = c$$

where c is the hypotenuse. For any right-angled, acute and obtuse (non right-angled) triangles, the sine and cosine rules apply:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

and:

$$a^2 = b^2 + c^2 - 2bc \cos A$$
$$b^2 = a^2 + c^2 - 2ac \cos B$$
$$c^2 = a^2 + b^2 - 2ab \cos C$$