Right triangles Ref Sheet

**Pythagorean Theorem**

\[ a^2 + b^2 = c^2 \]

Pythagorean Triplets to memorize:
- 3, 4, 5
- 7, 24, 25
- 5, 12, 13

*Just make sure c is the largest side length!*

**Trigonometry**

\[ \theta = \text{"theta"} = \text{an angle} = \text{angle formed by hypotenuse and adjacent} \]

\[ \sin \theta = \frac{\text{opp}}{\text{hyp}} \]
\[ \cos \theta = \frac{\text{adj}}{\text{hyp}} \]
\[ \tan \theta = \frac{\text{opp}}{\text{adj}} \]

- Make sure your calculator is on **DEGREES** mode.
- Use inverse trig to find a missing angle:
  - \( \sin^{-1} \) to solve \( \sin x = \# \)
  - \( \cos^{-1} \) to solve \( \cos x = \# \)
  - \( \tan^{-1} \) to solve \( \tan x = \# \)

**Special Right Triangles**

- **45-45-90 Triangle**
  \[ x = \frac{x}{\sqrt{2}} \]

- **30-60-90 Triangle**
  \[ x = \frac{x}{\sqrt{3}} \]

**Converse of Pythagorean Theorem**

- If \( a, b, \) and \( c \) are sides of a \( \triangle \) and...
  - \( a^2 + b^2 < c^2 \), then the \( \triangle \) is obtuse
  - \( a^2 + b^2 = c^2 \), then the \( \triangle \) is right
  - \( a^2 + b^2 > c^2 \), then the \( \triangle \) is acute

**How to find missing sides or angles in a right triangle**

1. Mark your angle \( \theta \)
   - Label the sides \( \text{opp}, \text{hyp}, \text{adj} \)

2. Choose a trig equation based on what info you have:
   - **Soh Cah Toa**

3. Write the trig equation and fill in the numbers and \( x \)

4. Solve the equation for \( x \):
   - *If \( x \) is a side length, use proportions*
   - *If \( x \) is an angle, use inverse trig

5. Use a calculator to get a final answer

**Angles of Elevation and Depression**

- **Angle of Elevation** when you look up
- **Angle of Depression** when you look down