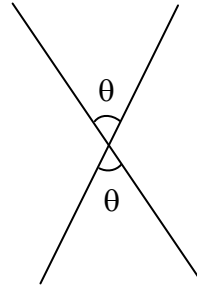


Notes 3: Geometry and trigonometry review

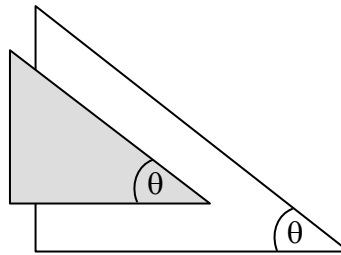
Objective 1: *Know and apply principles from geometry.*

1. Two angles are equal if:

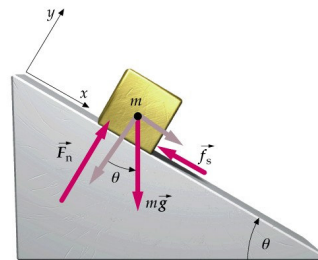
a. They are vertical angles.



b. Their sides are parallel.



c. Their sides are mutually perpendicular



2. Triangles:

a. The sum of the angles of any triangle is 180 degrees.

b. A right triangle has one angle that is 90 degrees.

c. A right triangle with angles equal to 37° and 53° is a **3-4-5 triangle**.

d. A right triangle with angles equal to 45° has sides equal to $\left(\frac{H\sqrt{2}}{2}\right)$.

e. A right triangle with $30^\circ/60^\circ$ angles has sides equal to $\left(\frac{H}{2}\right)$ and $\left(\frac{H\sqrt{3}}{2}\right)$.

3. Areas, circumferences, and volumes of common shapes:

a. The area of a triangle equals $\frac{1}{2}(b)(h)$.

b. The area of a circle equals πr^2 .

- c. The circumference of a circle equals $2\pi r$.
- d. The surface area of a sphere equals $4\pi r^2$.
- e. The volume of a sphere equals $\frac{4}{3}\pi r^3$.
- f. The surface area of a cylinder equals $2\pi r^2 + 2\pi rh$.
- g. The volume of a cylinder equals $\pi r^2 h$.

Objective 2: Know and apply principles from trigonometry.

4. For a right triangle:

$\sin \theta =$	$\frac{\text{Side opposite } \theta}{\text{Hypotenuse}}$	$= \frac{h_o}{h}$
$\cos \theta =$	$\frac{\text{Side adjacent to } \theta}{\text{Hypotenuse}}$	$= \frac{h_a}{h}$
$\tan \theta =$	$\frac{\text{Side opposite } \theta}{\text{Side adjacent to } \theta}$	$= \frac{h_o}{h_a}$

A simple rule of thumb for all of this is SOH—CAH—TOA.

5. The **Pythagorean Theorem** states that the square of the hypotenuse of a right triangle is equal to the sum of the squares of the other two sides, or $c^2 = a^2 + b^2$.
6. The **law of cosines** and the **law of sines** apply to any triangle, not just a right triangle, and they relate the angles and the lengths of the sides.

Law of cosines	$c^2 = a^2 + b^2 - 2ab(\cos \gamma)$
Law of sines	$\frac{a}{\sin \alpha} = \frac{b}{\sin \beta} = \frac{c}{\sin \gamma}$

Objective 3: Know and apply the quadratic formula.

7. If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$