3-Dimensional Shape | Volume | Total Surface Area
---|---|---
Right Circular Cone | $V = \frac{1}{3} \pi r^2 h$ | $T = \frac{1}{3} (2\pi r \ell + \pi r^2 + \pi r^2)$
Pyramid | $V = \frac{1}{3} B h$ | $T = B + \frac{1}{2} P \ell$
Sphere | $V = \frac{4}{3} \pi r^3$ | $T = 4\pi r^2$
Right Circular Cylinder | $V = \pi r^2 h$ | $T = 2\pi rh + 2\pi r^2$
Right Prism | $V = Bh$ | $T = 2B + Ph$

### Key
- \( b \) = base
- \( w \) = width
- \( B \) = area of base
- \( d \) = diameter
- \( h \) = height
- \( r \) = radius
- \( l \) = length
- \( \ell \) = slant

**Use 3.14 for \( \pi \)**

### Formulas

**Pythagorean Theorem**

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

Distance, rate, and time formula, where
- \( d \) = distance, \( r \) = rate, \( t \) = time:
- \[ d = rt \]

### Right-Triangle Relationships

**Trigonometric Ratios**
- \( \sin A = \frac{a}{c} \)
- \( \cos A = \frac{b}{c} \)
- \( \tan A = \frac{a}{b} \)

**30°-60°-90° Triangle Relationships**
- \( \tan 60° = \sqrt{3} \)
- \( \tan 30° = \frac{1}{\sqrt{3}} \)
- \( \sin 60° = \frac{\sqrt{3}}{2} \)
- \( \cos 60° = \frac{1}{2} \)
- \( \sin 30° = \frac{1}{2} \)
- \( \cos 30° = \frac{\sqrt{3}}{2} \)

**45°-45°-90° Triangle Relationships**
- \( \tan 45° = 1 \)
- \( \sin 45° = \frac{\sqrt{2}}{2} \)
- \( \cos 45° = \frac{\sqrt{2}}{2} \)
### Linear Equation Forms

**Point-Slope Form:**

\[ y - y_1 = m (x - x_1) \]

**Standard or General Form:**

\[ Ax + By = C \]

**Slope-Intercept Form:**

\[ y = mx + b \]

### Coordinate Geometry

**Distance between two points:**

\[ AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]

**Midpoint between two points:**

Midpoint of \( AB = \left( \frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right) \)

**Slope of line through two points:**

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]

### Equation of a Circle

\[ (x - h)^2 + (y - k)^2 = r^2 \]

\( (h, k) = \) center  \( r = \) radius

### Quadratic Formula

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ ax^2 + bx + c = 0 \]

### Conversions – Length

**Standard Units** | **Metric Units**
--- | ---
1 foot (ft) = 12 inches (in.) | 1 centimeter (cm) = 10 millimeters (mm)
1 yard (yd) = 3 feet (ft) = 36 inches (in.) | 1 meter (m) = 100 centimeters (cm)
1 mile (mi) = 1,760 yards (yd) = 5,280 feet (ft) | 1 kilometer (km) = 1,000 meters (m)

### Conversions – Area

1 square foot (sq. ft) = 144 square inches (sq. in.)
1 square yard (sq. yd) = 9 square feet (sq. ft)

### Conversions – Volume

1 cubic yard (cu. yd) = 27 cubic feet (cu. ft)
1 cubic foot (cu. ft) = 1,728 cubic inches (cu. in.)

### Conversions – Capacity

1 cup = 8 fluid ounces (fl oz)
1 pint (pt) = 2 cups
1 quart (qt) = 2 pints (pt)
1 gallon (gal.) = 4 quarts (qt)

### Conversions – Weight/Mass

1 pound (lb) = 16 ounces (oz)
1 ton = 2,000 pounds (lb)
1 gram (g) = 1,000 milligrams (mg)
1 kilogram (kg) = 1,000 grams (g)