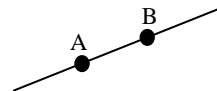


# Review of Plane Geometry

## Points, Lines, and Rays

A **point** has no length or width. • A **line** is straight with unlimited length in *two* directions but no width.

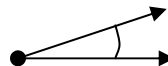


A **ray** has a starting point and unlimited length in *one* direction but no width.

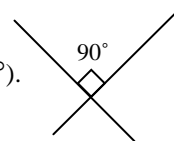


## Angles, Triangles

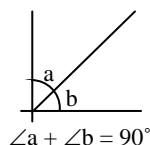
An **angle** is formed by two rays with the same beginning point called the **vertex**.



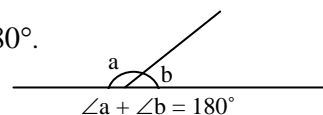
Angles are measured in degrees or radians. Two lines are **perpendicular** if their intersection forms a **right angle** ( $90^\circ$ ).



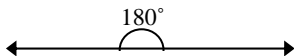
**Complementary** angles add to  $90^\circ$ .



**Supplementary** angles add to  $180^\circ$ .



A **straight angle** measures  $180^\circ$ .

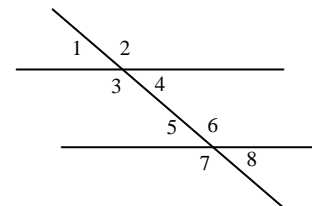


**Parallel** lines do not intersect.



The opposite angles formed by a **transverse** line intersecting two parallel lines are called **vertical angles**. 1 and 4 are vertical angles. So are 2 and 3, 5 and 8, and 6 and 7.

Vertical angles are **congruent** (have the same measure). So angle 1 = angle 4, angle 2 = angle 3, angle 6 = angle 7, and angle 5 = angle 8.



Angles 3, 4, 5, and 6 are called **interior** angles because they are *between* the parallel lines. Angles 1, 2, 7, and 8 are called **exterior** angles because they are *outside* the parallel lines.

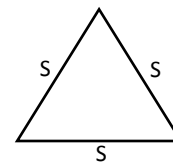
**Alternate interior angles** are congruent (angle 3 = angle 6 and angle 4 = angle 5).

**Alternate exterior angles** are congruent (angle 1 = angle 8 and angle 2 = angle 7).

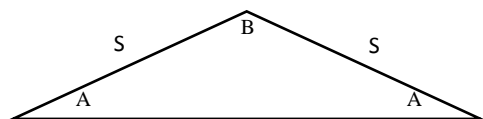
**Interior angles on the same side** of the transversal are **supplementary**. So angle 3 + angle 5 =  $180^\circ$  = angle 4 + angle 6.

A **triangle** has three sides and three angles. The *sum of the angles* of a triangle is  $180^\circ$ .

In an **equilateral triangle** all three sides are the same length and all three angles are also congruent.

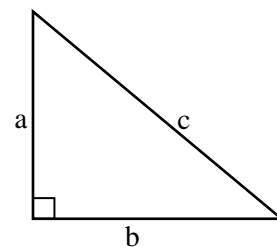


An **isosceles triangle** has two congruent angles and sides.

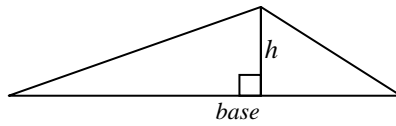


**Right triangle:** One of the angles is  $90^\circ$ . This is indicated by a "square" in the angle.

Pythagorean Theorem:  $a^2 + b^2 = c^2$

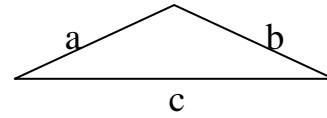
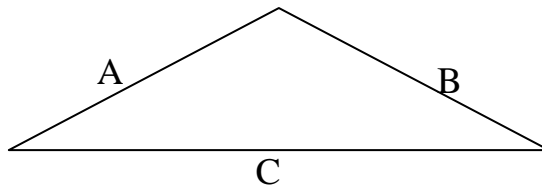


Area of a triangle is  $\frac{1}{2}$  base x height.



In **similar triangles**, corresponding angles are congruent. Thus, similar triangles have the *same shape*, and their corresponding sides are **proportional**.

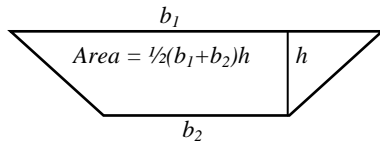
$$\frac{A}{a} = \frac{B}{b} = \frac{C}{c}$$



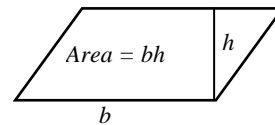
## Quadrilaterals

A **quadrilateral** has four sides (and four angles). The four angles of a quadrilateral add up to  $360^\circ$ .

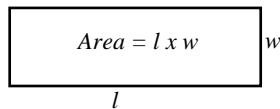
A **trapezoid** has two parallel sides.



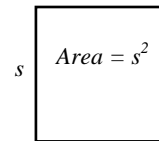
A **parallelogram** has two sets of parallel sides.



A **rectangle** is a parallelogram with each angle  $90^\circ$ .

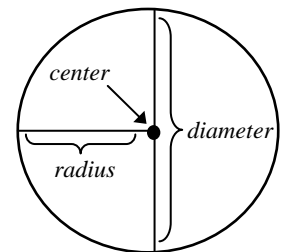


A **square** is a rectangle with each side the same length.



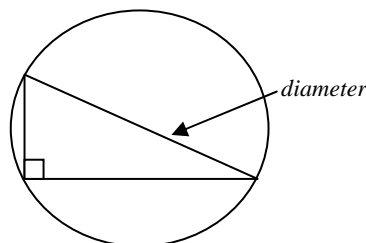
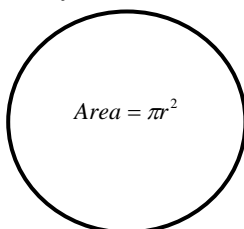
## Circles

A **circle** is the set of all points that are the same distance from a point called the **center**. The distance from the center to any point on the circle is the **radius** of the circle. The **diameter** is a line segment that goes through the center with endpoints on the circle. So a diameter = two radii.



The **circumference** is the length of the circle if it is cut once and formed into a straight line. A triangle inscribed with one side a diameter is a **right triangle**.

$$\text{Circumference} = 2\pi r = \pi d$$



## Angle Measure

A circle has  $360^\circ$ . If a circle has *radius* = 1 and an angle is formed with the vertex of the angle at the center of the circle, the *radian measure* of the angle is the number of *radius* lengths in the *arc* the angle subtends (or cuts out) on the circle.

There are  $2\pi$  radius lengths in any circle (the circumference =  $2\pi \times$  radius), so for a circle of radius = 1, the circumference is  $2\pi$  radians. Radians are abbreviated as *rad*.

$$90^\circ = \frac{\pi}{2} \text{ rad}$$

$$180^\circ = \pi \text{ rad}$$

$$270^\circ = \frac{3\pi}{2} \text{ rad}$$

$$360^\circ = 2\pi \text{ rad}$$

$$1 \text{ rad} = \frac{180^\circ}{\pi}$$

To convert radians to degrees, multiply by  $\frac{180^\circ}{\pi}$

$$1^\circ = \frac{\pi}{180^\circ} \text{ rad}$$

To convert degrees to radians, multiply by  $\frac{\pi}{180^\circ}$

Example:  $1 \text{ rad} = \frac{180^\circ}{\pi} \approx 57.3^\circ$

Example:  $90^\circ = 90^\circ \cdot \frac{\pi}{180^\circ} \text{ rad} = \frac{\pi}{2} \text{ rad}$