






# Tools of Geometry

Tuesday, September 25, 2018 4:58 PM

Undefined Terms		
Term	Geometric Figure	Ways to Name the Figure
A <b>point</b> is a specific location. It has no dimension and is represented by a dot.		point $P$
A <b>line</b> is a connected straight path. It has no thickness and it continues forever in both directions.		line $l$ , line $AB$ , line $BA$ , $\overleftrightarrow{AB}$ , or $\overleftrightarrow{BA}$
A <b>plane</b> is a flat surface. It has no thickness and it extends forever in all directions.		plane $\mathcal{R}$ or plane $XYZ$
Defined Terms		
Term	Geometric Figure	Ways to Name the Figure
A <b>line segment</b> (or <i>segment</i> ) is a portion of a line consisting of two points (called <b>endpoints</b> ) and all points between them.		segment $CD$ , segment $DC$ , $\overline{CD}$ , or $\overline{DC}$
A <b>ray</b> is a portion of a line that starts at a point (the <i>endpoint</i> ) and continues forever in one direction.		ray $PQ$ or $\overrightarrow{PQ}$

## Addition Postulates

Use as reasoning for proofs!

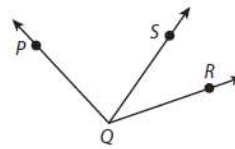
### Postulate 1: Segment Addition Postulate

Let  $A$ ,  $B$ , and  $C$  be collinear points. If  $B$  is between  $A$  and  $C$ , then  $AB + BC = AC$ .



### Postulate 2: Angle Addition Postulate

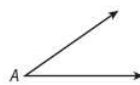
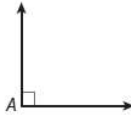
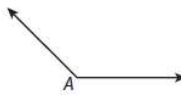

If  $S$  is in the interior of  $\angle PQR$ , then  $m\angle PQR = m\angle PQS + m\angle SQR$ .



## Angles:

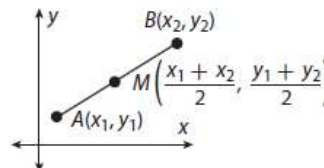
An **angle** is a figure formed by two rays with the same endpoint. The common endpoint is the **vertex** of the angle. The rays are the **sides** of the angle.

### Classifying Angles

Acute Angle	Right Angle	Obtuse Angle	Straight Angle
			
$0^\circ < m\angle A < 90^\circ$	$m\angle A = 90^\circ$	$90^\circ < m\angle A < 180^\circ$	$m\angle A = 180^\circ$

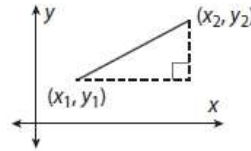
## Midpoint Formula

The midpoint  $M$  of  $\overline{AB}$  with endpoints  $A(x_1, y_1)$  and  $B(x_2, y_2)$  is given by  $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ .



Distance Formula

The distance between two points  $(x_1, y_1)$  and  $(x_2, y_2)$  on the coordinate plane is  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ .



Bisector

"To cut in equal halves"

Segment--cuts a line in 2 equal halves  
 Angle--cuts an angle in 2 equal halves

Reasoning & Proofs

A **conjecture** is a statement that is believed to be true. You can use reasoning to investigate whether a conjecture is true. **Inductive reasoning** is the process of reasoning that a rule or statement may be true by looking at specific cases. **Deductive reasoning** is the process of using logic to *prove* whether all cases are true.

Theorem

A statement that you can prove is true (using reasons & postulates!)

Conditional Statement

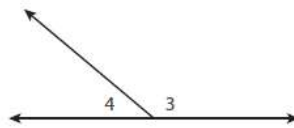
"If P, then Q"

Properties of Equality

Addition Property of Equality	If $a = b$ , then $a + c = b + c$ .
Subtraction Property of Equality	If $a = b$ , then $a - c = b - c$ .
Multiplication Property of Equality	If $a = b$ , then $ac = bc$ .
Division Property of Equality	If $a = b$ and $c \neq 0$ , then $\frac{a}{c} = \frac{b}{c}$ .
Reflexive Property of Equality	$a = a$
Symmetric Property of Equality	If $a = b$ , then $b = a$ .
Transitive Property of Equality	If $a = b$ and $b = c$ , then $a = c$ .
Substitution Property of Equality	If $a = b$ , then $b$ can be substituted for $a$ in any expression.

Linear Pair Theorem

If two angles form a linear pair, then they are supplementary.



$$m\angle 3 + m\angle 4 = 180^\circ$$

Additional Postulates

Good to know for test!

Through any two points, there is exactly one line.

Through any three noncollinear points, there is exactly one plane containing them.

If two points lie in a plane, then the line containing those points lies in the plane.

If two lines intersect, then they intersect in exactly one point.

If two planes intersect, then they intersect in exactly one line.

