VOCABULARY

Undefined term A word without a formal definition

Point A point has no dimension. It is represented by a dot.

Line A line has one dimension. It is represented by a line with two arrowheads.

Plane A plane has two dimensions. It is represented by a shape that looks like a floor or a wall.

Collinear points Points that lie on the same line

Coplanar points Points that lie in the same plane

Defined Terms Terms that can be described using known words

Line segment, endpoints Part of a line that consists of two points, called endpoints, and all the points on the line between the endpoints

Ray The ray *AB* consists of the endpoint *A* and all points on $\overleftrightarrow{AB}$ that lie on the same side of *A* as *B*.

Opposite rays If point *C* lies on $\overleftrightarrow{AB}$ between *A* and *B*, then $\overrightarrow{CA}$ and $\overrightarrow{CB}$ are opposite rays.

Intersection The intersection of two or more geometric figures is the set of points that the figures have in common.

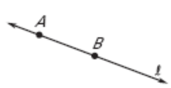
UNDEFINED TERMS

Point A point has __no__ dimension. It is represented by a __dot__.

point *A*

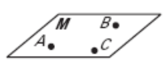
Line A line has __one__ dimension. It is represented by a __line__ with two arrowheads, but it extends without end.

Through any __two__ points, there is exactly __one__ line. You can use any __two__ points on a line to name it.



line ℓ, line *AB* ($\overleftrightarrow{AB}$), or line *BA* ($\overleftrightarrow{BA}$)

Plane A plane has __two__ dimensions. It is represented by a shape that looks like a floor or wall, but it extends without end.



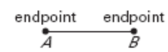
plane *M* or plane *ABC*

Through any __three__ points not on the same line, there is exactly __one__ plane. You can use __three__ points that are not all on the same line to name a plane.

DEFINED TERMS: SEGMENTS AND RAYS

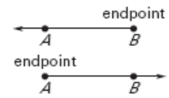
Line *AB* (written as __$\overleftrightarrow{AB}$__) and points *A* and *B* are used here to define the terms below.

Segment The line segment *AB*, or segment *AB*, (written as __$\overline{AB}$__) consists of the endpoints *A* and *B* and all points on $\overleftrightarrow{AB}$ that are __between__ *A* and *B*.



Note that $\overline{AB}$ can also be named __$\overline{BA}$__.

Ray The ray *AB* (written as __$\overrightarrow{AB}$__) consists of the endpoint *A* and all points on $\overleftrightarrow{AB}$ that lie on the same side of __*A*__ as __*B*__.



Note that $\overrightarrow{AB}$ and $\overrightarrow{BA}$ are __different__ rays.

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Postulate, axiom A rule that is accepted without proof

Theorem A rule that can be proved

Coordinate The real number that corresponds to a point

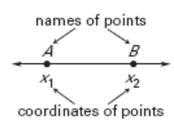
Distance The distance between two points *A* and *B*, written as *AB*, is the absolute value of the difference of the coordinates of *A* and *B*.

Between When three points are collinear, you can say that one point is between the other two.

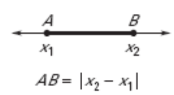
Congruent segments Line segments that have the same length

POSTULATE 1 RULER POSTULATE

The points on a line can be matched one to one with real numbers. The real number that corresponds to a point is the __coordinate__ of the point.



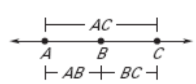
The __distance__ between points *A* and *B*, written as *AB*, is the absolute value of the difference of the coordinates of *A* and *B*.



POSTULATE 2 SEGMENT ADDITION POSTULATE

If *B* is between *A* and *C*, then *AB* + *BC* = *AC*.

If *AB* + *BC* = *AC*, then *B* is between *A* and *C*.



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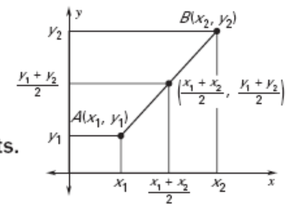
Midpoint The point that divides a segment into two congruent segments

Segment bisector A point, ray, line, line segment, or plane that intersects the segment at its midpoint

THE MIDPOINT FORMULA

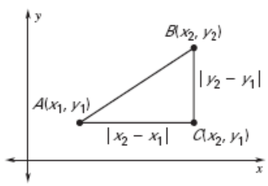
The coordinates of the midpoint of a segment are the averages of the *x*-coordinates and of the *y*-coordinates of the endpoints.



If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the midpoint M of $\overline{AB}$ has coordinates $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

THE DISTANCE FORMULA

If $A(x_1, y_1)$ and $B(x_2, y_2)$ are points in a coordinate plane, then the distance between A and B is



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

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Angle An angle consists of two different rays with the same endpoint.

Sides of an angle In an angle, the rays are called the sides of the angle.

Vertex of an angle In an angle, the endpoint is the vertex of the angle.

Measure of an angle In $\angle AOB$, $\overrightarrow{OA}$ and $\overrightarrow{OB}$ can be matched one to one with real numbers from 0 to 180. The measure of $\angle AOB$ is equal to the absolute value of the difference between the real numbers for $\overrightarrow{OA}$ and $\overrightarrow{OB}$.

Acute angle An angle that measures between 0° and 90°

Right angle An angle that measures 90°

Obtuse angle An angle that measures between 90° and 180°

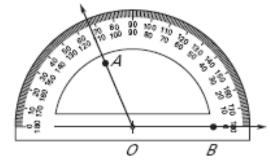
Straight angle An angle that measures 180°

Congruent angles Angles with the same measure

Angle bisector A ray that divides an angle into two angles that are congruent

POSTULATE 3: PROTRACTOR POSTULATE

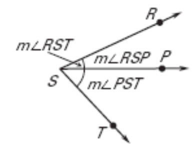
Consider $\overrightarrow{OB}$ and point A on one side of $\overleftrightarrow{OB}$. The rays of the form $\overrightarrow{OA}$ can be matched one to one with the real numbers from 0 to 180.



The measure of $\angle AOB$ is equal to the absolute value of the difference between the real numbers for $\overrightarrow{OA}$ and $\overrightarrow{OB}$.

POSTULATE 4: ANGLE ADDITION POSTULATE

Words If P is in the interior of $\angle RST$, then the measure of $\angle RST$ is equal to the sum of the measures of $\angle$ RSP and $\angle$ PST.



Symbols If P is in the interior of $\angle RST$, then $m\angle RST = m\angle RSP + m\angle PST$.

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Complementary angles Two angles whose sum is 90°

Supplementary angles Two angles whose sum is 180°

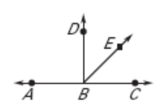
Adjacent angles Two angles that share a common vertex or side, but have no common interior points

Linear pair Two adjacent angles are a linear pair if their noncommon sides are opposite rays.

Vertical angles Two angles are vertical angles if their sides form two pairs of opposite rays.

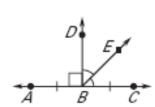
CONCEPT SUMMARY: INTERPRETING A DIAGRAM

There are some things you can conclude from a diagram, and some you cannot. For example, here are some things that you can conclude from the diagram at the right.



- All points shown are coplanar.
- Points A, B, and C are collinear, and B is between A and C.
- $\overleftrightarrow{AC}$, $\overrightarrow{BD}$, and $\overrightarrow{BE}$ intersect at point B.
- $\angle DBE$ and $\angle EBC$ are adjacent angles, and $\angle ABC$ is a straight angle.
- Point E lies in the interior of $\angle DBC$.

In the diagram above, you cannot conclude that $\overline{AB} \cong \overline{BC}$, that $\angle DBE \cong \angle EBC$, or that $\angle ABD$ is a right angle. This information must be indicated, as shown at the right.



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Polygon A polygon is a closed plane figure with the following properties: (1) It is formed by three or more line segments called sides. (2) Each side intersects exactly two sides, one at each endpoint, so that no two sides with a common endpoint are collinear.

Sides The sides of a polygon are the line segments that form the polygon.

Vertex A vertex of a polygon is an endpoint of a side of the polygon.

Convex A polygon is convex if no line that contains a side of the polygon contains a point in the interior of the polygon.

Concave A concave polygon is a polygon that is not convex.

***n*-gon** An n-gon is a polygon with n sides.

Equilateral A polygon is equilateral if all of its sides are congruent.

Equiangular A polygon is equiangular if all of its angles in the interior are congruent.

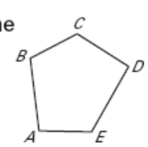
Regular A polygon is regular if all sides and all angles are congruent.

IDENTIFYING POLYGONS

In geometry, a figure that lies in a plane is called a *plane figure*. A polygon is a closed plane figure with the following properties.

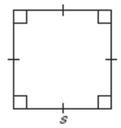
1. It is formed by three or more line segments called sides.
2. Each side intersects exactly two sides, one at each endpoint, so that no two sides with a common endpoint are collinear.

Each endpoint of a side is a vertex of the polygon. The plural of vertex is *vertices*. A polygon can be named by listing the vertices in consecutive order. For example, *ABCDE* and *CDEAB* are both correct names for the polygon at the right.



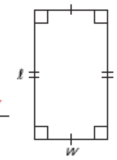
FORMULAS FOR PERIMETER *P*, AREA *A*, AND CIRCUMFERENCE *C*

Square
side length s



$P = 4s$
$A = s^2$

Rectangle
length ℓ and width w



$P = 2\ell + 2w$
$A = \ell w$

Triangle
side lengths a, b, and c, base b, and height h.

$P = a + b + c$
$A = \frac{1}{2}bh$

Circle
radius r

$C = 2\pi r$
$A = \pi r^2$

Pi (π) is the ratio of a circle's circumference to its diameter.