Math Glossary

A

addition property of equality

The addition property of equality states: If a, b, and c are real numbers and $a = b$, then $a + c = b + c$.

Example

If $x = 2$, then $x + 5 = 2 + 5$, or $x + 5 = 7$ is an example of the addition property of equality.

Addition Rule for probability

The Addition Rule for probability states: "The probability that Event A occurs or Event B occurs is the probability that Event A occurs plus the probability that Event B occurs minus the probability that both A and B occur."

$$P(A \text{ or } B) = P(A) + P(B) = P(A \text{ and } B)$$

Example

You flip a coin two times. Calculate the probability of flipping a heads on the first flip or flipping a heads on the second flip.

Let A represent the event of flipping a heads on the first flip. Let B represent the event of flipping a heads on the second flip.

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$P(A \text{ or } B) = \frac{1}{2} + \frac{1}{2} - \frac{1}{4}$

$P(A \text{ or } B) = \frac{3}{4}$

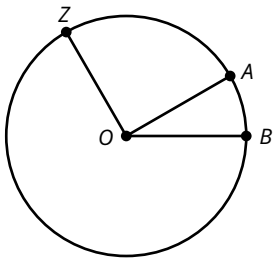
So, the probability of flipping a heads on the first flip or flipping a heads on the second flip is $\frac{3}{4}$.

adjacent arcs

Adjacent arcs are two arcs of the same circle sharing a common endpoint.

Example

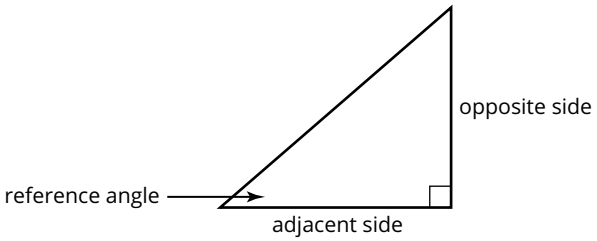
Arcs ZA and AB are adjacent arcs.



adjacent side

The adjacent side is the adjacent side of the reference angle that is not the hypotenuse.

Example



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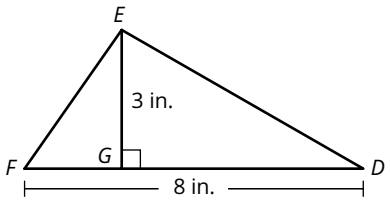
altitude

An altitude of a triangle is a line segment that is perpendicular to a side of the triangle and has one endpoint at the opposite vertex.

Example

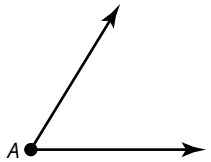
Segment *EG* is an altitude of $\triangle FED$.



angle

An angle is formed by two rays that share a common endpoint.

Example



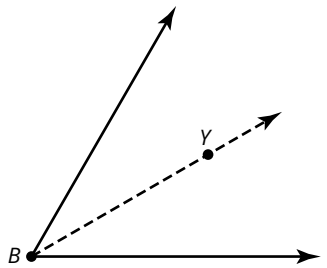
$\angle A$

angle bisector
[bisectriz de un ángulo]

An angle bisector is a line, segment, or ray that is drawn through the vertex of an angle and divides the angle into two congruent angles.

Example

Ray *BY* is an angle bisector.

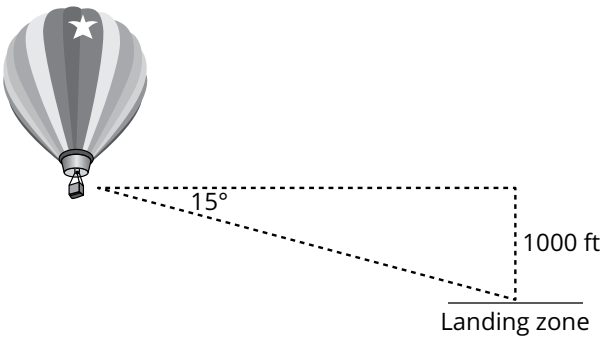


angle of depression

An angle of depression is an angle below horizontal.

Example

The angle of depression is 15°.

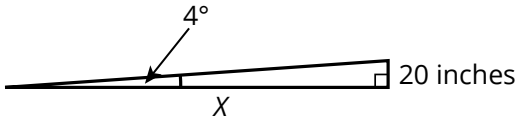


angle of elevation

An angle of elevation is the angle above the horizontal.

Example

The angle of elevation is 4°.

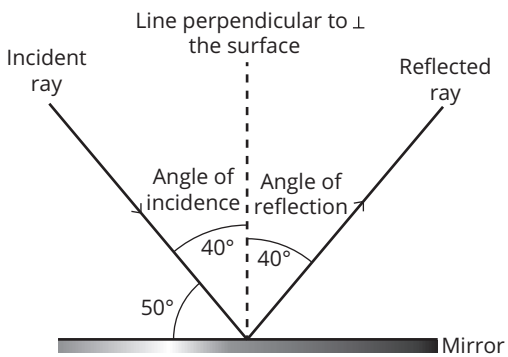


angle of incidence
[ángulo de incidencia]

The angle of incidence is the angle formed by the incidence ray and a line perpendicular to the surface of a mirror.

Example

The angle of incidence measures 40°.

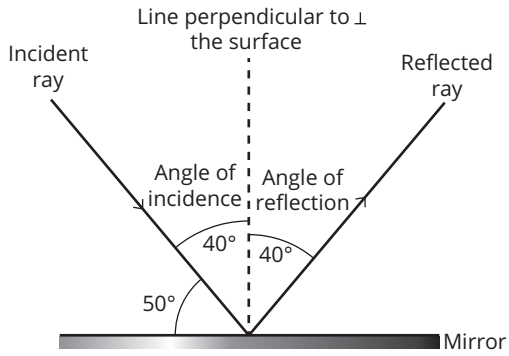


angle of reflection
[ángulo de reflexión]

The angle of reflection is the angle formed by the reflected ray and a line perpendicular to the surface of a mirror.

Example

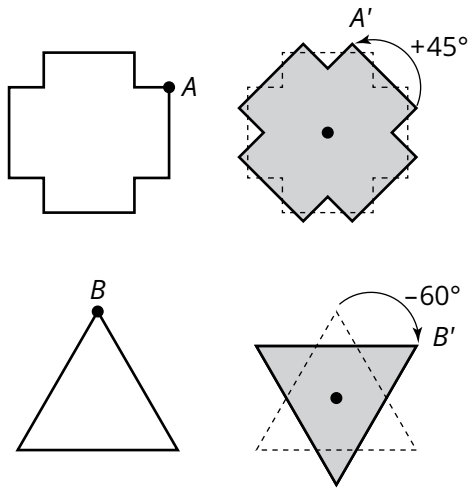
The angle of reflection measures 40°.



angle of rotation
[ángulo de rotación]

An angle of rotation is a directed angle based on a circle. Positive angles of rotation turn counterclockwise, and negative angles of rotation turn clockwise.

Example

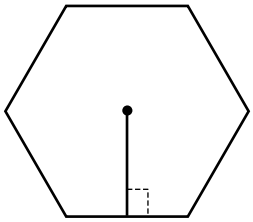


apothem
[apotema]

The apothem of a regular polygon is the perpendicular segment from the center of a regular polygon to one of its sides.

Example

The apothem is shown on the regular hexagon.

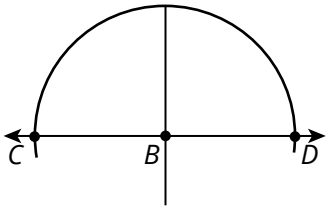


arc
[arco]

An arc consists of two points on a circle and the curved line that connects the two points.

Example

$\overset{\frown}{CD}$ is shown.



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arc length

Arc length is a linear measurement that represents a portion of the circumference of a circle. The length of an arc of a circle can be calculated by multiplying the circumference of the circle by the ratio of the measure of the arc to 360°.

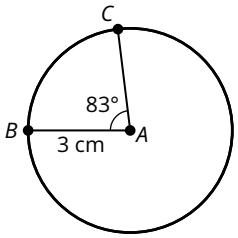
arc length $= 2\pi r \cdot \frac{x°}{360°}$

Example

In circle A, the radius $\overline{AB}$ is 3 centimeters and the measure of $\overset{\frown}{BC}$ is 83 degrees.

$$(2\pi r)\left(\frac{\text{m}\overset{\frown}{BC}}{360°}\right) = 2\pi(3)\left(\frac{83}{360°}\right)$$
$$\approx 4.35$$

So, the length of $\overset{\frown}{BC}$ is approximately 4.35 centimeters.

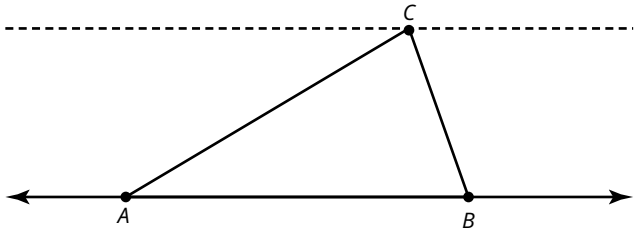


auxiliary line

An auxiliary line is a line or line segment added to a diagram to help in solving or proving a concept. Typically auxiliary lines are drawn with dashed lines.

Example

An auxiliary line is drawn parallel to $\overleftrightarrow{AB}$ through point C.

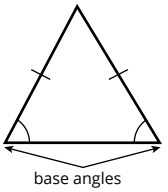


B

base angles
[ángulos de la base]

The congruent sides of an isosceles triangle are called the legs. The other side is called the base, and the angles between the base and the congruent sides are called base angles.

Example

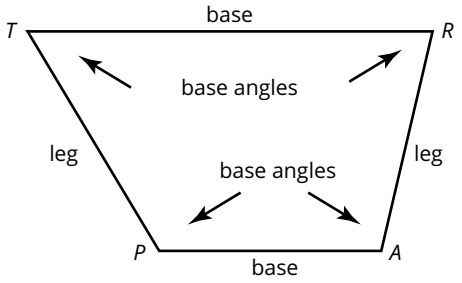


base angles of a trapezoid
[ángulos base de un trapecio]

The base angles of a trapezoid are either pair of angles that share a base as a common side.

Example

Angle T and angle R are one pair of base angles of trapezoid $PART$. Angle P and angle A are another pair of base angles.



biconditional statement

A biconditional statement is a statement written in the form "if and only if *p*, then *q*." It is a combination of both a conditional statement and the converse of that conditional statement when both statements are true.

Example

Consider the property of an isosceles trapezoid: "The diagonals of an isosceles trapezoid are congruent." The property states that if a trapezoid is isosceles, then the diagonals are congruent. The converse of this statement is true: "If the diagonals of a trapezoid are congruent, then the trapezoid is an isosceles trapezoid." So, this property can be written as a biconditional statement: "A trapezoid is isosceles if and only if its diagonals are congruent."

C

categorical data
[datos categóricos]

Categorical data are data for which each piece of data fits into exactly one of several different groups or categories.

Example

Animals: lions, tigers, bears, etc.
U.S. Cities: Los Angeles, Atlanta, New York City, Dodge City, etc.

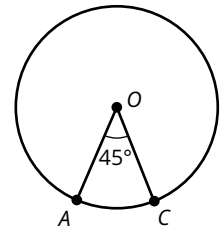
The set of animals and the set of U.S. cities are two examples of categorical data sets.

central angle
[ángulo central]

A central angle of a circle is an angle whose vertex is at the center of the circle.

Example

In circle *O*, $\angle AOC$ is a central angle and $\overset{\frown}{AC}$ is its intercepted arc. If $m\angle AOC = 45°$, then $m\overset{\frown}{AC} = 45°$.

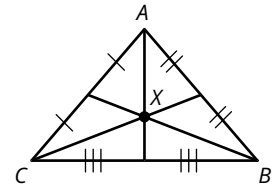


centroid

The centroid is the point of concurrency of the three medians of a triangle. It is also known as the center of gravity.

Example

Point *X* is the centroid of triangle $\triangle ABC$.

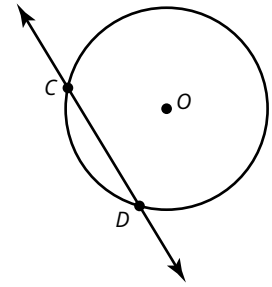


chord
[cuerda]

A chord is a segment whose endpoints are points on a circle.

Example

Segment *CD* is a chord of circle *O*.



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circular permutation
[permutación circular]

A circular permutation is a permutation in which there is no starting point and no ending point. The circular permutation of n objects is $(n - 1)!$.

Example

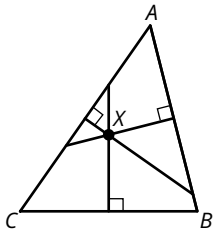
A club consists of four officers: a president (P), a vicepresident (VP), a secretary (S), and a treasurer (T). There are $(4 - 1)!$, or 6 ways for the officers to sit around a round table.

circumcenter

The circumcenter is the point of concurrency of the three perpendicular bisectors of the sides of a triangle, and it is equidistant from each vertex of the triangle.

Example

Point X is the circumcenter of $\triangle ABC$.

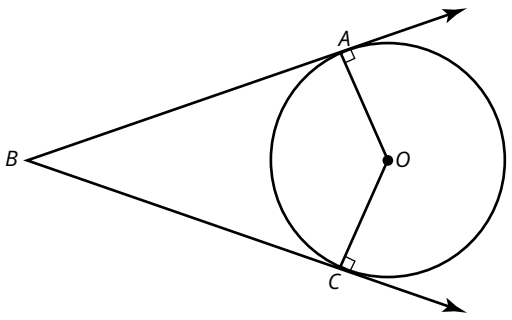


circumscribed angle
[ángulo circunscrito]

A circumscribed angle has its two sides tangent to a circle.

Example

Angle ABC is circumscribed in circle O.

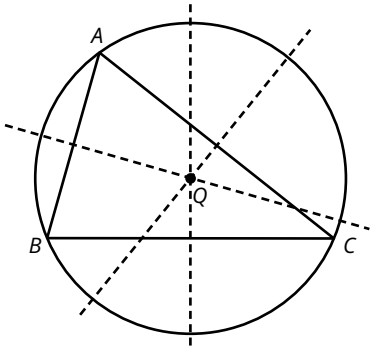


circumscribed circle

A circumscribed circle is a circle that passes through all the vertices of a polygon.

Example

Circle Q is circumscribed around $\triangle ABC$.

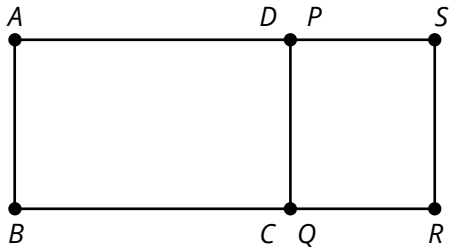


coincident
[coincidente]

Two line segments are coincident when they lie exactly on top of each other.

Example

$\overline{DC}$ and $\overline{PQ}$ are coincident.

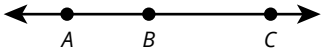


collinear points
[puntos colineales]

Collinear points are points that are located on the same line.

Example

Points A, B, and C are collinear.



combination
[combinación]

A combination is an unordered collection of items. One notation for the combinations of r elements taken from a collection of n elements is:

$$ {}_nC_r = C(n, r) = C_r^n $$

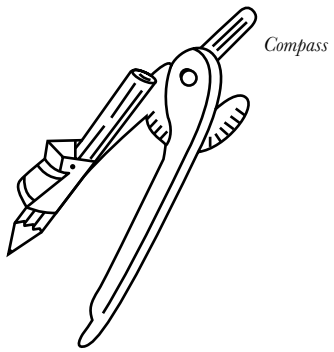
Example

The two-letter combinations of the letters A, B, and C are: AB, AC, BC.

compass
[compás]

A compass is a tool used to create circles and portions of circles.

Example



complement of an event
[complemento de un evento]

The complement of an event is an event that contains all the outcomes in the sample space that are not outcomes in the event. If E is an event, then the complement of E is often denoted as $\overline{E}$ or E^c.

Example

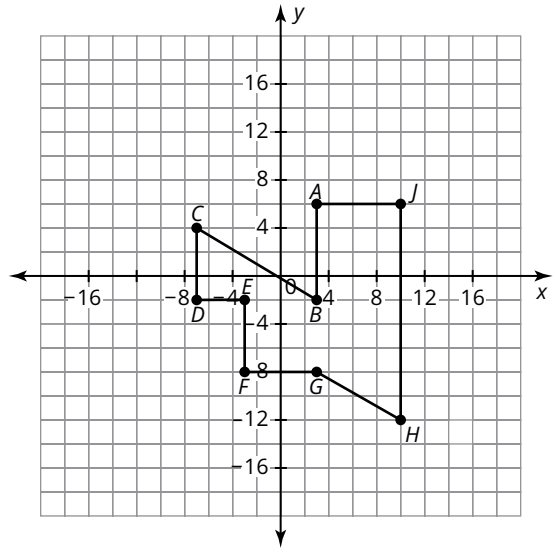
A number cube contains the numbers 1 through 6. Let E represent the event of rolling an even number. The complement of Event E is rolling an odd number.

composite figure
[figura compuesta]

A composite figure is a figure that is formed by combining different shapes.

Example

A composite figure is shown on the coordinate plane.



compound event
[evento compuesto]

A compound event is an event that consists of two or more events.

Example

You roll a number cube twice. Rolling a six on the first roll and rolling an odd number on the second roll are compound events.

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compound probability rule involving *and*
[regla de probabilidad compuesta con "y"]

The compound probability rule involving *and* states: "If Event *A* and Event *B* are independent events, then the probability that Event *A* happens and Event *B* happens is the product of the probability that Event *A* happens and the probability that Event *B* happens, given that Event *A* has happened."

$P(A \text{ and } B) = P(A) \cdot P(B)$

Example

You flip a coin two times. Calculate the probability of flipping a heads on the first flip and flipping a heads on the second flip. Let *A* represent the event of flipping a heads on the first flip. Let *B* represent the event of flipping a heads on the second flip.

$P(A \text{ and } B) = P(A) \cdot P(B)$

$P(A \text{ and } B) = \frac{1}{2} \cdot \frac{1}{2}$

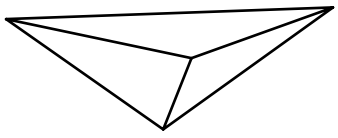
$P(A \text{ and } B) = \frac{1}{4}$

So, the probability of flipping a heads on the first flip and flipping a heads on the second flip is $\frac{1}{4}$.

concave polygon
[polígono cóncavo]

A polygon is a concave polygon if and only if at least one of its interior angles is greater than 180°.

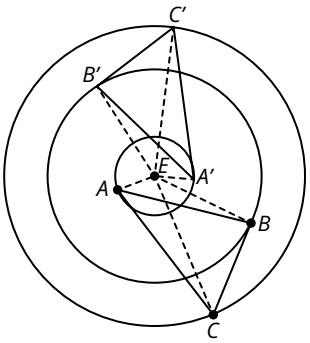
Example



concentric circles

Concentric circles are circles with a common center point.

Example



conclusion

A conclusion is the part of the "if-then" statement that follows the "then."

Example

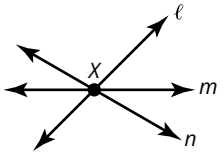
In the statement "If two positive numbers are added, then the sum is positive," the conclusion is "the sum is positive."

concurrent

Concurrent lines, rays, and line segments are three or more lines, rays, or line segments intersecting at a single point.

Example

Lines ℓ, *m*, and *n* are concurrent lines.



conditional probability
[probabilidad condicional]

Conditional probability is the probability of an event which assumes the occurrence of some other event. $P(B \mid A)$ means "the probability of the occurrence of Event B given the occurrence of Event A."

Example

The probability of rolling a 4 or less on the second roll of a number cube, given that a 5 is rolled first, is an example of a conditional probability.

conditional statement

A conditional statement is a statement that can be written in the form "If p, then q."

Example

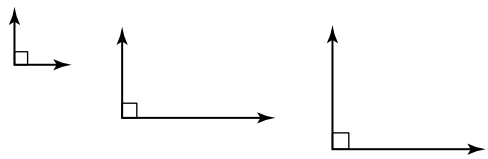
Conditional Statement

if $\underbrace{x^2 = 36}_{\text{Hypothesis}}$, then $\underbrace{x = 6 \text{ or } x = -6}_{\text{Conclusion}}$

congruent angles
[ángulos congruentes]

Congruent angles are two or more angles of equal measure.

Example



congruent line segments

Congruent line segments are two or more line segments of equal measure.

Example

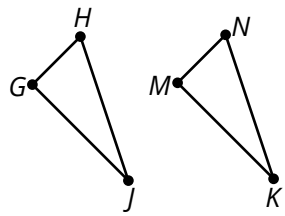
$\overline{FG}$ and $\overline{HI}$ are congruent line segments.

congruent triangles
[triángulos congruentes]

Congruent triangles are two triangles that have the same shape and size. In congruent triangles, corresponding sides and angle measures are congruent.

Example

$GHJ \cong MNK$



conjecture

A conjecture is a mathematical statement that appears to be true, but has not been formally proved.

construct

When you construct a geometric figure, the figure is created using only a compass and a straightedge.

contrapositive
[contrapositivo]

The contrapositive of a conditional statement written in the form "If p, then q" negates the hypothesis and conclusion, and reverses them. The contrapositive is "If not q, then not p."

Example

Conditional statement: If a triangle is an equilateral triangle, then the triangle is isosceles.

The contrapositive of the conditional statement is: If a triangle is not isosceles, then the triangle is not an equilateral triangle.

converse

The converse of a conditional statement is a new statement that results when the hypothesis and conclusion of the conditional statement are interchanged.

Conditional Statement: If p, then q.
Converse: If q, then p.

Example

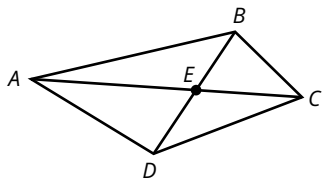
Conditional Statement: If $a = 0$ or $b = 0$, then $ab = 0$.

Converse: If $ab = 0$, then $a = 0$ or $b = 0$.

convex polygon
[polígono convexo]

A convex polygon contains all of the line segments connecting any pair of points.

Example



coordinate notation
[notación de coordenadas]

Coordinate notation describes how the original coordinates of a point are changed into new coordinates after one or more transformations. The coordinate notation is written in the form $(x, y) \rightarrow$ (new expression in terms of x, new expression in terms of y).

Example

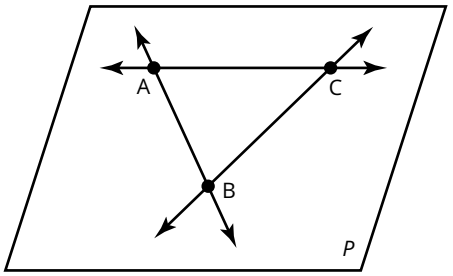
$(x, y) \rightarrow (x + 3, y - 2)$

coplanar lines

Coplanar lines are two or more lines that are located in the same plane.

Example

Three coplanar lines shown in plane P.



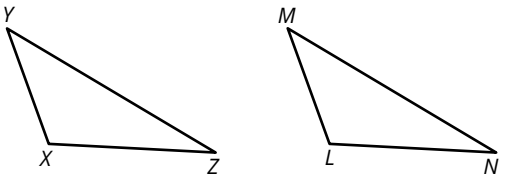
corresponding parts of congruent triangles are congruent (CPCTC)

CPCTC states that if two triangles are congruent, then each part of one triangle is congruent to the corresponding part of the other triangle.

Example

In the triangles shown, $\triangle XYZ \cong \triangle LMN$. Because corresponding parts of congruent triangles are congruent (CPCTC), the following corresponding parts are congruent.

- $\angle X \cong \angle L$
- $\angle Y \cong \angle M$
- $\angle Z \cong \angle N$
- $\overline{XY} \cong \overline{LM}$
- $\overline{YZ} \cong \overline{MN}$
- $\overline{XZ} \cong \overline{LN}$



cosine (cos)
[coseno]

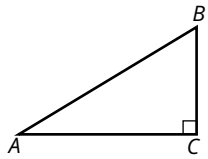
The cosine (cos) of an acute angle in a right triangle is the ratio of the length of the adjacent side of the angle to the length of the hypotenuse.

Example

In $\triangle ABC$, the cosine of $<A$ is:

$$\cos A = \frac{\text{length of adjacent side of } \angle A}{\text{length of hypotenuse}} = \frac{AC}{AB}$$

The expression "cos A" means "the cosine of angle A."



counterexample
[contrajemplo]

A counterexample is a specific example that shows that a general statement is not true.

Example

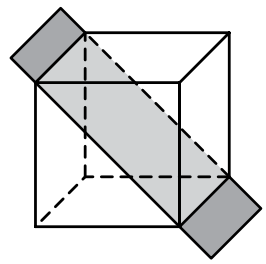
Your friend claims that you add fractions by adding the numerators and then adding the denominators. A counterexample is $\frac{1}{2} + \frac{1}{2}$. The sum of these two fractions is 1. Your friend's method results in $\frac{1+1}{2+2}$, or $\frac{1}{2}$. Your friend's method is incorrect.

cross-section

A cross-section of a three-dimensional solid results from the intersection of a plane with the solid. When the plane passes through the solid, a two-dimensional cross-section is formed.

Example

The cross-section through the square is a rectangle.



D

deductive reasoning
[razonamiento deductivo]

Deductive reasoning is a process of using statements and ideas that you know to be true in order to prove new statements and ideas. These statements and ideas could include facts, definitions, theorems, postulates, or properties.

Example

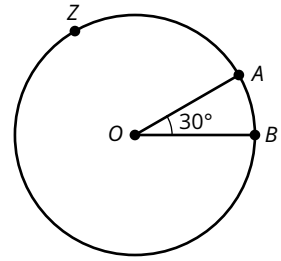
You may learn the rule for which direction to turn a screwdriver: "righty tighty, lefty loosey." If you want to remove a screw, you apply the rule and turn the screwdriver counterclockwise.

degree measure of an arc

The degree measure of an arc is the same as the degree measure of its central angle.

Example

The measure of minor arc AB is 30°.
The measure of major arc BZA is $360° - 30° = 330°$.



dependent events
[eventos dependientes]

Dependent events are events for which the occurrence of one event has an impact on the occurrence of subsequent events.

Example

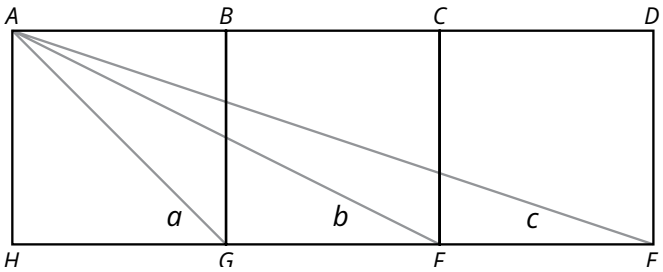
A jar contains 1 blue marble, 1 green marble, and 2 yellow marbles. You randomly choose a yellow marble without replacing the marble in the jar, and then randomly choose a yellow marble again. The events of randomly choosing a yellow marble first and randomly choosing a yellow marble second are dependent events because the 1st yellow marble was not replaced in the jar.

diagonal
[diagonal]

A diagonal is a line segment joining two vertices of a polygon but is not a side of the polygon.

Example

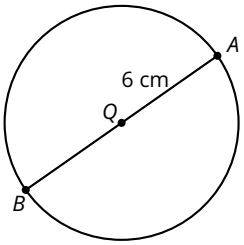
Lines *a*, *b*, and *c* are diagonals.



diameter
[diámetro]

A diameter of a circle is a line segment passing through the center of the circle with endpoints on the circle.

Example

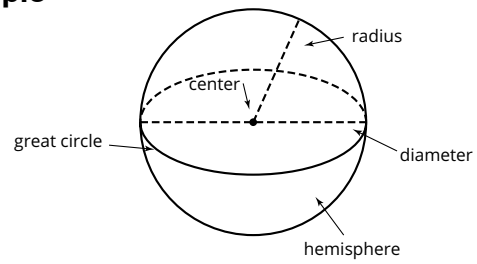


diameter $\overline{BA}$

diameter of a sphere
[diámetro de una esfera]

The diameter of a sphere is a line segment drawn between two points on the sphere passing through the center.

Example

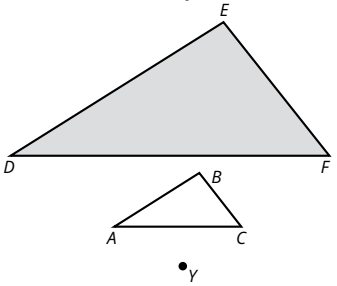


dilation
[dilatación]

A dilation is a transformation of the figure in which the figure stretches or shrinks with respect to a fixed point, or center of dilation.

Example

Triangle *DEF* is a dilation of $\triangle ABC$. The center of dilation is point *Y*.

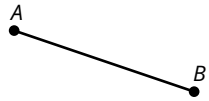


directed line segment

A directed line segment is assigned a direction from one endpoint to the other.

Example

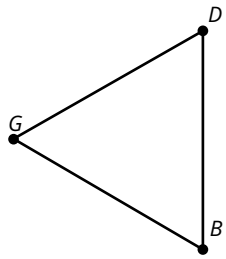
Directed line segment AB is mathematically different from directed line segment BA.



direct proof
[prueba directa]

A direct proof begins with the given information and works to the desired conclusion directly through the use of givens, definitions, properties, postulates, and theorems.

Example



Given: $\angle B \cong \angle D$

Prove: $\overline{GB} \cong \overline{GD}$

$\triangle DCG$ and $\triangle BCG$ can be formed by constructing a point C on $\overline{DB}$ such that $\overline{GC}$ bisects $\angle DGB$. Since $\angle DGC$ is congruent to $\angle BGC$ and $\overline{GC}$ is congruent to itself, $\triangle DCG$ and $\triangle BCG$, are congruent by *AAS* congruence theorem. By CPCTC, corresponding sides $\overline{GD}$ and $\overline{GB}$ are congruent.

disc
[disco]

A disc is the set of all points on a circle and in the interior of a circle.

disjoint sets

Two or more sets are disjoint sets when they do not have any common elements.

Example

Let N represent the set of 9th grade students. Let T represent the set of 10th grade students. The sets N and T are disjoint sets because the two sets do not have any common elements. Any student can be in one grade only.

distance formula
[fórmula de la distancia]

The distance formula states that if (x_1, y_1) and (x_2, y_2) are two points on the coordinate plane, then the distance d between (x_1, y_1) and (x_2, y_2) is given by the equation:

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

Example

To find the distance between the points $(-1, 4)$ and $(2, -5)$, substitute the coordinates into the distance formula.

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

$d = \sqrt{(2 + 1)^2 + (-5 - 4)^2}$

$d = \sqrt{3^2 + (-9)^2}$

$d = \sqrt{9 + 81}$

$d = \sqrt{90}$

$d \approx 9.49$

So, the distance between the points $(-1, 4)$ and $(2, -5)$ is approximately 9.49 units.

draw

To draw is to create a geometric figure using tools such as a ruler, straightedge, compass, or protractor. A drawing is more accurate than a sketch.

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E

element
[elemento]

An element is a member of a set.

Example

Set B contains the elements a, b, and c.

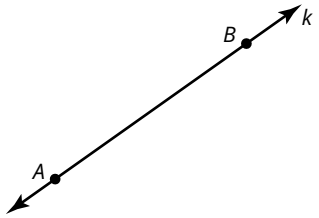
$B = \{a, b, c\}$

endpoint of a ray

The endpoint of a ray is the single point where the ray begins.

Example

Point A is the endpoint of a ray.

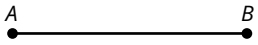


endpoints of a line segment

The endpoints of a line segment are the points where the line segment begins and ends.

Example

Points A and B are endpoints of a line segment.



Euclidean geometry
[geometría euclidiana]

The *Elements* is a book written by the Greek mathematician Euclid. He used a small number of undefined terms and postulates to systematically prove many theorems. As a result, Euclid was able to develop a complete system we now know as Euclidean geometry.

Euclid's first five postulates are:

1. A straight line segment can be drawn joining any two points.
2. Any straight line segment can be extended indefinitely in a straight line.
3. Given any straight line segment, a circle can be drawn that has the segment as its radius and one endpoint as its center.
4. All right angles are congruent.
5. If two lines are drawn that intersect a third line in such a way that the sum of the inner angles on one side is less than two right angles, then the two lines inevitably must intersect each other on that side if extended far enough. (This postulate is equivalent to what is known as the parallel postulate.)

event
[evento]

An event is an outcome or a set of outcomes in a sample space.

Example

A number cube contains the numbers 1 through 6. Rolling a 6 is one event. Rolling an even number is another event.

expected value
[valor esperado]

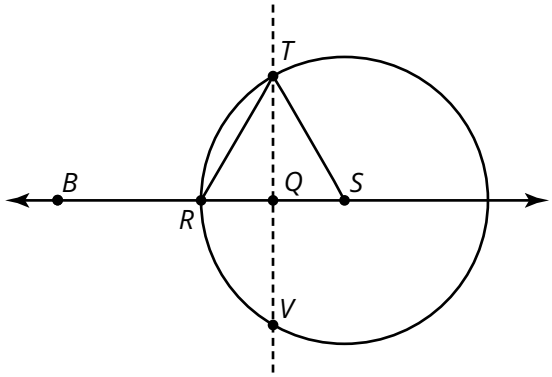
The expected value is the average value when the number of trials is large.

exterior angle
[ángulo exterior]

An exterior angle of a polygon is an angle that forms a linear pair with an interior angle of the polygon.

Example

$\angle TRB$ is an exterior angle of $\triangle RST$.

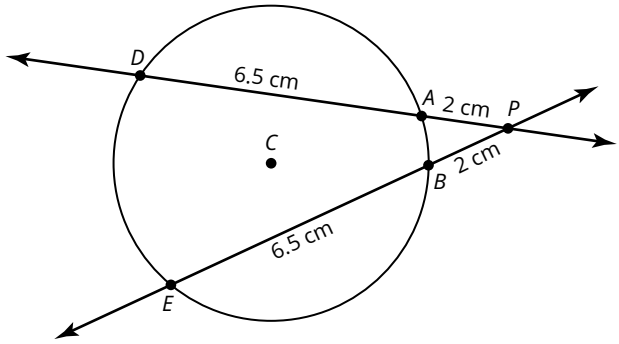


external secant segment
[segmento secante externo]

An external secant segment is the portion of each secant segment that lies on the outside of the circle. It begins at the point at which the two secants intersect and ends at the point where the secant enters the circle.

Example

$\overline{PA}$ and $\overline{PB}$ are external secant segments.



extracting perfect squares

Extracting perfect squares is the process of removing perfect square numbers from under a radical symbol.

Example

To extract perfect squares for $\sqrt{18}$, remove all perfect square numbers that are factors of 18.

$$\sqrt{18} = \sqrt{9} \cdot \sqrt{2}$$
$$= \sqrt{3^2} \cdot \sqrt{2}$$
$$= 3\sqrt{2}$$

F

factorial
[factorial]

The factorial of n, which is written with an exclamation mark as $n!$, is the product of all non-negative integers less than or equal to n.

Example

$3! = 3 \times 2 \times 1 = 6$

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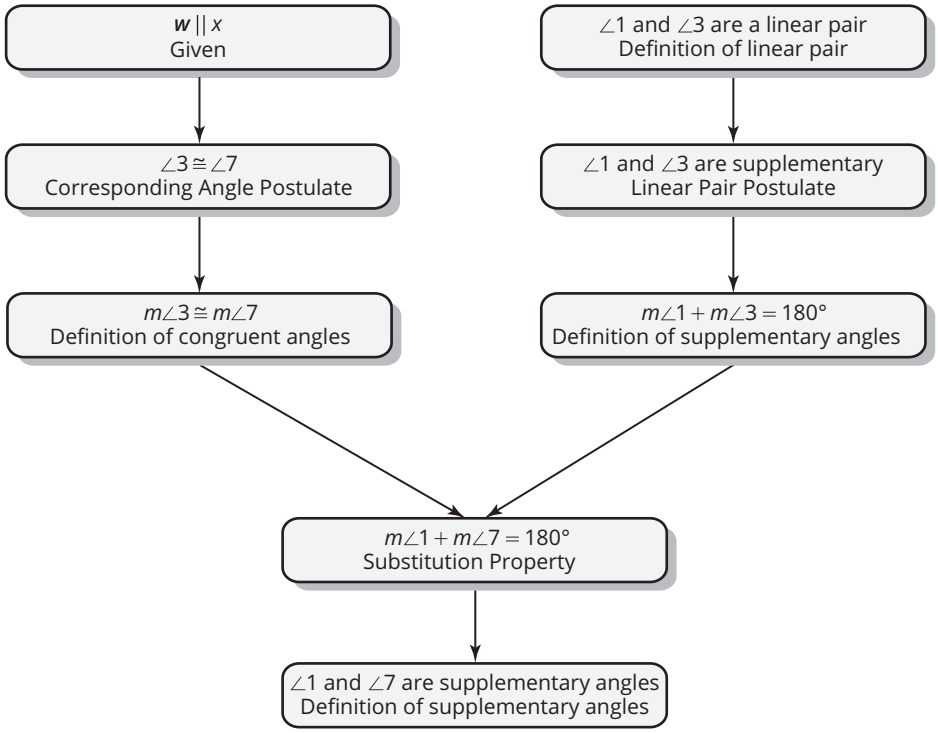


flow chart proof

A flow chart proof is a proof in which the statement and reason for each step are written in boxes.

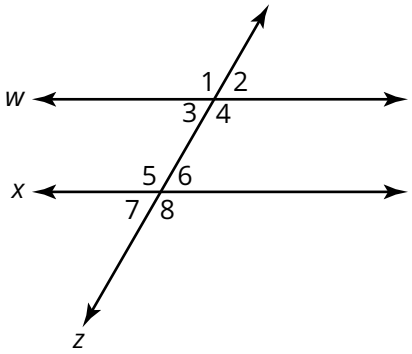
Arrows connect the boxes and indicate how each step and reason is generated from one or more other steps and reasons.

Example

Create a flow chart proof to prove that angle 1 and angle 7 are supplementary angles.

Given: $w \parallel x$, z is a transversal

Prove: $\angle 1$ and $\angle 7$ are a supplementary angles



frequency table
[tabla de frecuencia(s)]

A frequency table shows the frequency of an item, number, or event appearing in a sample space.

Example

The frequency table shows the number of times a sum of two number cubes occurred.

Sum of Two Number Cubes	Frequency
2	1
3	2
4	3
5	4
6	5
7	6
8	5
9	4
10	3
11	2
12	1

Fundamental Counting Principle
[Principio fundamental de conteo]

The Fundamental Counting Principle states: "If an action A can occur in m ways and for each of these m ways an action B can occur in n ways, then actions A and B can occur in $m \cdot n$ ways."

Example

In the school cafeteria, there are 3 different main entrees and 4 different sides. When you choose one entrée and one side, there are $3 \cdot 4$, or 12 different lunches that can be created.

G

geometric mean

The geometric mean of two positive numbers a and b is the positive number x such that $\frac{a}{x} = \frac{x}{b}$.

Example

The geometric mean of 3 and 12 is 6.

$\frac{3}{x} = \frac{x}{12}$

$x^2 = 36$

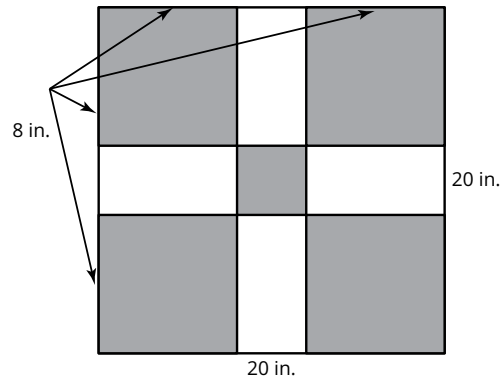
$x = 6$

geometric probability
[probabilidad geométrica]

Geometric probability is probability that involves a geometric measure, such as length, area, volume, and so on.

Example

A dartboard has the size and shape shown. The gray shaded area represents a scoring section of the dartboard. Calculate the probability that a dart that lands on a random part of the target will land in a gray scoring section.



Calculate the area of the dartboard:
$20(20) = 400$ in.^{2}

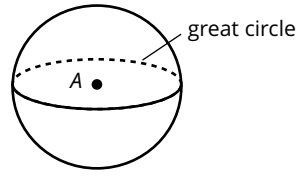
There are 4 gray scoring squares with 8-in. sides and a gray scoring square with $20 - 8 - 8 = 4$-in. sides. Calculate the area of the gray scoring sections:
$4(8)(8) + 4(4) = 272$ in.^{2}

Calculate the probability that a dart will hit a gray scoring section: $\frac{272}{400} = 0.68 = 68\%$.

great circle

A great circle is the intersection of a sphere and a plane passing through the center of the sphere.

Example



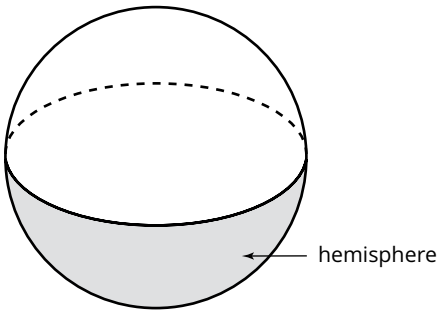
H

hemisphere
[hemisferio]

A hemisphere is half of a sphere bounded by a great circle.

Example

A hemisphere is shown.



hypothesis
[hipótesis]

A hypothesis is the part of the "if-then" statement that follows "if."

Example

In the statement, "If the last digit of a number is a 5, then the number is divisible by 5," the hypothesis is "If the last digit of a number is a 5."

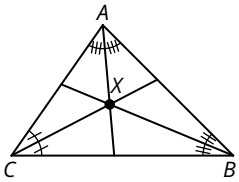
I

incenter

The incenter is the point of concurrency of the three angle bisectors of a triangle, and it is equidistant from each side of the triangle.

Example

Point X is the incenter of $\triangle ABC$.

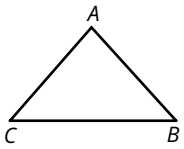


included angle
[ángulo incluido]

An included angle is an angle formed by two sides of a triangle.

Example

In $\triangle ABC$, $\angle A$ is the included angle formed by $\overline{AB}$ and $\overline{AC}$.

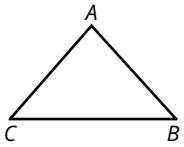


included side

An included side is the side between two angles of a triangle.

Example

In $\triangle ABC$, $\overline{AB}$ is the included side formed by angles A and B.



independent events
[eventos independientes]

Independent events are events for which the occurrence of one event has no impact on the occurrence of the other event.

Example

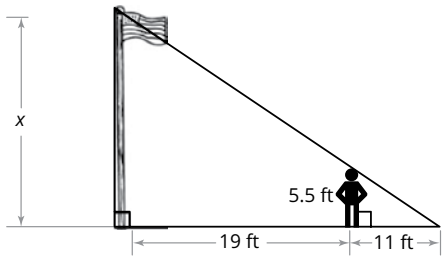
You randomly choose a yellow marble, replace the marble in the jar, and then randomly choose a yellow marble again. The events of randomly choosing a yellow marble first and randomly choosing a yellow marble second are independent events because the 1st yellow marble was replaced in the jar.

indirect measurement

Indirect measurement is a technique that uses proportions to calculate measurement when direct measurement is not possible.

Example

You can use a proportion to solve for the height x of the flagpole.



$$\frac{x}{5.5} = \frac{19 + 11}{11}$$
$$\frac{x}{5.5} = \frac{30}{11}$$
$$11x = 165$$
$$x = 15$$

The flagpole is 15 feet tall.

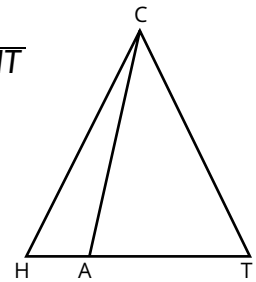
indirect proof or proof by contradiction [prueba indirecta o prueba indirecta contradicción]

An indirect proof, or proof by contradiction, uses the contrapositive. If you prove the contrapositive true, then the original conditional statement is true. Begin by assuming the conclusion is false, and use this assumption to show one of the given statements is false, thereby creating a contradiction.

Example

Given: In $\triangle CHT$, $\overline{CH} \cong \overline{CT}$.
$\overline{CA}$ does not bisect $\overline{HT}$

Prove: $\triangle CHA \ncong \triangle CTA$



Statements	Reasons
1. $\triangle CHA \cong \triangle CTA$	1. Assumption
2. $\overline{CA}$ does not bisect $\overline{HT}$	2. Given
3. $\overline{HT} \cong \overline{TA}$	3. CPCTC
4. $\overline{CA}$ bisects $\overline{HT}$	4. Definition of bisect
5. $\triangle CHA \cong \triangle CTA$ is false	5. This is a contradiction. Step 4 contradiction step 2; the assumption is false
6. $\triangle CHA \ncong \triangle CTA$ is true	6. Proof by contradiction

In step 5, the "assumption" is stated as "false." The reason for making this statement is "contradiction."

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inductive reasoning
[razonamiento inductivo]

Inductive reasoning is a process of arriving at a conclusion by generalizing a statement from observing patterns.

Example

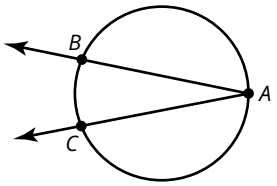
You may notice that when you don't study for a test, your grade is lower than when you do study for a test. You apply what you learned from these observations to the next test you take. Sometimes a conjecture made this way seems true, but one counterexample proves it to be false.

inscribed angle
[ángulo inscrito]

An inscribed angle is an angle whose vertex is on a circle and whose sides contain chords of the circle.

Example

Angle *BAC* is an inscribed angle. The vertex of angle *BAC* is on the circle and the sides of angle *BAC* contain the chords $\overline{AB}$ and $\overline{AC}$.

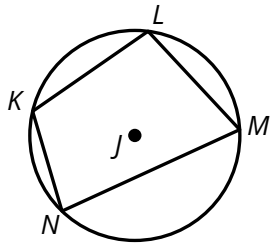


inscribed polygon
[polígono inscrito]

An inscribed polygon is a polygon drawn inside another polygon or circle in which all the vertices of the interior polygon lie on the outer figure.

Example

Quadrilateral *KLMN* is inscribed in circle *J*.

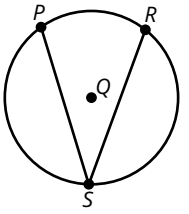


intercepted arc
[arco interceptado]

An intercepted arc is a part of a circle that lies in the interior of an angle with endpoints that are the intersection of the sides of the angle and the circle.

Example

$\overset{\frown}{PR}$ is an intercepted arc of inscribed angle *PSR*.

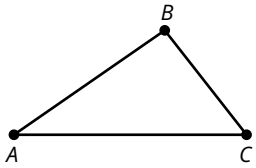


interior angle of a polygon
[ángulo interior de un polígono]

An interior angle of a polygon is an angle inside the polygon between two adjacent sides.

Example

The interior angles of $\triangle ABC$ are $<ABC$, $<BCA$, and $<CAB$.



intersecting sets

Two or more sets are intersecting sets when they do have common elements.

Example

Let V represent the set of students who are on the girls' volleyball team. Let M represent the set of students who are in the math club. Julia is on the volleyball team and belongs to the math club. The sets V and M are intersecting sets because the two sets have at least one common element, Julia.

inverse
[inverso]

The inverse of a conditional statement written in the form"If p, then q"negates the hypothesis and the conclusion. The inverse is "If not p, then not q".

Example

Conditional statement: If a triangle is an equilateral triangle, then the triangle is isosceles.

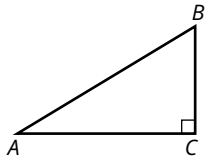
The inverse of the conditional statement is: If a triangle is not an equilateral triangle, then the triangle is not isosceles.

inverse cosine
[coseno inverso / arco coseno]

The inverse cosine (or arccosine) of x is the measure of an acute angle whose cosine is x.

Example

In right triangle ABC, when $\cos A = x$, $\cos^{-1} x = m<A$.

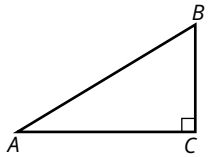


inverse sine
[seno inverso / arco seno]

The inverse sine (or arcsine) of x is the measure of an acute angle whose sine is x.

Example

In right triangle ABC, when $\sin A = x$, $\sin^{-1} x = m<A$.

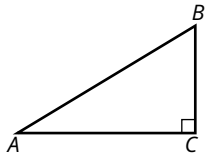


inverse tangent
[tangente inversa /arco tangente]

The inverse tangent (or arctangent) of x is the measure of an acute angle whose tangent is x.

Example

In right triangle ABC, when $\tan A = x$, then $\tan^{-1} x = m<A$.

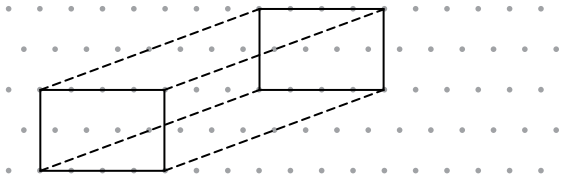


isometric paper
[papel isométrico]

Isometric paper, or dot paper, is used to create a two-dimensional representation of a three-dimensional figure.

Example

The rectangular prism is shown on isometric paper.

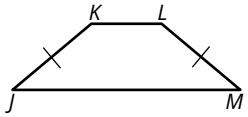


isosceles trapezoid
[trapecio isósceles]

An isosceles trapezoid is a trapezoid with congruent legs.

Example

In trapezoid *JKLM*, $\overline{KL}$ is parallel to $\overline{JM}$, and *JK* is equal to *LM*, so trapezoid *JKLM* is an isosceles trapezoid.



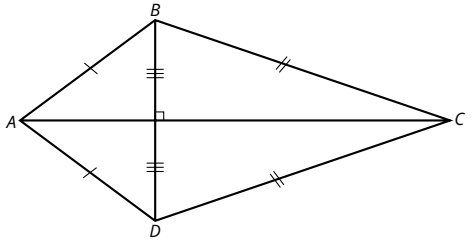
K

kite

A kite is a quadrilateral with two pairs of equal adjacent sides. If the diagonals of a quadrilateral are perpendicular, non-congruent, and only one bisects the other, it can only be classified as a kite.

Example

Quadrilateral *ABCD* is a kite.



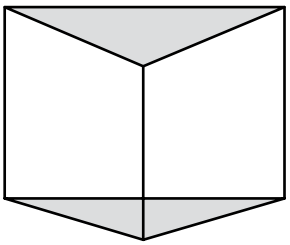
L

lateral face

A lateral face of a three-dimensional object is a face that is not a base.

Example

Each lateral face of a right triangular prism is a rectangle.



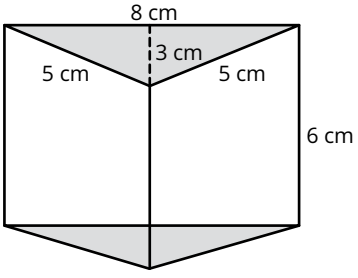
lateral surface area
[área de superficie lateral]

The lateral surface area of a three-dimensional figure is the sum of the areas of its lateral faces.

Example

The lateral surface area of the right triangular prism is 108 square centimeters.

$$\text{Lateral surface area} = (5 \times 6) + (5 \times 6) + (8 \times 6)$$
$$= 30 + 30 + 48$$
$$= 108$$



law of reflection
[ley de la reflexión]

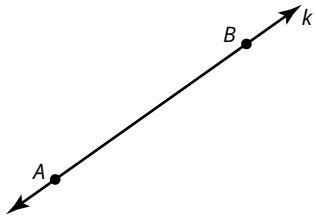
The law of reflection states that the measure of the angle of incidence equals the measure of the angle of reflection.

line

A line is described as a straight, continuous arrangement of an infinite number of points. A line has an infinite length, but no width.

Example

The line below can be called line k or line AB.

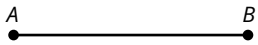


line segment

A line segment is a part of a line that includes two points and all of the collinear points between the two points.

Example

The line segment shown is named $\overline{AB}$ or $\overline{BA}$.



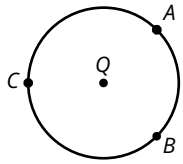
M

major arc
[arco mayor]

Two points on a circle determine a major arc and a minor arc. The arc with the greater measure is the major arc. The other arc is the minor arc.

Example

Circle Q is divided by points A and B into two arcs, arc ACB and arc AB. Arc ACB has the greater measure, so it is the major arc. Arc AB has the lesser measure, so it is the minor arc.

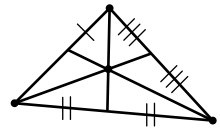


median

The median of a triangle is a line segment drawn from a vertex to the midpoint of the opposite side.

Example

The 3 medians are drawn on the triangle shown.

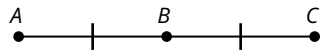


midpoint

A midpoint of a line segment is the point that divides the line segment into two congruent segments.

Example

Because point B is the midpoint of segment AC, segment AB is congruent to segment BC.



midpoint formula
[fórmula del punto medio]

The midpoint formula states that if (x_1, y_1) and (x_2, y_2) are two points on the coordinate plane, then the midpoint of the line segment that joins these two points is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

Example

To find the midpoint between the points $(-1, 4)$ and $(2, -5)$, substitute the coordinates into the midpoint formula.

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{-1 + 2}{2}, \frac{4 - 5}{2}\right)$$
$$= \left(\frac{1}{2}, \frac{-1}{2}\right)$$

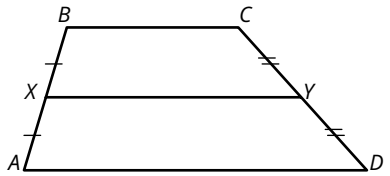
So, the midpoint between the points $(-1, 4)$ and $(2, -5)$ is $\left(\frac{1}{2}, -\frac{1}{2}\right)$.

midsegment
[segmento medio]

A midsegment of a polygon is any line segment that connects two midpoints of the sides of the polygon.

Example

Segment *XY* is a midsegment of trapezoid *ABCD*.

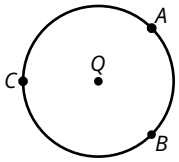


minor arc
[arco menor]

Two points on a circle determine a minor arc and a major arc. The arc with the lesser measure is the minor arc. The other arc is the major arc.

Example

Circle *Q* is divided by points *A* and *B* into two arcs, arc *ACB* and arc *AB*. Arc *AB* has the lesser measure, so it is the minor arc. Arc *ACB* has the greater measure, so it is the major arc.

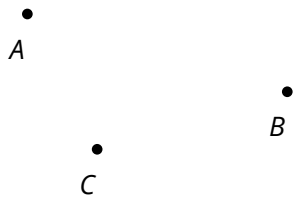


N

non-collinear points

Non-collinear points are points that do not all lie on the same line.

Example

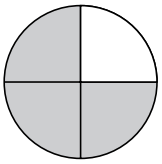


non-uniform probability model
[modelo de probabilidad no uniforme]

When the probabilities of the outcomes are not all equal, the model is a non-uniform probability model.

Example

Spinning the spinner shown represents a non-uniform probability model because the probability of landing on a shaded space is not equal to the probability of landing on a non-shaded space.



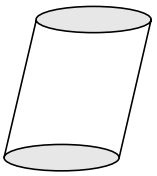
O

oblique cylinder
[cilindro oblicuo]

When you translate a disc through space in a direction that is *not* perpendicular to the plane containing the disc, the solid formed is an oblique cylinder.

Example

The prism shown is an oblique cylinder.

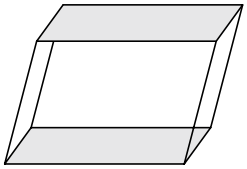


oblique rectangular prism
[prisma rectangular oblicuo]

When you translate a rectangle through space in a direction that is *not* perpendicular to the plane containing the rectangle, the solid formed is an oblique rectangular prism.

Example

The prism shown is an oblique rectangular prism.

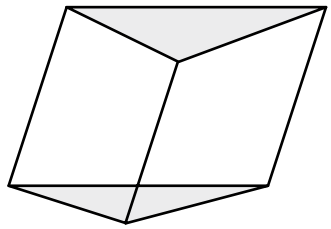


oblique triangular prism
[prisma triangular oblicuo]

When you translate a triangle through space in a direction that is *not* perpendicular to the plane containing the triangle, the solid formed is an oblique triangular prism.

Example

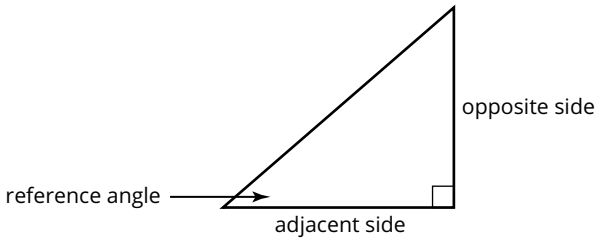
The prism shown is an oblique triangular prism.



opposite side

The opposite side is the opposite side of the reference angle.

Example



organized list
[lista organizada]

An organized list is a visual model for determining the sample space of events.

Example

The sample space for flipping a coin 3 times can be represented as an organized list.

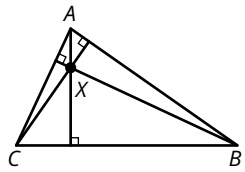
HHH THH	HTH TTH
HHT THT	HTT TTT

orthocenter

The orthocenter is the point of concurrency of the three altitudes of a triangle.

Example

Point X is the orthocenter of $\triangle ABC$.



outcome

An outcome is a result of an experiment.

Example

Flipping a coin has two outcomes: heads or tails.

P

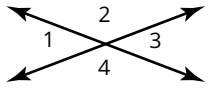
paragraph proof
[prueba en párrafo]

A paragraph proof is a proof that is written in paragraph form in which the statements and corresponding reasons are written in complete sentences.

Example

The proof shown is a paragraph proof that vertical angles 1 and 3 are congruent.

Angle 1 and angle 3 are vertical angles. By the definition of linear pair, angle 1 and angle 2 form a linear pair. Angle 2 and angle 3 also form a linear pair. By the linear pair postulate, angle 1 and angle 2 are supplementary. Angle 2 and angle 3 are also supplementary. Angle 1 is congruent to angle 3 by the congruent supplements theorem.



permutation
[permutación]

A permutation is an ordered arrangement of items without repetition.

Example

The permutations of the letters *A*, *B*, and *C* are:

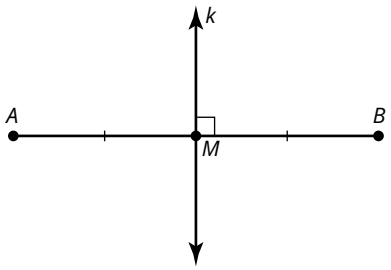
ABC *ACB* *BAC* *BCA* *CAB* *CBA*

perpendicular bisector
[bisectriz perpendicular]

A perpendicular bisector is a line, line segment, or ray that bisects a line segment and is also perpendicular to the line segment.

Example

Line *k* is the perpendicular bisector of $\overline{AB}$.
It is perpendicular to $\overline{AB}$, and intersects $\overline{AB}$ at midpoint *M* so that *AM* = *MB*.

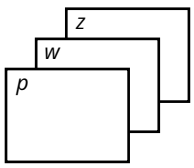


plane
[plano]

A plane is described as a flat surface. A plane has an infinite length and width, but no depth, and extends infinitely in all directions.

Example

Three planes *P*, *W*, and *Z* that do not intersect.



point
[punto]

A point is described simply as a location. A point in geometry has no size or shape, but it is often represented using a dot. In a diagram, a point can be labeled using a capital letter.

Example

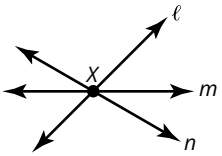
Point *A* is shown.

point of concurrency

A point of concurrency is the point at which concurrent lines, rays, or line segments intersect.

Example

Point *X* is the point of concurrency for lines ø, *m*, and *n*.



postulate
[postulado]

A postulate is a statement that is taken to be true without proof.

Example

The following statement is a postulate:
A straight line may be drawn between any two points.

probability
[probabilidad]

The probability of an event is the ratio of the number of desired outcomes to the total number of possible outcomes. The probability of event A is $P(A) = \frac{\text{desired outcomes}}{\text{possible outcomes}}$.

Example

When flipping a coin, there are 2 possible outcomes: heads or tails. The probability of flipping a heads is $\frac{1}{2}$.

probability model
[modelo de probabilidad]

A probability model lists the possible outcomes and the probability for each outcome.

Example

The table shows a probability model for flipping a fair coin once. In a probability model, the sum of the probabilities must equal 1.

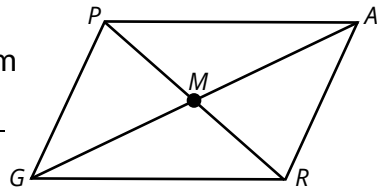
Outcomes	Head (H)	Tails (H)
Probability	$\frac{1}{2}$	$\frac{1}{2}$

proof
[prueba]

A proof is a logical series of statements and reasons that starts with a hypothesis and arrives at a conclusion.

Example

Given: Parallelogram $PARG$ with diagonals $\overline{PR}$ and $\overline{AG}$ intersecting at point M



Prove: $\angle GPA \cong \angle ARG$

Statements	Reasons
1. Parallelogram $PARG$ with diagonals $\overline{PR}$ and $\overline{AG}$ intersecting at point M.	1. Given
2. $\overline{PG} \parallel \overline{AR}$ and $\overline{GR} \parallel \overline{PA}$	2. Definition of a Parallelogram
3. $\angle PAG \cong \angle RGA$ and $\angle PGA \cong \angle RAG$	3. Alternative interior angle theorem
4. $\overline{PR} \cong \overline{PR}$	4. Reflexive property of congruence
5. $\triangle APG \cong \triangle GRA$	5. ASA congruence theorem
6. $\angle GPA \cong \angle ARG$	6. CPCTC

Pythagorean triple

Any set of three positive integers a, b, and c that satisfies the equation $a^2 + b^2 = c^2$ is a Pythagorean triple.

Example

The integers 3, 4, and 5 form a Pythagorean triple because $3^2 + 4^2 = 5^2$.

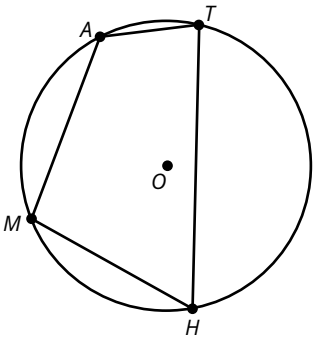
Q

quadrilateral inscribed in a circle
[cuadrilátero inscrito en un círculo]

A quadrilateral inscribed in a circle is a quadrilateral whose vertices all lie on a single circle.

Example

Quadrilateral *ATHM* is inscribed in circle *O*.



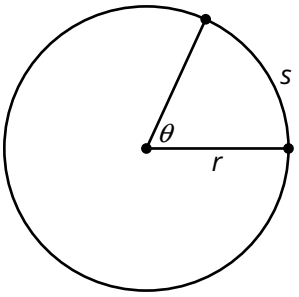
R

radian
[radián]

One radian is defined as the measure of a central angle whose arc length is the same as the radius of the circle.

Example

$\theta = 1$ radian when $s = r$.



radical
[radical]

The symbol $\sqrt{\ }$ is called a radical.

Example

radical

$\sqrt{25}$

radicand
[radicando]

The radicand is the quantity under a radical.

Example

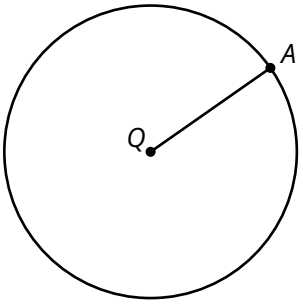
radicand

$\sqrt{25}$

radius
[radio]

A radius is a line segment from the center of a circle to a point on the circle.

Example

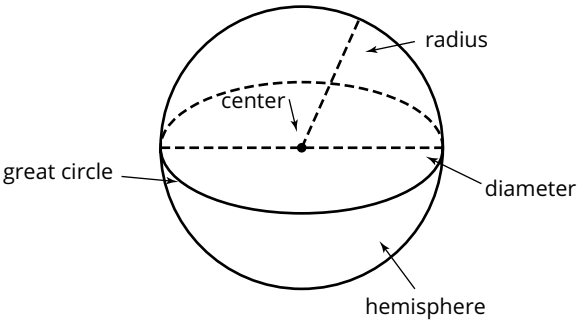


radius $\overline{QA}$

radius of a sphere
[radio de una esfera]

The radius of a sphere is a line segment drawn from the center of the sphere to a point on the sphere.

Example



rationalize the denominator
[racionalizar el denominador]

Rationalize the denominator is the process of rewriting a fraction with no irrational numbers in the denominator. To rationalize the denominator of a fraction involving radicals, multiply a fraction by a form of 1 so that the product in the denominator includes a perfect square radicand. Then rewrite, when possible.

Example

Rationalize the denominator of the expression $\frac{5}{\sqrt{3}}$.

$$\frac{5}{\sqrt{3}} = \frac{5}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$
$$= \frac{5\sqrt{3}}{\sqrt{9}}$$
$$= \frac{5\sqrt{3}}{3}$$

ray
[rayo]

A ray is a part of a line that begins with a single point and extends infinitely in one direction.

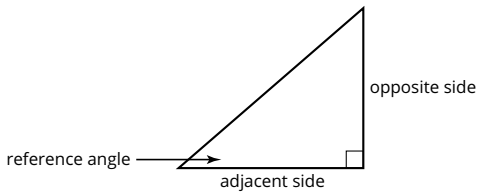
Example

The ray shown is ray *AB*.

reference angle
[ángulo de referencia]

A reference angle is the angle of the triangle being considered. The opposite side and adjacent side are named based on the reference angle.

Example

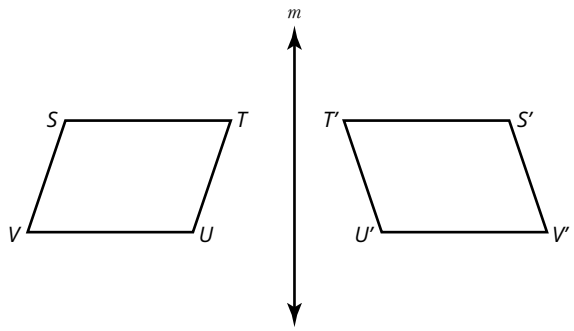


reflection
[reflexión]

A reflection is a rigid motion that reflects, or "flips," a figure over a given line called a line of reflection. A line of reflection is a line over which a figure is reflected so that corresponding points are the same distance from the line.

Example

Parallelogram *STUV* is reflected over line *m* to create parallelogram *S'T'U'V'*.

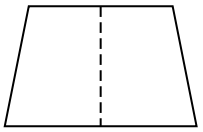


reflectional symmetry
[simetría de reflexión]

A plane figure has reflectional symmetry when you can draw a line so that the figure to one side of the line is a reflection of the figure on the other side of the line.

Example

The figure shown has reflectional symmetry.



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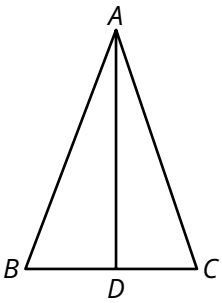
reflexive property of congruence
[propiedad reflexiva de la congruencia]

The reflexive property of congruence states that all geometric figures or parts of a geometric figure are congruent to themselves.

Example

Triangle ABD and $\triangle ACD$ share side $\overline{AD}$. Therefore, $\overline{AD} \cong \overline{AD}$ by the reflexive property of congruence.



reflexive property of equality

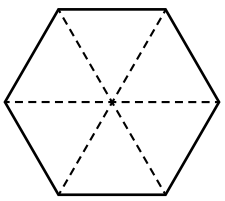
The reflexive property of equality states: If a is a real number, then $a = a$.

Example

The statement $2 = 2$ is an example of the reflexive property of equality.

regular polygon
[polígono regular]

A regular polygon is a polygon with all sides congruent and all angles congruent.



relative frequency
[frecuencia relativa]

A relative frequency is the ratio of occurrences within a category to the total number of occurrences. It can also be expressed as a percent.

Example

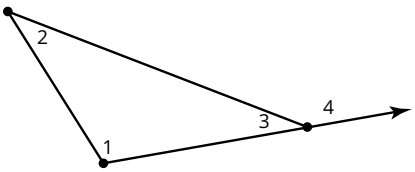
A teacher surveys 100 students in his school about their favorite school subject. Of the 100 students, 37 chose math as their favorite subject. The relative frequency of students who selected math as their favorite subject is $\frac{37}{100}$, or 37%.

remote interior angles
[ángulos interiores remotos]

The remote interior angles of a triangle are the two angles that are not adjacent to the specified exterior angle.

Example

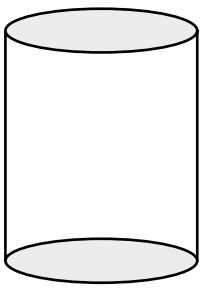
The remote interior angles with respect to exterior angle 4 are angles 1 and 2.



right cylinder

When you translate a disc through space in a direction that is perpendicular to the plane containing the disc, the solid formed is a right cylinder.

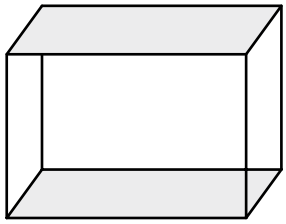
Example



right rectangular prism

When you translate a rectangle through space in a direction that is perpendicular to the plane containing the rectangle, the solid formed is a right rectangular prism.

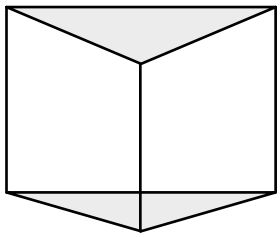
Example



right triangular prism

When you translate a triangle through space in a direction that is perpendicular to the plane containing the triangle, the solid formed is a right triangular prism.

Example



rigid motion
[movimiento rígido]

A rigid motion is a special type of transformation that preserves the size and shape of the figure.

Example

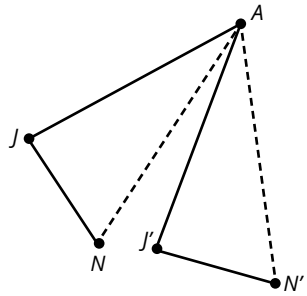
Translations, reflections, and rotations are examples of rigid motion transformations.

rotation
[rotación]

A rotation is a function that maps its input, a point, to another location, by a specific rotation angle around a fixed point. This movement to a new location is described by a center of rotation, E, and a rotation angle, t.

Example

$\overline{JN}$ is rotated 40° counterclockwise with center of rotation A to create $\overline{J'N'}$.

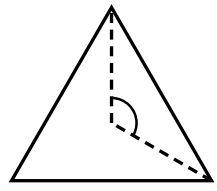


rotational symmetry
[simetría de rotación]

A plane figure has rotational symmetry when you can rotate the figure more than 0° but less than 360° and the resulting figure is the same as the original figure in the original position.

Example

The figure shown has rotational symmetry.



S

sample space

The sample space is the set of all the possible outcomes of an experiment.

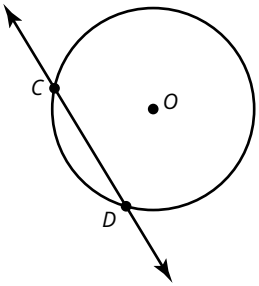
Example

The sample space for flipping a coin two times: HH, HT, TH, and TT.

secant
[secante]

A secant of a circle is a line that intersects the circle at two points.

Example



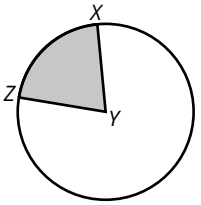
secant $\overleftrightarrow{CD}$

sector of a circle
[sector de un círculo]

A sector of a circle is a region of the circle bounded by two radii and the included arc.

Example

In circle Y, $\overset{\frown}{XZ}$, radius $\overline{XY}$, and radius $\overline{YZ}$ form a sector.

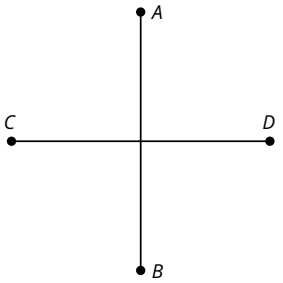


segment bisector
[bisectriz de segmento]

A segment bisector is a line, line segment, or ray that divides a line segment into two line segments of equal length.

Example

$\overline{AB}$ is a segment bisector of $\overline{CD}$.

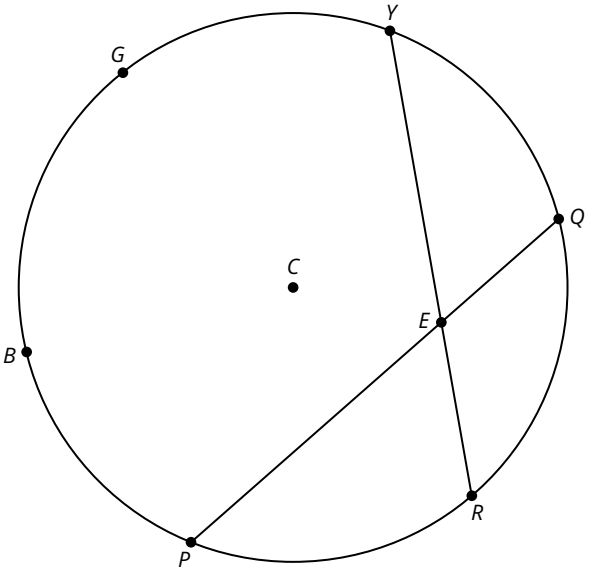


segments of a chord
[segmentos de una cuerda]

Segments of a chord are the segments formed on a chord when two chords of a circle intersect.

Example

$\overline{YE}$ and $\overline{ER}$ are segments of chord $\overline{YR}$. $\overline{QE}$ and $\overline{EP}$ are segments of chord $\overline{QP}$.

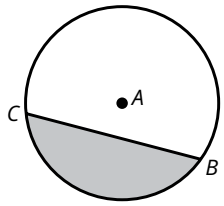


segment of a circle
[segmento de un círculo]

A segment of a circle is a region of the circle bounded by a chord and the included arc.

Example

In circle A, chord $\overline{BC}$ and $\overset{\frown}{BC}$ are the boundaries of a segment of the circle.



set

A set is a collection of items. If x is a member of set B, then x is an element of set B.

Example

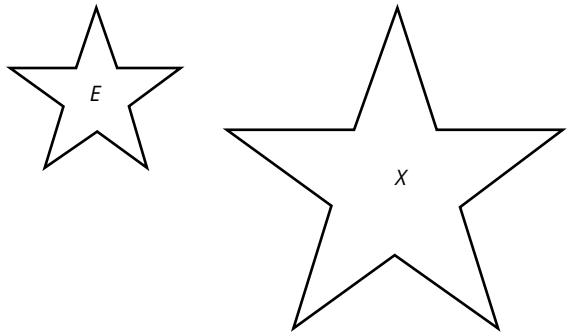
Let E represent the set of even whole numbers. $E = \{2, 4, 6, 8, \ldots\}$

similar figures
[figuras similares]

Similar figures are geometric figures where all pairs of corresponding angles are congruent and the lengths of all corresponding sides are proportional.

Example

Dilations produce similar figures. Figures E and X are similar figures.

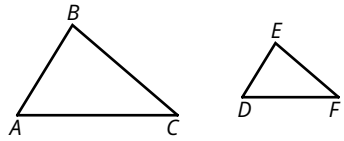


similar triangles
[triángulos similares]

Similar triangles are triangles where all pairs of corresponding angles are congruent and the lengths of all corresponding sides are proportional.

Example

$\triangle ABC \sim \triangle DEF$



sine (sin)
[seno]

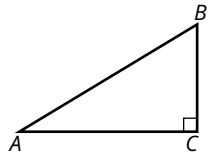
The sine (sin) of an acute angle in a right triangle is the ratio of the length of the opposite side of the angle to the length of the hypotenuse.

Example

In $\triangle ABC$, the sine of $\angle A$ is:

$$\sin A = \frac{\text{length of opposite side of } \angle A}{\text{length of hypotenuse}} = \frac{BC}{AB}$$

The expression "sin A" means "the sine of angle A."



sketch

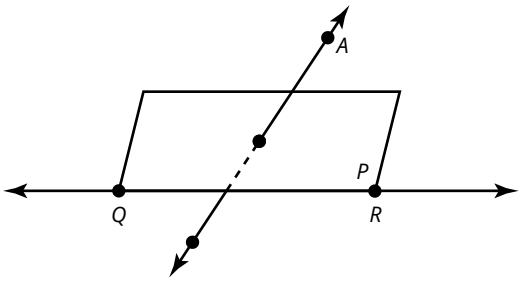
To sketch is to create a geometric figure without using tools such as a ruler, straightedge, compass, or protractor. A drawing is more accurate than a sketch.

skew lines

Skew lines are two or more lines that do not intersect and are not parallel. Skew lines do not lie in the same plane.

Example

$\overleftrightarrow{QR}$ lies in plane P. $\overleftrightarrow{AB}$ does not lie in plane P. $\overleftrightarrow{AB}$ intersects plane P but does not intersect $\overleftrightarrow{QR}$. So $\overleftrightarrow{AB}$ and $\overleftrightarrow{QR}$ are skew lines.

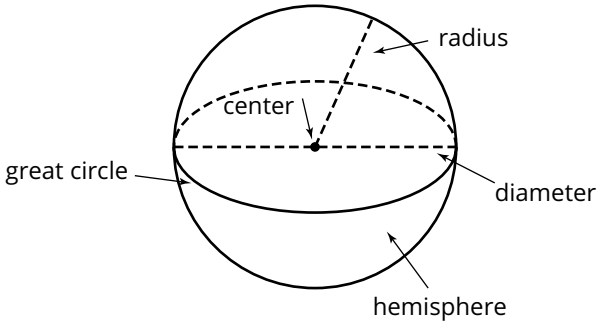


sphere

A sphere is the set of all points in three dimensions that are equidistant from a given point called the center.

Example

A sphere is shown.

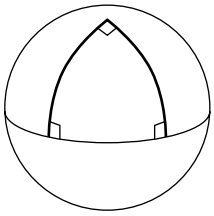


spherical geometry
[geometría esférica]

Spherical geometry is a geometry that substitutes a sphere for a plane.

Example

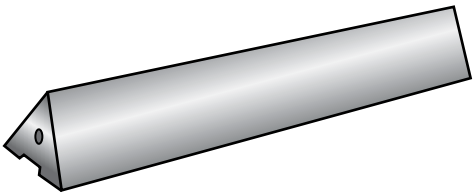
A representation of a triangle in spherical geometry is shown.



straightedge

A straightedge is a ruler with no numbers.

Example



substitution property of equality
[propiedad de sustitución de la igualdad]

The substitution property of equality states: "If a and b are real numbers and $a = b$, then a can be substituted for b."

Example

If $x = 2$ and $3x + 4 = 10$, then $3(2) + 4 = 10$ is an example of the substitution property of equality.

subtraction property of equality

The subtraction property of equality states: If a, b, and c are real numbers and $a = b$, then $a - c = b - c$.

Example

If $x + 5 = 7$, then $x + 5 - 5 = 7 - 5$, or $x = 2$ is an example of the subtraction property of equality.

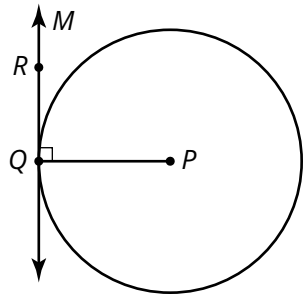
T

tangent

A tangent to a circle is a line that intersects a circle in exactly one point, called the *point of tangency*.

Example

Line M is a tangent to circle P and point Q is the point of tangency.



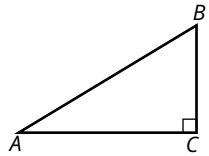
tangent (tan)
[tangente]

The tangent (tan) of an acute angle in a right triangle is the ratio of the length of the opposite side of the reference angle to the length of the adjacent side of the reference angle.

Example

In $\triangle ABC$, the tangent of $\angle A$ is:

$$\tan A = \frac{\text{length of opposite side of } \angle A}{\text{length of adjacent side of } \angle A} = \frac{BC}{AC}$$



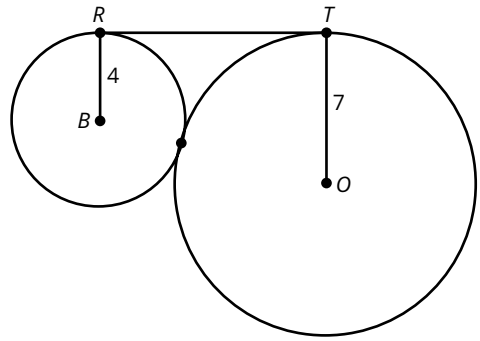
The expression "tan A" means "the tangent of angle A."

tangent circles
[círculos tangentes]

Tangent circles are circles that lie in the same plane and intersect at exactly one point.

Example

Circles O and B are tangent circles.



theorem

A theorem is a statement that can be demonstrated to be true by accepted mathematical operations and arguments.

Example

The Pythagorean Theorem states that if a right triangle has legs of lengths a and b and hypotenuse of length c, then $a^2 + b^2 + c^2$.

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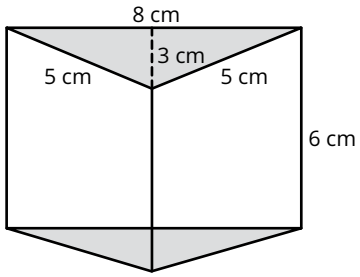
total surface area
[área de superficie total]

The total surface area of a three-dimensional figure is the sum of the areas of its bases and lateral faces.

Example

The total surface area of the right triangular prism is 132 square centimeters.

$$\begin{aligned}\text{Total surface area} &= (5 \times 6) + (5 \times 6) + \\ &\quad (8 \times 6) + \tfrac{1}{2}(8 \times 3) + \\ &\quad \tfrac{1}{2}(8 \times 3) \\ &= 30 + 30 + 48 + 12 + 12 \\ &= 132\end{aligned}$$

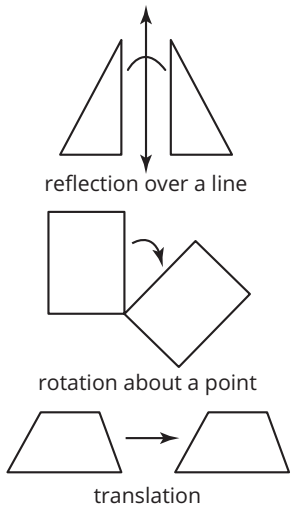


transformation
[transformación]

A transformation is the mapping, or movement, of the points of a figure on a plane according to a common action or operation.

Example

Reflection, rotation, and translation are types of transformations.



transitive property of equality
[propiedad transitiva de la igualdad]

The transitive property of equality states: "If a, b, and c are real numbers and $a = b$, and $b = c$, then $a = c$.

Example

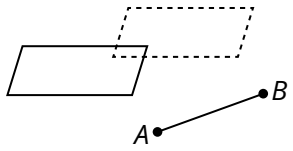
If $x = y$ and $y = 2$, then $x = 2$ is an example of the transitive property of equality.

translation

A translation is a function, which takes as its input a set of pre-image points and outputs a set of image points.

Example

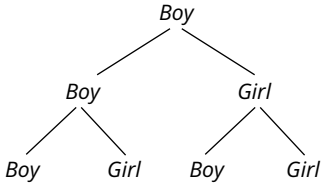
The solid parallelogram is translated a distance equal to AB in the direction of $\overline{AB}$ to form the dashed parallelogram.



tree diagram

A tree diagram is a visual model for determining the sample space of multiple events.

Example



two-column proof
[prueba de dos columnas]

A two-column proof is a proof in which the steps are written in the left column and the corresponding reasons are written in the right column. Each step and corresponding reason are numbered.

Example

The proof shown is a two-column proof.

Statements	Reasons
1. $\angle 1$ and $\angle 3$ are vertical angles.	1. Given
2. $\angle 1$ and $\angle 2$ form a linear pair. $\angle 2$ and $\angle 3$ form a linear pair.	2. Definition of linear pair
3. $\angle 1$ and $\angle 2$ are supplementary. $\angle 2$ and $\angle 3$ are supplementary.	3. Linear Pair Postulate
4. $\angle 1 \cong \angle 3$	4. Congruent Supplement Theorem

two-way frequency table
[transformación]

A two-way frequency table shows the number of data points and their frequencies for two variables. One variable is divided into rows, and the other is divided into columns.

Example

The two-way frequency table shows the hand(s) favored by people who do and do not participate in individual or team sports.

		Sports Participation			
		Individual	**Team**	**Does Not Play**	**Total**
Favored Hand	**Left**	3	13	8	24
	Right	6	23	4	33
	Mixed	1	3	2	6
	Total	10	39	14	63

two-way relative frequency table

A two-way relative frequency table displays the relative frequencies for two categories of data.

Example

The two-way relative frequency table shows the hand(s) favored by people who do and do not participate in individual or team sports.

	Individual	Team	Does Not Play	Total
Left	$\frac{3}{63} \approx 4.8\%$	$\frac{13}{63} \approx 20.6\%$	$\frac{8}{63} \approx 12.7\%$	$\frac{24}{63} \approx 38.1\%$
Right	$\frac{6}{63} \approx 9.5\%$	$\frac{23}{63} \approx 36.5\%$	$\frac{4}{63} \approx 6.3\%$	$\frac{33}{63} \approx 52.4\%$
Mixed	$\frac{1}{63} \approx 1.6\%$	$\frac{3}{63} \approx 4.8\%$	$\frac{2}{63} \approx 3.2\%$	$\frac{6}{63} \approx 9.5\%$
Total	$\frac{10}{63} \approx 15.9\%$	$\frac{39}{63} \approx 61.9\%$	$\frac{14}{63} \approx 22.2\%$	$\frac{63}{63} = 100\%$

two-way table

A two-way table shows the relationship between two data sets, one data set is organized in rows and the other data set is organized in columns.

Example

The two-way table shows all the possible sums that result from rolling two number cubes once.

		2nd Number Cube					
		1	**2**	**3**	**4**	**5**	**6**
1st Number Cube	**1**	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

U

uniform probability model
[modelo de probabilidad uniforme]

In a uniform probability model, the probabilities for each outcome are equal.

Example

Rolling a number cube represents a uniform probability model because the probability of rolling each number is equal.

union of sets

A union of sets is a set formed by combining all the members of the sets. A member is listed only once.

Example

Let B represent the set of students in the 11th grade band. Let C represent the set of students in the 11th grade chorus. The union of these two sets would be all the students in the 11th grade band or the 11th grade chorus. A student in both would be listed only once.

V

validity
[validez]

The validity of a conditional statement is whether the statement is true or false.

Example

If a triangle has a right angle, then it is a right triangle.

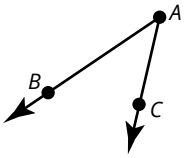
The validity of this statement is true.

vertex of an angle
[vértice de un ángulo]

The vertex of an angle is the common endpoint that the two rays of the angle share.

Example

Point A is the vertex of $\angle BAC$.



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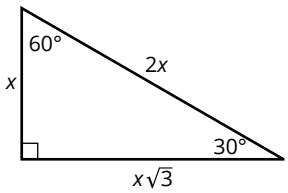
Postulates and Theorems

30°-60°-90° triangle theorem
[teorema del triángulo 30°-60°-90°]

The 30°-60°-90° triangle theorem states: "The length of the hypotenuse in a 30°-60°-90° triangle is 2 times the length of the shorter leg, and the length of the longer leg is $\sqrt{3}$ times the length of the shorter leg."

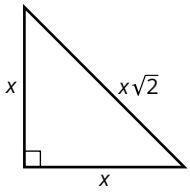
Example



45°-45°-90° triangle theorem
[teorema del triángulo 45°–45°–90°]

The 45°-45°-90° triangle theorem states: "The length of the hypotenuse in a 45°-45°-90° triangle is $\sqrt{2}$ times the length of a leg."

Example

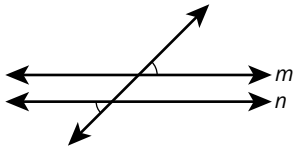


alternate exterior angles converse theorem

The alternate exterior angles converse theorem states: "If two lines intersected by a transversal form congruent alternate exterior angles, then the lines are parallel."

Example

Lines *m* and *n* are parallel.

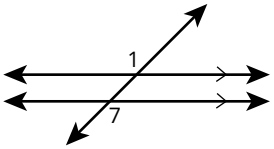


alternate exterior angles theorem
[teorema de los ángulos exteriores alternos]

The alternate exterior angles theorem states: "If two parallel lines are intersected by a transversal, then the alternate exterior angles are congruent."

Example

Angles 1 and 7 are congruent.

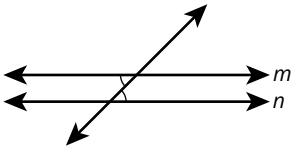


alternate interior angles converse theorem

The alternate interior angles converse theorem states: "If two lines intersected by a transversal form congruent alternate interior angles, then the lines are parallel."

Example

Lines *m* and *n* are parallel.

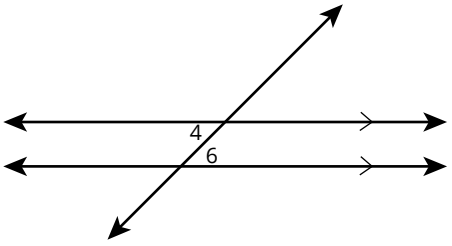


alternate interior angles theorem
[teorema de los ángulos interiores alternos]

The alternate interior angles theorem states: "If two parallel lines are intersected by a transversal, then the alternate interior angles are congruent."

Example

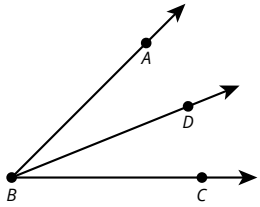
Angles 4 and 6 are congruent.



angle addition postulate

The angle addition postulate states: "If point D lies in the interior of $\angle ABC$, then $m\angle ABD + m\angle DBC = m\angle ABC$."

Example

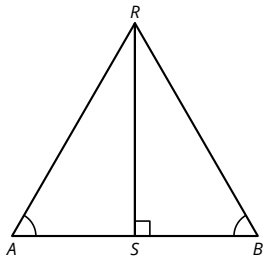


Angle-Angle-Side congruence theorem

The Angle-Angle-Side (AAS) congruence theorem states: "If two angles and the non-included side of one triangle are congruent to two angles and the non-included side of another triangle, then the two triangles are congruent."

Example

$\triangle ARS \cong \triangle BRS$ by the AAS congruence theorem

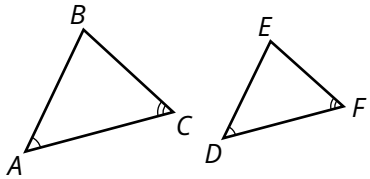


Angle-Angle (AA) similarity theorem

The Angle-Angle (AA) similarity theorem states: "If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar."

Example

$\triangle ABC \sim \triangle DEF$

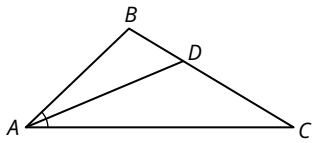


angle bisector/proportional side theorem [teorema de la bisectriz del ángulo/lado proporcional]

The angle bisector/proportional side theorem states: "A bisector of an angle in a triangle divides the opposite side into two segments whose lengths are in the same ratio as the lengths of the sides adjacent to the angle."

Example

$\frac{AB}{AC} = \frac{BD}{DC}$

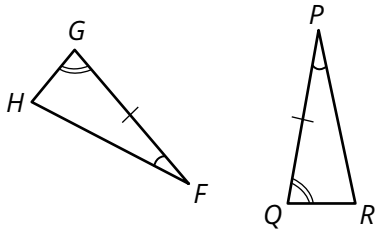


Angle-Side-Angle congruence theorem

The Angle-Side-Angle congruence theorem (ASA) states: "If two angles and the included side of one triangle are congruent to the corresponding two angles and the included side of another triangle, then the triangles are congruent."

Example

$\triangle FGH \cong \triangle PQR$ by the ASA congruence theorem

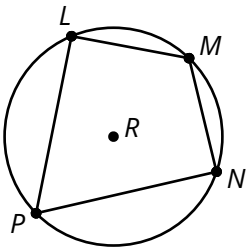


arc addition postulate

The arc addition postulate states: "The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs."

Example

$\overset{\frown}{LM} + \overset{\frown}{MN} = \overset{\frown}{LN}$

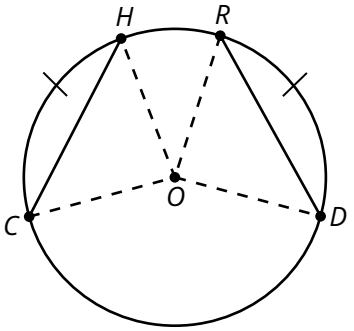


congruent chord-congruent arc converse theorem

The congruent chord-congruent arc converse theorem states: "If arcs of the same circle or congruent circles are congruent, then their corresponding chords are congruent."

Example

$\overline{CH} \cong \overline{DR}$

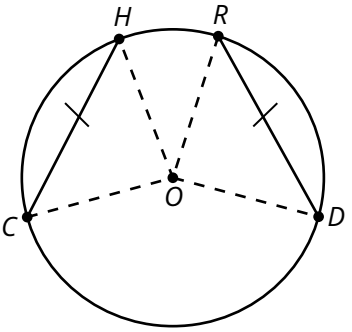


congruent chord-congruent arc theorem

The congruent chord-congruent arc theorem states: "If two chords of the same circle or congruent circles are congruent, then their corresponding arcs are congruent."

Example

$\overset{\frown}{CH} \cong \overset{\frown}{DR}$



congruent supplements theorem

The congruent supplements theorem states: "If two angles are supplements of the same angle or of congruent angles, then the angles are congruent."

Example

Given: $\angle 2 \cong \angle 4$

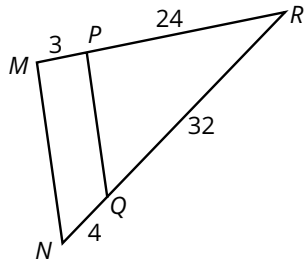
Since $\angle 1$ is supplementary to $\angle 2$, $\angle 3$ is supplementary to $\angle 4$, and it is given that $\angle 2 \cong \angle 4$, then by the congruent supplements theorem $\angle 1 \cong \angle 3$.

converse of the Triangle Proportionality theorem

The converse of the Triangle Proportionality theorem is also true. It states:"If a line divides two sides of a triangle proportionally, then it is parallel to the third side."

Example

$\overline{MN} \parallel \overline{PQ}$

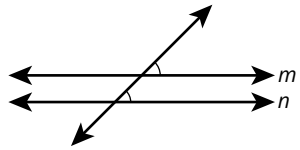


corresponding angles converse theorem

The corresponding angles converse theorem states: "If two lines intersected by a transversal form congruent corresponding angles, then the lines are parallel."

Example

Lines *m* and *n* are parallel.

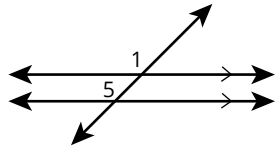


corresponding angles theorem
[teorema de los ángulos correspondientes]

The corresponding angles theorem states: "If two parallel lines are intersected by a transversal, then corresponding angles are congruent."

Example

Corresponding angles 1 and 5 are congruent.

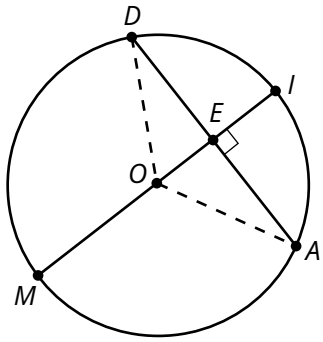


diameter-chord theorem

The diameter-chord theorem states: "If a circle's diameter is perpendicular to a chord, then the diameter bisects the chord and bisects the arc determined by the chord."

Example

$\overline{MI}$ bisects $\overline{DA}$ and $\overline{MI}$ bisects $\overset{\frown}{DIA}$.

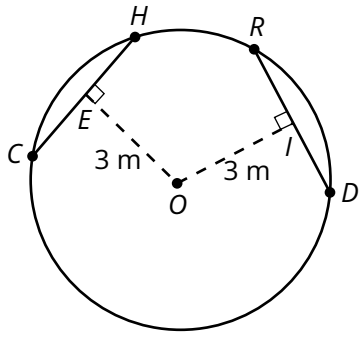


equidistant chord converse theorem

The equidistant chord converse theorem states: "If two chords of the same circle or congruent circles are equidistant from the center of the circle, then the chords are congruent."

Example

$\overline{CH} \cong \overline{DR}$



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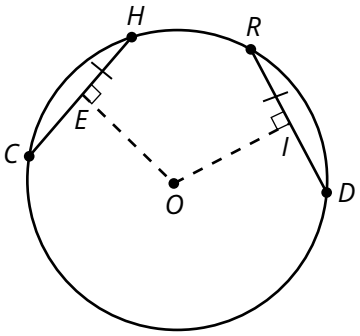
equidistant chord theorem
[teorema de las cuerdas equidistantes]

The equidistant chord theorem states: "If two chords of the same circle or congruent circles are congruent, then they are equidistant from the center of the circle."

Example

$EO = IO$

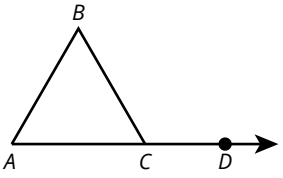


exterior angle theorem
[teorema del ángulo exterior]

The exterior angle theorem states: "The measure of an exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles."

Example

$m\angle A + m\angle B = m\angle DCB$

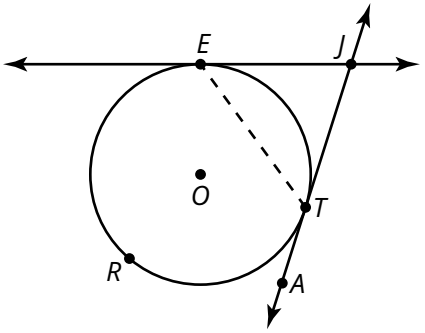


exterior angles of a circle theorem
[teorema de los ángulos exteriores de un círculo]

The exterior angles of a circle theorem states: "If an angle is formed by two intersecting chords or secants of a circle such that the vertex of the angle is in the exterior of the circle, then the measure of the angle is half of the difference of the measures of the arcs intercepted by the angle."

Example

$m\angle EJT = \frac{1}{2}(m\overset{\frown}{ERT} - m\overset{\frown}{ET})$

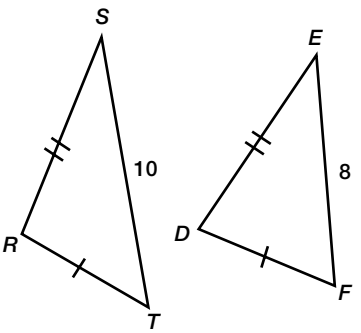


hinge converse theorem

The hinge converse theorem states: "If two sides of one triangle are congruent to two sides of another triangle and the third side of the first triangle is longer than the third side of the second triangle, then the included angle of the first pair of sides is larger than the included angle of the second pair of sides."

Example

In the two triangles shown, notice that $RT = DF$, $RS = DE$, and $ST > EF$. The hinge converse theorem guarantees that $m\angle R > m\angle D$.



hinge theorem

The hinge theorem states: "If two sides of one triangle are congruent to two sides of another triangle, and the included angle of the first pair is larger than the included angle of the second pair, then the third side of the first triangle is longer than the third side of the second triangle."

Example

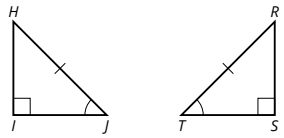
In the two triangles shown, notice that $RS = DE$, $ST = EF$, and $\angle S > \angle E$. The hinge theorem says that $RT > DF$.

Hypotenuse Angle congruence theorem
[Teorema de congruencia del ángulo hipotenusa]

The Hypotenuse-Angle (HA) congruence theorem states: "If the hypotenuse and an acute angle of one right triangle are congruent to the hypotenuse and an acute angle of another right triangle, then the two triangles are congruent."

Example

$\triangle HIJ \cong \triangle RST$ by the HA congruence theorem

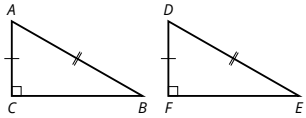


Hypotenuse-Leg (HL) congruence theorem

The Hypotenuse-Leg (HL) congruence theorem states: "If the hypotenuse and leg of one right triangle are congruent to the hypotenuse and leg of another right triangle, then the triangles are congruent."

Example

$\triangle ABC \cong \triangle DEF$

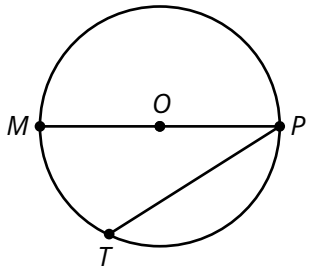


inscribed angle theorem
[teorema del ángulo inscrito]

The inscribed angle theorem states: "The measure of an inscribed angle is half the measure of its intercepted arc."

Example

$m\angle MPT = \frac{1}{2}m\overset{\frown}{MT}$

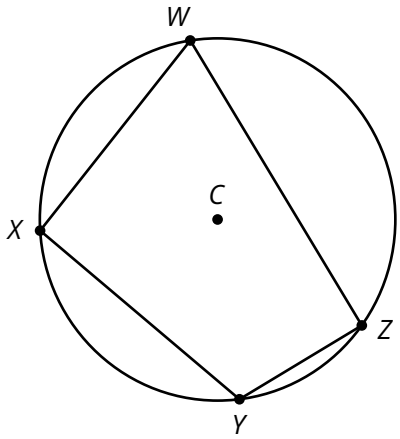


inscribed quadrilateral-opposite angles theorem

The inscribed quadrilateral-opposite angles theorem states: "If a quadrilateral is inscribed in a circle, then the opposite angles are supplementary."

Example

Angles W and Y are supplementary. Angles X and Z are supplementary.

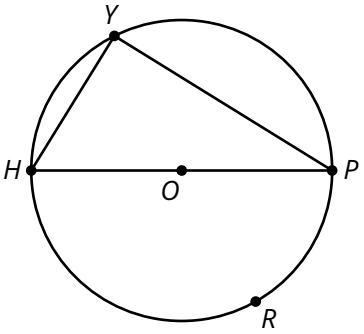


inscribed right triangle–diameter theorem

The inscribed right triangle-diameter theorem states: "If a triangle is inscribed in a circle such that one side of the triangle is a diameter of the circle, then the triangle is a right triangle."

Example

$\overline{HP}$ is the diameter of the circle. So, $\triangle HYP$ is a right triangle.

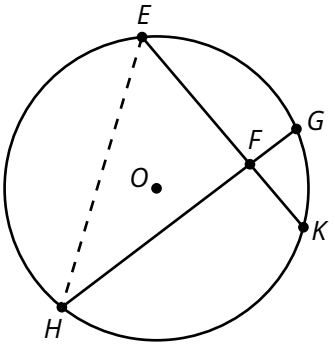


interior angles of a circle theorem
[teorema de los ángulos interiores de un círculo]

The interior angles of a circle theorem states: "If an angle is formed by two intersecting chords or secants of a circle such that the vertex of the angle is in the interior of the circle, then the measure of the angle is half of the sum of the measures of the arcs intercepted by the angle and its vertical angle."

Example

$m\angle KFH = \frac{1}{2}(m\overset{\frown}{HK} - m\overset{\frown}{EG})$

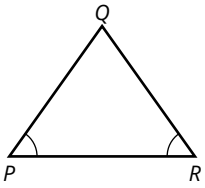


isosceles triangle base angles converse theorem

The isosceles triangle base angles converse theorem states: "If two angles of a triangle are congruent, then the sides opposite these angles are congruent."

Example

$\overline{PQ} \cong \overline{RQ}$

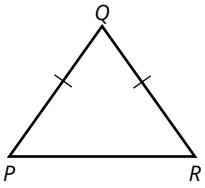


isosceles triangle base angles theorem
[teorema de los ángulos de la base del triángulo isósceles]

The isosceles triangle base angles theorem states: "If two sides of a triangle are congruent, then the angles opposite these sides are congruent."

Example

Angles P and R are congruent.

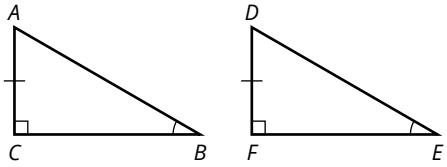


Leg-Angle (LA) congruence theorem

The Leg-Angle (LA) congruence theorem states: "If the leg and an acute angle of one right triangle are congruent to the corresponding leg and acute angle of another right triangle, then the triangles are congruent."

Example

$\triangle ABC \cong \triangle DEF$

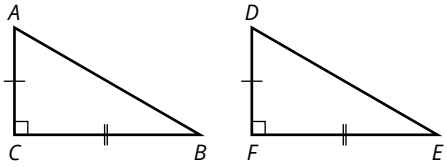


Leg-Leg (LL) congruence theorem

The Leg-Leg (LL) congruence theorem states: "If the two corresponding shorter legs of two right triangles are congruent, then the two triangles are congruent."

Example

$\triangle ABC \cong \triangle DEF$

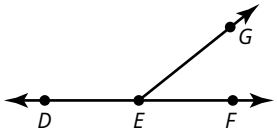


linear pair postulate
[postulado del par lineal]

The linear pair postulate states: "If two angles form a linear pair, then the angles are supplementary."

Example

$\angle DEG$ and $\angle GEF$ form a linear pair.

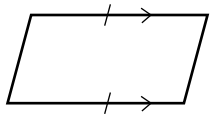


parallelogram/congruent-parallel sides theorem

The parallel/congruent-parallel sides theorem states: "If one pair of opposite sides of a quadrilateral is both congruent and parallel, then the quadrilateral is a parallelogram."

Example

The quadrilateral is a parallelogram.

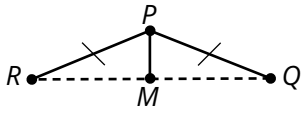


perpendicular bisector converse theorem

The perpendicular bisector converse theorem states: "If a point is equidistant from the endpoints of a line segment, then the point lies on the perpendicular bisector of the segment."

Example

Point P lies on the perpendicular bisector of $\overline{QR}$.

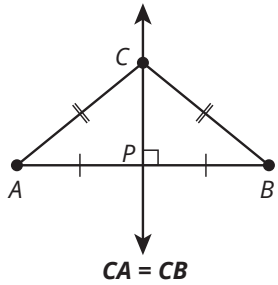


perpendicular bisector theorem
[teorema de la bisectriz perpendicular]

The perpendicular bisector theorem states: "Any point on the perpendicular bisector of a segment is equidistant from the endpoints of that segment."

Example

$\overleftrightarrow{CP}$ is a perpendicular bisector of $\overline{AB}$.

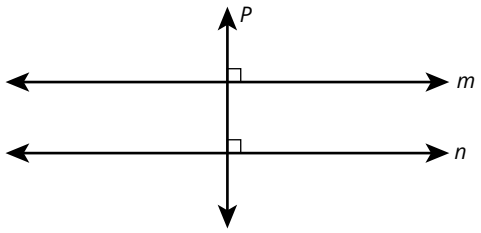


perpendicular/parallel line theorem
[teorema de líneas perpendiculares y paralelas]

The perpendicular/parallel line theorem states: "If two lines are perpendicular to the same line, then the two lines are parallel to each other."

Example

Lines m and n are parallel.

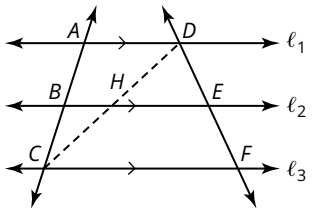


proportional segments theorem
[teorema de segmentos proporcionales]

The proportional segments theorem states: "If three parallel lines intersect two transversals, then they divide the transversals proportionally."

Example

$\frac{AB}{BC} = \frac{DE}{EF}$

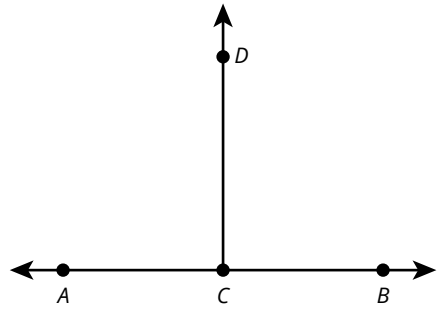


right angle congruence postulate

The right angle congruence postulate states: "All right angles are congruent."

Example

Since $\angle ACD$ and $\angle BCD$ are right angles, $\angle ACD \cong \angle BCD$ by the right angle congruence postulate.

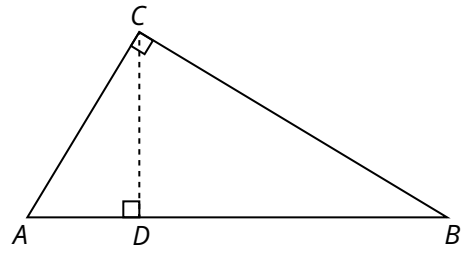


right triangle altitude/hypotenuse theorem

The right triangle altitude/hypotenuse theorem states: "The measure of the altitude drawn from the vertex of the right angle of a right triangle to its hypotenuse is the geometric mean between the measures of the two segments of the hypotenuse."

Example

$\frac{AD}{CD} = \frac{CD}{DB}$



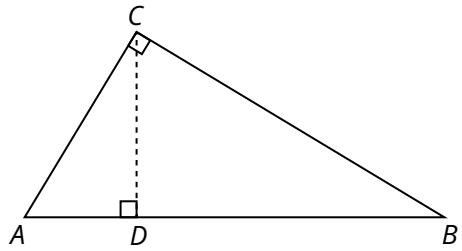
right triangle altitude/leg theorem

The right triangle altitude/leg theorem states: "If the altitude is drawn to the hypotenuse of a right triangle, each leg of the right triangle is the geometric mean of the hypotenuse and the segment of the hypotenuse adjacent to the leg."

Example

The proportion for leg $\overline{AC}$ is $\frac{AB}{AC} = \frac{AC}{AD}$.

The proportion for leg $\overline{BC}$ is $\frac{AB}{BC} = \frac{BC}{BD}$.

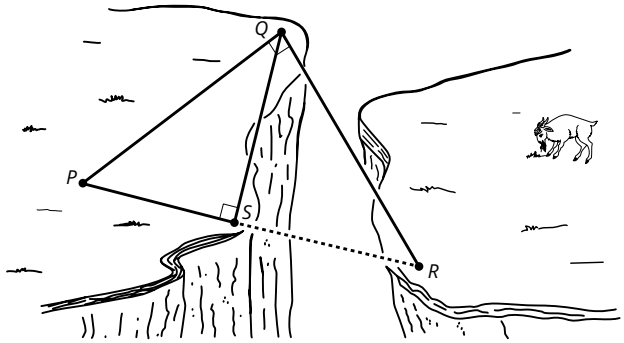


right triangle/altitude similarity theorem

The right triangle/altitude similarity theorem states: "If an altitude is drawn to the hypotenuse of a right triangle, then the two triangles formed are similar to the original triangle and to each other."

Example

$\triangle PRQ \sim \triangle PQS \sim \triangle QRS$

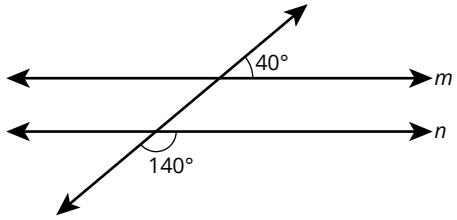


same-side exterior angles converse theorem

The same-side exterior angles converse theorem states: "If two lines intersected by a transversal form supplementary same-side exterior angles, then the lines are parallel."

Example

Lines *m* and *n* are parallel.

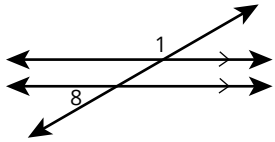


same-side exterior angles theorem

The same-side exterior angles theorem states: "If two parallel lines are intersected by a transversal, then the same-side exterior angles are supplementary."

Example

Angles 1 and 8 are supplementary.

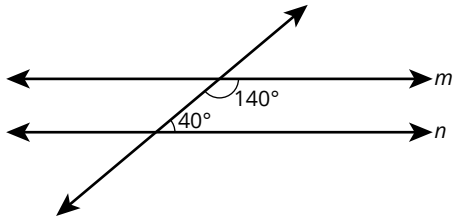


same-side interior angles converse theorem

The same-side interior angles converse theorem states: "If two lines intersected by a transversal form supplementary same-side interior angles, then the lines are parallel."

Example

Lines *m* and *n* are parallel.



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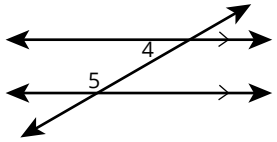
same-side interior angles theorem

The same-side interior angles theorem states, "If two parallel lines are intersected by a transversal, then the interior angles on the same side of the transversal are supplementary."

Example

Angles 4 and 5 are supplementary.

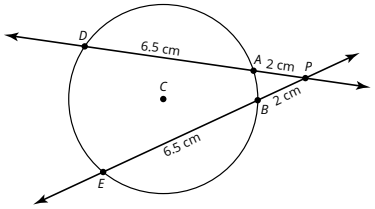


secant segment theorem
[teorema del segmento secante]

The secant segment theorem states: "If two secants intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the product of the lengths of the second secant segment and its external secant segment"

Example

$DA \cdot AP = EB \cdot BP$

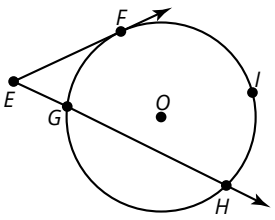


secant tangent theorem
[teorema de la sacante y la tangente]

The secant tangent theorem states: "If a tangent and a secant intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the square of the length of the tangent segment."

Example

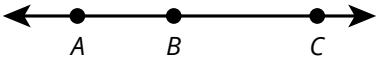
$EG \cdot GH = EF^2$



segment addition postulate

The segment addition postulate states: "If point B is on $\overline{AC}$ and between points A and C, then $AB + BC = AC$."

Example



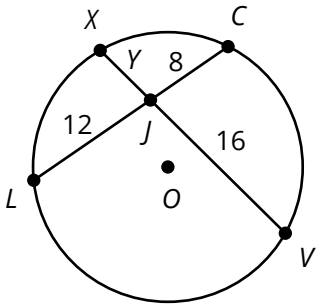
segment chord theorem
[teorema del segmentocuerda]

The segment chord theorem states that "If two chords in a circle intersect, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the second chord."

Example

$XJ \cdot JV = CJ \cdot JL$

$y \cdot 16 = 8 \cdot 12$

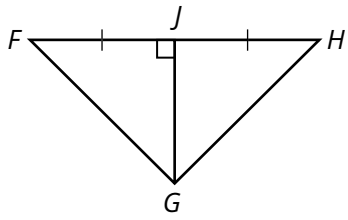


Side-Angle-Side congruence theorem

The Side-Angle-Side congruence theorem (SAS) states: "If two sides and the included angle of one triangle are congruent to the corresponding two sides and the included angle of a second triangle, then the triangles are congruent."

Example

$\triangle FJG \cong \triangle HJG$ by the SAS congruence theorem

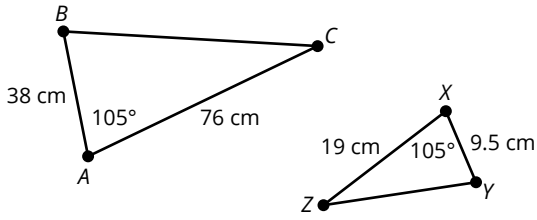


Side-Angle-Side (SAS) similarity theorem

The Side-Angle-Side (SAS) similarity theorem states: "If two of the corresponding sides of two triangles are proportional and the included angles are congruent, then the triangles are similar."

Example

$\triangle ABC \sim \triangle XYZ$

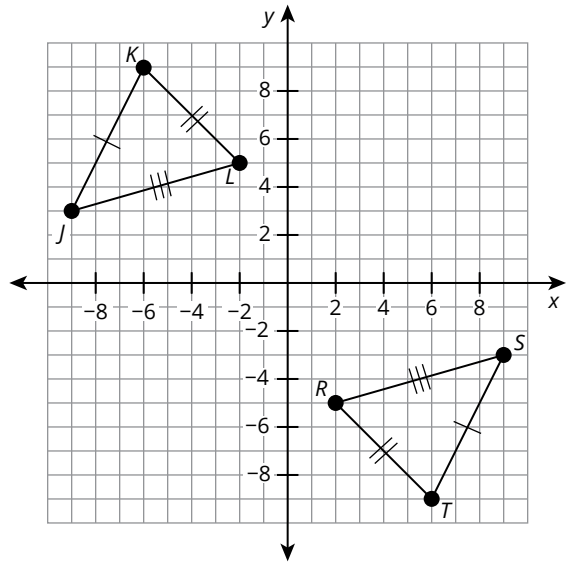


Side-Side-Side congruence theorem

The Side-Side-Side congruence theorem (SSS) states: "If three sides of one triangle are congruent to the corresponding sides of another triangle, then the triangles are congruent."

Example

$\triangle JKL \cong \triangle STR$ by the SSS congruence theorem.

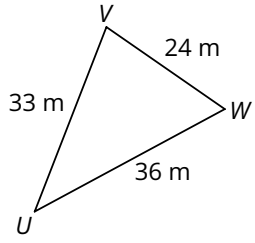


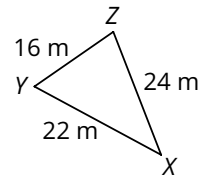
Side-Side-Side (SSS) similarity theorem

The Side-Side-Side (SSS) similarity theorem states: "If all three corresponding sides of two triangles are proportional, then the triangles are similar."

Example

$\triangle UVW \sim \triangle XYZ$



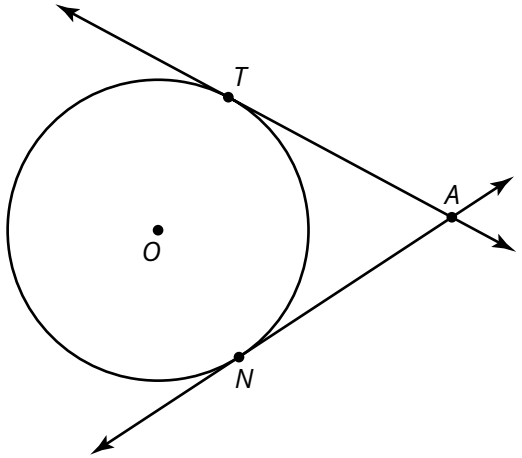


tangent segment theorem
[teorema del segmento tangente]

The tangent segment theorem states: "If two tangent segments are drawn from the same point on the exterior of a circle, then the tangent segments are congruent."

Example

$\overline{AT} \cong \overline{AN}$

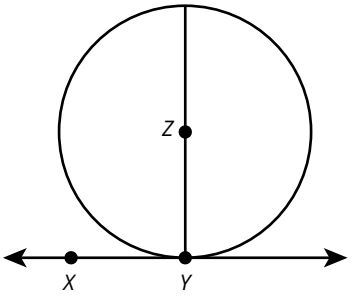


tangent to a circle theorem
[teorema de la tangente a un círculo]

The tangent to a circle theorem states: "A line drawn tangent to a circle is perpendicular to a radius of the circle drawn to the point of tangency."

Example

Radius $\overline{ZY}$ is perpendicular to tangent $\overline{XY}$.



trapezoid midsegment theorem
[teorema del segmento medio del trapecio]

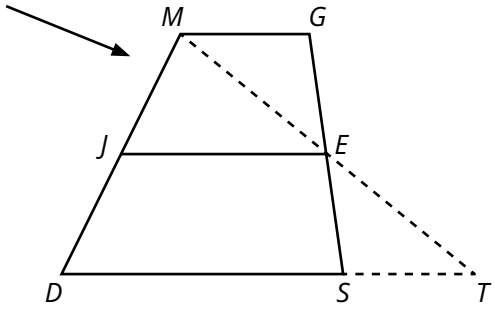
The trapezoid midsegment theorem states: "The midsegment that connects the legs of a trapezoid is parallel to each of the bases and its length is one half the sum of the lengths of the bases."

Example

$\overline{JE} \parallel \overline{MG}$ and $\overline{JE} \parallel \overline{DS}$

$JE = \frac{1}{2}(MG + DS)$

midsegment $\overline{JE}$



Triangle Inequality theorem
[Teorema de la desigualdad triangular]

The Triangle Inequality theorem states that the sum of the lengths of any two sides of a triangle is always greater than the length of the third side.

Example

When two sides of a triangle measure 8 meters and 15 meters, the measure of the third side is between 7 meters and 23 meters not including 7 meters and 23 meters according to the Triangle Inequality theorem.

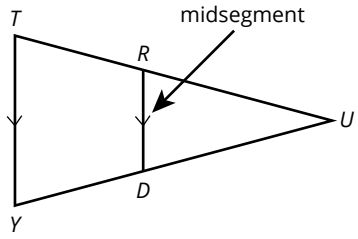
15 meters −8 meters or 7 meters < third side measure < 8 meters + 15 meters or 23 meters

triangle midsegment theorem
[Teorema del segmento medio del triángulo]

The triangle midsegment theorem states: "The midsegment of a triangle is parallel to the third side of the triangle and is half the measure of the third side of the triangle."

Example

$TY = \frac{1}{2}RD$

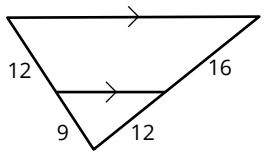


Triangle Proportionality theorem
[teorema de proporcionalidad del triángulo]

The Triangle Proportionality theorem states: "If a line parallel to one side of a triangle intersects the other two sides, then it divides the two sides proportionally."

Example

$\frac{9}{12} = \frac{12}{16}$

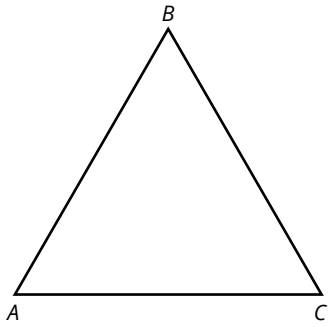


triangle sum theorem
[teorema de la suma del triángulo]

The triangle sum theorem states: "The sum of the measures of the interior angles of a triangle is equal to 180°."

Example

$m\angle A + m\angle B + m\angle C = 180°$

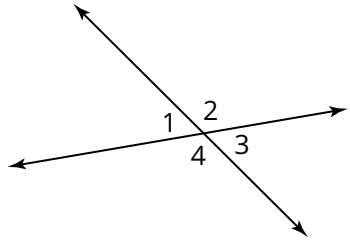


vertical angle theorem

The vertical angle theorem states: "Vertical angles are congruent."

Example

$\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$ by the vertical angle theorem.



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