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**Access**

**Geometry**

**(#7912065)**

**Course Standards**

[MA.912.GR.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15676) Prove relationships and theorems about lines and angles. Solve mathematical and real-world problems involving postulates, relationships and theorems of lines and angles.

**Clarifications:**
*Clarification 1*: Postulates, relationships and theorems include vertical angles are congruent; when a transversal crosses parallel lines, the consecutive angles are supplementary and alternate (interior and exterior) angles and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.

C*larification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs.

*Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.1.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18353) | Use the relationships and theorems about lines and angles to solve mathematical or real-world problems involving postulates, relationships and theorems of lines and angles. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: acute angle, obtuse angle, right angle, straight angle, vertical angles, parallel lines, perpendicular lines, adjacent angles, alternate interior angles, congruent angles, transversal, vertex, ray, protractor, supplementary angles, complimentary angles, horizontal lines, vertical lines
* Understand that a protractor can be used to show that angles are supplementary (equals 180 degrees)
* Understand that a protractor can be used to show that angles are equal
* Understand that the angle measure of a straight line is 180 degrees
* Understand that vertical angles, adjacent angles, and supplementary angles are formed when given a set of parallel lines cut by a third line called a transversal
* Understand that two angles can be supplementary (two angles that added together equal 180 degrees) or complimentary (two angles that added together equal 90 degrees)

Understand that pairs of congruent angles are formed when given a set of parallel lines cut by a transversalUnderstand that alternate interior angles are formed when given a set of parallel lines cut by a transversal* Understand that there are several types of angles, included but not limited to: acute angle, right angle, obtuse angle, straight angle
* Understand that there are several types of lines, included but not limited to: Parallel lines, perpendicular lines, intersecting lines, vertical line, horizontal line, transversal line
* Understand that a line must contain at least two points
* Understand that an angle is formed when two rays intersect at a point called the vertex
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| Resources: |  |  |  |  |

[MA.912.GR.1.2:](https://www.cpalms.org//PreviewStandard/Preview/15677) Prove triangle congruence or similarity using Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg.

**Clarifications:**
*Clarification 1*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs.

*Clarification 2*: Instruction focuses on helping a student choose a method they can use reliably.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.1.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18354) | Identify the triangle congruence or similarity criteria; Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: congruent triangles, similar triangles, congruent angles, proportion, side-side-side (SSS), side-angle-side (SAS), angle-side-angle (ASA), angle-angle-side (AAS) and hypotenuse-leg (HL), angle-angle (AA)
* Understand that two congruent triangles are two triangles that are the same shape and same size
* Understand that two similar triangles are two triangles whose sides are in proportion to each other, and their angles are congruent
* Understand that the following can be used to prove that two triangles are congruent: side-side-side (SSS), side-angle-side (SAS), angle-side-angle (ASA), angle-angle-side (AAS) and hypotenuse-leg (HL)
* Understand that the following can be used to prove that two triangles are similar: angle-angle (AA), side-angle-side (SAS), and side-side-side (SSS)
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| Resources: |  |  |  |  |

[MA.912.GR.1.3:](https://www.cpalms.org//PreviewStandard/Preview/15678) Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles.

**Clarifications:**
*Clarification 1*: Postulates, relationships and theorems include measures of interior angles of a triangle sum to 180°; measures of a set of exterior angles of a triangle sum to 360°; triangle inequality theorem; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

*Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs.

*Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.1.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18355)  | Use the relationships and theorems about triangles. Solve mathematical and/or real-world problems involving postulates, relationships and theorems of triangles. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: triangle, polygon, sides, angles, interior angles, equilateral triangle, isosceles triangle, scalene triangle, right triangle, acute triangle, obtuse triangle, congruent triangle, similar triangle, congruent angle, proportion
* Understand that a triangle is a polygon which consists of three sides
* Understand that a triangle consists of three angles
* Understand that when adding the three interior angles of a triangle the sum of the angles is 180 degrees
* Understand that triangles can be named by their sides: equilateral, isosceles, scalene
* Understand that triangles can be names by their angles: right triangle, acute triangle, obtuse triangle
* Understand that two congruent triangles are two triangles that are the same shape and same size
* Understand that two similar triangles are two triangles whose sides are in proportion to each other, and their angles are congruent
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| Resources: |  |  |  |  |

[MA.912.GR.1.4:](https://www.cpalms.org//PreviewStandard/Preview/15679) Prove relationships and theorems about parallelograms. Solve mathematical and real-world problems involving postulates, relationships and theorems of parallelograms.

**Clarifications:**
*Clarification 1*: Postulates, relationships and theorems include opposite sides are congruent, consecutive angles are supplementary, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and rectangles are parallelograms with congruent diagonals.

*Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs.

*Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.1.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18356) | Use the relationships and theorems about parallelograms. Solve mathematical and/or real-world problems involving postulates, relationships and theorems of parallelograms. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: quadrilateral, parallelogram, opposite sides, parallel, congruent, consecutive angles, supplementary angles, bisect, diagonals, congruent triangles, polygons
* Understand that parallel lines are lines that do not cross and are the same distance from each other
* Understand that a quadrilateral is a polygon which has four sides and four angles
* Understand that a parallelogram is a special type of quadrilateral
* Understand that a parallelogram has opposite sides that are parallel
* Understand that the opposite angles of a parallelogram are congruent
* Understand that consecutive angles of a parallelogram are supplementary
* Understand that diagonals bisect each other
* Understand that diagonals of a parallelogram form two congruent triangles
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| Resources: |  |  |  |  |

[MA.912.GR.1.5:](https://www.cpalms.org//PreviewStandard/Preview/15680) Prove relationships and theorems about trapezoids. Solve mathematical and real-world problems involving postulates, relationships and theorems of trapezoids.

**Clarifications:**
*Clarification 1*: Postulates, relationships and theorems include the Trapezoid Midsegment Theorem and for isosceles trapezoids: base angles are congruent, opposite angles are supplementary and diagonals are congruent.

*Clarification 2*: Instruction includes constructing two-column proofs, pictorial proofs, paragraph and narrative proofs, flow chart proofs or informal proofs.

*Clarification 3*: Instruction focuses on helping a student choose a method they can use reliably.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.1.AP.5:](https://www.cpalms.org/PreviewAccessPoint/Preview/18357)  | Use the relationships and theorems about trapezoids. Solve mathematical and/or real-world problems involving postulates, relationships and theorems of trapezoids. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: trapezoid, parallel lines, polygon, quadrilateral, isosceles trapezoid, congruent, supplementary angles, diagonals, opposite angles, base angles
* Understand that parallel lines are lines that do not cross and are the same distance from each other
* Understand that a quadrilateral is a polygon which has four sides and four angles
* Understand that a trapezoid is a special type of quadrilateral
* Understand that a trapezoid consists of at least one pair of parallel sides
* Understand that a trapezoid can be an isosceles trapezoid (legs are the same length)
* Understand that in an isosceles trapezoid the diagonals are congruent
* Understand in an isosceles trapezoid the opposite angles are supplementary
* Understand that in an isosceles trapezoid the base angles are congruent
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| Resources: |  |  |  |  |

[MA.912.GR.1.6:](https://www.cpalms.org//PreviewStandard/Preview/15681) Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures.

**Clarifications:**
*Clarification 1:* Instruction includes demonstrating that two-dimensional figures are congruent or similar based on given information.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.1.AP.6:](https://www.cpalms.org/PreviewAccessPoint/Preview/18358) | Use the definitions of congruent or similar figures to solve mathematical and/or real-world problems involving two-dimensional figures. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: two-dimensional figures, congruent, similar, proportion, angles, multiplication, cross multiplication, fractions
* Understand that tools can be used to show that sides and angles are congruent (ruler, gridded paper, protractor, etc.)
* Understand basic multiplication of two numbers
* Understand that cross multiplication can be used to show that two fractions are proportional
* Understand that two congruent two-dimensional figures are figures that are the same shape and size
* Understand that two similar two-dimensional figures are two figures whose sides are in proportion to each other, and their angles are congruent
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| Resources: |  |  |  |  |

[MA.912.GR.2.1:](https://www.cpalms.org//PreviewStandard/Preview/15682) Given a preimage and image, describe the transformation and represent the transformation algebraically using coordinates.

**Clarifications:**
*Clarification 1*: Instruction includes the connection of transformations to functions that take points in the plane as inputs and give other points in the plane as outputs.\*Clarification 2*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates.

*Clarification 3*: Within the Geometry course, rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation, and the centers of rotations and dilations are limited to the origin or a point on the figure.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.2.AP.1a:](https://www.cpalms.org/PreviewAccessPoint/Preview/18359) | Given a preimage and image, identify the transformation. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: transformation, pre-image, image, slide, flip, rotate, rotation, reflection, translation, line, axis, point, figure, up, down, right, left
* Understand that a rotation, reflection and translation is a type of a transformation
* Understand that the pre-image is the figure before the transformation
* The image is the figure after the transformation
* Understand that a translation is a slide of every point in the figure the same distance and the same direction (up, down, right, or left)
* Understand that a reflection is a flip of every point in a figure over a line, axis, point, etc.
* Understand that a rotation is a turn of every point in a figure about a point
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| Resources: |  |  |  |  |
| [MA.912.GR.2.AP.1b:](https://www.cpalms.org/PreviewAccessPoint/Preview/18360)  | Select the algebraic coordinates that represent the transformation. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: transformation, pre-image, image, slide, flip, rotate, rotation, reflection, translation, line, axis, point, figure, up, down, right, left, signs, opposite signs, x-axis, y-axis, x-coordinate, y-coordinate, addition, subtraction, counterclockwise, coordinate value, positive numbers, negative numbers
* Understand basic addition and subtraction
* Understand that negative numbers and positive numbers have opposite signs
* Understand that a rotation, reflection, and translation is a type of a transformation
* Understand that the pre-image is the figure before the transformation

The image is the figure after the transformation* Understand that a translation is a slide of every point in the figure the same distance and the same direction (up, down, right, or left)
* Understand that a reflection is a flip of every point in a figure over a line, axis, point, etc.
* Understand that a rotation is a turn of every point in a figure about a point
* Understand to reflect a point over the x-axis the y-coordinate changes signs

For example (2,1) reflected over the x-axis becomes (2,-1)* Understand to reflect a point over the y-axis the x- changes signs
* For example (2,1) reflected over coordinate the y-axis becomes (-2,1)
* Understand to translate (slide) a point right or left, a value will be added/subtracted to the x-coordinate

For example, (2,1) translated to the right 6 units (8,1)* Understand to translate (slide) a point up or down, a value will be added/subtracted to the y-coordinate

For example, (2,1) translated up 6 units (2,7)* Understand to rotate a point counterclockwise 90 degrees centered at the origin, the coordinate point will change from (x,y) to (-y,x)
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| Resources: |  |  |  |  |

[MA.912.GR.2.2:](https://www.cpalms.org//PreviewStandard/Preview/15683) Identify transformations that do or do not preserve distance.

**Clarifications:**
*Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates.

*Clarification 2*: Instruction includes recognizing that these transformations preserve angle measure.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.2.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18361)  | Select a transformation that preserves distance. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: preserve distance, transformations, translation, reflection, rotation, congruent, figure, point, slide, up, down, right, left, flip, line, axis
* Understand the following transformations preserve distance: translation, reflection, rotation
* Understand that preserve distance means the distance between the points of the figure will remain the same when a figure is transformed (The figures are congruent)
* Understand that a translation is a slide of every point in the figure the same distance and the same direction (up, down, right, or left)
* Understand that a reflection is a flip of every point in a figure over a line, axis, point, etc.
* Understand that a rotation is a turn of every point in a figure about a point
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.2.3:](https://www.cpalms.org//PreviewStandard/Preview/15684) Identify a sequence of transformations that will map a given figure onto itself or onto another congruent or similar figure.

**Clarifications:**
*Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates.

*Clarification 2*: Within the Geometry course, figures are limited to triangles and quadrilaterals and rotations are limited to 90°, 180° and 270° counterclockwise or clockwise about the center of rotation.

*Clarification 3*: Instruction includes the understanding that when a figure is mapped onto itself using a reflection, it occurs over a line of symmetry.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.2.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18362) | Identify a given sequence of transformations, that includes translations or reflections, that will map a given figure onto itself or onto another congruent figure. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: transformation, translation, reflection, slide, figure, up, down, right, left, line, axis, point, x-axis, y-axis, add, subtract, value, y-coordinate, x-coordinate, sequence, mapping a figure
* Understand that a translation is a slide of every point in the figure the same distance and the same direction (up, down, right, or left)
* Understand that a reflection is a flip of every point in a figure over a line, axis, point, etc.
* Understand to reflect a point over the x-axis the y-coordinate changes signs

For example, (2,1) reflected over the x-axis becomes (2,-1)* Understand to reflect a point over the y-axis the x- coordinate changes signs

For example, (2,1) reflected over coordinate the y-axis becomes (-2,1)* Understand to translate (slide) a point right or left, a value will be added/subtracted to the x-coordinate

For example, (2,1) translated to the right 6 units (8,1)* Understand to translate (slide) a point up or down, a value will be added/subtracted to the y-coordinate

For example, (2,1) translated up 6 units (2,7)* Understand that a sequence of transformations can be used to move a figure and then move it back on itself
* This is called mapping a figure on itself

For example, if a figure was shifted to the right and reflected over the x-axis, what steps would be needed to return the figure to its original location?* Understand that a sequence of transformations can be used to move a figure on top of a congruent figure
* This is called mapping a figure onto another figure
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| Resources: |  |  |  |  |

[MA.912.GR.2.5:](https://www.cpalms.org//PreviewStandard/Preview/15686) Given a geometric figure and a sequence of transformations, draw the transformed figure on a coordinate plane.

**Clarifications:**
*Clarification 1*: Transformations include translations, dilations, rotations and reflections described using words or using coordinates.

*Clarification 2*: Instruction includes two or more transformations.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.2.AP.5:](https://www.cpalms.org/PreviewAccessPoint/Preview/18363) | Given a geometric figure and a sequence of transformations, select the transformed figure on a coordinate plane. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: transformation, translation, reflection, rotation, slide, figure, up, down, right, left, line, axis, point, x-axis, y-axis, add, subtract, value, y-coordinate, x-coordinate, sequence, mapping a figure, coordinate plane
* Understand that a translation is a slide of every point in the figure the same distance and the same direction (up, down, right, or left)
* Understand that a reflection is a flip of every point in a figure over a line, axis, point, etc.
* Understand that a rotation is a turn of every point in a figure about a point
* Understand to reflect a point over the x-axis the y-coordinate changes signs

For example (2,1) reflected over the x-axis becomes (2,-1)* Understand to reflect a point over the y-axis the x- changes signs

For example (2,1) reflected over coordinate the y-axis becomes (-2,1)* Understand to translate (slide) a point right or left, a value will be added/subtracted to the x-coordinate

For example, (2,1) translated to the right 6 units (8,1).* Understand to translate (slide) a point up or down, a value will be added/subtracted to the y-coordinate

For example, (2,1) translated up 6 units (2,7)* Understand to rotate a point counterclockwise 90 degrees centered at the origin, the coordinate point will change from (x,y) to (-y,x)

For example, (2,1) rotated counterclockwise 90 degrees becomes (-1,2)* Understand that given a figure and a sequence of transformations (rotation, translations, and reflection) identify where the figure is mapped on a coordinate plane (new location)
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| Resources: |  |  |  |  |

[MA.912.GR.2.6:](https://www.cpalms.org//PreviewStandard/Preview/15687) Apply rigid transformations to map one figure onto another to justify that the two figures are congruent.

**Clarifications:**
*Clarification 1*: Instruction includes showing that the corresponding sides and the corresponding angles are congruent.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.2.AP.6:](https://www.cpalms.org/PreviewAccessPoint/Preview/18364)  | Use rigid transformations that includes translations or reflections to map one figure onto another to show that the two figures are congruent. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and conditions: transformation, translation, reflection, slide, figure, up, down, right, left, line, axis, point, x-axis, y-axis, add, subtract, value, y-coordinate, x-coordinate, sequence, mapping a figure, congruent, two-dimensional
* Understand that tools can be used to show that sides and angles are congruent (ruler, gridded paper, protractor, etc.)
* Understand that a translation is a slide of every point in the figure the same distance and the same direction (up, down, right, or left)
* Understand that a reflection is a flip of every point in a figure over a line, axis, point, etc.
* Understand to reflect a point over the x-axis the y-coordinate changes signs

For example (2,1) reflected over the x-axis becomes (2,-1)* Understand to reflect a point over the y-axis the x- changes signs

For example (2,1) reflected over coordinate the y-axis becomes (-2,1)* Understand to translate (slide) a point right or left, a value will be added/subtracted to the x-coordinate

For example, (2,1) translated to the right 6 units (8,1)* Understand to translate (slide) a point up or down, a value will be added/subtracted to the y-coordinate

For example, (2,1) translated up 6 units (2,7)* Understand that two congruent two-dimensional figures are figures that are the same shape and size
* Understand that a sequence of transformations can be used to move a figure on top of a congruent figure. This is called mapping a figure onto another figure
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| Resources: |  |  |  |  |

[MA.912.GR.2.8:](https://www.cpalms.org//PreviewStandard/Preview/15689) Apply an appropriate transformation to map one figure onto another to justify that the two figures are similar.

**Clarifications:**
*Clarification 1*: Instruction includes showing that the corresponding sides are proportional, and the corresponding angles are congruent.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.2.AP.8:](https://www.cpalms.org/PreviewAccessPoint/Preview/18365)  | Identify an appropriate transformation to map one figure onto another to show that the two figures are similar. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and conditions: transformation, translation, reflection, rotation, slide, figure, up, down, right, left, line, axis, point, x-axis, y-axis, add, subtract, value, y-coordinate, x-coordinate, sequence, mapping a figure, congruent angles, similar, proportion, counterclockwise, two-dimensional, fractions, multiplication, cross multiplication
* Understand that tools can be used to show that sides and angles are congruent (ruler, gridded paper, protractor, etc.)
* Understand basic multiplication of two numbers
* Understand that a translation is a slide of every point in the figure the same distance and the same direction (up, down, right, or left)
* Understand that a reflection is a flip of every point in a figure over a line, axis, point, etc.
* Understand that a rotation is a turn of every point in a figure about a point
* Understand to reflect a point over the x-axis the y-coordinate changes signs

For example (2,1) reflected over the x-axis becomes (2,-1).* Understand to reflect a point over the y-axis the x- changes signs

For example (2,1) reflected over coordinate the y-axis becomes (-2,1)* Understand to translate (slide) a point right or left, a value will be added/subtracted to the x-coordinate

For example, (2,1) translated to the right 6 units (8,1).Understand to translate (slide) a point up or down, a value will be added/subtracted to the y-coordinateFor example, (2,1) translated up 6 units (2,7)* Understand to rotate a point counterclockwise 90 degrees centered at the origin, the coordinate point will change from (x,y) to (-y,x)

For example, (2,1) rotated counterclockwise 90 degrees becomes (-1,2)* Understand that two similar two-dimensional figures are two figures whose sides are in proportion to each other, and their angles are congruent.
* Understand that cross multiplication can be used to show that two fractions are proportional.
* Understand that a sequence of transformations can be used to move a figure on top of another figure\When the figures have congruent angles, and the sides are in proportion to each other they are similar. This is called mapping a figure onto another figure
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.3.1:](https://www.cpalms.org//PreviewStandard/Preview/15690) Determine the weighted average of two or more points on a line.

**Clarifications:**
*Clarification 1*: Instruction includes using a number line and determining how changing the weights moves the weighted average of points on the number line.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.3.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18366)  | Select the weighted average of two or more points on a line. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: ratio, graph, point, line segment, x-variable, y-variable, x-axis, y-axis, weighted average, integer, partitions,
* Understand addition and subtraction of integers
* Understand using basic ratios and how they are represented
* Understand when given two points and a ratio, a weighted average will be used to locate a third point

Ex. A = (2,5) B = (-2,1) Ratio 1:3 Where should point P be located so that it partitions Segment AB into a 1:3 ratio? Start with point A (Using segment AB)For the x-variable 1 is one away from 2 and three away from -2For the y-variable 4 is one away from 5 and three away from 1Chart, line chart  Where should point P be located so that it partitions Segment BA into a 1:3 ratio? Start with B (using segment BA)For the x-variable -1 is one away from -2 and three away from 2For the y-variable 2 is one away from 1 and three away from 5Chart, line chart   |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.3.2:](https://www.cpalms.org//PreviewStandard/Preview/15691) Given a mathematical context, use coordinate geometry to classify or justify definitions, properties and theorems involving circles, triangles or quadrilaterals.

**Clarifications:**
*Clarification 1*: Instruction includes using the distance or midpoint formulas and knowledge of slope to classify or justify definitions, properties and theorems.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.3.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18367)  | Use coordinate geometry to classify definitions, properties and theorems involving circles, triangles, or quadrilaterals. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: triangle, polygon, sides, equilateral triangle, isosceles triangle, scalene triangle, congruent, center, circle, length, parallel, parallelogram, square, rectangle, trapezoid, opposite, rhombus, diameter, radius, distance formula, center point
* Understand that a triangle is a polygon which consists of three sides
* Understand that triangles can be named by their sides: equilateral, isosceles, scalene
* Understand that the distance formula ( ) can be used to find the length of a side of a polygon
* Understand that the distance formula ( ) can be used to identify which type of triangle is formed:

Equilateral – all three sides have the same lengthIsosceles – two sides have the same lengthScalene – none of the sides have the same length* Understand that a quadrilateral is a polygon which has four sides
* Understand that the following quadrilaterals have parallel sides: Square, Rectangle, parallelogram, trapezoid
* Understand to determine if two sides are parallel, the slope formula is used
* Understand that two sides are parallel, if their slopes are the same
* Understand that the following quadrilaterals have opposite sides that are congruent: square, parallelogram, rectangle
* Understand the following quadrilaterals have four sides that are congruent: square, rhombus
* Understand to prove that sides of a quadrilateral are congruent, the distance formula (d=√(〖(x\_2-x\_1)〗^2+〖(y\_2-y\_1)〗^2 )) is used.
* Understand that a circle consists of all the points on a given plane the same distance from a center point
* Understand the distance from the side of a circle to the center point is called the radius
* Understand the distance across the circle going through the center point is called the diameter
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.3.3:](https://www.cpalms.org//PreviewStandard/Preview/15692) Use coordinate geometry to solve mathematical and real-world geometric problems involving lines, circles, triangles and quadrilaterals.

**Clarifications:**
*Clarification 1*: Problems involving lines include the coordinates of a point on a line segment including the midpoint.

*Clarification 2*: Problems involving circles include determining points on a given circle and finding tangent lines.

*Clarification 3*: Problems involving triangles include median and centroid.

*Clarification 4*: Problems involving quadrilaterals include using parallel and perpendicular slope criteria.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.3.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18368)  | Use coordinate geometry to solve mathematical geometric problems involving lines, triangles and quadrilaterals. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: triangle, polygon, sides, equilateral triangle, isosceles triangle, scalene triangle, congruent, length, parallel, parallelogram, square, rectangle, trapezoid, opposite, rhombus, distance formula, line, line segment, infinite
* Understand that a triangle is a polygon which consists of three sides
* Understand that triangles can be named by their sides: equilateral, isosceles, scalene
* Understand that the distance formula (d=√(〖(x\_2-x\_1)〗^2+〖(y\_2-y\_1)〗^2 ) ) or counting can be used to find the length of a side of a polygon
* Understand that the distance formula or counting can be used to identify which type of triangle is formed:

Equilateral – all three sides have the same lengthIsosceles – two sides have the same lengthScalene – none of the sides have the same length* Understand that a quadrilateral is a polygon which has four sides
* Understand that the following quadrilaterals have parallel sides: Square, Rectangle, parallelogram, trapezoid
* Understand to determine if two sides are parallel, the slope formula is used
* Understand that two sides are parallel, if their slopes are the same
* Understand that the following quadrilaterals have opposite sides that are congruent: square, parallelogram, rectangle
* Understand the following quadrilaterals have four sides that are congruent: square, rhombus
* Understand to prove that sides of a quadrilateral are congruent, the distance formula or counting is used
* Understand that the slope of a line can be determined by using the slope formula and two points on the line
* Understand that once the slope is determined, the equation of a line can be determined using the slope and a point on the line
* Understand that the distance of a line cannot be determined as it is infinite
* Understand that the distance of a line segment (portion of a line) can be determined by using the distance formula
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.3.4:](https://www.cpalms.org//PreviewStandard/Preview/15693) Use coordinate geometry to solve mathematical and real-world problems on the coordinate plane involving perimeter or area of polygons.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.3.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18369) | Solve mathematical and/or real-world problems on the coordinate plane involving perimeter or area of a three- or four-sided polygon. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: distance formula, triangle, base, height, polygon, length, perimeter, area, square, rectangle, parallelogram, trapezoid four-sided figure, three-sided figure
* Understand the lengths of the sides of a polygon are determined by counting or using the distance formula
* Understand the area of a triangle (three-sided figure), when given the length of the base and the height, is calculated with the following formula: . (b equals the length of the base and h equals the height)
* Understand the perimeter of a triangle is determined by adding the length of all three sides
* Understand that the perimeter of a four-sided figure is determined by adding the lengths of all four sides
* Understand the area of following four-sided figures can be determined using the following formulas:

Square, rectangle, parallelogram: Trapezoid:  |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.4.1:](https://www.cpalms.org//PreviewStandard/Preview/15694) Identify the shapes of two-dimensional cross-sections of three-dimensional figures.

**Clarifications:**
*Clarification 1*: Instruction includes the use of manipulatives and models to visualize cross-sections.

*Clarification 2*: Instruction focuses on cross-sections of right cylinders, right prisms, right pyramids and right cones that are parallel or perpendicular to the base.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.4.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18370) | Identify the shape of a two-dimensional cross section of a three-dimensional figure. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: two-dimensional figure, three-dimensional figure, cross section, square, circle, triangle, rectangle, cube, cylinder, cone, pyramid, length, width, height, parallel, base, shape, solid
* Understand that a two-dimensional figure has two dimensions, width, and height, and lies in one plane

Ex. Circle, square, triangle, rectangle, etc. * Understand that a three-dimensional figure has three dimensions, length, width, and height

Ex. Cube, cylinder, cone, pyramid, etc.* Understand that a cross section is a shape made when a solid is cut through parallel to the base

Ex. Cutting through a cube parallel to its base, the cross section is a square |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.4.2:](https://www.cpalms.org//PreviewStandard/Preview/15695) Identify three-dimensional objects generated by rotations of two-dimensional figures.

**Clarifications:**
*Clarification 1*: The axis of rotation must be within the same plane but outside of the given two-dimensional figure.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.4.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18371) | Identify a three-dimensional object generated by the rotation of a two-dimensional figure. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: two-dimensional figure, three-dimensional figure, width, height, length, plane, circle, square, triangle, rectangle, cube, cylinder, cone, pyramid, rotated, generate new figure, line
* Understand that a two-dimensional figure has two dimensions, width, and height, and lies in one plane

Ex. Circle, square, triangle, rectangle, etc. * Understand that a three-dimensional figure has three dimensions, Length, width, and height

Ex. Cube, cylinder, cone, pyramid, etc.* Understand when a two-dimensional figure is rotated, a three-dimensional figure is generated

Ex. Rotating a triangle around a line generates a cone Rotating a rectangle around a line generates a cylinder |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.4.3:](https://www.cpalms.org//PreviewStandard/Preview/15696) Extend previous understanding of scale drawings and scale factors to determine how dilations affect the area of two-dimensional figures and the surface area or volume of three-dimensional figures.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.4.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18372)  | Select the effect of a dilation on the area of two-dimensional figures and/or surface area or volume of three-dimensional figures. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: two-dimensional figure, three-dimensional figure, area, surface area, volume, dilation, image, width, length, height, plane, circle, square, triangle, rectangle, cube, cylinder, cone, pyramid, exponents
* Understand that a two-dimensional figure has two dimensions, width, and height, and lies in one plane

Ex. Circle, square, triangle, rectangle, etc. * Understand that a three-dimensional figure has three dimensions, Length, width, and height

Ex. Cube, cylinder, cone, pyramid, etc.* Understand how to use exponents (square and cube only)
* Understand how to calculate the area of a two-dimensional figure
* Understand how to calculate the surface area of a three-dimensional figure
* Understand how to calculate the volume of a three-dimensional figure
* Understand how dilation effects area, surface area, and volume

Ex: The dilation (a) effects area of a two-dimensional figure by creating a new image whose area is times largerThe dilation (a) effects surface area of a three-dimensional figure by creating a new image whose surface area is times largerThe dilation (a) effects volume of a three-dimensional figure by creating a new image whose area is times largerTable   |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.4.4:](https://www.cpalms.org//PreviewStandard/Preview/15697) Solve mathematical and real-world problems involving the area of two-dimensional figures.

**Clarifications:**
*Clarification 1*: Instruction includes concepts of population density based on area.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.4.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18373)  | Solve mathematical and/or real-world problems involving the area of triangles, squares, circles or rectangles. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: triangle, square, circle, rectangle, multiply (x), two-dimensional, side, angles, parallel, right angle, center, radius, diameter, , infinite, point, base, height, length, opposite sides
* Understand how to multiply two numbers together
* Understand how to take half of a number
* Understand that a triangle is a two-dimensional figure with three sides and three angles
* Understand that a square is a two-dimensional figure with four sides and four right angles where all the sides are the same length and opposite sides are parallel
* Understand that a rectangle is a two-dimensional figure with four sides and four right angles where the sides opposite each other are the same length and parallel
* Understand that a circle is a two-dimensional figure made up of infinite number of points the same distance from the center
* Understand that the radius of a circle is the distance from the center to the sides
* Understand that the radius is half the diameter (distance across the center of the circle)
* Understand the following area formulas:

Square and rectangle - (b = length of base, h = height of the figure)Triangle - (b = length of base, h = height of the figure)Circle - (r = radius of the circle, ) |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.4.5:](https://www.cpalms.org//PreviewStandard/Preview/15698) Solve mathematical and real-world problems involving the volume of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.

**Clarifications:**
*Clarification 1:* Instruction includes concepts of density based on volume.

*Clarification 2:* Instruction includes using Cavalieri’s Principle to give informal arguments about the formulas for the volumes of right and non-right cylinders, pyramids, prisms and cones.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.4.AP.5:](https://www.cpalms.org/PreviewAccessPoint/Preview/18374) | Solve mathematical or real-world problems involving the volume of three-dimensional figures limited to cylinders, pyramids, prisms, or cones. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: cylinders, pyramids, prisms, cones, three-dimensional figure, circular ends, parallel, curved side, rectangular base, triangular side, multiplication, radius, diameter, length, width, height, volume, circular base
* Understand multiplication of three numbers
* Understand how to take a half and a third of a number
* Understand that a cylinder is a three-dimensional figure is made up of two circular ends that are parallel to each other and are connected by a curved side (tube, soup can, etc.)
* Understand that the radius of a circle is the distance from the center to the sides
* Understand that the radius is half the diameter (distance across the center of the circle)
* Understand that a pyramid can be a three-dimensional figure with a rectangular base and four triangular sides
* Understand that a prism can be a three-dimensional figure with identical parallel ends (ex. rectangle, square, triangle) and multiple rectangular sides (ex. if the base is a triangle, the prism will have three rectangular sides)
* Understand that a cone is a three-dimensional figure with a circular base, a point at the opposite end and a curved side
* Understand the following volume formulas:

Cylinder - (, r = radius, h = height)Cone - (, r = radius, h = height)Rectangular Prism - (l = length, w = width, h = height)Triangular Prism - (l = length, w = width, h = height)Pyramid - (l = length, w = width, h = height) |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.4.6:](https://www.cpalms.org//PreviewStandard/Preview/15699) Solve mathematical and real-world problems involving the surface area of three-dimensional figures limited to cylinders, pyramids, prisms, cones and spheres.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.4.AP.6:](https://www.cpalms.org/PreviewAccessPoint/Preview/18375) | Solve mathematical or real-world problems involving the surface area of three-dimensional figures limited to cylinders, pyramids, prisms, and cones. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: cylinders, pyramids, rectangular prisms, triangular prisms, cones, three-dimensional figure, circular ends, parallel, curved side, rectangular base, triangular side, multiplication, radius, diameter, length, width, height, surface are, circular base, slant height, perimeter, center
* Understand multiplication of two numbers
* Understand how to take a half of a number
* Understand that a cylinder is a three-dimensional figure is made up of two circular ends that are parallel to each other and are connected by a curved side (tube, soup can, etc.)
* Understand that the radius of a circle is the distance from the center to the sides
* Understand that the radius is half the diameter (distance across the center of the circle)
* Understand that a pyramid can be a three-dimensional figure with a rectangular base and four triangular sides
* Understand that a prism can be a three-dimensional figure with identical parallel ends (ex. rectangle, square, triangle) and multiple rectangular sides (ex. if the base is a triangle, the prism will have three rectangular sides)
* Understand that a cone is a three-dimensional figure with a circular base, a point at the opposite end and a curved side
* Understand the following surface area formulas:

Cylinder - (r = radius, h = height, )Cone - (r = radius, s = slant height, )Rectangular Prism – (l = length, w = width, h = height)Triangular Prism - (b = length of base, h = height, l = length, s = slant height)Pyramid - (B = area of the base, p = perimeter of the base, s = slant height) |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.5.1:](https://www.cpalms.org//PreviewStandard/Preview/15700) Construct a copy of a segment or an angle.

**Clarifications:**
*Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.5.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18376)  | Construct a copy of a segment. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: segment, reference line and endpoint, straightedge, portion, compass, line, span, point
* Understand that a segment is a portion of a line

It begins at one point on the line and ends at another pointThese points are known as the endpoints of the segment* Understand to copy a segment the following steps need to be followed:

Draw a line with a straightedgePlace a starting point on the line Image of a line segment and line  Place the point of the compass on point *A*Stretch the compass so that the pencil is exactly on *B*Without changing the span of the compass, place the compass point on the starting point on the reference line and swing the pencil so that it crosses the reference lineLabel the new line segment |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.5.2:](https://www.cpalms.org//PreviewStandard/Preview/15701) Construct the bisector of a segment or an angle, including the perpendicular bisector of a line segment.

**Clarifications:**
*Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.5.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18377)  | Construct the bisector of a segment, including the perpendicular bisector of a line segment. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: line segment, point, arc, intersect, perpendicular, bisect, congruent, midpoint, compass, span, arc, straightedge
* Understand that bisect means to divide the segment into two equal parts
* Understand that a perpendicular bisector is a perpendicular line or segment that passes through the midpoint of a line
* Understand to bisect a segment the following steps need to be followed:

Place compass point on *A* and stretch the compass more than halfway to point *B*, but not beyond *B*With this length, swing a large arc that will go both above and below Without changing the span on the compass, place the compass point on *B* and swing the arc again  The two arcs that have been created should intersectWith a straightedge, connect the two points of intersectionThis new straight line bisects Label the point where the new line and cross as *C* has now been bisected and *AC = CB* (It could also be said that the segments are congruent, )Chart, radar chart   |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.5.3:](https://www.cpalms.org//PreviewStandard/Preview/15702) Construct the inscribed and circumscribed circles of a triangle.

**Clarifications:**
*Clarification 1*: Instruction includes using compass and straightedge, string, reflective devices, paper folding or dynamic geometric software.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.5.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18378) | Select the inscribed and circumscribed circles of a triangle. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: inscribed circle, circumscribed circle, triangle, sides, circle, vertices
* Understand that inscribed circle is a circle inside a triangle that touches all three sides
* Understand that a circumscribed circle is a circle that is on the outside of a triangle touching all three vertices (points of the triangle)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.6.1:](https://www.cpalms.org//PreviewStandard/Preview/15705) Solve mathematical and real-world problems involving the length of a secant, tangent, segment or chord in a given circle.

**Clarifications:**
*Clarification 1:* Problems include relationships between two chords; two secants; a secant and a tangent; and the length of the tangent from a point to a circle.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.6.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18379) | Identify and describe the relationship involving the length of a secant, tangent, segment or chord in a given circle. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: tangent, secant, chord, segment, circle, line, length, intersecting, product, point, inside, outside, squared, equal
* Understand how to multiply two numbers
* Understand the secant of a circle is a line that touches the circle in two places
* Understand the tangent of a circle is a line that touches the circle in one place
* Understand the segment is part of a line
* Understand the chord of a circle is a segment that touches two points on a circle
* Understand when two chords intersect, the product of the lengths of the segments of one chord equals the product of the lengths of segments of the intersecting chord (see image below)

image of a circle with two intersecting chords  * Understand when two secants intersect the circle and meet at the same point outside the circle, the product of the length of the segment outside the circle and the length of the segment is equal to the product of the other length of the segment outside the circle and the length of the other segment (see image below)

image of a circle with two lines (secant and a tangent intersection)* Understand when a secant and a tangent intersect outside the circle, the product of the length of the segment outside the circle and the length of the segment inside the circle equals the length of the tangent segment squared (see image below)

image of a circle where a secant and tangent intersect outside the circle |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.6.2:](https://www.cpalms.org//PreviewStandard/Preview/15706) Solve mathematical and real-world problems involving the measures of arcs and related angles.

**Clarifications:**
*Clarification 1*: Within the Geometry course, problems are limited to relationships between inscribed angles; central angles; and angles formed by the following intersections: a tangent and a secant through the center, two tangents, and a chord and its perpendicular bisector.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.6.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18380) | Identify the relationship involving the measures of arcs and related angles, limited to central, inscribed and intersections of a chord, secants or tangents. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: tangent, secant, chord, segment, circle, line, length, intersecting, intercepting, vertex, arc, angle, central angle, radii, point, equal, inscribed angle, relationship
* Understand how to multiply two numbers
* Understand the secant of a circle is a line that touches the circle in two places
* Understand the tangent of a circle is a line that touches the circle in one place
* Understand the segment is part of a line
* Understand the chord of a circle is a segment that touches two points on a circle
* Understand the central angle is formed by two radii that meet at the center of the circle (vertex)
* Understand the central angle is the same measure as the intercepted arc. The relationship between the central angle and the intercepted arc is

image of a circle with three points (A, B, and C) where C is the center of the circle and points A and B meet at the center to form a 101-degree angle.* Understand an inscribed angle is the angle formed by two intersecting chords (secants) that intersect on the circle forming the vertex of the angle. The relationship between the vertex and the intercepted arc formed is m

image of a circle with three points (A, B, and C on the perimeter of the circle) C is the center of the angle  A and B meet at the center to form a 101-degree angle. the center of the angle is 50 degrees* Understand when a chord and a tangent intersect on a circle, the vertex of the created angle is on the circle. The relationship between the created angle and the intercepted arc is

image of a circle with three points (A and C are on the perimeter of the circle. A is outside of the circle. B is the center of the angle.  A and C =  142-degree angle and  the center of the angle is 71 degrees |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.6.3:](https://www.cpalms.org//PreviewStandard/Preview/15707) Solve mathematical problems involving triangles and quadrilaterals inscribed in a circle.

**Clarifications:**
*Clarification 1*: Instruction includes cases in which a triangle inscribed in a circle has a side that is the diameter.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.6.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18381) | Identify and describe the relationship involving triangles and quadrilaterals inscribed in a circle. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: supplementary angles, semicircle, right angle, inscribe, degrees, quadrilateral, opposite angles, circle, addition sign
* Understand how to add two numbers
* Understand an angle inscribed in a semicircle is a right angle (Thales Theorem)
* Understand when a quadrilateral is inscribed in a circle its opposite angles add up to 180 degrees (supplementary angles)
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.6.4:](https://www.cpalms.org//PreviewStandard/Preview/15708) Solve mathematical and real-world problems involving the arc length and area of a sector in a given circle.

**Clarifications:**
*Clarification 1*: Instruction focuses on the conceptual understanding that for a given angle measure the length of the intercepted arc is proportional to the radius, and for a given radius the length of the intercepted arc is proportional is the angle measure.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.6.AP.4:](https://www.cpalms.org/PreviewAccessPoint/Preview/18382) | Identify and describe the relationship involving the arc length and area of a sector in a given circle. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: radius (r), arc length (L), angle measure (), pi (), circle, sector, area, chord, arc, length, point, distance, radians, degrees, radii, intercept, squared
* Understand the sector of a circle is formed when two radii intercept an arc

The angle measure () is in radians: The angle measure () is in degrees: * Understand that the arc length is the distance from one point on the arc to another point on the arc
* Understand that the length of the arc is found by multiplying the angle measure by the radius

The angle measure () is in radians: The angle measure () is in degrees: |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.7.2:](https://www.cpalms.org//PreviewStandard/Preview/15711) Given a mathematical or real-world context, derive and create the equation of a circle using key features.

**Clarifications:**
*Clarification 1:* Instruction includes using the Pythagorean Theorem and completing the square.

*Clarification 2:* Within the Geometry course, key features are limited to the radius, diameter and the center.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.7.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18383)  | Create the equation of a circle when given the center and radius. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: radius, circle, equation, substitution, center, variable, point, distance, formula, graph
* Understand the center of a circle is at point (*h*, *k*) on a graph
* Understand that the radius is represented by the variable *r*
* Understand that the radius is the distance from the side of the circle to the center of the circle
* Understand to create the equation of a circle, the following formula is used:
* Understand the center point (*h*, *k*) and the radius (*r)* are substituted into the formula
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.GR.7.3:](https://www.cpalms.org//PreviewStandard/Preview/15712) Graph and solve mathematical and real-world problems that are modeled with an equation of a circle. Determine and interpret key features in terms of the context.

**Clarifications:**
*Clarification 1*: Key features are limited to domain, range, eccentricity, center and radius.

*Clarification 2*: Instruction includes representing the domain and range with inequality notation, interval notation or set-builder notation.

*Clarification 3*: Within the Geometry course, notations for domain and range are limited to inequality and set-builder.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.GR.7.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18384) | Given an equation of a circle, identify center and radius, and graph the circle. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: radius (*r*), circle, equation, center (*h*, *k*), variable, point, distance, formula, right, left, up, down, graph
* Understand the equation of a circle uses the following formula:
* Understand the center of a circle is at point (*h*, *k*) on a graph
* Understand that the radius is represented by the variable *r*
* Understand that the radius is the distance from the side of the circle to the center of the circle
* Understand to graph a circle, graph the center point first (*h*, *k*)
* Understand to graph the radius (distance from the center to the side), count from the center down, up, left and right. (If the radius is 3, count left 3, down 3, up 3 and right 3 from the center). Connect the dots to form the circle
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.LT.4.3:](https://www.cpalms.org//PreviewStandard/Preview/15804) Identify and accurately interpret “if…then,” “if and only if,” “all” and “not” statements. Find the converse, inverse and contrapositive of a statement.

**Clarifications:**
*Clarification 1:* Instruction focuses on recognizing the relationships between an “if…then” statement and the converse, inverse and contrapositive of that statement.

*Clarification 2:* Within the Geometry course, instruction focuses on the connection to proofs within the course.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.LT.4.AP.3:](https://www.cpalms.org/PreviewAccessPoint/Preview/18399)  | Identify and accurately interpret “if…then,” “if and only if,” “all” or “not” statements. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: relationships, logical, interpret, if…then, if and only if, all, not
* Understand that “if…then”,“if and only if”, “all” or “not”have logical relationships

Ex. If a figure is a square, then it is a quadrilateral. , if and only if *a* = 2.All triangles have three sidesNot all rectangles are squares |  |  |  |
| Resources: |  |  |  |  |

[MA.912.LT.4.10:](https://www.cpalms.org//PreviewStandard/Preview/15811) Judge the validity of arguments and give counterexamples to disprove statements.

**Clarifications:**
*Clarification 1:* Within the Geometry course, instruction focuses on the connection to proofs within the course.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.LT.4.AP.10:](https://www.cpalms.org/PreviewAccessPoint/Preview/18400) | Select the validity of an argument or give counterexamples to disprove statements. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: premise, argument, conclusion, valid, invalid, counterexample, true, false
* Understand that an argument is made up of a premise (initial statement) followed by a conclusion
* Understand that an argument is valid if and only if the premise is true and the conclusion is true

Ex. Valid argument1. If Bob has a turtle, then Bob has a reptile.
2. Bob has a turtle.
3. Therefore, Bob has a reptile.

Invalid argument (invalid argument because the premise and conclusion are false)1. All rectangles are squares
2. All squares are triangles
3. Therefore, all rectangles are triangles

Counterexample: All cats are hairy.Counterexample: This is invalid because there are hairless cats. |  |  |  |
| Resources: |  |  |  |  |

[MA.912.T.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15719) Define trigonometric ratios for acute angles in right triangles.

**Clarifications:**
*Clarification 1*: Instruction includes using the Pythagorean Theorem and using similar triangles to demonstrate that trigonometric ratios stay the same for similar right triangles.

*Clarification 2*: Within the Geometry course, instruction includes using the coordinate plane to make connections to the unit circle.

*Clarification 3*: Within the Geometry course, trigonometric ratios are limited to sine, cosine and tangent. **Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.T.1.AP.1:](https://www.cpalms.org/PreviewAccessPoint/Preview/18395) | Select a trigonometric ratio for acute angles in right triangles limited to sine or cosine. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: triangle, opposite side, adjacent side, hypotenuse, sine (sin), cosine (cos), right triangle, ratio, trigonometric ratio, length
* Understand that a right triangle is a triangle that has one right angle
* Understand when given an angle on a right triangle, identify the opposite side and the adjacent side
* Understand when given a right triangle, identify the hypotenuse
* Understand the trigonometric ratio of sine in a right triangle is
* Understand the trigonometric ratio of cosine in a right triangle is
 |  |  |  |
| Resources: |  |  |  |  |

[MA.912.T.1.2:](https://www.cpalms.org//PreviewStandard/Preview/15720) Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem.

**Clarifications:**
*Clarification 1*: Instruction includes procedural fluency with the relationships of side lengths in special right triangles having angle measures of 30°-60°-90° and 45°-45°-90°.

**Related Access Points**

| **Name** | **Description** | **Date(s) Instruction** | **Date(s) Assessment** | **Date Mastery** |
| --- | --- | --- | --- | --- |
| [MA.912.T.1.AP.2:](https://www.cpalms.org/PreviewAccessPoint/Preview/18396) | Given a mathematical and/or real-world problem involving right triangles, solve using trigonometric ratio or the Pythagorean Theorem. |  |  |  |
| EssentialUnderstandings | * Understand the following terms and vocabulary: triangle, opposite side, adjacent side, hypotenuse, leg of a triangle, sine (sin), cosine (cos), tangent (tan), cotangent (cot), cosecant (csc), secant (sec), Pythagorean Theorem, right triangle, ratio, trigonometric ratio, length
* Understand that a right triangle is a triangle that has one right angle
* Understand when given an angle on a right triangle, identify the opposite side and the adjacent side
* Understand when given a right triangle, identify the hypotenuse
* Understand the trigonometric ratio of sine in a right triangle is
* Understand the trigonometric ratio of cosine in a right triangle is
* Understand the trigonometric ratio of tangent in a right triangle is
* Understand the trigonometric ratio of cotangent in a right triangle is
* Understand the trigonometric ratio of cosecant in a right triangle is
* Understand the trigonometric ratio of secant in a right triangle is
* Understand the Pythagorean Theorem is the following: where *a* and *b* are lengths of the legs of the right triangle and *c* is the length of the hypotenuse
 |  |  |  |
| Resources: |  |  |  |  |

[MA.K12.MTR.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15875) Actively participate in effortful learning both individually and collectively. Mathematicians who participate in effortful learning both individually and with others:

* Analyze the problem in a way that makes sense given the task.
* Ask questions that will help with solving the task.
* Build perseverance by modifying methods as needed while solving a challenging task.
* Stay engaged and maintain a positive mindset when working to solve tasks.
* Help and support each other when attempting a new method or approach.

**Clarifications:**
Teachers who encourage students to participate actively in effortful learning both individually and with others:

* Cultivate a community of growth mindset learners.
* Foster perseverance in students by choosing tasks that are challenging.
* Develop students’ ability to analyze and problem solve.
* Recognize students’ effort when solving challenging problems.

[MA.K12.MTR.2.1:](https://www.cpalms.org//PreviewStandard/Preview/15876) Demonstrate understanding by representing problems in multiple ways.

Mathematicians who demonstrate understanding by representing problems in multiple ways:

* Build understanding through modeling and using manipulatives.
* Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
* Progress from modeling problems with objects and drawings to using algorithms and equations.
* Express connections between concepts and representations.
* Choose a representation based on the given context or purpose.

**Clarifications:**
Teachers who encourage students to demonstrate understanding by representing problems in multiple ways:

* Help students make connections between concepts and representations.
* Provide opportunities for students to use manipulatives when investigating concepts.
* Guide students from concrete to pictorial to abstract representations as understanding progresses.
* Show students that various representations can have different purposes and can be useful in different situations.

[MA.K12.MTR.3.1:](https://www.cpalms.org//PreviewStandard/Preview/15877) Complete tasks with mathematical fluency.

Mathematicians who complete tasks with mathematical fluency:

* Select efficient and appropriate methods for solving problems within the given context.
* Maintain flexibility and accuracy while performing procedures and mental calculations.
* Complete tasks accurately and with confidence.
* Adapt procedures to apply them to a new context.
* Use feedback to improve efficiency when performing calculations.

**Clarifications:**
Teachers who encourage students to complete tasks with mathematical fluency:

* Provide students with the flexibility to solve problems by selecting a procedure that allows them to solve efficiently and accurately.
* Offer multiple opportunities for students to practice efficient and generalizable methods.
* Provide opportunities for students to reflect on the method they used and determine if a more efficient method could have been used.

[MA.K12.MTR.4.1:](https://www.cpalms.org//PreviewStandard/Preview/15878) Engage in discussions that reflect on the mathematical thinking of self and others.

Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:

* Communicate mathematical ideas, vocabulary and methods effectively.
* Analyze the mathematical thinking of others.
* Compare the efficiency of a method to those expressed by others.
* Recognize errors and suggest how to correctly solve the task.
* Justify results by explaining methods and processes.
* Construct possible arguments based on evidence.

**Clarifications:**
Teachers who encourage students to engage in discussions that reflect on the mathematical thinking of self and others:

* Establish a culture in which students ask questions of the teacher and their peers, and error is an opportunity for learning.
* Create opportunities for students to discuss their thinking with peers.
* Select, sequence and present student work to advance and deepen understanding of correct and increasingly efficient methods.
* Develop students’ ability to justify methods and compare their responses to the responses of their peers.

[MA.K12.MTR.5.1:](https://www.cpalms.org//PreviewStandard/Preview/15879) Use patterns and structure to help understand and connect mathematical concepts.

Mathematicians who use patterns and structure to help understand and connect mathematical concepts:

* Focus on relevant details within a problem.
* Create plans and procedures to logically order events, steps or ideas to solve problems.
* Decompose a complex problem into manageable parts.
* Relate previously learned concepts to new concepts.
* Look for similarities among problems.
* Connect solutions of problems to more complicated large-scale situations.

**Clarifications:**
Teachers who encourage students to use patterns and structure to help understand and connect mathematical concepts:

* Help students recognize the patterns in the world around them and connect these patterns to mathematical concepts.
* Support students to develop generalizations based on the similarities found among problems.
* Provide opportunities for students to create plans and procedures to solve problems.

Develop students’ ability to construct relationships between their current understanding and more sophisticated ways of thinking.

[MA.K12.MTR.6.1:](https://www.cpalms.org//PreviewStandard/Preview/15880) Assess the reasonableness of solutions.

Mathematicians who assess the reasonableness of solutions:

* Estimate to discover possible solutions.
* Use benchmark quantities to determine if a solution makes sense.
* Check calculations when solving problems.
* Verify possible solutions by explaining the methods used.
* Evaluate results based on the given context.

**Clarifications:**
Teachers who encourage students to assess the reasonableness of solutions:

* Have students estimate or predict solutions prior to solving.
* Prompt students to continually ask, “Does this solution make sense? How do you know?”
* Reinforce that students check their work as they progress within and after a task.
* Strengthen students’ ability to verify solutions through justifications.

[MA.K12.MTR.7.1:](https://www.cpalms.org//PreviewStandard/Preview/15881) Apply mathematics to real-world contexts.

Mathematicians who apply mathematics to real-world contexts:

* Connect mathematical concepts to everyday experiences.
* Use models and methods to understand, represent and solve problems.
* Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.

**Clarifications:**
Teachers who encourage students to apply mathematics to real-world contexts:

* Provide opportunities for students to create models, both concrete and abstract, and perform investigations.
* Challenge students to question the accuracy of their models and methods.
* Support students as they validate conclusions by comparing them to the given situation.
* Indicate how various concepts can be applied to other disciplines.

[ELA.K12.EE.1.1:](https://www.cpalms.org//PreviewStandard/Preview/15201) Cite evidence to explain and justify reasoning.

**Clarifications:**
K-1 Students include textual evidence in their oral communication with guidance and support from adults. The evidence can consist of details from the text without naming the text. During 1st grade, students learn how to incorporate the evidence in their writing.

2-3 Students include relevant textual evidence in their written and oral communication. Students should name the text when they refer to it. In 3rd grade, students should use a combination of direct and indirect citations.

4-5 Students continue with previous skills and reference comments made by speakers and peers. Students cite texts that they’ve directly quoted, paraphrased, or used for information. When writing, students will use the form of citation dictated by the instructor or the style guide referenced by the instructor.

6-8 Students continue with previous skills and use a style guide to create a proper citation.

9-12 Students continue with previous skills and should be aware of existing style guides and the ways in which they differ.

[ELA.K12.EE.2.1:](https://www.cpalms.org//PreviewStandard/Preview/15202) Read and comprehend grade-level complex texts proficiently.

**Clarifications:**
See [Text Complexity](https://cpalmsmediaprod.blob.core.windows.net/uploads/docs/standards/best/la/appendixb.pdf) for grade-level complexity bands and a text complexity rubric.

[ELA.K12.EE.3.1:](https://www.cpalms.org//PreviewStandard/Preview/15203) Make inferences to support comprehension.

**Clarifications:**
Students will make inferences before the words infer or inference are introduced. Kindergarten students will answer questions like “Why is the girl smiling?” or make predictions about what will happen based on the title page. Students will use the terms and apply them in 2nd grade and beyond.

[ELA.K12.EE.4.1:](https://www.cpalms.org//PreviewStandard/Preview/15204) Use appropriate collaborative techniques and active listening skills when engaging in discussions in a variety of situations.

**Clarifications:**
In kindergarten, students learn to listen to one another respectfully.

In grades 1-2, students build upon these skills by justifying what they are thinking. For example: “I think \_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_.” The collaborative conversations are becoming academic conversations.

In grades 3-12, students engage in academic conversations discussing claims and justifying their reasoning, refining and applying skills. Students build on ideas, propel the conversation, and support claims and counterclaims with evidence.

[ELA.K12.EE.5.1:](https://www.cpalms.org//PreviewStandard/Preview/15205) Use the accepted rules governing a specific format to create quality work.

**Clarifications:**
Students will incorporate skills learned into work products to produce quality work. For students to incorporate these skills appropriately, they must receive instruction. A 3rd grade student creating a poster board display must have instruction in how to effectively present information to do quality work.

[ELA.K12.EE.6.1:](https://www.cpalms.org//PreviewStandard/Preview/15206) Use appropriate voice and tone when speaking or writing.

**Clarifications:**
In kindergarten and 1st grade, students learn the difference between formal and informal language. For example, the way we talk to our friends differs from the way we speak to adults. In 2nd grade and beyond, students practice appropriate social and academic language to discuss texts.

[ELD.K12.ELL.MA.1:](https://www.cpalms.org//PreviewStandard/Preview/8642) English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.

[ELD.K12.ELL.SI.1](https://cpalms.org/PreviewStandard/Preview/8640) English language learners communicate for social and instructional purposes within the school setting.