# **Geometry A Unit Test Guide**

## Transformations Unit Test

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| **Item** | **Lesson Coverage** | **Objective** | **Mathematical Practice Standard** | **Lesson Page** | **Assessment Item** |
| 1 | Lesson 2: Translations | In this section, you will apply geometric descriptions of rigid motions to translate figures. | Look for and express regularity in repeated reasoning. | p. 1-6 | *Use the image to answer the question.*A coordinate plane's x-axis ranges from negative 1 to 20 and its y-axis ranges from negative 10 to 10, both in 1-unit increments. Eight points are marked and plotted forming two quadrilaterals.What kind of translation has been done to quadrilateral *ABCD*?Quadrilateral *ABCD* has been translated \_\_\_\_\_ units to the right and \_\_\_\_\_ units down.Answer: 9; 3[Transformation Unit Test Item #1 - GeoGebra](https://www.geogebra.org/calculator/tavueqdh) |
| 2 | Lesson 2: Translations | In this section, you will draw a geometric figure that undergoes a translation in the coordinate plane. | Attend to precision. | p. 7-16 | *Use the image to answer the question.*A rectangle is labeled upper A upper B upper C upper D. The area inside of the rectangle is shaded, and each of the vertices is labeled.Jarvis wants to translate rectangle *ABCD* horizontally by -4 and vertically by +3 to produce rectangle *A’B’C’D’*. What will be the coordinates of *C’* after Jarvis completes this translation?(\_\_\_, \_\_\_)Answer: -9; 4[Transformations Unit Test Item #2 - GeoGebra](https://www.geogebra.org/calculator/fax2wdbn) |
| 3 | Lesson 3: Translations as Functions | In this section, you will use a function to translate a figure on a coordinate plane. | Look for and make use of structure. | p. 1-7 | Lucy draws a line with the equation $y = 3x + 2$. She translates the line by shifting it one unit to the right and two units up. Which is the equation of the new line?Answer: $y = 3x + 1$[Transformations Unit Test Item #3 - GeoGebra](https://www.geogebra.org/calculator/ufcr6mrv) |
| 4 | Lesson 3: Translations as Functions | In this section, you will create a function that describes a given translation on a coordinate plane. | Look for and make use of structure. | p. 8-15 | A point is translated on the coordinate plane from (4, -1) to (4, 2). Journey writes the function $g(y)=y+k$ to describe the translation. What is the value of *k*?Answer: 3 |
| 5 | Lesson 4: Reflections | In this section, you will apply geometric descriptions of rigid motions to reflect figures. | Look for and express regularity in repeated reasoning. | p. 1-6 | *Use the image to answer the question.*A vertical line separates 2 triangles. The triangle to the left of the line is made up of points upper P, upper Q, and upper R, while the triangle on the right is made up of points upper P prime, upper Q prime, and upper R prime.Triangle *PQR* is reflected over a vertical line of reflection to create triangle *P’Q’R’*. What are the coordinates of point *R’*? Answer: (-3, 1)[Transformations Unit Item Test #5 - GeoGebra](https://www.geogebra.org/calculator/g6gzj8mr) |
| 6 | Lesson 4: Reflections | In this section, you will draw a geometric figure that undergoes a reflection in the coordinate plane. | Attend to precision. | p. 7-17 | *Use the image to answer the question.*Triangle upper F upper U upper N and a dotted line are graphed on a coordinate plane. The x and y-axes range from negative 7 to 7 in increments of 1. The dotted line follows x equals negative 1.For $∆FUN, x=-1.$ What are the coordinates for *F’* after a reflection?Answer: *F’* (3, 5)[Transformation Unit Test Item #6 - GeoGebra](https://www.geogebra.org/calculator/qydxhkmw) |
| 7 | Lesson 5: Reflections as Functions | In this section, you will use a function to reflect a figure in the coordinate plane. | Identify and make use of structure. | p. 1-6 | The coordinate point *Q* (0, 10) is reflected over the y-axis. Identify the *x*- and *y*-coordinates of its image, *Q’*.The coordinates of *Q*’ are (\_\_\_, \_\_\_) after a reflection over the y-axis.Answer: 0; 10[Transformations Unit Test Item #7 - GeoGebra](https://www.geogebra.org/calculator/sxzvyntr) |
| 8 | Lesson 5: Reflections as Functions | In this section, you will create a function that describes a given reflection in the coordinate plane. | Identify and make use of structure. | p. 7-12 | The function $f\left(x\right)=x^{2}-1$ is reflected over the *y*-axis. Choose the equation that correctly identifies $g(x)$.Answer: $g\left(x\right)=x^{2}-1$[Transformation Unit Test Item #8 - GeoGebra](https://www.geogebra.org/calculator/q7zuuxux) |
| 9 | Lesson 6: Rotations | In this section, you will apply geometric descriptions of rigid motions to rotate figures. | Look for and express regularity in repeated reasoning. | p. 1-7 | The point *P* (-1, 2) is rotated to become *P’* (2, 1). Describe the rotation by degree and direction.Answer: $-90°$ rotation[Transformations Unit Test Item #9 - GeoGebra](https://www.geogebra.org/calculator/r7kyymc5) |
| 10 | Lesson 6: Rotations | In this section, you will draw a geometric figure that undergoes a rotation in the coordinate plane. | Attend to precision. | p. 8-14 | The point *Q* (-5, -9) is rotated $-270°$ about the origin. Select the location of *Q’*.Answer: Q’ (9, -5)[Transformations Unit Test Item #11 - GeoGebra](https://www.geogebra.org/calculator/myvkzb2c) |
| 11 | Lesson 7: Rotations as Functions | In this section, you will use a function to rotate a figure in the coordinate plane. | Identify and make use of structure. | p. 1-6 | A quadrilateral with vertices *G* (−10, 1), *E* (−6, −4), *O* (2, 0), and *M* (0, 4) is rotated about the origin 270 degrees (counterclockwise). Apply rotation mapping rules to find the image of *M*.*M’* (\_\_\_, \_\_\_)Answer: 4; 0[Transformations Unit Test item #11 - GeoGebra](https://www.geogebra.org/calculator/bp3pkggy) |
| 12 | Lesson 7: Rotations as Functions | In this section, you will create a function that describes a given rotation in the coordinate plane. | Look for and make use of structure. | p. 7-13 | A figure is rotated 90 degrees counterclockwise about the origin. Which of the following function mappings was applied? Enter the number of the correct option. Option #1: $(x, y) \rightarrow (y, -x)$Option #2:$ (x, y) \rightarrow (-y, x)$Option #3: $(x, y) \rightarrow (-x, -y)$Option #4: $(x, y) \rightarrow (y, x)$The mapping for a 90-degree counterclockwise rotation is Option #\_\_\_.Answer: 2 |
| 13 | Lesson 8: Symmetry | In this section, you will summarize the rotations that transform a rectangle, parallelogram, trapezoid, or regular polygon onto itself. | Identify and express regularity in repeated reasoning. | p. 1-7 | Provide two different degrees of rotation less than $150° $but greater than $0°$ that will turn a regular pentagon onto itself.A regular pentagon will turn onto itself after a \_\_\_$°$ and \_\_\_$° $rotation.Answer: 72; 144 |
| 14 | Lesson 8: Symmetry | In this section, you will summarize the reflections that carry a rectangle, parallelogram, trapezoid, or regular polygon onto itself. | Look for and express regularity in repeated reasoning. | p. 8-14 | *Use the image to answer the question.*Rectangle upper A upper B upper C upper D is plotted on a coordinate plane. Complete the equations identifying both lines of reflection that will flip the given figure onto itself.The lines of reflection are *x* = \_\_\_ and *y* =\_\_\_. Answer: 0.5; 0.5 |
| 15 | Lesson 10: Comparing Rigid Transformations | In this section, you will create definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. | Make sense of problems and persevere in solving them. | p. 1-8 | *Use the image to answer the question.*A circle is divided into 12 equal segments by 12 lines emanating from the center. With the exception of 120 degrees and 330 degrees, all of the segments are labeled in 30-degree increments. At 120 degrees and 330 degrees, the segments are labeled as time on a clock.A circle measures 360 degrees. If this circle were marked with numbers like a clock, every number would represent 30 degrees farther from 0 and closer to 360 degrees. If an angle marker typically found at 11:00 were to rotate to the place normally marked for 4:00, what is the degree measure of the angle formed moving clockwise?Answer: 150 degrees |
| 16 | Lesson 10: Comparing Rigid Transformations | In this section, you will compare transformations that preserve distance and angle measure to those that do not. | Look for and express regularity in repeated reasoning. | p. 9-14 | *Use the image to answer the question.*Two triangles, a larger one and a smaller one, are plotted in quadrant 1 of a coordinate plane. Both triangles have vertices plotted on the y-axis and vertices plotted on the x-axis.What type of transformation can map $∆ABC\rightarrow ∆A'B'C'$?Answer: no rigid transformation can make this transformation |
| 17 | Lesson 11: Making Predictions with Transformations | In this section, you will apply geometric descriptions of rigid motions to predict the effect of a given rigid motion on a given figure | Identify and express regularity in repeated reasoning. | p. 1-6 | A double reflection of a preimage across perpendicular lines produces the same result as a:Answer: 180-degree rotation. |
| 18 | Lesson 9: Compositions of Transformations | In this section, you will use the definition of congruence as it applies to rigid motions to assess two figures and determine whether they are congruent. | Look for and express regularity in repeated reasoning. | p. 1-6 | *Use the image to answer the question.*Two trapezoids, upper A upper B upper C upper D and upper A prime upper B prime upper C prime upper D prime, are graphed on a coordinate plane.Which explanation for the congruency of the trapezoids is correct? Statement #1: The trapezoids are congruent because *ABCD* was reflected over the line $y=x$. Statement #2: The trapezoids are congruent because *ABCD* was translated left 4 units and up 2 units. Statement #3: The trapezoids are congruent because *ABCD* was rotated $270° $(counterclockwise). Statement #4: The trapezoids are congruent because *ABCD* was rotated $90°$ (counterclockwise).Statement #\_\_\_ is correct.Answer: 4 |
| 19 | Lesson 9: Compositions of Transformations | In this section, you will identify a sequence of transformations that will carry a given figure onto another. | Look for and express regularity in repeated reasoning. | p. 7-12 | What composition transformation rule has $∆LMN$, $L (1, 1), M (7, 2), and N (5, 7)$ map onto $∆L"M"N"$, $L" (2, -1), M" (-4, 0), and N" (-2, 5)$?Answer: a reflection across the y-axis and a move to the right by 3 and down by 2[Transformations Unit Test Item #19 - GeoGebra](https://www.geogebra.org/calculator/x3qpghrx) |
| 20 | Lesson 8: Symmetry | In this section, you will summarize the rotations that transform a rectangle, parallelogram, trapezoid, or regular polygon onto itself. | Identify and express regularity in repeated reasoning. | p. 1-7 | In 3–5 sentences, summarize the rotations that carry a regular pentagon onto itself.Answer: Student answers should state that a regular pentagon is a five-sided figure that has all its sides and interior angles congruent. An example looks like the following diagram:Each side of a pentagon is marked by a tick at the midpoint. The interior angles of the pentagon are marked by arcs at the vertices.Each interior angle measures $108°((180∙3)÷5)$. A regular pentagon can make 5 turns (5 vertices) in multiples of $72°\left(360°÷5\right) $before coming around full circle. The degree turns are $72°$, $144°$, $216°$, $288°$, and $360°$. A regular pentagon can be turned counterclockwise or clockwise onto itself. Since a regular pentagon can make turns less than $360° $onto itself, a regular pentagon has rotational symmetry. |
| 21 | Lesson 11: Making Predictions with Transformations | In this section, you will apply geometric descriptions of rigid motions to predict the effect of a given rigid motion on a given figure | Identify and express regularity in repeated reasoning. | p. 1-6 | Use the function rules to find the coordinates of $ΔA " B " C "$ and predict the quadrant it will be in after the transformations. $ΔABC$, with coordinates $A (-8, 4), B(-5, 8), and C (-3, 3)$, is transformed by $(x, y) \rightarrow (x + 4, y - 6)$ to produce $ΔA 'B 'C '$. $ΔA 'B 'C '$ is transformed by the rule $(x, y) \rightarrow (x + 5, y - 3)$. Create the rule for the composition transformation and predict what quadrant the image will be in. Answer: Student answers should state that $ΔA " B " C "$ will be in Quadrant IV. The two rules can be combined into $(x, y) \rightarrow (x + 9, y - 9)$. The coordinates are as follows: |
| 22 | Lesson 9: Compositions of Transformations | In this section, you will use the definition of congruence as it applies to rigid motions to assess two figures and determine whether they are congruent. | Look for and express regularity in repeated reasoning. | p. 1-6 | *Use the image to answer the question.*Two triangles, upper A upper B upper C and Upper X upper Y upper Z, are graphed on a coordinate plane. The x-axis ranges from negative 8 to 4 in increments of 1. The y-axis ranges from negative 8 to 6 in increments of 1.What transformations were made to $∆ABC$ to produce $∆XYZ$? Assess whether the two triangles are congruent. How do you know? Show your work.Answer: Students should note that$ ∆ABC$ was rotated $90°$ (counterclockwise), then translated 2 units to the right and 1 unit down. Students should write out the mapping equations for counterclockwise rotation and translation, as such: Mapping equation for $90°$ (counterclockwise): $$A\left(x,y\right)\rightarrow A^{'}\left(-y,x\right)$$$$A\left(-5, 2\right)\rightarrow A^{'}\left(-2, -5\right);B\left(-3, 2\right)\rightarrow B^{'}\left(-2, -3\right);C\left(-3, 5\right)\rightarrow C'(-5, -3)$$Mapping equation for the translation:$$A\left(x,y\right)\rightarrow A^{'}\left(x+2, y-1\right)$$$$A^{'}\left(-2, -5\right)\rightarrow A"(0, -6); B'(-2, -3)\rightarrow B\left(0, -4\right);C^{'}\left(-5, -3\right)\rightarrow C"(-3, -4)$$Students should use these mapping equations to conclude that points A”, B”, and C” are the same as points X, Y, and Z, and therefore, $∆ABC≅∆XYZ.$ |
| 23 | Lesson 9: Compositions of Transformations | In this section, you will identify a sequence of transformations that will carry a given figure onto another. | Look for and express regularity in repeated reasoning. | p. 7-12 | *Use the image to answer the question.*Two triangles, upper A upper B upper C and upper A double prime upper B double prime upper C double prime, are graphed on a coordinate plane.In 1-2 sentences, identify what composition transformation maps $∆ABC\rightarrow ∆A$” B” C”.Answer: Student answers should state that $∆ABC $is reflected across the y-axis and then translated right 2 and down 3. The rule would be $\left(x,y\right)\rightarrow (x+2, y-3)$. |