

MeTEOR Performance Task

Eighth Grade

Mathematics
Translations and Dilations

Performance Task Item: Translations and Dilations

Grade Level: 8th grade

Focus Area: Graphing Translations and Dilations

Essential Question: What strategies can be used to develop the concept of transformations and dilations?

Core Ideas:

- Understands shapes can be described in terms of their location in a plane or in space and a coordinate system can be used to describe these locations precisely.
- Understands shapes can be moved in a plane or in space to make congruent or similar shapes.
- Understands movements of shapes in a plane or in space are called transformations and include translations, reflections, rotations, and dilations.
- Understands reflections, translations, and rotations are actions that produce congruent geometric objects.
- Understands a dilation is a transformation that changes the size of a figure, but not the shape.

Learning Targets:

- Students will explore the relationship between an original figure and its image in regards to their corresponding parts being moved an equal distance.
- Students will explore congruence of figures.
- Students will describe transformations with both words and numbers.
- Students will relate rigid motions to the concept of symmetry and use them to prove congruence or similarity of two figures.
- Students will physically manipulate figures to discover properties of similar and congruent figures.

STANDARDS

Domain: Geometry

Content Standards:

- Verify experimentally the congruence properties of rotations, reflections, and translations: lines are taken to lines and line segments to line segments of the same length; angles are taken to angles of the same measure; parallel lines are taken to parallel lines.
- Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and

dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

- Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals.

Supporting Standard:

- Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Math Practice Standards:

MP 1: Make sense of problems and persevere in solving them.

MP 2: Reason abstractly and quantitatively.

MP 3: Construct viable arguments and critique the reasoning of others.

MP 4: Model with mathematics.

MP 6: Attend to precision.

Materials:

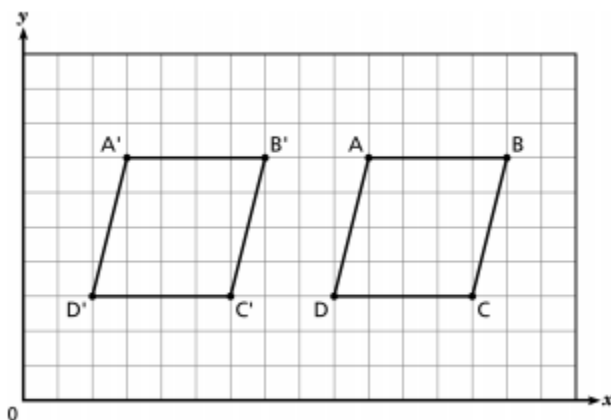
- Performance Task
- Pencil
- Graph paper (see last page)
- Ruler
- Two different colored pencils

Task/Question 1:

DOK Level 1: Recall & Reproduction

Math Practice Standard:

- MP 6: Attend to precision.



- A.** Parallelogram ***ABCD*** was **translated** to parallelogram ***A'B'C'D'***. How many units were the x coordinates of the parallelogram ***ABCD*** moved?
- B.** In what direction were the x coordinates of the parallelogram ***ABCD*** translated?

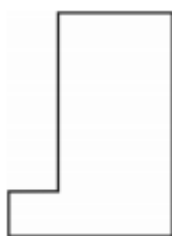
Task/Question 2:

DOK Level 2: Basic Application of Skills and Concepts

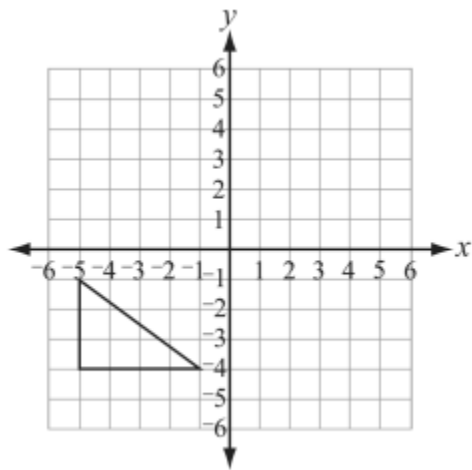
Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 4: Model with mathematics.
- MP 6: Attend to precision.

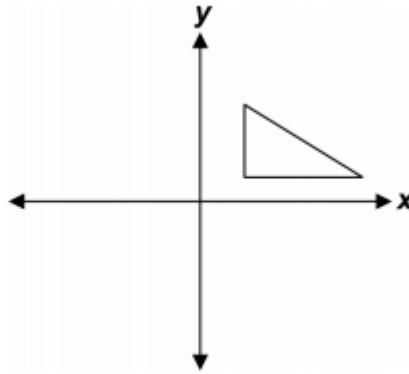
A. Below is a shape. Draw the shape after it has undergone a **180° rotation**.



B. Rotate the triangle below 90° clockwise about the origin. Draw the triangle in the new position on the graph paper provided.



- C. **Reflect** the triangle below over the x-axis, then again over the y-axis. Draw the triangle in the new position on the graph paper provided.



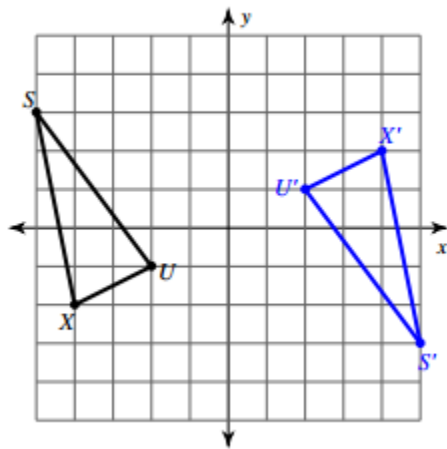
Task/Question 3:

DOK Level 3: Strategic Thinking and Complex Reasoning

Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.
- MP 4: Model with mathematics.
- MP 7: Look for and make use of structure.

A. How has the figure below been **translated**? Defend your answer.



B. On graph paper draw and label a triangle. Describe its original position and size.

C. Rotate, Translate, and Reflect the triangle from Part B so that one side is touching an original side. List your steps and explain how your process is the **most efficient**:

Task/Question 4:

DOK Level 3: Strategic Thinking and Complex Reasoning

Math Practice Standards:

- MP 1: Make sense of problems and persevere in solving them.
- MP 3: Construct viable arguments and critique the reasoning of others.
- MP 4: Model with mathematics.
- MP 7: Look for and make use of structure.

A. Create a Three-Dimensional Figure on a coordinate plane by completing the following:

- Place the origin in the center of the coordinate plane.
- Plot and label these points:

$$A = (1, 5) \quad B = (7, -2) \quad C = (4, -3) \quad D = (-4, -3) \quad E = (-1, -2)$$

- Create solid lines for:

$$\overline{AB} \quad \overline{AC} \quad \overline{BC} \quad \overline{CD} \quad \overline{AD}$$

- Create dashed lines for:

$$\overline{AE} \quad \overline{DE} \quad \overline{EB}$$

B. Transform the image ABCDE that you created in Part A using the rule $(x, y) \rightarrow (2x, 2y)$ to get the new image **VWXYZ**:

Complete:

- $V = (,)$ $W = (,)$ $X = (,)$ $Y = (,)$ $Z = (,)$

- Plot and label V, W, X, Y and Z on the same coordinate plane as Part A, but in a **different color**.

- Create solid lines for:

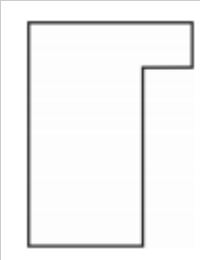
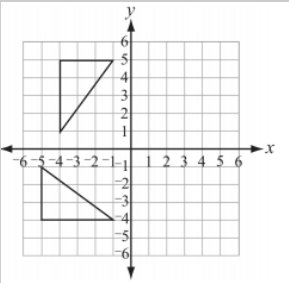
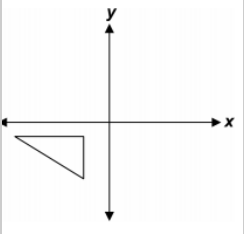
$$\overline{VW} \quad \overline{VX} \quad \overline{WX} \quad \overline{XY} \quad \overline{VY}$$

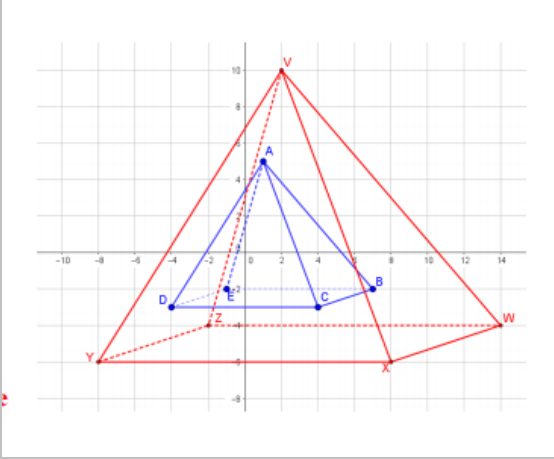
- Create dashed lines for:

$$\overline{VZ} \quad \overline{YZ} \quad \overline{ZW}$$

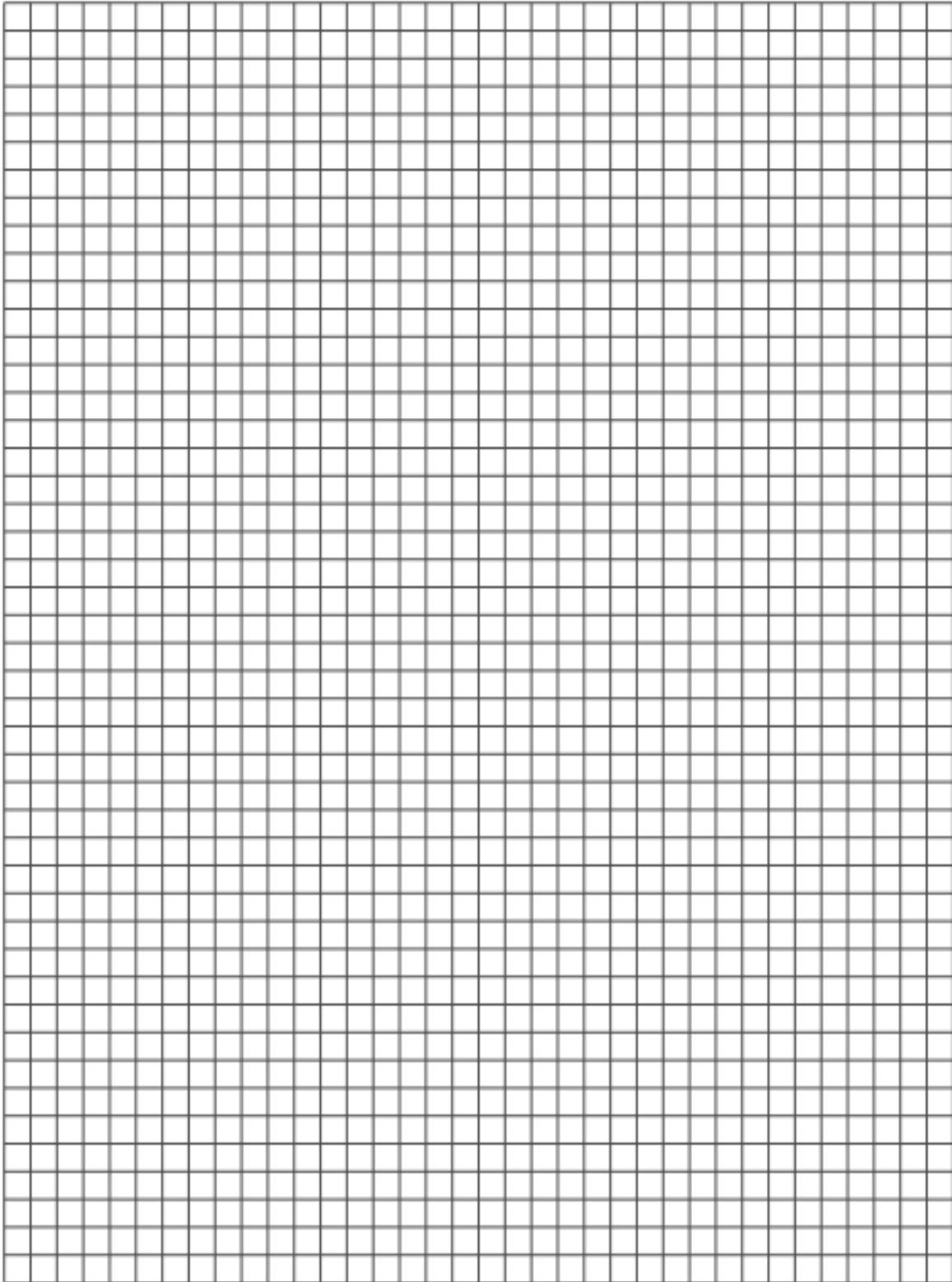
Complete Performance Task Scoring Rubric *Translations and Dilations*

16-21 Proficient 10-15 Good 7-9 Satisfactory 4-6 Poor 0-3 Unsatisfactory

| | Depth of Knowledge Level | Points | Total Possible Points for Task | Total Points Earned by Student |
|---|--------------------------|--|--------------------------------|--------------------------------|
| Task 1: A. 7 B. Left | 1 | 1 1 | 2 | |
| Task 2: A.  B.  C.  | 2 | 1 1 1 | 3 | |

| | | | | |
|--|----------|--|-----------|--|
| <p>Task 3:</p> <p>A. Rotated 180° about the origin. Answers will vary. Students could focus on one point and details describing how it moved. Ex: Point X went from (-4,-2) to (4, 2).</p> <p>B. Answers will vary</p> <p>C. Answers will vary</p> | 3 | 1 1 1 | 3 | |
| <p>Task 4:</p> <p>A. Completed Diagram (Blue)</p>  <p>B. $V(2, 10)$, $W(14, -4)$, $X(8, -6)$, $Y(-8, -6)$, $Z(-2, -4)$ Completed Diagram Above in Red</p> <p>C. Answers will vary. Possible Explanation: VWXYZ is double in size of ABCDE.</p> <p>D. Answers will vary. Students should explain that a dilation of the original figure occurred.</p> <p>E. Answers will vary. Students need to provide an explanation using mathematical language.</p> | 3 | 5 3 1 1 3 | 13 | |
| TOTAL POINTS: | | | | |

Name: _____ Date: _____





meteoreducation.com . 800.699.7516

MeTEOR CONNECT, MeTEOR Education and MeTEOR Design are trademarks or registered trademarks of MeTEOR Education, LLC © 2019.

All rights reserved. PTMATH8.4