

Mini-Lesson 8.1

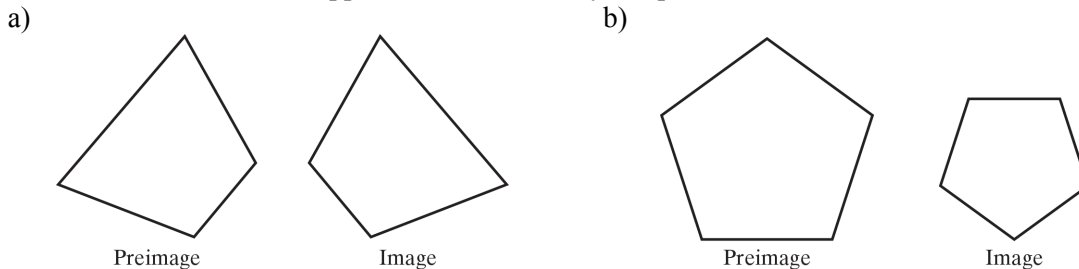
Rigid Transformations

Learning Objectives:

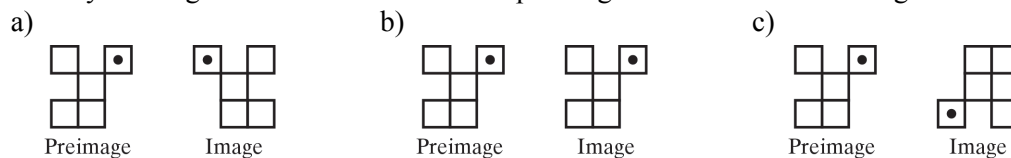
1. Identify rigid transformations or isometries.
2. Name images and corresponding parts.
3. Key vocabulary: *transformation, preimage, image, isometry, rigid transformation*

Key Examples:

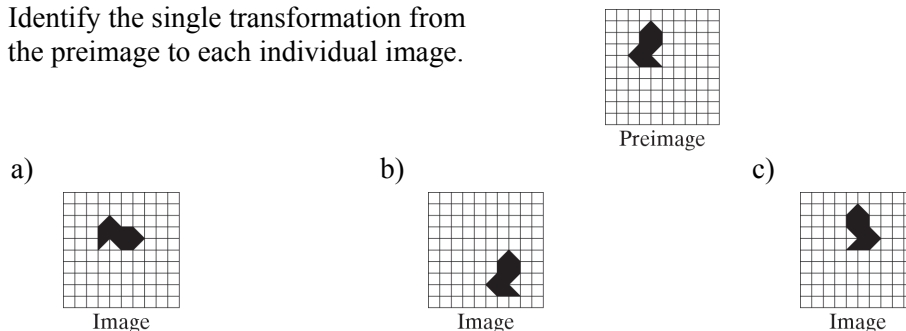
1. Does each transformation appear to be an isometry? Explain.



2. Identify the single transformation from the preimage to each individual image.

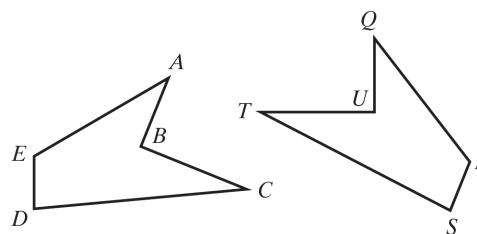


3. Identify the single transformation from the preimage to each individual image.



4. In the diagram, $ABCDE \rightarrow QUTSR$.

- a) What are the images of point B and of point C ?
- b) What are the pairs of congruent corresponding sides?



Answers: 1a) Yes, the preimage and image appear to be congruent. 1b) No, the figures are not the same size.
 2a) reflection 2b) translation 2c) rotation 3a) rotation 3b) translation 3c) reflection 4a) point U ; point T
 4b) $\overline{AB} \cong \overline{QU}$; $\overline{BC} \cong \overline{UT}$; $\overline{CD} \cong \overline{TS}$; $\overline{DE} \cong \overline{SR}$; $\overline{EA} \cong \overline{RQ}$

Mini-Lesson 8.2

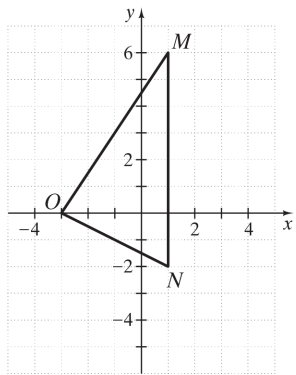
Translations

Learning Objectives:

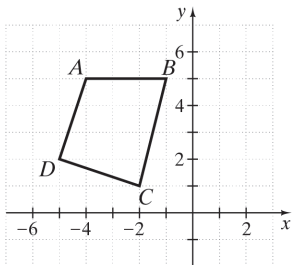
1. Find translation images of figures.
2. Key vocabulary: *translation, composition of transformations*

Key Examples:

1. a) Find the image of each vertex of $\triangle MNO$ for the translation $(x, y) \rightarrow (x + 3, y - 3)$.
b) Graph $\triangle MNO$ and its image.



2. The translation image of $ABCD$ is $A'B'C'D'$ with $A'(2, 3)$, $B'(5, 3)$, $C'(4, -1)$, and $D'(1, 0)$. What is a translation rule that describes the translation?



3. On Tuesdays and Thursdays, a college student has a math class, followed by a history class, and lastly a chemistry class. The shortest route between the buildings in which the mathematics the history departments are located is 1 block south and 4 blocks west. The chemistry building is 3 blocks east and 1 block south of the history building. Where is the chemistry building in relation to the mathematics building?

Answers: 1a) $M'(4, 3)$, $N'(4, -5)$, $O'(0, -3)$ 1b) See Additional Answers at end of Mini-Lessons.
2) $(x, y) \rightarrow (x + 6, y - 2)$ 3) 1 block west and 2 blocks south

Mini-Lesson 8.3

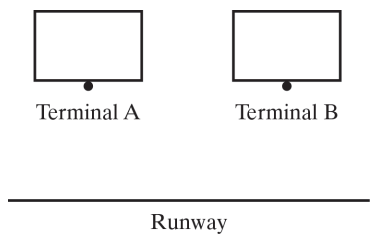
Reflections

Learning Objectives:

1. Find reflection images of figures.
2. Identify line symmetry.
3. Key vocabulary: *reflection, line of reflection, line symmetry, reflectional symmetry line of symmetry*

Key Examples:

1. What is the image of $P(7, -5)$ reflected across the line $y = 2$?
2. Graph $\triangle JKL$, where $J(3, 4)$, $K(-3, 1)$, and $L(-1, -3)$. What is the image of $\triangle JKL$ reflected across the x -axis?
3. Two taxi strips are to be constructed between two terminals, A and B, and a main runway. At what point C along the runway should the strips be built so that the total length of the strips is minimized?



4. How many lines of symmetry does a regular pentagon have?

Answers: 1) $(7, 9)$ 2) and 3) See Additional Answers at end of Mini-Lessons. 4) five

Mini-Lesson 8.4

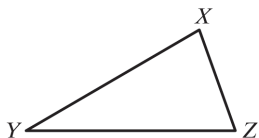
Rotations

Learning Objectives:

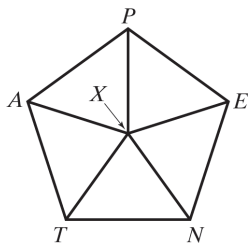
1. Draw and identify rotation images of figures.
2. Identify rotational symmetry.
3. Key vocabulary: *rotation, center of rotation, angle of rotation, center of a regular polygon, symmetry, rotational symmetry*

Key Examples:

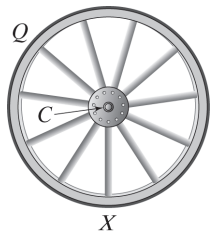
1. What is the image of $\triangle XYZ$ for a 45° rotation about Z ?



2. What is the image of P for a 288° rotation about X ?



3. For the wheel in the figure, what is the angle of rotation about C that maps Q to X ?



4. What are the coordinates of the image of point $X(7, 7)$ for a composition of a 60° rotation and a 75° rotation about the origin?

Answers: 1) See Additional Answers at end of Mini-Lessons. 2) E 3) 130.9° 4) $(-7, 0)$ 5) No

Mini-Lesson 8.5

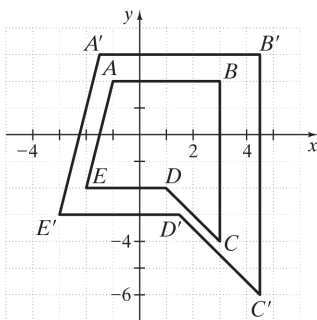
Dilations

Learning Objectives:

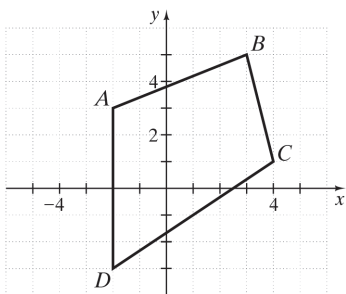
1. Understand dilation images of figures.
2. Key Vocabulary: *dilation, center of dilation, scale factor of a dilation, enlargement, reduction*

Key Examples:

1. $A'B'C'D'E'$ is a dilation image of $ABCDE$. The center of dilation is the origin O . Is the dilation an enlargement or a reduction? What is the scale factor of the dilation?



2. What are the images of the vertices of $ABCD$ for a dilation with center $(0, 0)$ and scale factor $\frac{1}{3}$?



3. A paramecium (a type of one-celled organism) is 0.25 mm long. What is the length of this organism when viewed under a microscope that magnifies objects by a scale factor of 200?

Answers: 1) enlargement; 1.5 2) $A'\left(-\frac{2}{3}, 1\right)$, $B'\left(1, \frac{5}{3}\right)$, $C'\left(\frac{4}{3}, \frac{1}{3}\right)$, $D'\left(-\frac{2}{3}, -1\right)$ 3) 50 mm or 5 cm

Mini-Lesson 8.6

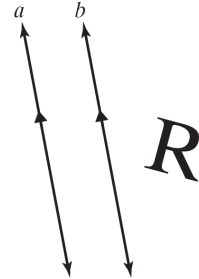
Compositions of Reflections

Learning Objectives:

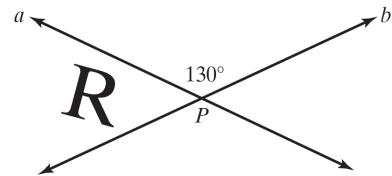
1. Find compositions of reflections, including glide reflections.
2. Classify isometries.
3. Key vocabulary: *glide reflection*

Key Examples:

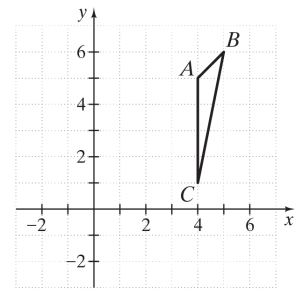
1. What is the image of R reflected first across line a and then across line b ?
What are the direction and distance of the resulting translation?



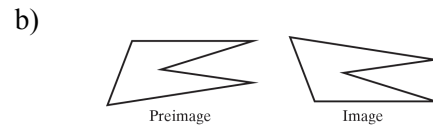
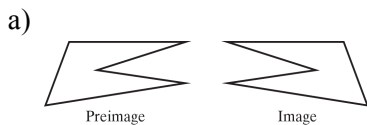
2. What is the image of R reflected first across line b and then across line a ?
What are the center of rotation and the angle of rotation for the resulting rotation?



3. What is the image of $\triangle ABC$ for a glide reflection where the translation is $(x, y) \rightarrow (x - 7, y)$ and the line of reflection is $y = 1$?



4. Each transformation is an isometry. Are the orientations of the preimage and image the same or opposite? What type of isometry maps the preimage to the image?



Answers: 1)–3) See Additional Answers at end of Mini-Lessons. 4a) opposite; reflection 4b) opposite; glide reflection