

Chapter Audio Summary for McDougal Littell *Geometry*

Chapter 7 Transformations

In Chapter 7 you learned about the characteristics of an isometry. You solved problems involving rigid transformations in the coordinate plane. You also proved theorems about reflections, rotations, and translations. You described translations using vectors and identified vector components. You also identified glide reflections in a plane. Then you used transformations to draw frieze patterns.

Turn to the lesson-by-lesson Chapter Review that starts on p. 446 of the textbook.

Lesson 7.1 Rigid Motion in a Plane

Important words to know are: *image*, *preimage*, *transformation*, and *isometry*.

The first goal of Lesson 7.1 is to identify the three basic rigid transformations. When a figure is reflected, rotated, or translated, the resulting figure is congruent to the original.

One way to identify a reflection is to think of it as flipping the original image. In the example, the congruent reflection is obtained by flipping the original image over the vertical line. The blue triangle is reflected to produce the congruent red triangle, so the transformation is an isometry.

Now try Exercises 1 through 3. If you need help, go to the worked-out Examples on pages 396 through 398.

Lesson 7.2 Reflections

Important words to know are: *reflection*, *line of reflection*, and *line of symmetry*.

The first goal of Lesson 7.2 is to identify and use reflections in a plane. In the diagram, \overline{AB} is reflected in the line $y=1$, so $\overline{A'B'}$ has endpoints $A'(-2, 0)$ and $B'(3, -2)$.

The second goal of Lesson 7.2 is to identify relationships between reflections and line symmetry. A figure in the plane has a line of symmetry if the figure can be mapped onto itself by a reflection in the line.

Now try Exercises 4 through 6. If you need help, go to the worked-out Examples on pages 404 through 406.

Lesson 7.3 Rotations

Important words to know are: *rotation*, *center of rotation*, *angle of rotation*, and *rotational symmetry*.

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The first goal of Lesson 7.3 is to identify rotations in a plane. In the diagram, $\triangle FGH$ is rotated 90° clockwise about the origin. The resulting congruent triangle $F'G'H'$ is shown in red.

You can think of rotating $\triangle FGH$ about the stationary point $(0, 0)$.

Now try Exercises 7 through 9. If you need help, go to the worked-out Examples on pages 413 through 415.

Lesson 7.4 Translations and Vectors

Important words to know are: *translation*, *vector*, *initial point*, *terminal point*, and *component form*.

The first goal of Lesson 7.4 is to identify and use translations in the plane. A translation can also be known as a “slide.”

Notice that the brackets used to write the component form of a vector are different than the parentheses used to write an ordered pair.

The second goal of Lesson 7.4 is to use vectors in real-life situations. Using the vector $\langle -3, -4 \rangle$ in the Example, $\triangle ABC$ can be translated to $\triangle A'B'C'$. To locate A' , start at $A(2, 4)$, move 3 units left and 4 units down. A' is located at $(-1, 0)$. To locate B' , start at $B(1, 2)$, move 3 units left and 4 units down, to $B'(-2, -2)$. To locate C' , start at $C(5, 2)$, move 3 units left and 4 units down to $C'(2, -2)$.

Now try Exercises 10 through 13. If you need help, go to the worked-out Examples on pages 422 through 424.

Lesson 7.5 Glide Reflections and Compositions

Important words to know are: *glide reflection* and *composition*.

The first goal of Lesson 7.5 is to identify glide reflections in a plane. A translation, or glide, and a reflection can be performed one after the other to produce a glide reflection. The diagram in the Example shows the image of $\triangle XYZ$ after a glide reflection. To find X' , move 4 units right. To find X'' , reflect X' over the line $y=3$. Do the same with Y and Z , to find Y'' and Z'' .

The second goal of Lesson 7.5 is to represent transformations as compositions of simpler transformations. The order in which a translation and a reflection are performed may or may not affect the image.

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Now try Exercises 14 and 15. If you need help, go to the worked-out Examples on pages 430 through 432.

Lesson 7.6 Frieze Patterns

Important words to know are: *frieze pattern* and *border pattern*.

The first goal of Lesson 7.6 is to use transformations to classify frieze patterns. The Example shows a frieze pattern that can be described as TRHVG because the pattern can be mapped onto itself by a translation (T), 180° rotation (R), horizontal line reflection (H), vertical line reflection (V), and glide reflection (G).

The second goal of Lesson 7.6 is to use frieze patterns to design border patterns in real-life.

Now try Exercises 16 and 17. If you need help, go to the worked-out Examples on pages 437 through 439.