Accelerated 7 · Unit 1 Worksheet

Rigid Transformations and Congruence

Name: _____ Date: _____

Part A · Naming the Moves

Use precise vocabulary: translation, rotation, reflection. Direction, angle, distance, line of reflection — all matter.

1. Triangle ABC has vertices A(1, 2), B(4, 2), C(1, 5). Describe each transformation precisely AND give the new coordinates of A, B, C.

a. Translate 5 units right and 1 unit down.

b. Reflect across the x-axis.

c. Rotate 90° counterclockwise about the origin.

2. A figure is rotated 180° about a point, then reflected across a line. Could the same final image be produced by a single transformation? Explain.

Part B · Properties of Rigid Transformations

3. Two segments AB and CD are images of each other under a rigid transformation. AB has length 7 cm. What can you say about CD? What can you say about angles formed at A and B compared to those at C and D? Justify using the definition of rigid motion.

4. Lines m and n are parallel. A 180° rotation about point P (between the lines) maps line m to a line m'. Show that m' is the same as line n. (Hint: think about what a 180° rotation does to a line.)

Part C · Congruence

5. Quadrilateral PQRS has all sides 5 cm and all angles 90°. Quadrilateral WXYZ has all sides 5 cm but its angles are 80°, 100°, 80°, 100°. Are they congruent? Explain why or why not in terms of rigid motions.

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6. Diego claims: "Two shapes are congruent if they have the same area." Is Diego right? Give a counterexample if you can.

Part D · Angles in a Triangle

7. Two parallel lines L and m are cut by transversal t. One of the angles formed is 47°. Identify the measures of THREE other angles in the figure and explain which angle relationship you used for each (alternate interior, corresponding, vertical, supplementary).

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8. In triangle DEF, angle D = 35° and angle E = 75°. Without measuring, find angle F. Then PROVE that the angles of ANY triangle sum to 180° (draw a line through one vertex parallel to the opposite side).

Angle F = _____°

Your proof:

Part E · Drawing Triangles with Given Conditions

9. For each set of conditions, decide if it determines exactly one triangle, more than one triangle, or no triangle. Explain.

a. Three sides: 3 cm, 4 cm, 5 cm

b. Three sides: 2 cm, 3 cm, 10 cm

c. Three angles: 60°, 60°, 60°

d. Two angles 40° and 70°, side between them 6 cm

Part F · Thinking Deeply

10. Mai says: "A translation, a rotation, and a reflection can ALL be undone by another transformation of the same type." Lin says: "Only a translation and a rotation can be — reflections are different." Who is right? Explain in detail.

11. Two right triangles have legs of lengths 3 and 4. One has a hypotenuse of length 5. Are the two triangles necessarily congruent? Why or why not?

12. Design a sequence of two or more rigid transformations that maps the point (2, 3) to (-3, 2). Then describe a DIFFERENT sequence that has the same effect. Are both sequences "the same" rigid motion? Justify.