Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour 1. 2. 3. 4. 5

**Transformations with Matrices**

**Use a matrix to find the coordinates of the vertices of the image of each figure under the given translations.**

1. $∆$STU with S(6, 4), T(9, 7) and U(14, 2); (x, y) $\rightarrow $ (x – 4, y + 3)

2. $∆$GHI with G(-5, 0), H(-3, 6) and I(-2, 1); (x, y) $\rightarrow $ (x + 2, y + 6)

3. $∆$KLM with K(-7, -3), L(4, 9) and M(9, -6); (x, y) $\rightarrow $ (x – 7, y + 2)

4. parallelogram ABCD with A(-4, 3), B(-2, 8), C(3, 10), and D(1, 5); (x, y) $\rightarrow $ (x + 3, y - 9)

**Use scalar multiplication to find the coordinates of the vertices of each figure for a dilation centered at the origin with the given scale factor.**

5. $∆$DEF with D(2, 1), E(5, 4) and F(7, 2); r = 4

6. quadrilateral WXYZ with W(-9, 6), X(-6, 3), Y(3, 12) and Z(-6, 15); r = $\frac{1}{3}$

7. quadrilateral HIJK with H(-2, 3), I(2, 6), J(8, 3) and K(3, -4); r = $-\frac{1}{3}$

8. pentagon DEFGH with D(-8, -4), E(-8, 2), F(2, 6), G(8, 0) and H(4, -6); r = $\frac{5}{4}$

**Use a matrix to find the coordinates of the vertices of the image of each figure under the given reflection.**

9. $∆$MNO with M(-5, 1), N(-2, 3) and O(2, 0); y -axis

10. quadrilateral ABCD with A(3, 1), B(6, -2), C(5, -5), and D(1, -6); x-axis

11. $∆$QRS with Q(-5, -4), R(-1, -1) and S(2, -6); x -axis

12. quadrilateral VXYZ with V(-4, -2), X(-3, 4), Y(2, 1) and Z(4, -3); y = x

**Use a matrix to find the coordinates of the vertices of the image of each figure under the given rotation.**

13. $∆$RST with R(-2, -2), S(-3, 3) and T(2, 2); 90$°$ counterclockwise

14. parallelogram LMNP with L(3, 4), M(7, 4), N(9, -3), and P(5, -3); 180$°$ counterclockwise

15. parallelogram EFGH with E(-5, -4), F(-3, -1), G(5, -1) and H(3, -4); 90$°$ counterclockwise

16. quadrilateral PSTU with P(-3, 5), S(2, 6), T(8, 1) and U(-6, -4); 270$°$ counterclockwise

17. **Forestry** A research botanist mapped a section of forested land on a coordinate grid to keep track of endangered plants in the region. The vertices of the map are A(-2, 6), B(9, 8), C(14, 4) and D(1, -1). After a month, the botanist has decided to decrease the research area to $\frac{3}{4}$ of its original size. If the center for the reduction is O(0, 0), what are the coordinates of the new research area?