Geometry Name KEY ID: 1

Chapter 4 Review

Date _____ Period ____

Find the coordinates of the vertices of each figure after the given transformation.

1) translation: $(x, y) \rightarrow (x - 2, y - 4)$
$D(-2, 1), E(-3, 5), F(2, 4)$

$D'(-4, -3), E'(-5, 1), F'(0, 0)$

2) translation: $(x, y) \rightarrow (x + 4, y - 1)$
$D(-5, -3), C(-1, 0), B(-1, -4)$

$D'(-1, -4), C'(3, -1), B'(3, -5)$

Write a rule to describe each transformation.

3) $T(0, 2), U(3, 5), V(3, 2)$
to
$T'(-4, 1), U'(-1, 4), V'(-1, 1)$

translation: $(x, y) \rightarrow (x - 4, y - 1)$

4) $A(1, -3), B(2, -2), C(3, -5)$
to
$A'(0, 3), B'(1, 4), C'(2, 1)$

translation: $(x, y) \rightarrow (x - 1, y + 6)$

Find the coordinates of the vertices of each figure after the given transformation.

5) reflection across $y = -2$
$V(-3, -3), W(1, -2), X(-1, -5)$

$W'(1, -2), X'(-1, 1), V'(-3, -1)$

6) reflection across $y = -x$ $(a, b) \rightarrow (-b, -a)$
$W(-5, -3), X(-5, 2), Y(-3, -1)$

$X'(-2, 5), Y'(1, 3), W'(3, 5)$

$(a, b) \rightarrow (-a, b)$

7) reflection across the y-axis
$S(-3, -3), T(-2, -1), U(-1, -5)$

$T'(2, -1), U'(1, -5), S'(3, -3)$

8) reflection across $y = x$ $(a, b) \rightarrow (b, a)$
$R(-5, -4), S(-5, -2), T(-4, -2)$

$S'(-2, -5), T'(-2, -4), R'(-4, -5)$

9) reflection across the x-axis $(a,b) \rightarrow (a,-b)$
$Q(1, -4)$, $R(5, -1)$, $S(5, -5)$

$R'(5, 1)$, $S'(5, 5)$, $Q'(1, 4)$

10) reflection across $x = -2$
$S(-5, 4)$, $T(-3, 5)$, $U(-1, 3)$

$T'(-1, 5)$, $U'(-3, 3)$, $S'(1, 4)$

Write a rule to describe each transformation.

11) $K(-4, -2)$, $L(-4, 3)$, $M(1, 1)$, $N(0, -4)$
to
$L'(-4, -3)$, $M'(1, -1)$, $N'(0, 4)$, $K'(-4, 2)$

reflection across the x-axis

12) $D(2, 3)$, $E(5, 5)$, $F(5, 2)$
to
$E'(-5, 5)$, $F'(-5, 2)$, $D'(-2, 3)$

reflection across the y-axis

13) $I(-4, -1)$, $H(-3, 4)$, $G(-1, 0)$
to
$H'(-4, 3)$, $G'(0, 1)$, $I'(1, 4)$

reflection across $y = -x$

14) $V(-4, -3)$, $W(-3, -1)$, $X(-3, -3)$
to
$W'(-1, -3)$, $X'(-3, -3)$, $V'(-3, -4)$

reflection across $y = x$

Find the coordinates of the vertices of each figure after the given transformation.

$(a,b) \rightarrow (b,-a)$

15) rotation 180° about the origin $(a,b) \rightarrow (-a,-b)$
$I(0, 3)$, $J(4, 4)$, $K(2, 0)$

$I'(0, -3)$, $J'(-4, -4)$, $K'(-2, 0)$

16) rotation of 270° about the origin
S(1, -3), T(4, -1), U(4, -5)

S'(-3,-1) T'(-1,-4) U'(-5,-4)

17) rotation of 90° about the origin $(a,b) \rightarrow (-b,a)$
E(3, -1), F(4, 3), G(5, 1)

E'(1,3) F'(-3,4) G'(-1,5)

18. A dilation maps the preimage (-2, 3) onto the image (4, -6). What is the scale factor of the dilation?

$k = -2$

19. The base of a triangle measures 5 cm and the height measures 7 cm. After a dilation is performed by a scale factor of 3, what is the area of the new triangle?

base $\times 3$: $5 \times 3 = 15$

height $\times 3$: $7 \times 3 = 21$

$A = \frac{1}{2}(b)(h)$

$A = \frac{1}{2}(15)(21) = 157.5 \text{ cm}^2$

20. A translation using the vector <-2, 5> is performed to create the image (4, -2). What are the coordinates of the preimage?

$(x, y) \rightarrow (x-2, y+5)$

$(6, -7) \rightarrow (4, -2)$

21. What would the scale factor be of a dilation that rotates a figure 180^0 and makes the image a third of the size of the preimage?

$k = -\frac{1}{3}$

22. Write a coordinate rule that would translate an image 3 units up and 4 units ~~down~~ left.

$(x, y) \rightarrow (x-4, y+3)$

23. A ferris wheel takes 40 seconds to complete a rotation. A seat that starts on coordinate (10, 0) is rotated for 10 seconds about the origin. What are the new coordinates for the seat after the rotation?

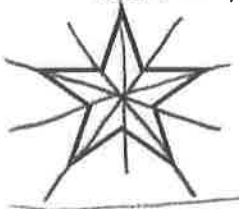
$\frac{10}{40} = \frac{1}{4}$ of a full rotation

$\frac{1}{4}(360) = 90^\circ$

$(a, b) \rightarrow (-b, a)$

$(10, 0) \rightarrow (0, 10)$

24. Determine a) how many lines of symmetry each figure has (if any) and b) What are the angles of rotational symmetry for each figure (if any)?

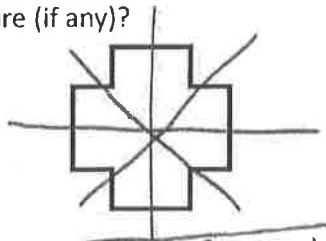


5 lines of symmetry

order = 5

$\frac{360}{5} = 72^\circ$

72° and 144°

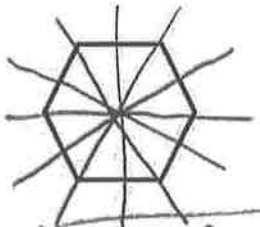


4 lines of symmetry

order = 4

$\frac{360}{4} = 90^\circ$

90° and 180°



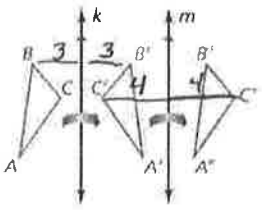
6 lines of symmetry

order = 6

$\frac{360}{6} = 60^\circ$

$60^\circ, 120^\circ, 180^\circ$

25. Triangle ABC is reflected over line k and then reflected over line m. The distance between line k and m is 5 cm. The distance between point B and line k is 3 cm, and the distance between point C'' and line m is 4 cm.



a. What is the distance from A to A''? 10 cm

b. What is the distance from B' to B''? 4 cm

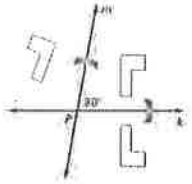
c. What is the distance from C to C'? 2 cm

d. What single transformation is equivalent to these to reflections?

translation (twice the distance between k and m)

26. A figure is reflected over line k and then reflected over line m. What is the angle of rotation this figure could go through to end up in the same location?

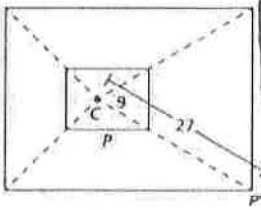
160° (twice the measure of the angle between the two intersecting lines)



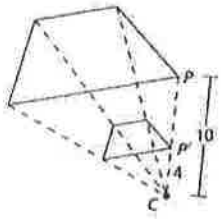
27. If a figure is rotated 100 degrees. Your friend tells you that this transformation could have also been completed by using a reflection over two intersecting lines. What would the angle be between those two intersecting lines in order to be equivalent to a 100 degree rotation?

50°

28. Find the scale factor of each dilation. Tell whether it was an enlargement or reduction.



$K = \frac{CP'}{CP} = \frac{27}{9} = 3$



$K = \frac{CP'}{CP} = \frac{4}{10} = \frac{2}{5}$

29. Describe the difference between a rigid motion and a non-rigid motion.

A rigid motion is a transformation that preserves size and shape. A translation, reflection, rotation, or composition of these is a rigid motion. It is a congruence transformation. A non-rigid motion is a similarity transformation that has the same shape but not same size. A dilation is a non-rigid motion

30. **Challenge:** Find the image of the point (2, 11) after being reflected over the line y = 2x + 1. You may leave your answer in decimal form.

① Find line ⊥ to $y = 2x + 1$ thru (2, 11)

$m = -\frac{1}{2}$ (2, 11) $y = -\frac{1}{2}x + 12$

$y = mx + b$

$11 = -\frac{1}{2}(2) + b$

$11 = -1 + b$

$12 = b$

② Find intersection

$2x + 1 = -\frac{1}{2}x + 12$

$2.5x = 11$

$x = 4.4$

$y = 2(4.4) + 1 = 9.8$

③ Work backwards from midpt.

+2.4

(2, 11) (4.4, 9.8) (6.8, 8.6)

−1.2

Find point C on the x-axis so $AC + BC$ is a minimum.

31. $A(1,4)$ *and* $B(6,1)$

$A'(1,-4)$

$+5\left(\begin{array}{c|c} 1 & -4 \\ 6 & 1 \end{array}\right)+5$

$m = 1$

$-4 = 1(1)+b$

$-4 = 1+b$

$-1 \quad -1$

$-5 = b$

$y = 1x-5$

$0 = 1x-5$

$+5 \qquad +5$

$5 = x$

$C(5,0)$

32. $A(4,-5)$ *and* $B(12,3)$

$+8\left(\begin{array}{c|c} 4 & -5 \\ 12 & 3 \end{array}\right)+8$

$m = 1$

$3 = 1(12)+b$

$3 = 12+b$

$-12 \quad -12$

$-9 = b$

$y = 1x-9$

$0 = 1x-9$

$+9 \qquad +9$

$9 = x$

$C(9,0)$

33. $A(-8,4)$ *and* $B(-1,3)$

$A'(-8,-4)$

$+7\left(\begin{array}{c|c} -8 & -4 \\ -1 & 3 \end{array}\right)+7$

$m = 1$

$-4 = 1(-8)+b$

$-4 = -8+b$

$+8 \quad +8$

$4 = b$

$y = 1x+4$

$0 = x+4$

$-4 \qquad -4$

$-4 = x$

$C(-4,0)$

34. $A(-1,7)$ *and* $B(5,-4)$

$+6\left(\begin{array}{c|c} -1 & 7 \\ 5 & -4 \end{array}\right)-11$

$m = \frac{-11}{6}$

$7 = \frac{-11}{6}(-1)+b$

$7 = \frac{11}{6}+b$

$-\frac{11}{6} \quad -\frac{11}{6}$

$\frac{31}{6} = b$

$y = \frac{-11}{6}x + \frac{31}{6}$

$0 = \frac{-11}{6}x + \frac{31}{6}$

$-\frac{31}{6} \qquad -\frac{31}{6}$

$6 \cdot -\frac{31}{6} = \frac{11}{6}x \cdot 6$

$\frac{-31}{11} = \frac{11x}{11}$

$-31/11 = x$

$C\left(\frac{-31}{11},0\right)$

$C(-2.8,0)$