Math 2 – Honors
Unit 1 – Geometric Transformations
Unit Review

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Date _____ Pd _____

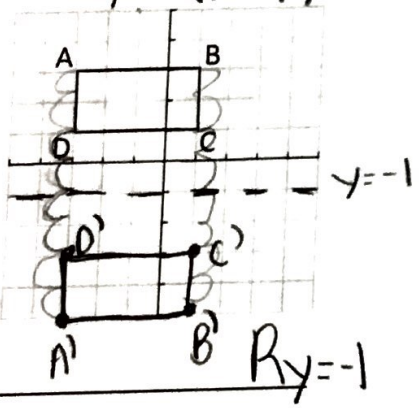
- For each transformation, state the coordinates for each:

	Image of (x, y)	Image of (1,4)	Image of $(-2, 7)$
1. Reflect over $y - axis$	$(-x, y)$	$(-1, 4)$	$(2, 7)$
2. Reflect over $x - axis$	$(x, -y)$	$(1, -4)$	$(-2, -7)$
3. Reflect over $y = x$	(y, x)	$(4, 1)$	$(7, -2)$
4. Reflect over $y = -x$	$(-y, -x)$	$(-4, -1)$	$(-7, 2)$
5. Rotate 90° *clockwise* about the origin	$(y, -x)$	$(4, -1)$	$(7, 2)$
6. Rotate 90° *counterclockwise* about the origin	$(-y, x)$	$(-4, 1)$	$(-7, -2)$
7. Rotate 180° about the origin	$(-x, -y)$	$(-1, -4)$	$(2, -7)$
8. Rotate 270° about the origin	$(y, -x)$	$(4, -1)$	$(7, 2)$

- For each of the following, graph and label the image for each transformation described.
- Then write using the correct notation.

8. Reflect over the line $y = -1$

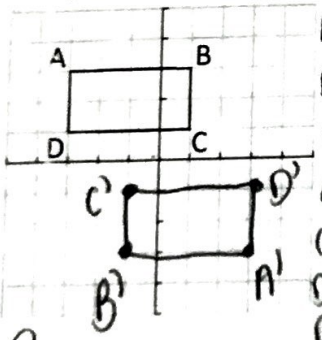
Y=# ALWAYS HORIZONTAL



$R_{y=-1}$

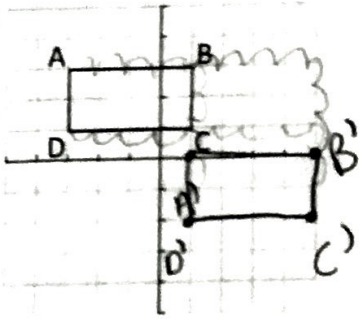
9. Rotate 180° about the origin $(-x, -y)$

A(-3,3)
A'(3,-3)
B(1,3)
B'(-1,-3)
C(1,1)
C'(-1,-1)
D(-3,1)
D'(3,-1)



$R_{180°}$

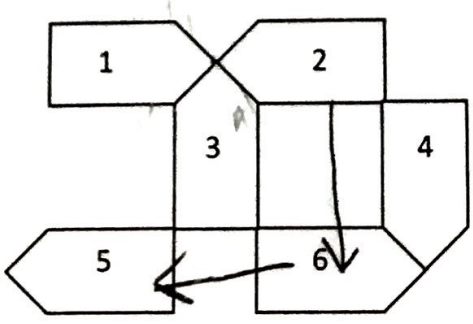
10. Translate right 4 units & down 3 units



$\langle 4, -3 \rangle$

- State whether the specified pentagon is mapped to the other pentagon by a reflection, translation, or rotation

11. Pentagon 1 to Pentagon 3 — Rotation
12. Pentagon 5 to Pentagon 6 — Reflection
13. Pentagon 2 to Pentagon 5 — Translation
14. Pentagon 1 to Pentagon 2 — Reflection
15. Pentagon 4 to Pentagon 6 — Rotation



- Perform each of the transformations using the set of points below for #16-19.

$$\{(7,-4)\ \ (0,6)\ \ (-2,3)\}$$

16. Reflect over the $y-axis$ $(-x,y)$ $\{(-7,-4),(0,6)(2,3)\}$	18. Rotate 90° $counter-clockwise$ $(-y,x)$ $\{(4,7)(-6,0)(-3,-2)\}$
17. Reflect over the line $y=-x$ $(-y,-x)$ $\{(4,-7)(-6,0)(-3,2)\}$	19. Dilate by a scale factor r = ½ $\{(3.5,-2)(0,3)(-1,1.5)\}$

- Answer each of the following.

20. If translation $(5,-3)\rightarrow(-4,0)$, then $(8,2)\rightarrow$ (-1, 5) (-9, +3)

21. If $T:(x,y)\rightarrow(x-5,\ y+2)$ and the point F′ (7, −6), then find the point F. (12, -8) (+5, -2)

Find Preimage

22. M is reflected over the $y-axis$. If M is $(6,-1)$, find M'. (-6, -1) $(-x,y)$

23. C is rotated about the origin 90° CW. If C' is $(-9,5)$, find C. (5, 9) $(y,-x)$

Find Preimage 90° CW

24. Y is rotated $counterclockwise$ 180°. If the image of Y' is (0, -3) find Y. (0, 3) 180 CW $(-x,-y)$

25. A figure is reflected over the line $y=x$. If the preimage is (2, 7), find the image. (7, 2) (y,x)

26. ΔABC has vertices $A(5,-2)$, $B(-4,0)$, $C(7,1)$.

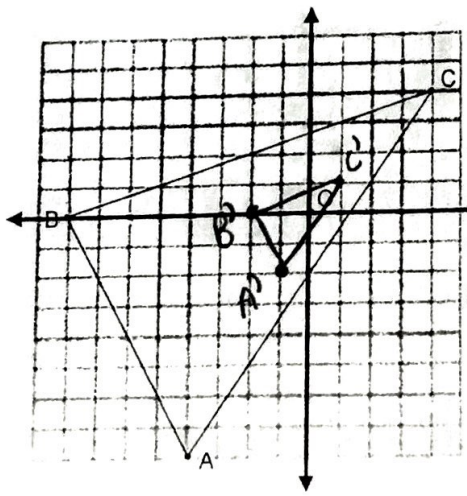
Find the coordinates of the image of the triangle if it is dilated by a scale factor r = 3.

A′(15, -6)

B′(-12, 0)

C′(21, 3)

27. Dilate ΔABC using a scale factor r = $\frac{1}{4}$. $(x,y)\rightarrow(\frac{1}{4}x,\frac{1}{4}y)$

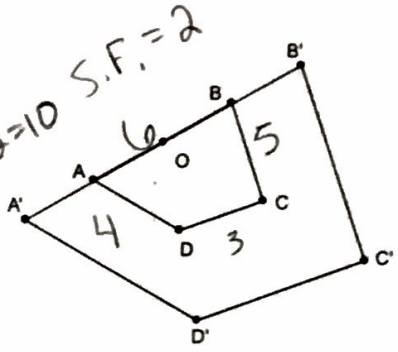


Explain why the two triangles are similar.

Corresponding sides proportional, ½

Corresponding angles congruent

28. $ABCD$ is dilated by a scale factor of $r = 2$ to produce $A'B'C'D'$.
The lengths of the segments of the preimage are as follows:
$AB = 6 \quad BC = 5 \quad CD = 3 \quad AD = 4$



BC x 2 = 5 x 2 = 10 S.F. = 2

a. What is the length of $\overline{B'C'}$? $5 \cdot 2 = 10$

b. What is the length of $\overline{A'B'}$? $6 \cdot 2 = 12$

c. If the slope of $\overline{CD}$ is $\frac{1}{3}$, what is the slope of $\overline{C'D'}$?
What allows you to make this conclusion?

y3, Dilating a figure will not change slope measures, only segment lengths

29. $PQRST \sim UWXYZ$ with a scale factor of 2:5. If the perimeter of $UWXYZ$ is 40 inches, what is the perimeter of $PQRST$?

1st to 2nd match

$\frac{2}{5} \times \frac{x}{40}$ $\quad 2/5 \cdot 40 = 16$ $\quad \frac{2}{5} = \frac{x}{40}$ $\quad \frac{2}{5} = S.F.$ $\quad x = 16$ $\quad x = \frac{2}{5}(40)$

$\frac{2}{5} \times \frac{x}{40}$ $\quad 80 = 5x$ $\quad \frac{80}{5} = \frac{5x}{5}$ $\quad x = 16$

30. For each problem, there is a composition of motions. Using your algebraic rules, come up with a new rule after both transformations have taken place.

a. Translate a triangle 5 *units left* and 3 *units up*, and then reflect the triangle over the $x-$*axis*.

$(x,y) \rightarrow (x-5, y+3) \rightarrow (x-5, -(y+3)) = (x-5, -y-3)$ $\quad (x, -(y))$

b. Translate a triangle 2 *units right* and 7 *units down*, and then rotate 90° *clockwise*.

$(x,y) \rightarrow (x+2, y-7) \rightarrow (y-7, -(x+2)) = (y-7, -x-2)$

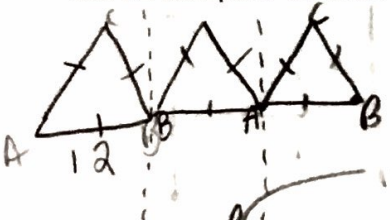
c. Rotate a triangle 90 *degrees counterclockwise*, and then reflect in the line $y = x$.

$(x,y) \rightarrow (-y, x) \rightarrow (x, -y)$

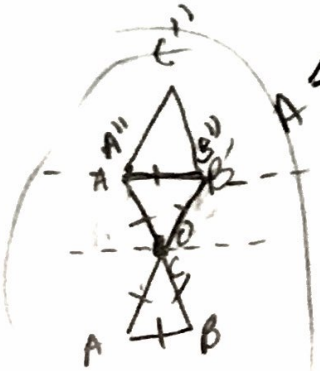
d. Reflect in the line $y = -x$, and then translate *right* 4 *units* and *down* 2 *units*.

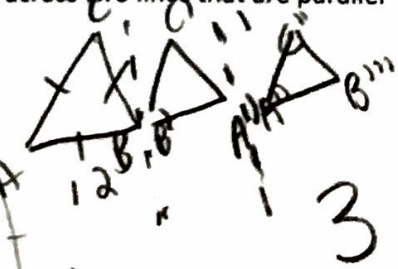
$(x,y) \rightarrow (-y, -x) \rightarrow (-y+4, -x-2)$
$\quad x \quad y$

31. An equilateral triangle with sides of length 12 *cm* is reflected consecutively across two lines that are parallel and 12 *cm* apart. Describe the result using another type of transformation.



Translation



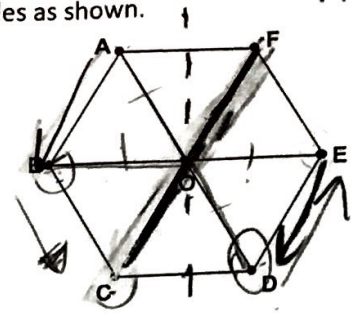


3

1

360/6 = 60 = central Angle

32. The diagonals of *Regular Hexagon ABCDEF* form six equilateral triangles as shown.



Fill in the correct **letter** after the given transformation:

a. Rotate 60° *clockwise*: $E \rightarrow$ O

60/60 = 1 turn

b. Rotate 60° *counter − clockwise*: $D \rightarrow$ F

60/60 = 1 turn

c. Rotate 120° *clockwise*: $F \rightarrow$ O

120/60 = 2 turns

d. Rotate 60° *clockwise*: C $\rightarrow B$ Backward

60/60 = 1 turn CCW from B

e. If a **translation** maps A to B, then it also maps O to C and E to O.

f. A reflection occurs over $\overleftrightarrow{FC}$, B maps to O and F maps to F.

Solve:

33. $\frac{2}{x} = \frac{4}{(x+3)}$

$2(x+3) = 4x$

$2x+6 = 4x$

$-2x \quad -2x$

$\frac{6}{2} = \frac{2x}{2}$

$x = 3$

34. $2x + 6 = 4(x + 8)$

$2x+6 = 4x+32$

$-2x \quad -2x$

$6 = 2x+32$

$-32 \quad -32$

$\frac{-26}{2} = \frac{2x}{2}$

$-13 = x$

35. $2x + 3y = 6$

$y = \frac{-1}{3}x + 3$

$2x+3(-\frac{1}{3}x+3) = 6$

$2x - x + 9 = 6$

$x + 9 = 6$

$-9 \quad -9$

$x = -3$

$2(-3)+3y = 6$

$-6 \quad +3y = 6$

$\frac{3y}{3} = \frac{6}{3}$

$y = 4$

36. $2x + 3y = 7$

$3x - 3y = -12$

$\frac{5x}{5} = \frac{-5}{5}$

$x = -1$

$y = 3$

$2(-1)+3y = 7$

$-2+3y = 7$

$+2 \quad +2$

$3y = 9$

$y = 3$

37. $3x + 5y = 6$

$5(2x - 4y = -7)$

$12x+20y = 24$

$10x-20y = -35$

$\frac{22x}{22} = \frac{-11}{22}$

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

$2(-\frac{1}{2}) - 4y = -7$

$-1 - 4y = -7$

$+1 \quad +1$

$\frac{-4y}{-4} = \frac{-6}{-4}$

$y = 3/2$

38. $3(6x - 8y = 50)$

$4(4x + 6y = 22)$

$18x-24y = 150$

$16x+24y = 88$

$\frac{34x}{34} = \frac{238}{34}$

$x = 7$

$4(7)+6y = 22$

$28+6y = 22$

$-28 \quad -28$

$\frac{6y}{6} = \frac{-6}{6}$

$y = -1$

39. Given a **line segment** with endpoints $(1, -2)$ **and** $(4, 5)$

A) State the **domain and range** of the pre – image segment. D: [1, 4] R: [-2, 5]

B) State the domain and range of the image **interval notation** when the relation is:

a) **Translated right 1 and up 4:** D+1 R+4

D: [2, 5]

R: [2, 9]

b) **Reflected in the $x-axis$:** $(x, -y)$

D: [1, 4]

R: [-5, 2]

c) **Reflected in the $y-axis$:** $(-x, y)$

D: [-4, -1]

R: [-2, 5]

d) **Reflected in the line $y = x$:** (y, x)

D: [-2, 5]

R: [1, 4]

e) **Rotated 90°:** $(-y, x)$

D: [-5, 2]

R: [1, 4]

f) **Dilated by a factor of 5 with a center of $(0, 0)$:**

D: [5, 20]

R: [-10, 25]