Geo. 21

Geo REVIEW for TRANSFORMATIONS TEST – Chapter 9 - Name ____________ per ___ date_____

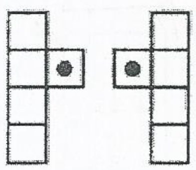
cabulary; define each of the following;

Pre-image – original figure
Image – resulting figure
Isometry – transformation when preimage ≅ image
Reflection – flip
Rotation – turn } isometries
Translation – slide
Dilation – transformation that changes size
Transformation – movement of a shape.
Scale factor – how much a dilation changes
Reflection line – line over which a reflection occurs
Regular polygon – polygon with all sides ≅ and all ∡'s ≅
Line symmetry – when an object can be "folded" ~~onto~~ or mapped onto itself.
Rotational symmetry – when an object can be rotated onto itself.
Order of rotation – how many times an object can rotate onto itself.
Degree of rotation – # of degrees of each rotation $\frac{360}{\text{order}}$

Tell what type of TRANSFORMATION is shown in each diagram;

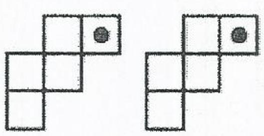
1)

a.



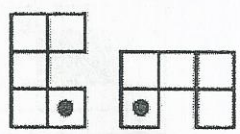
reflection

b.



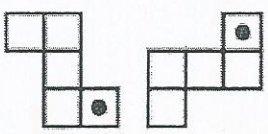
translation

c.



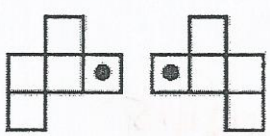
rotation

d.



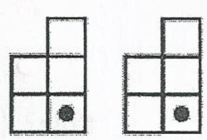
rotation

e.



reflection

f.



translation

True or False?

2) The pre-image is congruent to the image for any transformation. False

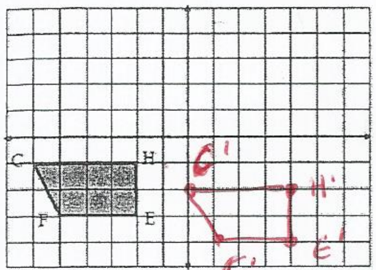
3) If triangle XYZ is reflected over the x-axis, then point Y and Y' are both the same distance from the x-axis.
true

4) If triangle XYZ is rotated about the origin, then point Y and Y' are both the same distance from the origin. true

5) In a reflection, if each image point is connected to its pre-image point, then the reflection line is the perpendicular bisector of the segment formed. true

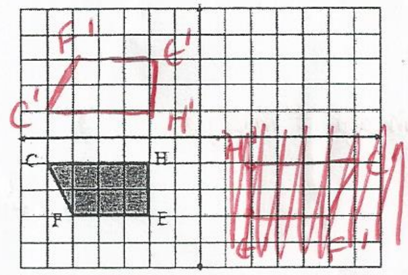
Perform each transformation. (you may use patty paper); Give the ordered pairs of the pre-image and the image; Then write the transformation RULE for #11-15.

10) (x ,y) → (x + 6, y – 1)



C(-6 ,-1) C'(0 ,-2)
H(-2 ,-1) H'(4 ,-2)
E(-2 ,-3) E'(4 ,-4)
F(-5 ,-3) F'(1 ,-4)

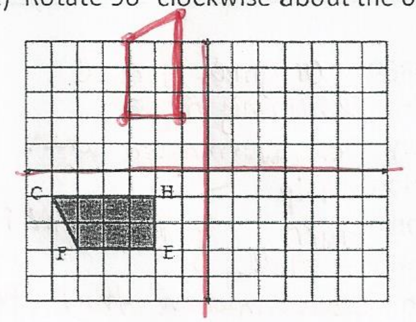
11) Reflect over the x-axis



C'(-6 , +1)
H'(-2 , +1)
E'(-2 ,+3)
F'(-5 , +3)

Rule? (x,y) → (X , -y)

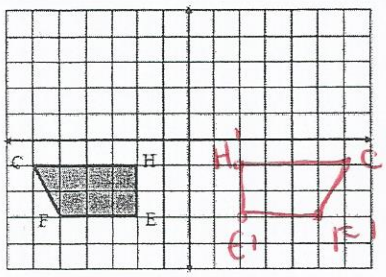
12) Rotate 90° clockwise about the origin



C'(-1 , 6)
H'(-1 , 2)
E'(-3, 2)
F'(-3, 5)

Rule? (x,y) → (y, -X)

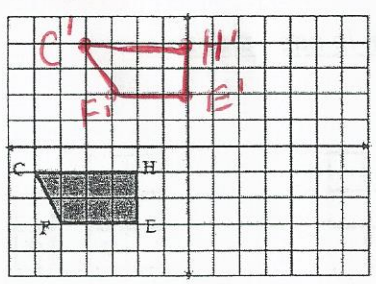
13) $R_{y\text{-axis}}$



C(-6 ,-1) C'(6 , -1)
H(-2,-1) H'(2 , -1)
E(-2,-3) E'(2 , -3)
F(-5,-3) F'(5 , -3)

Rule? (x,y) → (-X , y)

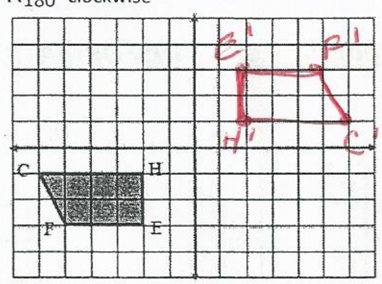
14) $T_{<2, 5>}$



C'(-4, 4)
H'(0 , 4)
E'(0 , 2)
F'(-3 , 2)

Rule? (x,y) → (X+2, y+5)

15) $R_{180°}$ clockwise



C'(6 , 1)
H'(2 , 1)
E'(2 , 3)
F'(5 , 3)

Rule? (x,y) → (-X, -y)

Decide if each figure below has rotational symmetry, then, if YES, give the order and degree of rotation.

25) equilateral triangle

Circle YES or NO
Order 3
Degree 120°

$\frac{360}{3}$

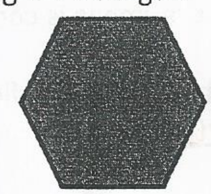
26)

Circle YES or NO
Order 1
Degree ~~____~~

27)

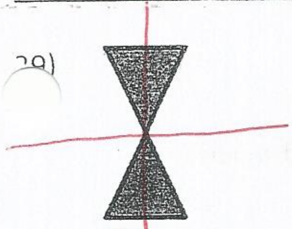
Circle YES or NO
Order 4
Degree 90°

28) regular hexagon

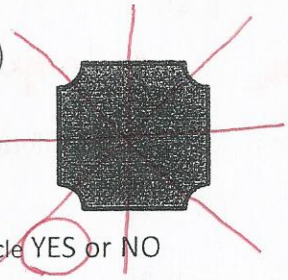


Circle YES or NO
Order 6
Degree 60°

Decide if each figure below has reflectional symmetry, then, if YES, draw all lines of symmetry.

29) 

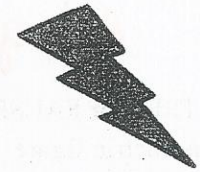
Circle YES or NO

30) 

Circle YES or NO

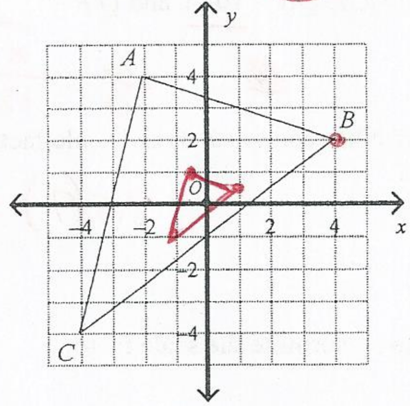
31) 

Circle YES or NO

32) 

Circle YES or NO

33) Dilate ΔABC by a scale factor of $\frac{1}{4}$.



$\frac{1}{4}x, \frac{1}{4}y$

$A(-2,4) \rightarrow A'(\frac{-2}{4}, \frac{4}{4})$

$B(4,2) \rightarrow B'(\frac{4}{4}, \frac{2}{4})$

$C(-4,-4) \rightarrow C'(\frac{-4}{4}, \frac{-4}{4})$

$A'(-\frac{1}{2}, 1)$
$B'(1, \frac{1}{2})$
$C'(-1,-1)$

34) Given the scale factor, tell whether each dilation is an enlargement or a reduction;

a) Scale factor = 5 enlargement

b) Scale factor = $\frac{1}{2}$ reduction

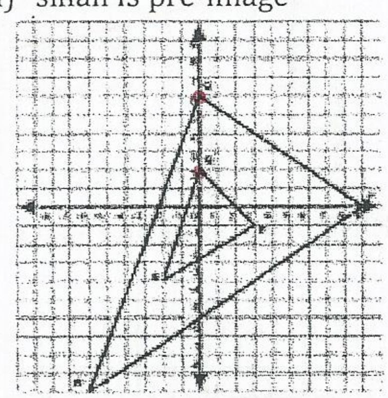
c) Scale factor = -2 enlargement

d) Scale factor = $\frac{7}{2}$ enlargement

e) Scale factor = 2.3 enlargement

35) What is the scale factor of the dilations shown below?

a) small is pre-image



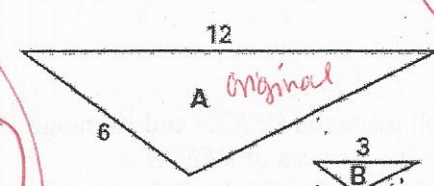
$Q(0,6)$

$Q'(0,2)$

$\frac{2}{6} = \frac{1}{3}$ = scale factor

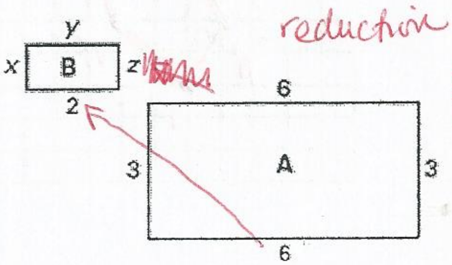
b) from A to B

$\frac{3}{12} = \frac{1}{4}$ = scale factor



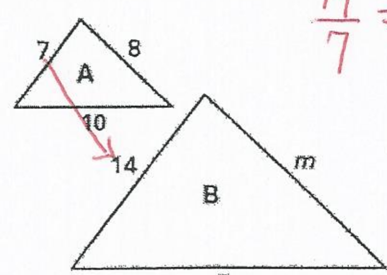
Determine whether the dilation from Figure A to Figure B is a *reduction* or an *enlargement*. Then, find the values of the variables.

5. reduction



$\frac{2}{6} = \frac{1}{3}$

6.



$\frac{14}{7} = 2$

enlargement

14. Determine if the following scale factor would create an enlargement or reduction.

a. 3.5 b. 2/5 c. 0.6 d. 4/3

enlargemet reduction reduction enlargment

15. TRUE or FALSE: If the scale factor for a transformation is 1, then the transformation would create an isometric figure.

true

16. A dilation maps ΔQRS to $\Delta Q'R'S'$. $QR = 10$ in. and $Q'R' = 12$ in. If $RS = 12$ in., what is $R'S'$?

$\frac{12}{10} = \frac{x}{12}$ $\boxed{x = 14.4} = R'S'$

17. A dilation on a coordinate grid has center (0, 0) and scale factor 2.5. Point A is at (3, 7). What is the y-coordinate of the image of A?

$2.5(7) = \boxed{17.5}$

18. Given the point and its image, determine the scale factor.

a. A(3,6) A'(4.5, 9)

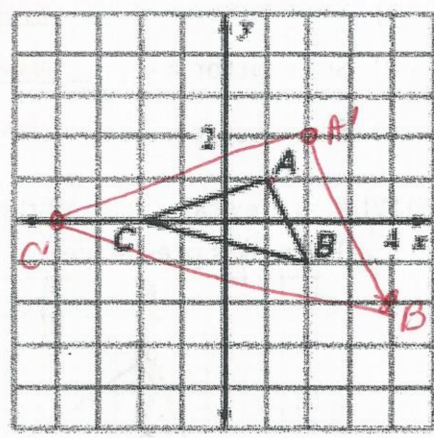
$\frac{4.5}{3} = 1.5$ or $\frac{9}{6} = 1.5$

b. G'(3,6) G(1.5,3) original

$\frac{6}{3} = 2$

19. Draw a dilation of the figure below with a scale factor of 2.

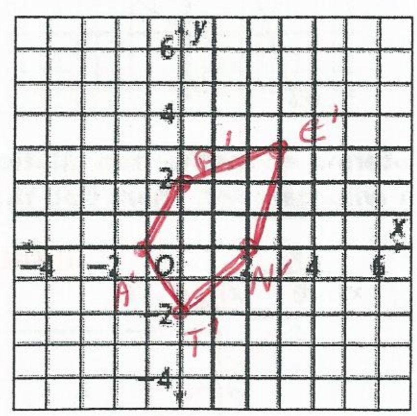
$A(1,1) \rightarrow A'(2,2)$
$B(2,-1) \rightarrow B'(4,-2)$
$C(-2,0) \rightarrow C'(-4,0)$



20. Graph pentagon $PENTA$ and its image $D_{0.5}(PENTA) = P'E'N'T'A'$. (HINT: This is a dilation with scale factor 0.5.) The vertices of $PENTA$ are:
$P(0, 4)$, $E(6, 6)$, $N(4, 0)$, $T(0, -4)$, $A(-2, 0)$.

2

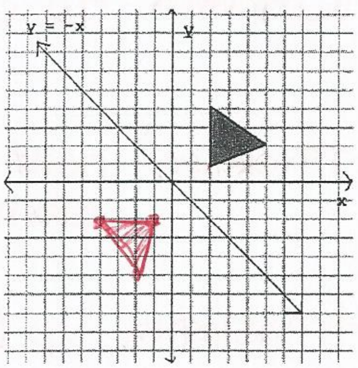
$P'(0,2)$ $E'(3,3)$ $N(2,0)$ $T(0,-2)$ $A(-1,0)$



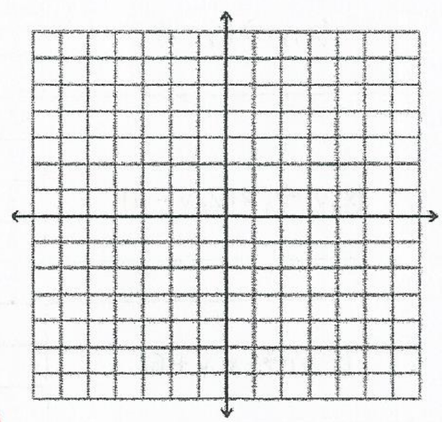
Geometry 21 - MORE PRACTICE WITH TRANSFORMATIONS

1. (a) A point (x, y) reflected over the x-axis has the coordinates (X, -y).
   (b) A point (x, y) reflected over the y-axis has the coordinates (-X, y).
   (c) A point (x, y) rotated 90° counterclockwise has the coordinates (-y, X).
   (d) A point (x,y) rotated 90° clockwise has the coordinates (y, -X).
   (e) A point (x, y) rotated 180° counterclockwise has the coordinates (-X, -y).
   (f) A point (x, y) rotated 180° clockwise has the coordinates (-X, -y).

2. Reflect the triangle over the line y = -x.



3. Using coordinates of your choice, graph triangle ABC and then rotate it 90° clockwise. Label all coordinates. Be sure to clearly differentiate the preimage and image.

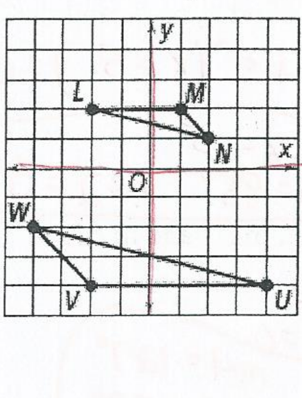


answers will vary

4. Apply the given rule to the pre-image to find the image. Then describe the transformation.

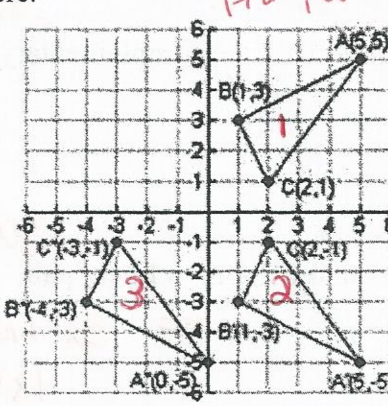
Rule	Pre-image coordinates	New image coordinates	Describe this transformation
$(x, y) \rightarrow (-(x+1), (y-4))$	(5, -2)	(-6, -6)	right 1, down 4 and reflected over y-axis
	(8, 1)	(-9, -3)	
	(-9, -2)	(8, -6)	
$(x, y) \rightarrow (-(x-6), -(y+3))$	(3, -7)	(3, 4)	left 6, up 3 and rotated 180°
	(10, 8)	(-4, -11)	
	(-2, -5)	(8, 2)	

5. Describe in words the transformation(s) that occurred here if ΔUVW is an image of ΔLMN. original



Dilation with scale factor = 2 and ~~reflection~~ rotation 180°

6. Write rules for the transformations that occurred here.



1→2 reflection over X-axis $(x,y) \rightarrow (x,-y)$

2→3 traslation left 5 $(x,y) \rightarrow (x-5,y)$

21. *Apply the given rule to the pre-image to find the image. Then tell what type of transformation it is.*

Rule	Pre-image coordinates	New image coordinates	Type of transformation
(x ,y)→(-x, y)	(3, -7)	(-3, -7)	Reflection over y-axis
	(10, 8)	(-10, 8)	
	(-2, -5)	(2, -5)	
(x ,y)→(-x, -y)	(6, -4)	(-6, 4)	Rotation 180°
	(1, 28)	(-1, -28)	
	(-12, -3)	(12, 3)	
(x ,y)→(y, -x)	(5, -2)	(-2, -5)	Rotation 90° clockwise
	(8, 1)	(1, -8)	
	(-9, -2)	(-2, 9)	
(x ,y)→(x+2, y – 4)	(3, -7)	(5, -11)	translation right 2 down 4
	(10, 8)	(12, 4)	
	(-2, -5)	(0, -9)	
(x ,y)→(x, y + 6)	(6, -4)	(6, 2)	translation up 6
	(1, 28)	(1, 34)	
	(-12, -3)	(-12, 3)	
(x ,y)→(x – 3, y)	(5, -2)	(2, -2)	translation left 3
	(8, 1)	(5, 1)	
	(-9, -2)	(-12, -2)	
(x ,y)→(3x, 3y)	(3, -7)	~~(9x, -21x)~~ (9, -21)	Enlargement Dilation scale factor = 3
	(10, 8)	~~(30x, 24)~~ (30, 24)	
	(-2, -5)	(-6, -15)	
(x ,y)→(.5x, .5y)	(6, -4)	(3, -2)	Reduction Dilation scale factor = -½
	(2, 28)	(1, 14)	
	(-12, -10)	(-6, -5)	

UNIT 1 REVIEW:

=90 $\quad$ $25+60$ $\quad$ $(-5)^2+60$ $\quad$ $-50+55$ $\quad$ $10(-5)$

22. ∠1 and ∠2 are complementary angles. m∠1=x^2 + 60 and m ∠2=10x + 55. Find x, m∠1 and m∠2.

$x^2+60+10x+55=90$ $\qquad$ $(x+5)(x+5)=0$

$x^2+10x+115=90$

$\quad\quad -90\ \ -90$

$x^2+10x+25=0$ $\qquad$ $x=-5$ $\quad$ $m\angle 1=85°$ $\quad$ $m\angle 2=5°$

=180

23. ∠1 and ∠2 form a linear pair. m∠1= $3x^2$ + 100 and m ∠2 = x^2 + 44. Find x, m∠1 and m∠2.

$3x^2+100+x^2+44=180$ $\qquad$ $4(x^2-9)=0$

$4x^2+144=180$ $\qquad$ $4(x+3)(x-3)=0$

$\quad -180\ \ -180$

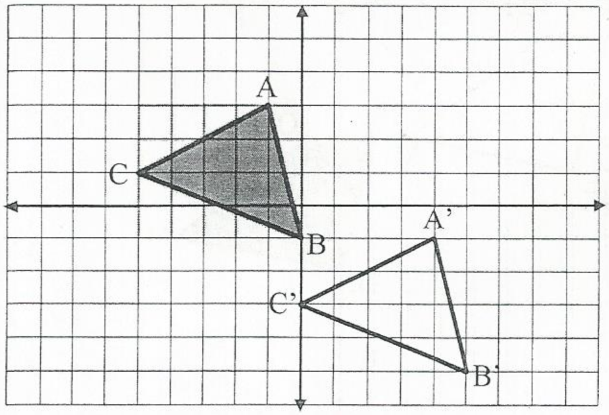
$4x^2-36=0$ $\qquad$ $x=3,-3$ $\quad$ $m\angle 1=127°$ $\quad$ $m\angle 2=53°$

Transformation Practice (HW)

Name: ANSWERS Date:________ Period:________ Score:________

Directions: State the type of transformation that would carry the pre-image onto it's image, (translation reflection, rotation or dilation) and write a function to describe the transformation.

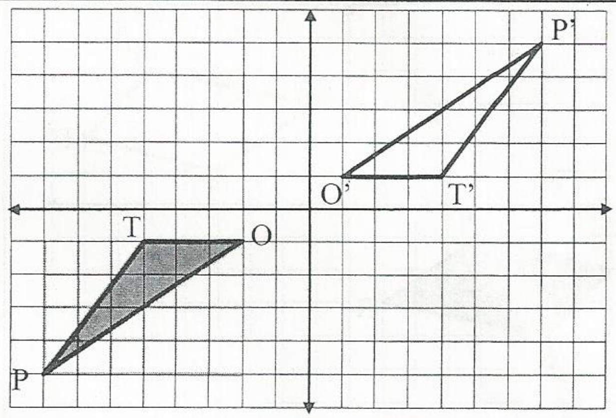
1.



Transformation: translation

Function: $T_{\langle 5,-4 \rangle}$

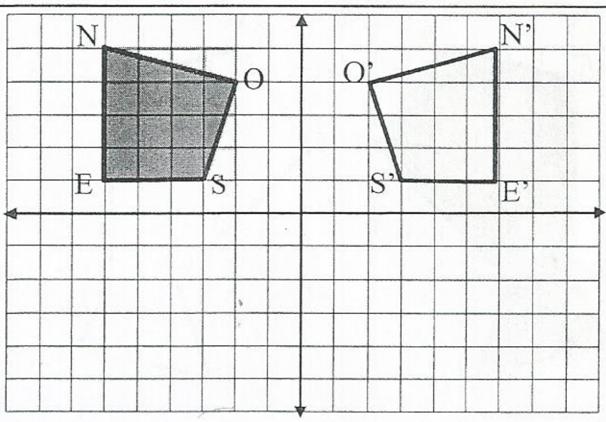
2.



Transformation: rotation

Function: r(180,0)

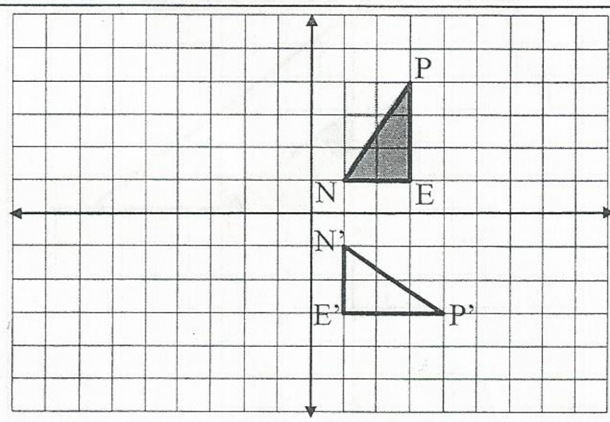
3.



Transformation: Reflection

Function: $R_{y\text{-axis}}$

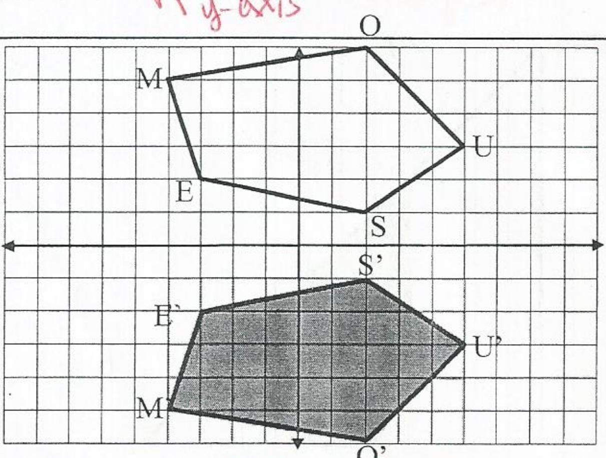
4.



Transformation: Rotation

Function: r(-90°, 0)

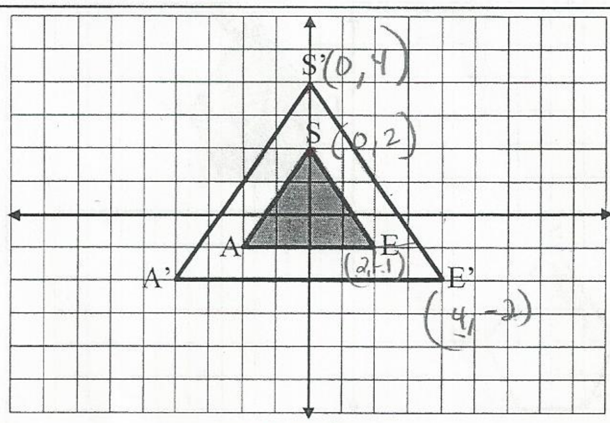
5.



Transformation: Reflection

Function: $R_{x\text{-axis}}$

6.



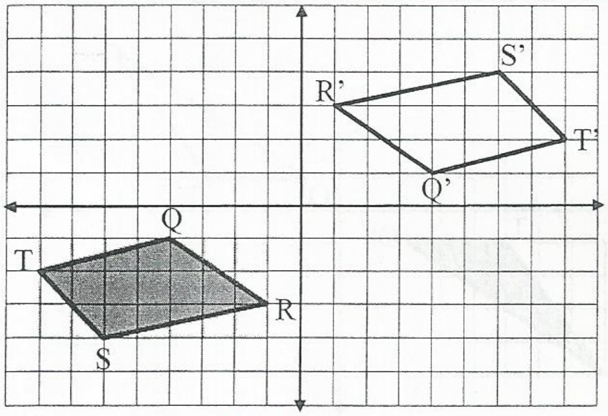
Transformation: Dilation

Function: D(x,y) → D'(2x, 2y)

Name:________________________ Date:__________ Period:__________ Score:__________

Directions: Using correct notation state the type of transformation that would carry the pre-image onto it's image and write a function to describe the transformation.

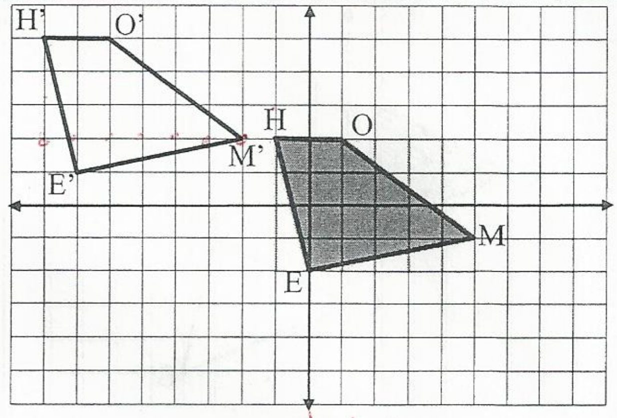
7.



Transformation: Rotation

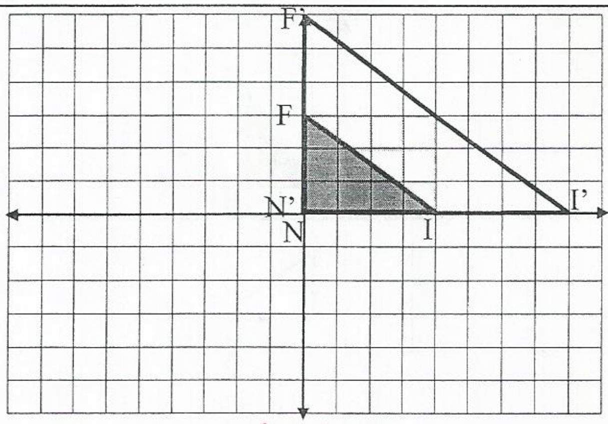
Function: $R_{(180°, 0)}$

8.



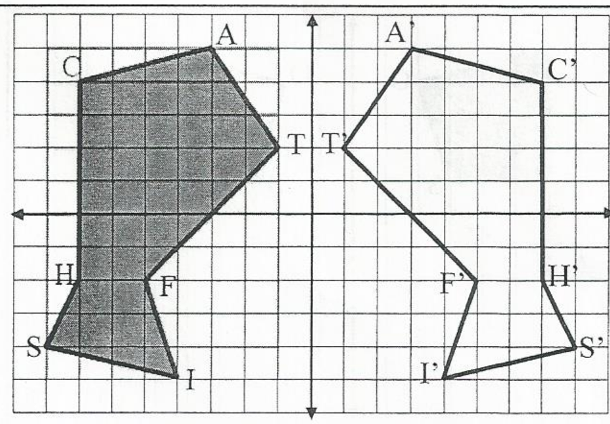
Transformation: translation

Function: $T\langle -7, 3\rangle$



Transformation: Dilation

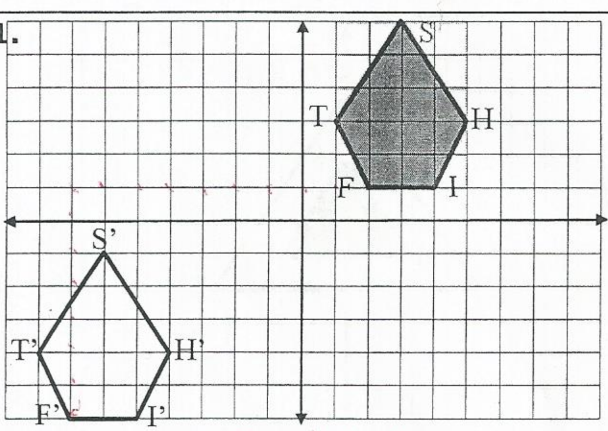
Function: $D'(2x, 2y)$



Transformation: Reflection

Function: R y-axis

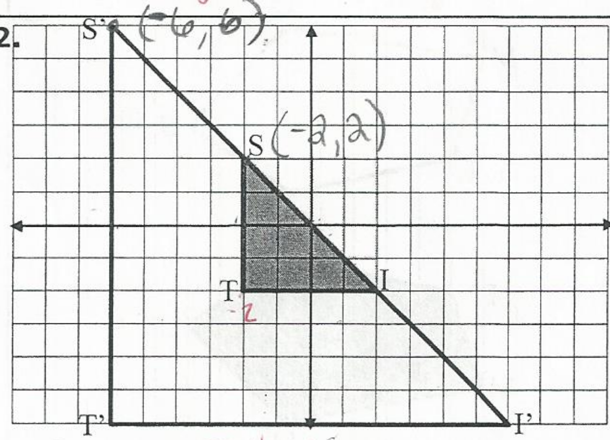
11.



Transformation: Translation

Function: $T'\langle -9, -7\rangle$ or $T'(x-9, y-7)$

12.



Transformation: Dilation

Function: $D'(3x, 3y)$

ROTATIONAL and LINE SYMMETRY

Name ______________ per____ date____

A shape has rotational symmetry if it fits onto itself two or more times in one turn.
The order of rotational symmetry is the number of times the shape fits onto itself in one turn.
The degree of rotational symmetry is the number of degrees of each turn. (360/order)

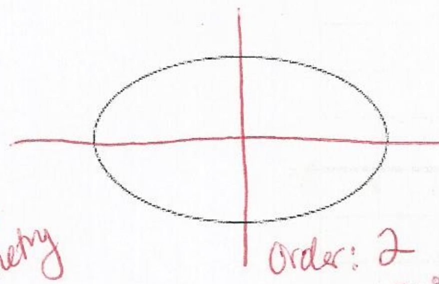
A 2D shape has a line of symmetry if the line divides the shape into two halves - one being the mirror image of the other.

Write the order and degree of rotational symmetry under each shape & letter. Also draw dotted lines to indicate lines of symmetry.

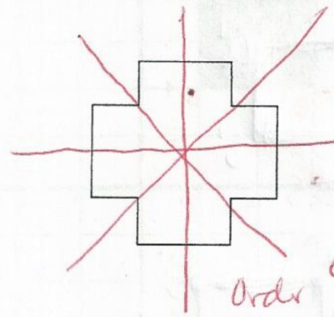
Order: 1

Degree: \

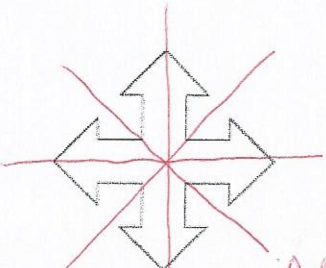
no rotational symmetry



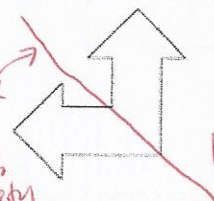
Order: 2
Deg: 180°



Order 4
Deg: 90°



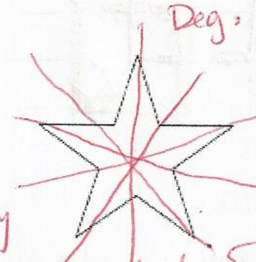
Order 4
Deg. 90°



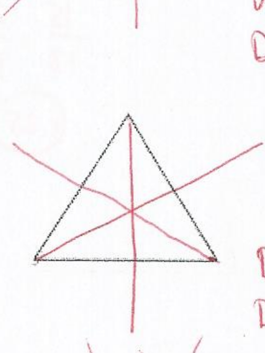
1 line of ~~symmetry~~ symmetry

No rotational symmetry

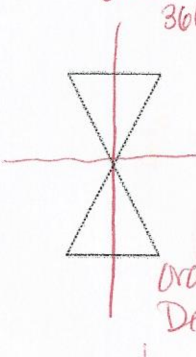
Order 1
360°



Order 5
Deg: 72°

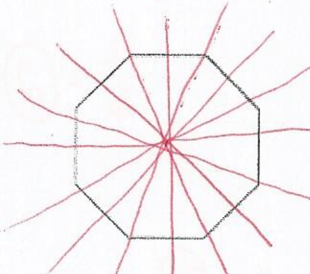


Order 3
Deg. 120°

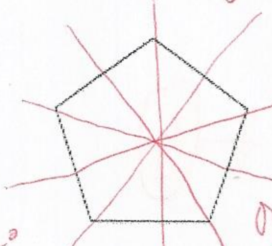


Order 2
Degr. 180°

none



Order 8
Degree $= \frac{360}{8} = 45°$



Order 5
Deg. 72°

(order 1)

no rotational symmetry

M A T H S

No rotat. symm.

~~No~~ No rotational symm.

no rot. symm.

Order = 2
180°

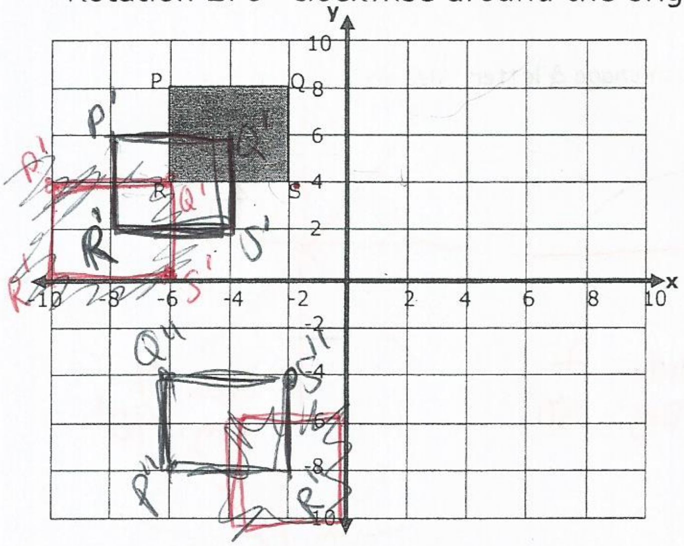
Order = 2
180°

Name ______________________ Date ______________________

3. Graph the image of PQRS after the following transformations:

Translation (x, y) ⟶ (x−2, y−2)

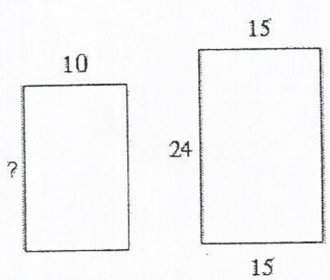
Rotation 270° clockwise around the origin.



DILATIONS:

The polygons are similar. Find the scale factor from the figure on the left to the figure on the right in each pair.

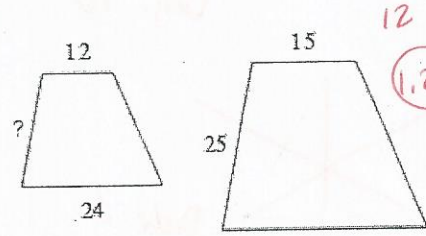
1)



$\frac{15}{10} = \frac{3}{2}$

1.5

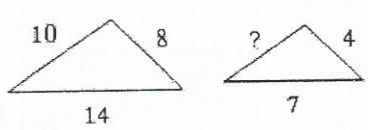
2)



$\frac{15}{12} = \frac{5}{4}$

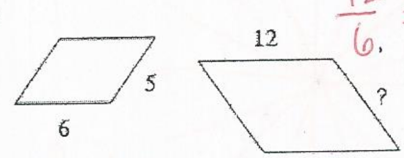
1.25

3)



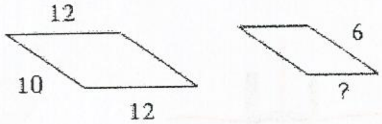
$\frac{4}{8} = \frac{1}{2}$

4)



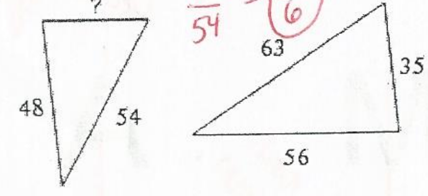
$\frac{12}{6} = 2$

5)



$\frac{6}{12} = \frac{1}{2}$

6)



$\frac{63}{54} = \frac{7}{6}$