So many Answers!!!

# Unit 1 Review - Transformations of Functions and Symmetry

## Transformations of Functions

*Using the function* $f(x) = 3^x$ *write a function that has the given transformations.*

1. A vertical shift up 5 units — $g(x) = (3^x) + 5$
2. A steeper slope by a factor of 4 — $g(x) = 4(3^x)$
3. A vertical shift down 3 units and a reflection across the x-axis — $g(x) = -(3^x) - 3$
4. Write all the transformations that occur to the parent graph for the function $y = -\frac{5}{4}x - 9$.

Translates down

Vertical stretch by $\frac{5}{4}$

Reflects over x-axis

5. The function f(x) has been graphed on the coordinate grid. Sketch the following functions given the transformations. **Make sure to label each line on the graph.**

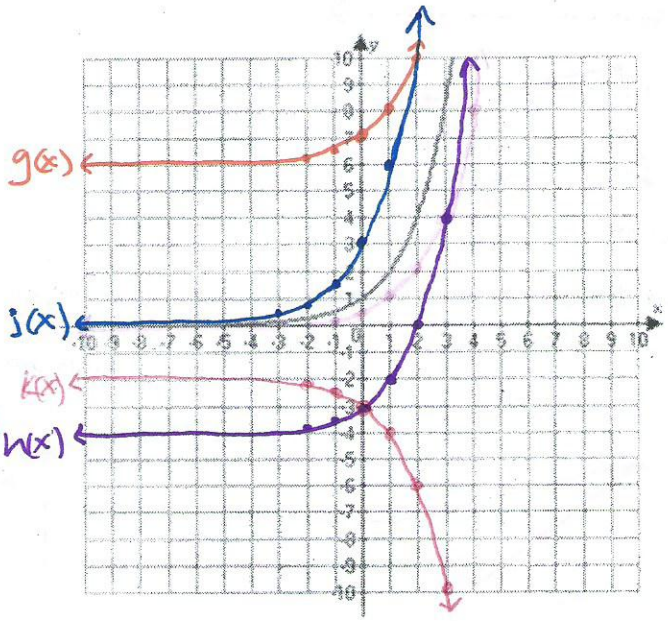
$g(x) = f(x) + 6$ UP 6 (y-value +6)

$h(x) = f(x) - 4$ down 4 (y-value -4)

$j(x) = 3f(x)$ stretch by 3 (mult. y value by 3)

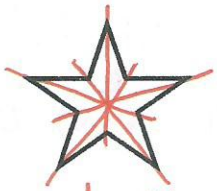
$k(x) = -f(x) - 2$ Reflect over x-axis & down 2 (Make y value ~~opp~~ change sign subtract 2)

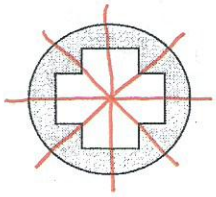
$n(x) = \frac{1}{2}f(x)$ COMPRESS by 1/2 (mult. y value by 1/2)

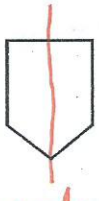



## Symmetry

*Draw the lines of symmetry for each graph and describe the order and magnitude (in degrees) of each that map the object onto itself.*

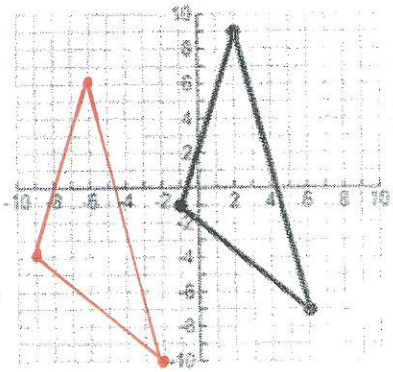
6. 
order 5
Mag = $\frac{360}{5} = 72°$

7. 
order 4
Mag = $\frac{360}{4} = 90$

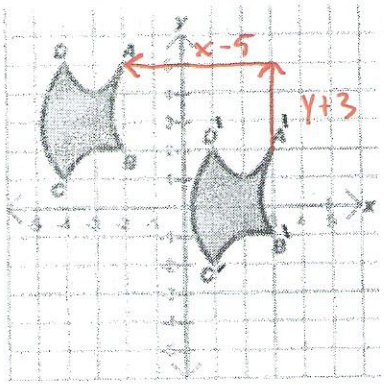
8. 
order 1
Mag = $\frac{360}{1} = 360$

## Translations

9. Complete the following translation
$T(x, y) \rightarrow (x - 8, y - 3)$

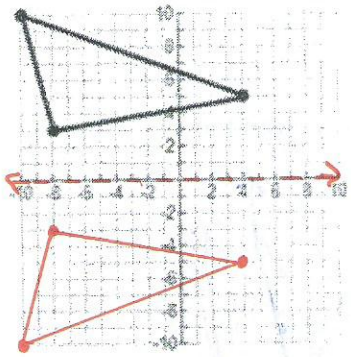


10. Write a function for the translation
$T(x, y) =$ (x-5, y+3)

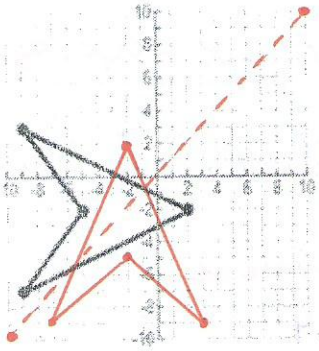



## Reflections

13. Reflect the object across the x-axis
↳ R(x, -y)

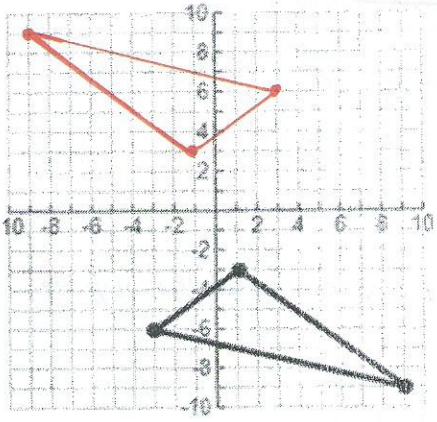


14. Complete the reflection: $R_{y=x}$
↳ (y, x)

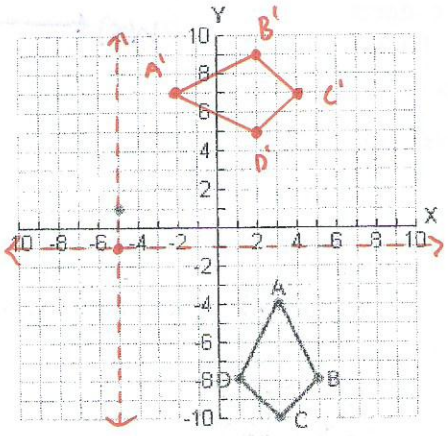


## Rotations

15. Rotate the object 180° about the origin.
↳ (-x, -y)

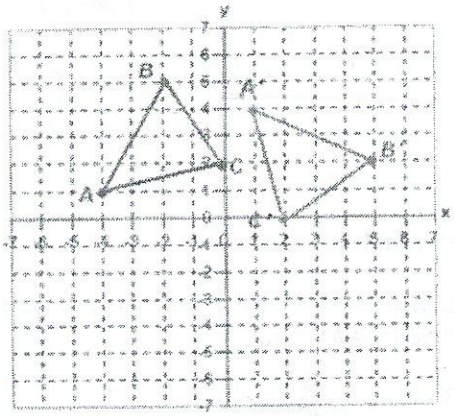


16. RotatePerform the figure 90° about the point following transformation: $R_{90°}, (-5, -1)$.)




17. Determine the rule that performsfor the rotation.

270° CCW or 90° CW



A → A' R
(-4, 1) (1, 4) (-y, x) 270°

B → B'
(-2, 5) (5, 2) (-y, x) 270°

C → C'
(0, 2) (2, 0) (y, -x) 270°

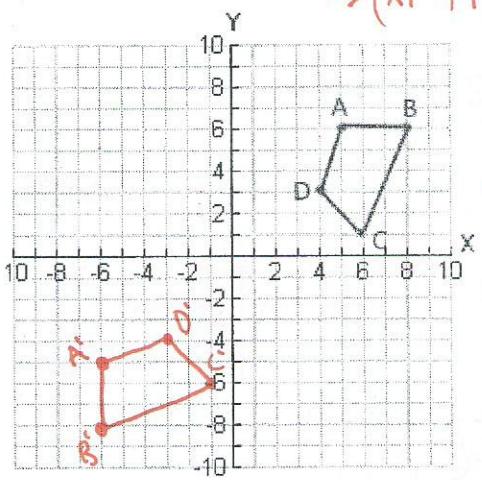
Combining Transformations -- Make sure you label the post-image.

18. $R_{90}$ *and* $R_{x-axis}$

$(-y, x)$ → $(x, -y)$

A=(5,6) B=(8,6)
↓ ↓
(-6,5) (-6,8)
↓
(-6,-5) (-6,-8)

C=(6,1) D=(4,3)
↓ ↓
(-1,6) (-3,4)
↓ ↓
(-1,-6) (-3,-4)

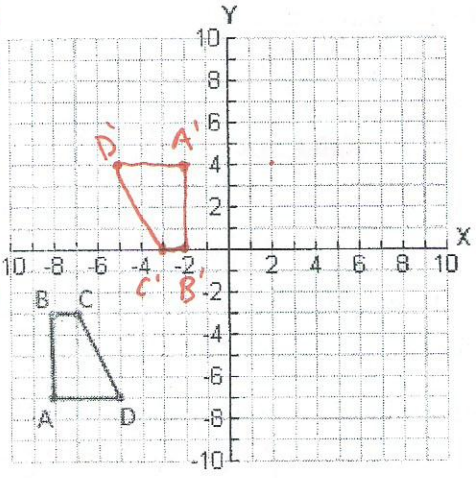



19. $T(x+10, y+3)$ *and* $R_{180}$

$(+10, +3)$ → $(-x, -y)$

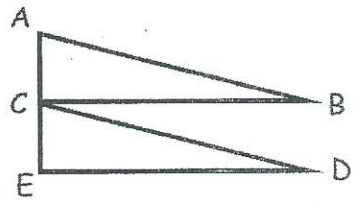
A=(-8,-7) B=(-8,-3)
↓ ↓
(2,-4) (2,0)
↓ ↓
(-2,4) (-2,0)

C=(-7,-7) D=(-5,-3)
↓ ↓
(3,0) (5,-)
↓
(-3,0) (-5,4)



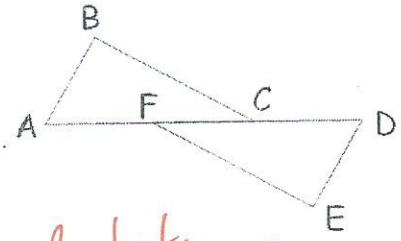

*Name the transformation that maps each figure.*

20. ΔABC→ΔCDE



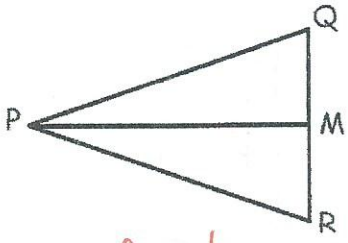

translation

21. ΔABC→ΔDEF



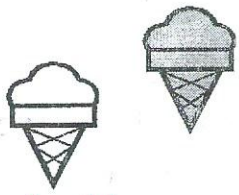

Rotation

22. ΔPMR→ΔPMQ




Reflection

23.

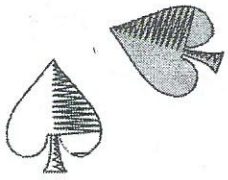


translation

24.

Reflection or Rotation

25.



Reflection Rotation

*Write the location of the point once the requested transformation has been completed.*

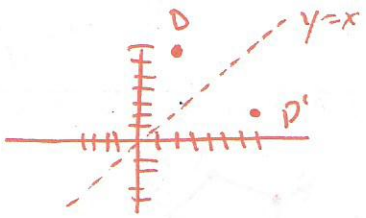
26. Reflect M (3, 4) across the y-axis. → (-x, y) M' = (-3, 4)

27. Rotate P (2, -4) 90° around the origin. ↳ (-y, x) P' = (4, 2)

28. Translate N (0, 8) up four units and left 5. (x-5, y+4) N' = (-5, 12)

29. Given B (6,3) transform by $R_{270}(x,y)$. ↳ (y, -x) B' = (3, -6)

30. Given D (2, 7) transform by R(x,y) = (y,x). D' = (7, 2)
For D, what is the line of reflection? y = x

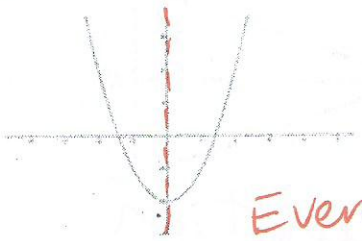



31. Given the new image P'(-2, 1) and the translation T(x, y) = (x - 4, y - 3), determine the coordinates of the original point P ? P'(-2, 1) → (x+4, y+3) → P = (2, 4)
to go back where it started

**Even/Odd/Neither**

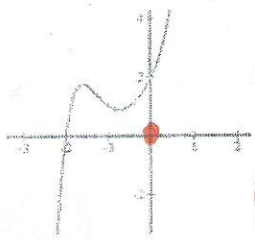
*Determine if the function is even, odd, or neither.*

32.



Even

33.



Neither

34. $f(x) = -3x^2 + 2x - 4$ Neither

35. $f(x) = \frac{1}{3}x^3 + 6x$ odd

*State whether the following represents an even or odd function.*

36. $f(-x) = -f(x)$ Odd
$f(x) = x^1$
$f(-2) = -2$

37. $f(-x) = f(x)$ Even
$f(x) = x^2$
$f(-2) = (-2)^2 = 4$

38. If a function is known to be **even** and the points (−4, −8) (-4, -10) lie on the function what additional point would also have to lie on the function?
Even means it will reflect over y-axis
so... R(-x,y) → (4, -8) or (4, -10)

39. If a function is known to be **odd** and the points (3, −6) (-2, 7) lie on the function, what additional point that would also have to lie on the function?
odd means it will have 180° rotational symmetry about the origin so R(-x, -y) → (-3, 6) or (2, -7) or (0, 0)