LG 2 Ver A

Name: _____ Student #:_____

Date:_____ T.A. #:_____

Mathematics 12 Pre-Calculus
LEARNING GUIDE 2 TEST – TRANSFORMATIONS

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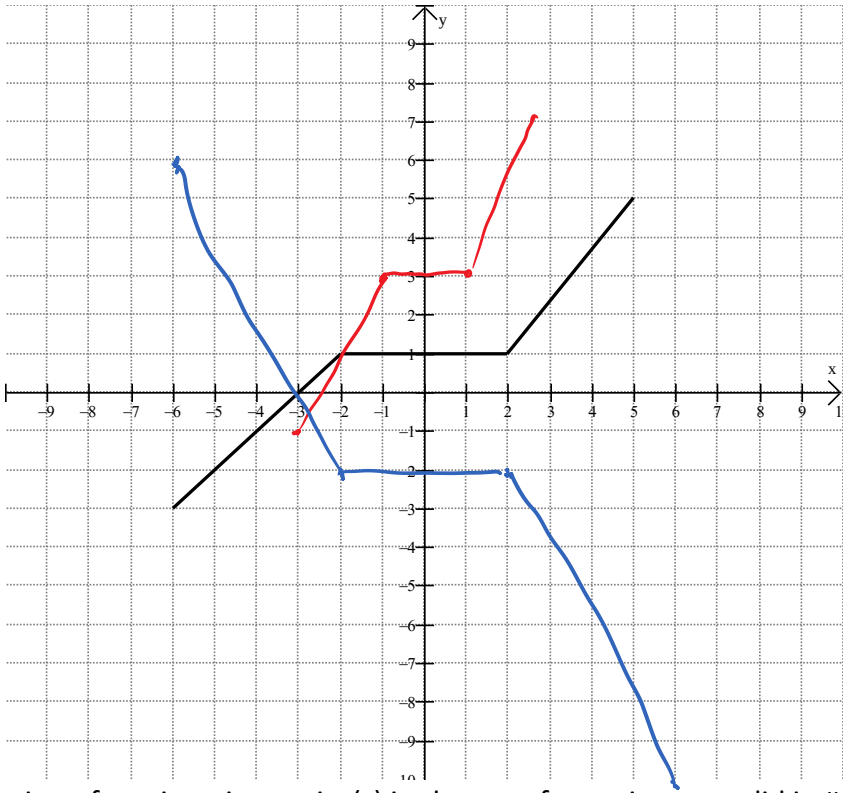
***Full marks may NOT be given for the final answer only.**

When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. Using the graph of $y = f(x)$ below, sketch and label the graphs of: (2 marks)
   a) $f(2x) + 2$
   b) $-2f(x)$



2. Give the location of any invariant point(s) in the transformations you did in #1b. (1 mark)

(-3, 0)

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3. Describe what happens to the graph of a function if you make each change to its equation:

(2 marks each)

a) replace y with $-y$, then replace x with $x + 1$

REFLECT IN THE X AXIS , LEFT 1

b) replace x with $x - 2$ and y with $y - 5$.

RIGHT 2 UP 5

c) replace x with $\frac{1}{2}x$ and y with $3y$.

HE BAFO 2 VC BAFO $\frac{1}{3}$

d) replace x with $-2x$ and y with $\frac{1}{3}y$, then y with y + 1

REFLECT IN THE Y AXIS , HC BAFO $\frac{1}{2}$, VE BAFO 3, DOWN 1

1

4. Describe what happens to the equation of a function if you make each change to its graph:

(2 marks each)

a) reflect the graph about the line $y = x$.

X & Y VALUES ARE SWITCHED

OR $y = f^{-1}(x)$

b) stretch (expand) horizontally by a factor of 3 and vertically by a factor of 4.

X IS REPLACED WITH $\frac{1}{3}x$ AND Y IS REPLACED WITH $\frac{1}{4}y$

OR $y = 4f\left(\frac{1}{3}x\right)$

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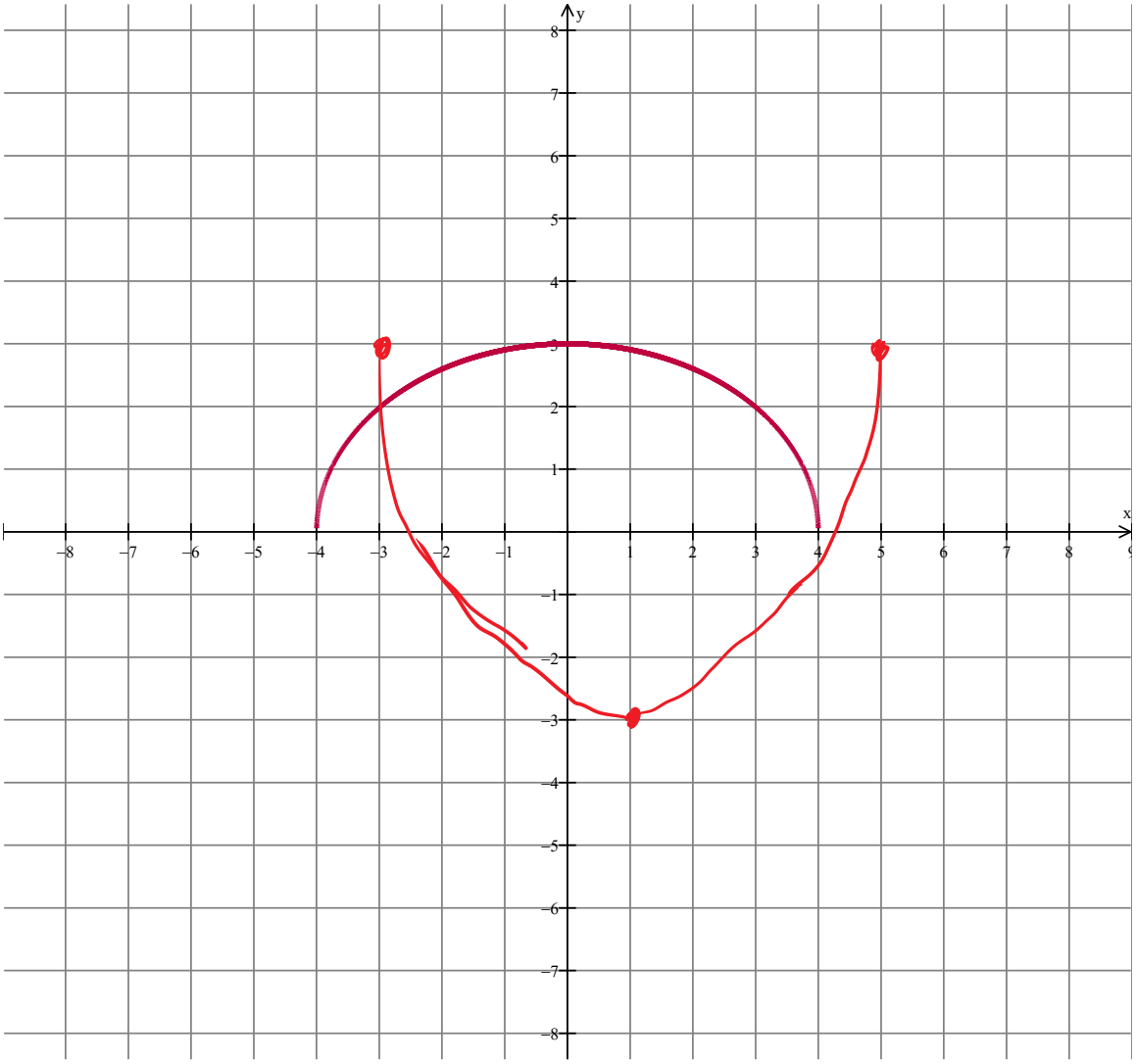
c) stretch (compress) vertically by a factor of $\frac{1}{5}$ and translate 2 units up.

y IS REPLACED WITH 5y AND THEN y IS REPLACED WITH y-2.

OR $y = \frac{1}{5} f(x) + 2$

5. Given the graph of $y = f(x)$, sketch the graph of $y = -2f(x-1) + 3$. (2 marks)



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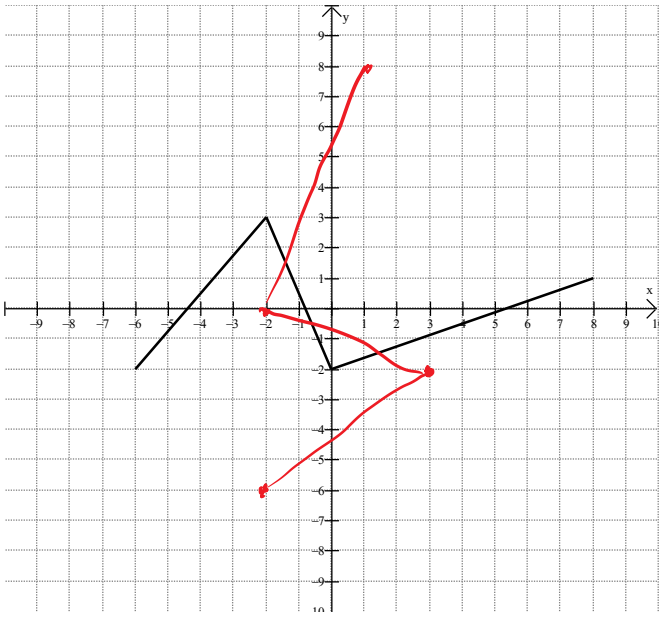
6. a) Given the graph of $f(x)$ below, sketch and label the graph of $y = f^{-1}(x)$. (3 marks)



b) How do can you tell by looking at the graph of $f(x)$ that the inverse will not be a function? (1 mark)

DOES NOT PASS HORIZONTAL LINE TEST.

c) How could you restrict the domain of $f(x)$ so that the inverse would be a function? (1 mark)

POSSIBLE DOMAIN: $-6 \leq x \leq -2$

$-2 \leq x \leq 0$ OR ANY PORTION OF THESE.

$0 \leq x \leq 8$

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7. What is the inverse of the relation $y = (x+1)^3$? (2 marks)

$x = (y+1)^3$

$\sqrt[3]{x} = y+1$

$y = \sqrt[3]{x} - 1$

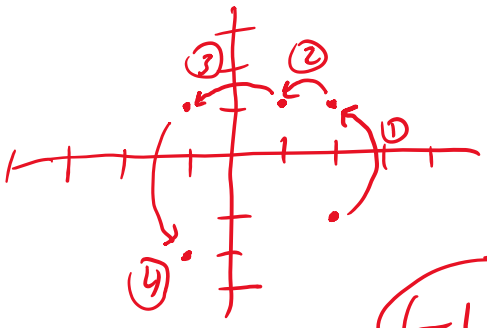
8. If (2, -1) is a point on the graph of $y = f(x)$, what must be a point on the graph of $y = -f(2(x + 2)) - 3$? (2 marks)

① (2, 1) REFLECT x

② (1, 1) HC BAFO $\frac{1}{2}$

③ (-1, 1) LEFT 2

④ (-1, -2) DOWN 3



(-1, -2)

9. Give the equation of the new relation if the graph of $y = x^2 - x + 1$ were stretched (expanded) vertically by a factor of 2, stretched (compressed) horizontal by a factor of $\frac{1}{3}$, reflected in the y axis, and moved down 1. (2 marks)

VE BAFO 2 → $\frac{1}{2}y = x^2 - x + 1$

HC BAFO $\frac{1}{3}$ → $\frac{1}{2}y = (3x)^2 - 3x + 1$

REFLECT in y → $\frac{1}{2}y = (-3x)^2 + 3x + 1$

DOWN 1 → $\frac{1}{2}(y+1) = (-3x)^2 + 3x + 1$

SIMPLIFYING

$\frac{1}{2}(y+1) = 9x^2 + 3x + 1$

$y + 1 = 18x^2 + 6x + 2$

$y = 18x^2 + 6x + 1$

OR $y = 2(-3x - 0.5)^2 + 0.5$

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