

Name: _____

Student #: _____

Date: _____

T.A. #: _____

**Mathematics 12 Pre-Calculus
LEARNING GUIDE 1 TEST – TRANSFORMATIONS PART A**

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

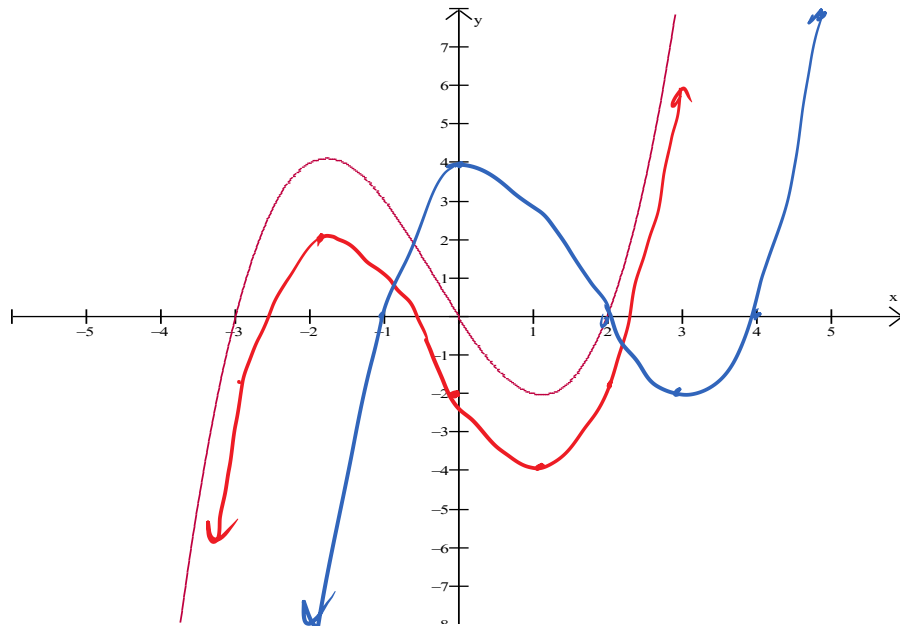
When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. Describe how the graph of $y = x^2$ compares to the graph of $y = x^2 + 3$. (1 mark)

UP 3

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

- a) $f(x) - 2$ — (red line)
 b) $f(x - 2)$ — (blue line)



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3. The graph of a function $y = f(x)$ is translated 4 units right and 6 units down. The equation of its image has the form $y = f(x - c) + d$. Determine the value of c and d . (2 marks)

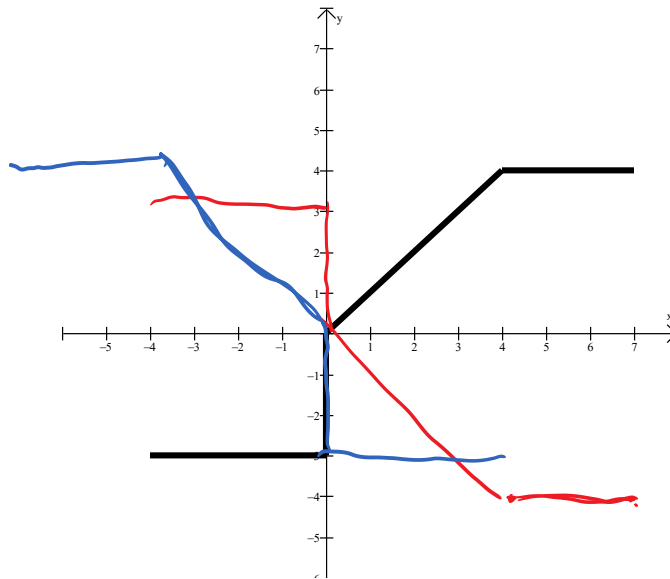
$c = 4$

$d = -6$

4. Given the graph of the function $y = f(x)$ below. Sketch and label the graphs of the following: (2 marks)

a) $-f(x)$

b) $f(-x)$



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

a) replace y with $-y$.

(1 mark each)

REFLECT IN THE X AXIS

b) replace x with $x - 1$ and y with $y + 3$.

RIGHT 1 DOWN 3

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

HORIZONTAL EXPANSION BY A FACTOR OF 3.
 HE B.A.F.O

e) replace x with $-4x$ and y with $2y$

REFLECT IN THE y AXIS , HC BAFO $\frac{1}{4}$, VC BAFO $\frac{1}{2}$

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

a) reflect the graph in the x-axis.

(1 mark each)

y IS REPLACED WITH -y

OR $y = -f(x)$

b) reflect the graph in both axis.

y IS REPLACED WITH -y AND x IS REPLACED WITH -x.

OR $y = -f(-x)$

c) expand vertically by a factor of 4 and reflect in the y axis.

y IS REPLACED WITH $\frac{1}{4}y$ X IS REPLACED WITH -x

OR $y = 4f(-x)$

d) compress horizontally by a factor of $\frac{2}{3}$.

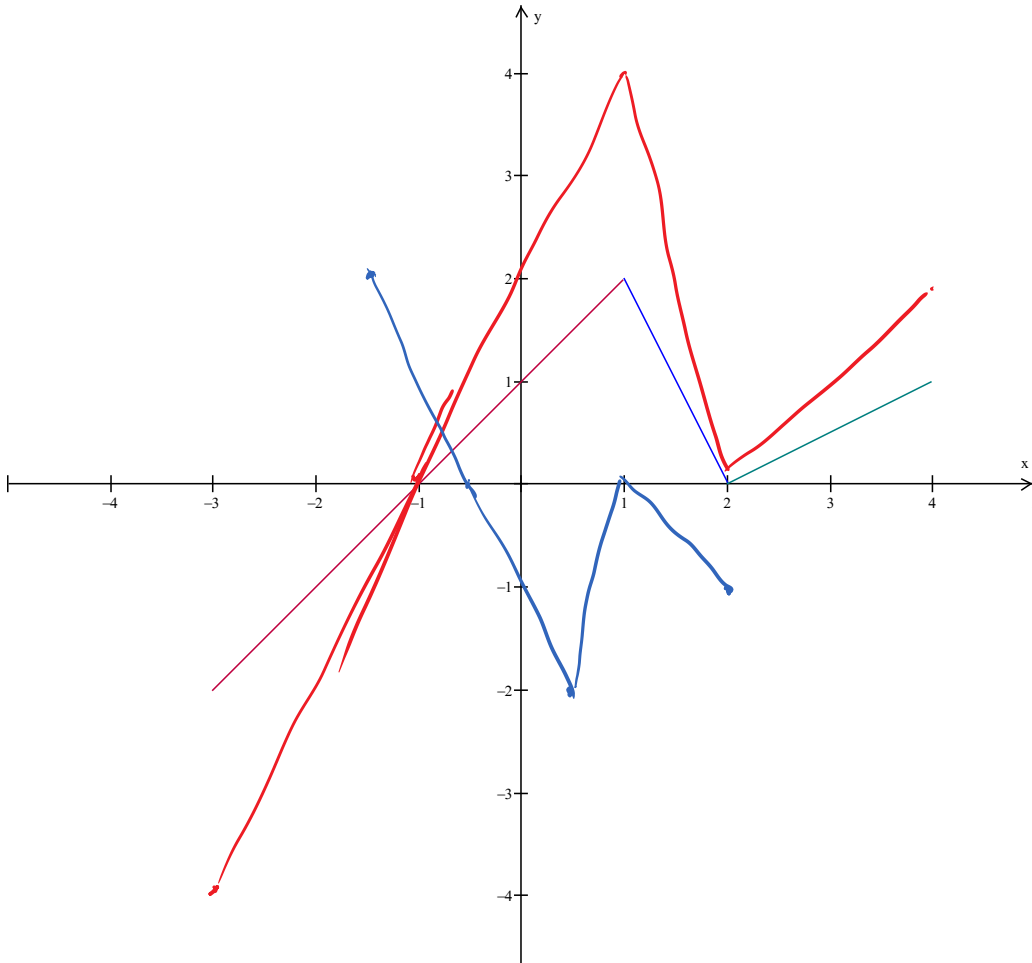
X IS REPLACED WITH $\frac{3}{2}x$

OR $y = f(\frac{3}{2}x)$

7. Given the graph of the function $y = f(x)$, sketch the graphs of:

a) $y = 2f(x)$ (1 mark) —

b) $y = -f(2x)$ (2 marks) —



8. Give the location of the invariant points:

(2 marks)

a) In the transformation you did in 7a.

(-1, 0) & (2, 0)

b) In the transformation you did in 7b.

NONE