MCR 3UI – V1

Name: _____

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UNIT 3 TEST: Transformations of Functions

[5] 1. For each statement below, circle T if the statement is true, or F if the statement is false.

T F a) When the function $f(x) = x^2$ is transformed to $y = -f(x)$, there is one invariant point.

T F b) For the function $y = -f(2x - 6)$, there is a horizontal translation right 6 units.

T F c) An asymptote is a line that a curve approaches, but never touches.

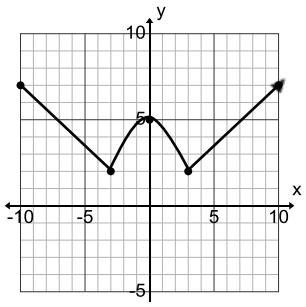
T F d) A vertical line is a relation, but not a function.

T F e) Horizontal and vertical translations are always completed first when applying transformations to any function.

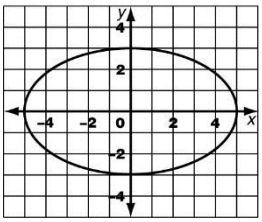
[9] 2. For each relation below, determine whether it is a function and state its domain and range.

a) {(-5, 2), (-3, 3), (-1, 4), (1, 5)}

b)



c)



Function? (circle) Yes / No

Domain: _____

Range: _____

Function? (circle) Yes / No

Domain: _____

Range: _____

Function? (circle) Yes / No

Domain: _____

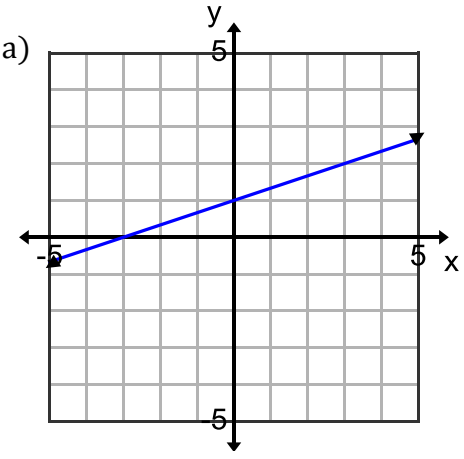
Range: _____

[5] 3. If $f(x) = \sqrt{-x+7}$, find:

a) $f(3)$ b) $f(1-a)$ c) x when $f(x) = 4$

[4] 4. Sketch the inverses of the following functions on the same grids they are drawn.

a)



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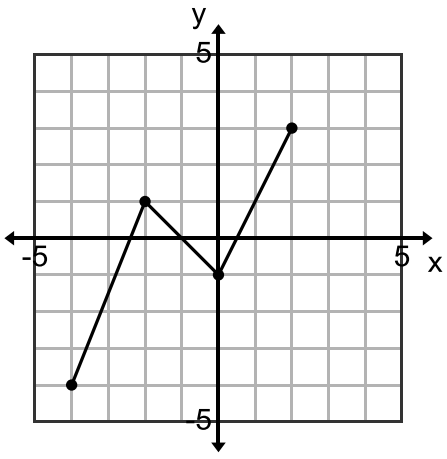


[6] 5. For each function below, find its inverse, $f^{-1}(x)$. Identify if the inverse is a function or not. Show your work.

a) $f(x)=\frac{4x-3}{9}$

b) $f(x)=(x+2)^2-5$

$\therefore f^{-1}(x)=$

Function (Y/N): _____

$\therefore f^{-1}(x)=$

Function (Y/N): _____

6. Given $f(x)=(x-3)^2$,

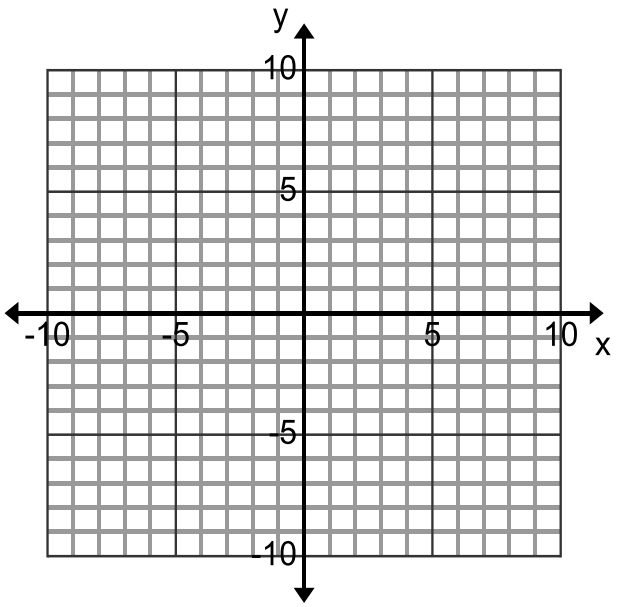
a) Write equations for:

[11]

$-f(x)=$ _____

$f(-x)=$ _____

b) Sketch the graphs of $y=f(x)$, $y=-f(x)$ and $y=f(-x)$ on the same set of axes. Label each function.



c) Determine any points that are invariant for each reflection.

$-f(x)$: _____ $f(-x)$: _____

d) State the domain and range for the reflected functions.

$-f(x)$

D: {_____}

R: {_____}

$f(-x)$:

D: {_____}

R: {_____}

7. Given a point (-4, 6) that lies on the graph of *y = f(x)*, determine its new co-ordinates as you apply each of the following transformations.

[4]

y = f(x)	*y = f(2x)*	*y = f(-2x)*	*y = 3f(-2x)*	*y = 3f(-2(x+1))*
(-4, 6)	(,)	(,)	(,)	(,)

8. The graph of $g(x) = x^3$ is reflected in the x-axis, compressed vertically by a factor of ¼ then translated left 4 units and up 7 units.

[2] What is the equation of the new image (the transformed function)?

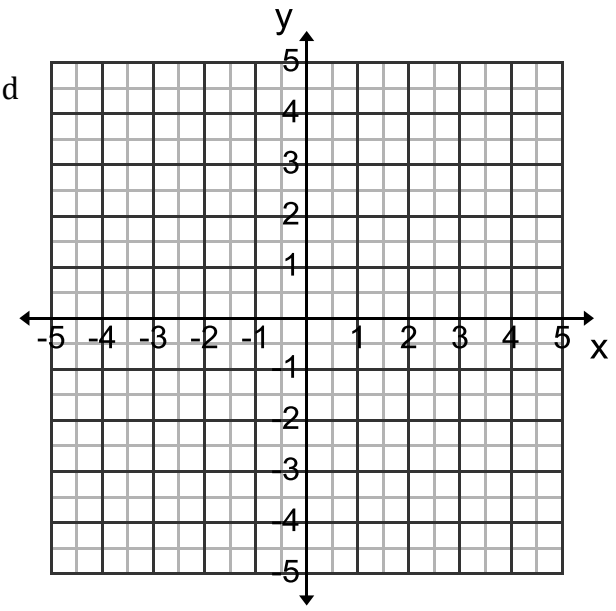
y =

9. Given $h(x) = \frac{1}{x-2} + 3$,

[6]

a) List the transformations that have been applied to the reciprocal function ($y = \frac{1}{x}$) to obtain $y = h(x)$.

b) Graph the base function and $h(x) = \frac{1}{x-2} + 3$ on the grid provided.



c) State the equations of the asymptotes for h(x):

Horizontal Asymptote: _____

Vertical Asymptote: _____

10. Consider $f(x) = \sqrt{x}$.

[9]

a) List the transformations in the order you would apply them to the function $f(x) = \sqrt{x}$ to graph $y = f(-\frac{1}{2}(x-1)) - 3$.

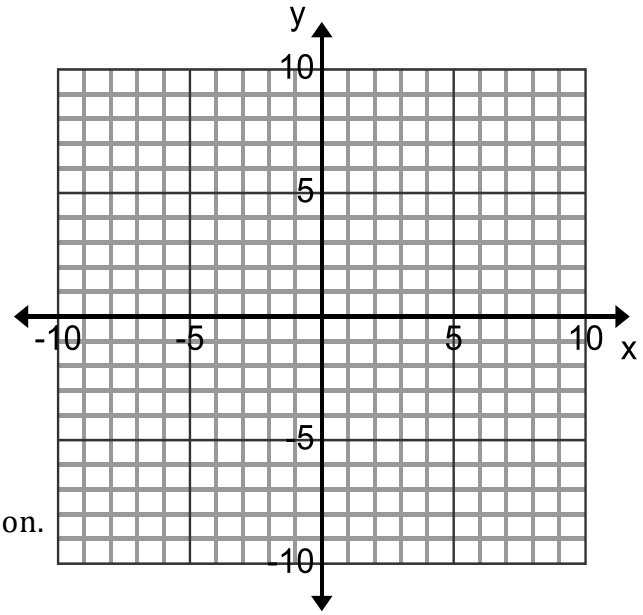
1.

2.

3.

4.

b) Graph the original image $f(x) = \sqrt{x}$ and the transformed image. Show all work/graphs for full marks. Label the original function and the final graph.



c) Write the equation for the transformed function.

y =

d) State the domain and range of $y = f(-\frac{1}{2}(x-1)) - 3$

D: { _____ } R: { _____ }

11. Given $f(x)=x$, $g(x)=x^2$, $h(x)=\sqrt{x}$

[5] Write the simplified equation of the following transformations.

a.) $y=\frac{2}{3}f(x-1)$ b) $y=g\left(-\frac{1}{4}x\right)-5$ c) $y=6h(x)+2$

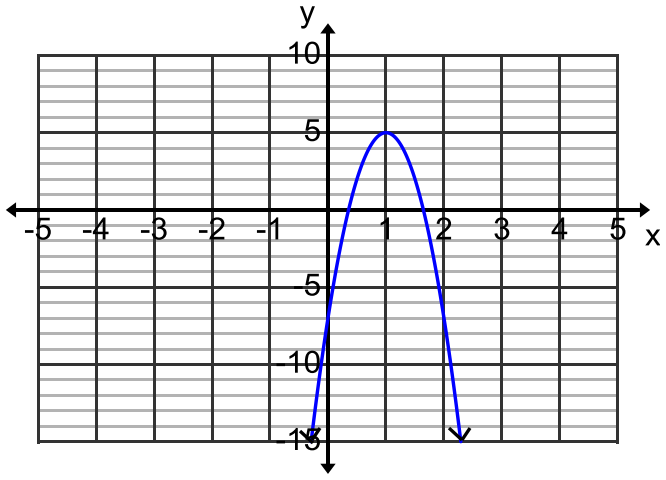
12. [3] A catering company charges $250, plus a variable rate of $20/person for any event they are hired to cater.

a) Write a function to represent the total cost of hiring the catering company, *c(p)* dollars, in terms of the number of people, *p*, that will be attending a catered event.

b) Determine the domain of the function.

c) If we were to find the inverse of the function, what would it represent in the context of this relationship?

BONUS: (+2)
Determine the equation of the graph given below.



Equation:

y =

Essential Skills Checklist

- ☐ Determine whether a relation is a function or not
- ☐ Determine domain and range of functions
- ☐ Interpret and Apply Function Notation
- ☐ Identify and interpret transformations of functions – graphically
- ☐ Identify and interpret transformations of functions – algebraically
- ☐ Graph transformations of basic functions
- ☐ Find the inverse of a function – graphically
- ☐ Find the inverse of a function – algebraically