



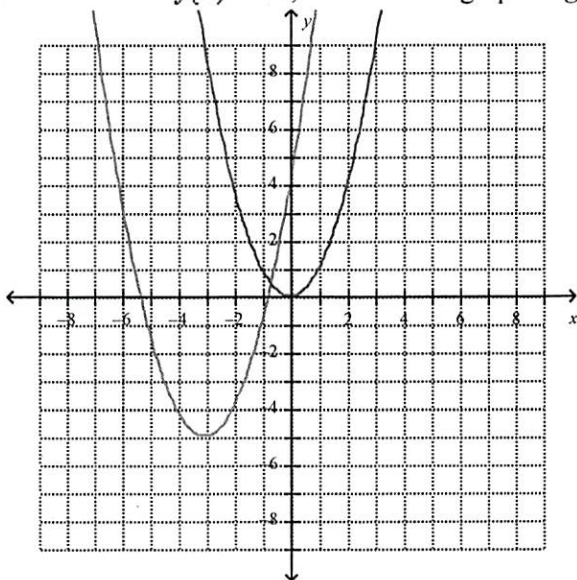
Chapter 1 TEST

Calculator allowed

Multiple Choice

[7]

- B 1. What is the equation of the transformed function, $g(x)$, after the transformations are applied to the graph of the base function $f(x) = x^2$, to obtain the graph of $g(x)$?



- A $g(x) + 3 = (x - 5)^2$ C $g(x) - 5 = (x + 3)^2$
B $g(x) = (x + 3)^2 - 5$ D $g(x) = (x - 5)^2 + 3$
- C 2. Given the function $f(x) = \sqrt{x - h} + k$ with a domain of $\{x | x \geq -5, x \in \mathbb{R}\}$ and a range of $\{y | y \geq 8, y \in \mathbb{R}\}$, which of the following best describes the vertical and horizontal translations with respect to the graph of $f(x) = \sqrt{x}$?
- A 8 units to the left and 5 units up C 5 units to the left and 8 units up
 B 8 units to the left and 5 units down D 5 units to the left and 8 units down
- A 3. When a function is reflected in the x -axis, the coordinates of point (x, y) become
- A $(x, -y)$ C $(-x, -y)$
 B $(-x, y)$ D (x, y)
- A 4. When $b < 0$, the function $g(x) = \frac{b}{x}$ has what relationship to the base function $f(x) = \frac{1}{x}$?
- A $f(x)$ is stretched vertically by a factor of b and reflected in the x -axis
 B $f(x)$ is stretched vertically by a factor of $1/b$
 C $f(x)$ is stretched horizontally by a factor of $1/b$ and reflected in the y -axis
 D $f(x)$ is stretched horizontally by a factor of b
- C 5. What are the coordinates of the invariant point(s) when the function $y = |x| - 2$ is reflected in the y -axis?
- A $(2, -2)$ C $(0, -2)$
 B $(-2, 0)$ and $(2, 0)$ D $(0, 2)$

- D 6. When the value of a is less than -1 , the function $g(x) = ax^2$ has what relationship to the base function $f(x) = x^2$?
- A $f(x)$ is compressed vertically
 B $f(x)$ is reflected and compressed vertically
 C $f(x)$ is stretched vertically
 D $f(x)$ is reflected and stretched vertically
- C 7. Which choice best describes the combination of transformations that must be applied to the graph of $f(x) = |x|$ to obtain the graph of $g(x) = f(2x - 4)$? $g(x) = \frac{1}{2}(2(x-2))$
- A a horizontal stretch by a factor of 2 and a horizontal translation of 2 units to the left
 B a horizontal stretch by a factor of $\frac{1}{2}$ and a horizontal translation of 4 units to the right
 C a horizontal stretch by a factor of $\frac{1}{2}$ and a horizontal translation of 2 units to the right
 D a horizontal stretch by a factor of -2 and a horizontal translation of 2 units to the right

Short Answer

8. Determine the equation, in standard form, of the parabola after being transformed from $f(x) = x^2$ by the given translations: 2 units to the left and 1 unit up [2]

$$y = (x + 2)^2 + 1$$

$$y = x^2 + 4x + 5$$

9. If $(2, -7)$ is on the graph of $y = f(x)$, what is its corresponding point for the transformed function $y = -5f(2(x + 3)) - 6$? Use the table below to list the transformations and see the effect on the coordinates. [5]

Transformation	Start point: $(2, -7)$
reflection around the x -axis	$(2; 7)$
vertical stretch factor 5	$(2; 35)$
horiz. stretch factor $\frac{1}{2}$	$(1; 35)$
horiz. translation 3 units \leftarrow	$(-2; 35)$
vert. transl. 6 units \downarrow	End point: $(-2; 29)$

10. Determine the inverse of the following functions. [6]

a) $f(x) = \frac{5}{2}x - 3$

$$\hookrightarrow x = \frac{5}{2}y - 3$$

$$2x = 5y - 6$$

$$5y = 2x + 6$$

$$\boxed{y = \frac{2}{5}x + \frac{6}{5}}$$

b) $f(x) = 3(x-2)^2 - 3$

$$\hookrightarrow x = 3(y-2)^2 - 3$$

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

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

$$y-2 = \pm \sqrt{\frac{x+3}{3}}$$

$$\boxed{y = 2 \pm \sqrt{\frac{x+3}{3}}}$$

c) $f(x) = x^2 - 4x + 5$

$$\hookrightarrow \text{vertex form: } \frac{-b}{2a} = \frac{4}{2} = 2 \quad f(2) = 4 - 8 + 5 = 1$$

$$f(x) = (x-2)^2 + 1$$

$$\hookrightarrow x = (y-2)^2 + 1$$

$$x-1 = (y-2)^2$$

$$y-2 = \pm \sqrt{x-1}$$

$$\boxed{y = 2 \pm \sqrt{x-1}}$$

11. a) Given the relation $y = g(x)$, write the equation that will reflect its graph over the y axis and ^{stretch} compress it vertically by a factor 3. [1]

$$\boxed{y = 3g(-x)}$$

b) Same question if $g(x) = 2\sqrt{x-3} - 4$ [2]

$$y = 3(2\sqrt{-x-3} - 4)$$

$$\boxed{y = 6\sqrt{-(x+3)} - 12}$$

Problem

12. Consider the function $f(x) = (x - 3)^2 - 5$.

a) State the domain and range of the function. [1]

0.5 x 2

$D = \mathbb{R}$ $R = [-5; +\infty)$

b) Is its inverse a function or not? (circle the answer)

If yes, determine the domain and the range of the inverse.

If not, then restrict the domain of the original function so that its inverse is a function, and state the domain and the range of the inverse function. [2]

yes no Restricted domain if needed: $D = [3; +\infty)$

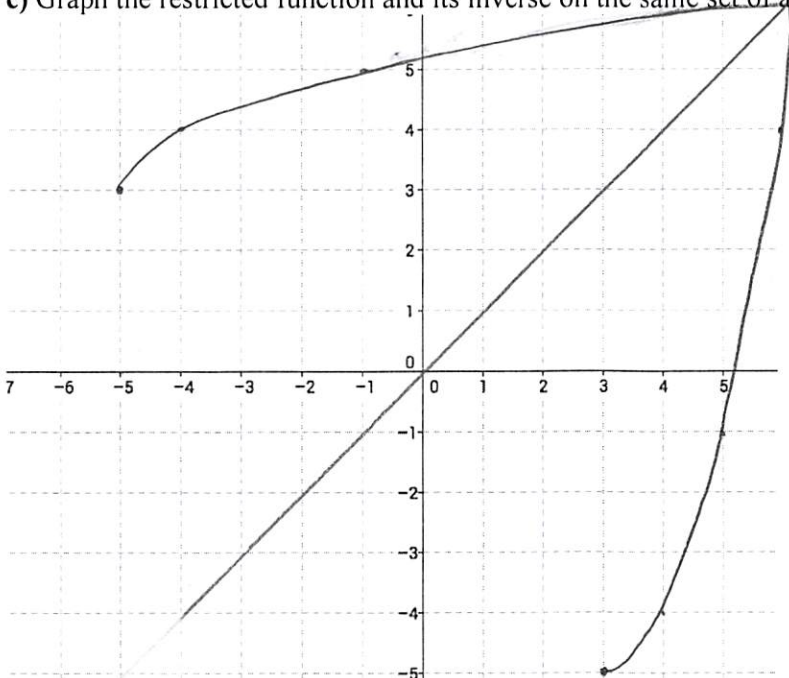
0.5 x 4

Domain of the inverse function: $D = [-5; +\infty)$

Range of the inverse function: $R = [3; +\infty)$

c) Graph the restricted function and its inverse on the same set of axes (include the line $y = x$). [2]

2



13. The cost of renting a car for a day is a flat fee of \$50 plus \$0.12 for each kilometre driven. Let C represent the total cost of renting a car for a day if it is driven a distance, x , in kilometres. [2]

a) Write the total cost C for the car rental as a function of the number of kilometres x .

0.5

$C = 50 + 0.12x$

b) What would the inverse of this function represent?

The number of km you can drive for a given cost.

0.5

c) Determine the inverse function.

$C - 50 = 0.12x$

$x = \frac{C - 50}{0.12}$

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