Name Solns

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MATH@TD

3U U2: Intro to Functions - Practice Problems

Multiple Choice

*Identify the choice that best completes the statement or answers the question. Circle the letter of your choice **AND** write the leter beside the question number.*

1. The temperature fell at a rate of 0.65 °C/h. The temperature was recorded at 37 °C at 6 p.m. Which function can be used to represent this situation?

A

(a.) $f(x) = 37 - 0.65x$
b. $f(x) = 37x + 0.65$
c. $f(x) = 0.65x + 37$
d. $f(x) = 0.65x - 37$

2. Consider the functions $f(x) = -(x^2) + 6x$ and $g(x) = x^2 - 9x + 1$. Which of the following is true?

D

a. $f(-3) > g(-3)$ FALSE
b. $f(0) = g(0)$ FALSE
c. $f(4) < g(4)$ FALSE
(d.) $f(-2) < g(-2)$ TRUE

3. Evaluate $f(x) = -4x^2 + 7$ for $f(1) + f(-2)$.

A

(a.) –6
b. 3
c. 26
d. 94

4. Debra thought of a number. She squared the number and added the original number to the result. She then divided the sum by 4. Which function represents Debra's number?

C

a. $f(x) = x^2 + \frac{x}{4}$
(c.) $f(x) = \frac{x^2 + x}{4}$
b. $f(x) = \frac{2x + x}{4}$
d. $f(x) = \frac{2x}{4} + x$

5. What are the domain and range of the function $f(x) = \sqrt{x - 5}$?

D

a. Domain = $\{x \in \mathbf{R}\}$ ✗
Range = $\{y \in \mathbf{R}\}$ ✗
b. Domain = $\{x \in \mathbf{R} \mid x \geq 0\}$ ✗
Range = $\{y \in \mathbf{R} \mid y \geq 0\}$ ✓
c. Domain = $\{x \in \mathbf{R} \mid x \geq 25\}$ ✗
Range = $\{y \in \mathbf{R} \mid y \geq 1\}$ ✗
(d.) Domain = $\{x \in \mathbf{R} \mid x \geq 5\}$ ✓
Range = $\{y \in \mathbf{R} \mid y \geq 0\}$ ✓

6. Which of the following is the inverse relation to the set of ordered pairs {(–10, 5), (–7, 9), (0, 6), (8, –12)}?

A

(a.) {(5, –10), (9, –7), (6, 0), (–12, 8)}
b. {(–10, –5), (–7, –9), (0, –6), (8, 12)}
c. {(10, –5), (7, –9), (0, –6), (–8, 12)}
d. {(–5, 10), (–9, 7), (–6, 0), (12, –8)}

Written Solutions

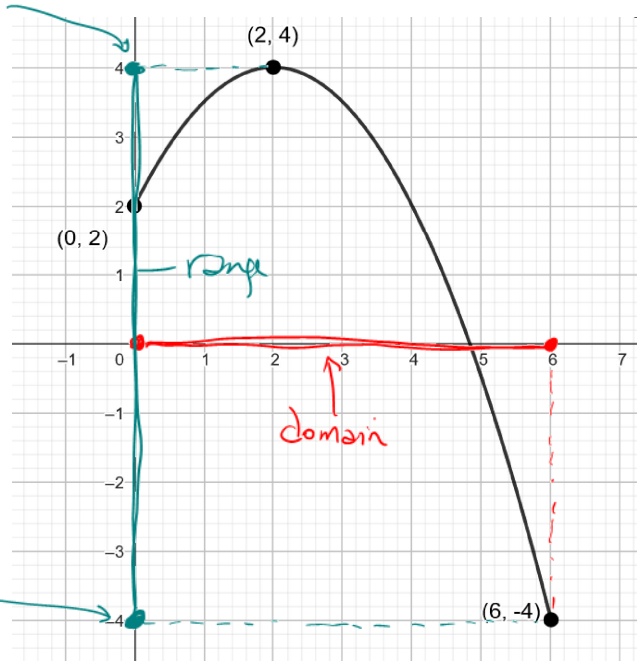
Provide solutions clearly showing your work.

7. State the definition of a function. (this is on your test for sure)

make sure you know this.

smallest value to biggest value

8. What are the domain and range of the graph? Is the graph a function? Why or why not?



$D_f : \{x \in \mathbb{R} \mid 0 \leq x \leq 6\}$

$R_f : \{f(x) \in \mathbb{R} \mid -4 \leq f(x) \leq 4\}$

9. Consider the function $g(x) = -2x - 5$. Determine
   a) $g(3)$.
   b) x *if* $g(x) = 5$

a) $g(3) = -2(3) - 5$
$= -11$
$\Rightarrow$ this produces the point $(x, g(x)) = (3, -11)$

b) $5 = -2x - 5$ (+5 on both sides)

$\Rightarrow \frac{10}{-2} = \frac{-2x}{-2}$

$\Rightarrow \boxed{x = -5}$

$(x, g(x))$

(which means $(-5, 5)$ is a point on the graph)

10. Given the function $f(x) = -2(x+4)^2 + 3$:

a) State the parent function, and call it $g(x)$

b) State all transformations applied to the parent function

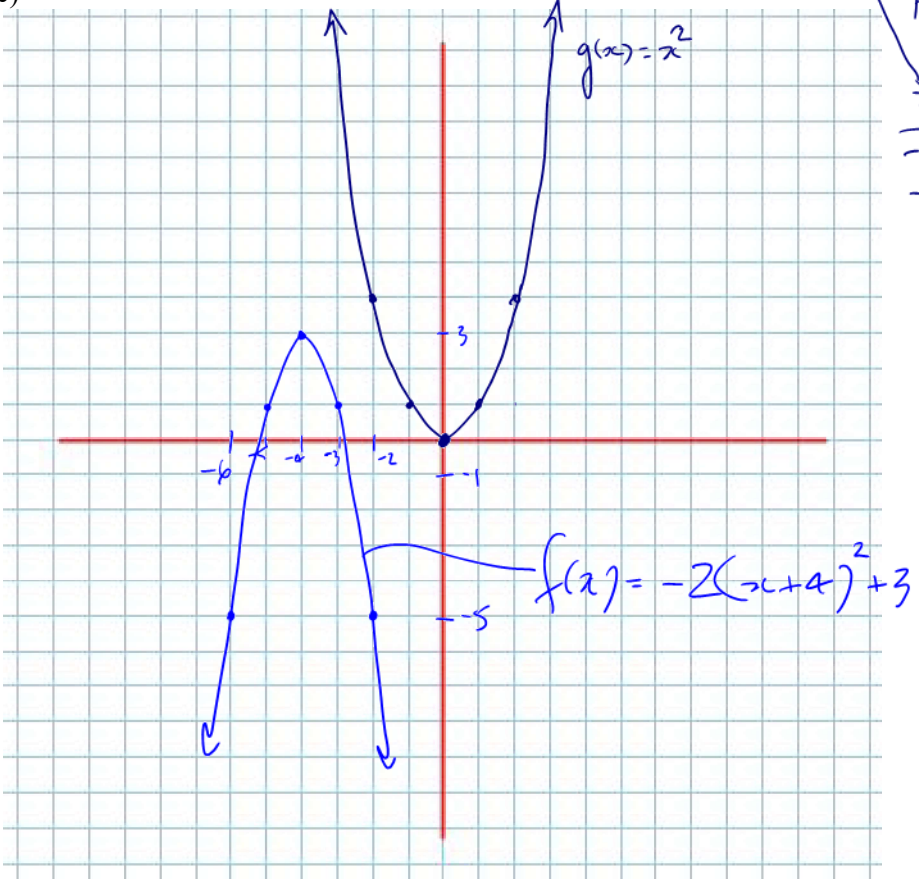
c) Sketch the graph of the parent function and $f(x)$ on the same set of axes.

a) $g(x) = x^2$

b)

	HORIZONTAL	VERTICAL	
FLIP	No	YES	
STRETCH	"1"	2	X-2
SHIFT	4 left	3 up	

c)



"x-parent" → PARENT

x_p	g
-2	4
-1	1
0	0
1	1
2	4

"x-transformed" → TRANSFORMED (ToV)

$x_T = x_p - 4$	$f = -2g + 3$
-6	-5
-5	1
-4	3
-3	1
-2	-5

$g(x) = af(k(x-d)) + c$

11. Given the function $f(x) = \sqrt{x}$, write the **equation** for a transformed function, $g(x)$, after the following transformations: (No sketch required - just the equation)

horizontal stretch by the factor 2, ⇒ "$k = \frac{1}{2}$"

vertical stretch by the factor 3 } $a = -3$

Reflection around the x-axis } vertical flip

Shift 3 units left and 5 units up

$d = -4$ (left 3 means $x+3$, so $d = -3$? — shift left 3 gives $f(x+3)$, $d=-3$; shift up 5 gives $c=5$)

$g(x) = -3\sqrt{\frac{1}{2}(x+4)} + 5$

12. Consider the function $f(x) = 6 + 5x - 2x^2$. Determine the range of $f(x)$ if the domain is given by $D_f = \{-2, -1, 0, 3\}$.

y-values for each domain value

$f(-2) = 6 + (-2) - 2(-2)^2 = 6 - 2 - 8 = -4$

$f(-1) = -1$

$f(0) = 6$

$f(3) = 3$

$R_f = \{-4, -1, 6, 3\}$

13. Determine the inverse function $f^{-1}(x)$ given $f(x) = \frac{1}{2}\sqrt{3x-6} + 5$. Use the method of your choice (brute force or transformations).

$3(x-2)$!

BRUTE FORCE (SAMDEB)

$x = \frac{1}{2}\sqrt{3(f^{-1}(x) - 2)} + 5$

$\Rightarrow x - 5 = \frac{1}{2}\sqrt{3(f^{-1}(x) - 2)}$

$\Rightarrow 2(x-5) = \sqrt{3(f^{-1}(x) - 2)}$

$\Rightarrow (2(x-5))^2 = 3(f^{-1}(x) - 2)$

$\Rightarrow \frac{1}{3}(2(x-5))^2 = f^{-1}(x) - 2$

$\Rightarrow f^{-1}(x) = \frac{1}{3}(2(x-5))^2 + 2$

TRANSFORMATIONS (vertical becomes horizontal and vice-versa)

$f(x) = \frac{1}{2}\sqrt{3(x-2)} + 5$

V H H V

$f^{-1}(x) = \frac{1}{3}(2(x-5))^2 + 2$