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Unit 2A Exam Review - Quadratic Equations

Multiple Choice -*Identify the choice that best completes the statement or answers the question. Make sure to show ALL work to receive full credit.*

1. Factored completely, the expression $2x^2 + 10x - 12$ is equivalent to
   a. $2(x-6)(x+1)$
   (b.) $2(x+6)(x-1)$
   c. $2(x+2)(x+3)$
   d. $2(x-2)(x-3)$

$\frac{2x^2}{2} + \frac{10x}{2} - \frac{12}{2}$ multiply to c, add to b

$2(x^2+5x-6)$

$2(x+6)(x-1)$

2. Which relation is *not* a function?
   a. $\{(2,4),(1,2),(0,0),(-1,2),(-2,4)\}$
   b. $\{(2,4),(1,1),(0,0),(-1,1),(-2,4)\}$
   c. $\{(2,2),(1,1),(0,0),(-1,1),(-2,2)\}$
   (d.) $\{(2,2),(1,1),(0,0),(1,-1),(2,-2)\}$

(a.) (x cannot repeat to be a function).

3. What is the vertex of the graph of the equation $y = 3x^2 + 6x + 1$?
   (a.) $(-1,-2)$
   b. $(-1,10)$
   c. $(1,-2)$
   d. $(1,10)$

*Use calc or put into vertex form

$-1 = 3(x^2+2x+1)$ $\left(\frac{2}{2}\right)^2$ b.

$+3$

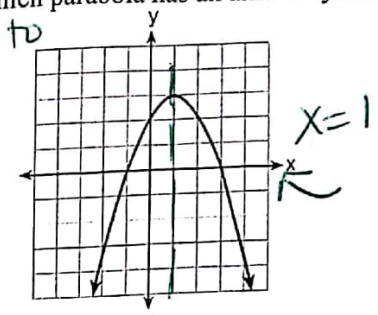
$2 = 3(x+1)^2$

-2

$y = 3(x+1)^2 - 2$

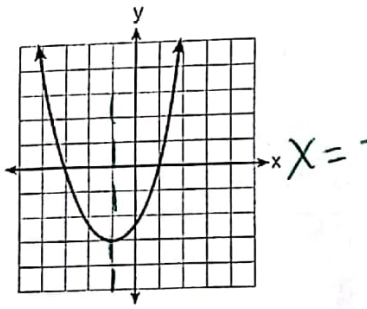
vertex: $(-1, -2)$

4. Which parabola has an axis of symmetry of $x = 1$?



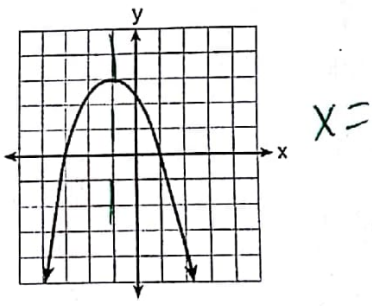
$x=1$

a.



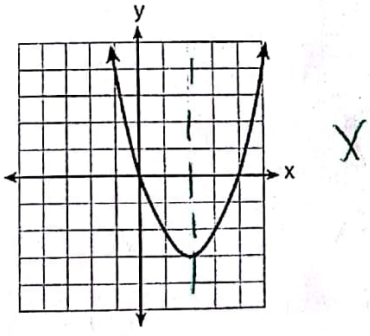
$x=-1$

b.



$x=-1$

c.



$x=2$

d.

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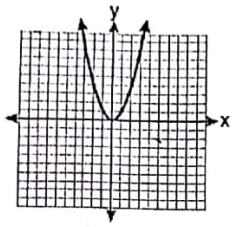
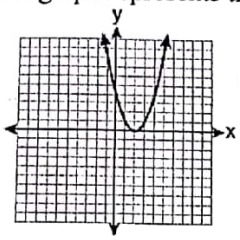
5. The graph below shows the function f(x).

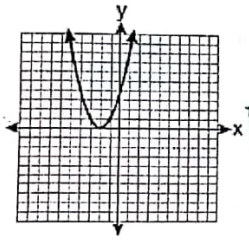


Which graph represents the function f(x + 2)?

a.

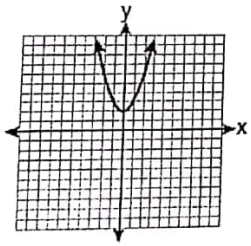


b.

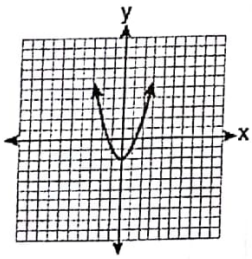


↑ left 2 units

c.



d.



6. What is the result when $4x^2 - 17x + 36$ is subtracted from $2x^2 - 5x + 25$?

a. $6x^2 - 22x + 61$
b. $2x^2 - 12x + 11$
c. $-2x^2 - 22x + 61$
d. $-2x^2 + 12x - 11$

$2x^2 - 5x + 25$
$-(4x^2 - 17x + 36)$
$-2x^2 + 12x - 11$

7. When factored completely, $x^3 - 13x^2 - 30x$ is

a. $x(x + 3)(x - 10)$
b. $x(x - 3)(x - 10)$
c. $x(x + 2)(x - 15)$
d. $x(x - 2)(x + 15)$

GCF: x
add ↙ ↘ multiply
$x(x^2 - 13x - 30)$
$x(x - 15)(x + 2)$

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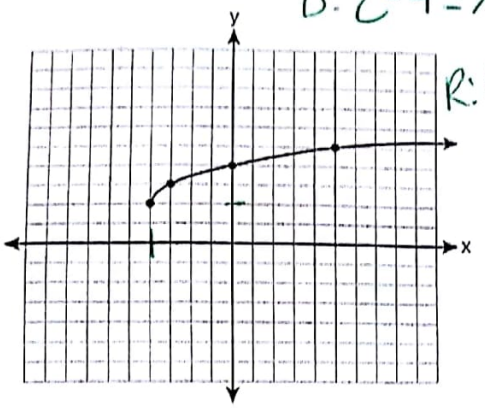
Short Answer- Show *ALL* work to receive full credit.

8. What are the domain and the range of the function shown in the graph below?



D: $\{-4 \le x < \infty\}$

R: $\{2 \le y < \infty\}$

9. 11. What is the vertex of the graph of the equation $y = 3x^2 + 6x + 1$?

must show work!

$-1 = 3(x^2+2x+1)$

$+3 \quad +3$

$2 = 3(x+1)^2$

$-2 \quad -2$

$y = 3(x+1)^2 - 2$

vertex: $(-1, -2)$

$\left(\frac{2}{2}\right)^2$

10. a. Find a rule for a quadratic function that opens up and has x-intercepts of (-3, 0) and (5, 0).

$y = a(x+3)(x-5)$, where a is any positive real #

b. Without using your calculator, find the coordinates of the minimum point of the graph of your function in Part a.

$x = 1$ b/c 1 is between -3 and 5

$(1, y)$ y is any value depending on the a-value you chose

11. Consider the quadratic function $f(x) = x^2 - 12x + 27$.

a. Find the value of $f(8)$.

$f(8) = -5$

$f(8) = (8)^2 - 12(8) + 27$

$= 64 - 96 + 27 =$

b. Find the y-intercept of the graph of $f(x)$.

*c-value is y-intercept so

(0, 27)

12. Write a rule for a quadratic function with a graph that has x-intercepts (2, 0) and (–6, 0) and a maximum point of (–2, 4).

(x, y)

$y = a(x-2)(x+6)$

$4 = a(-2-2)(-2+6)$

$4 = a(-4)(4)$

$\frac{4}{-16} = \frac{a(-16)}{-16}$ $\quad a = -\frac{1}{4}$

$y = -\frac{1}{4}(x-2)(x+6)$

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13. Write a rule for a quadratic function with a graph that has x-intercepts (–2, 0) and (8, 0) and y-intercept (0, 8).

$y = a(x+2)(x-8)$

$8 = a(0+2)(0-8)$

$8 = a(2)(-8)$

$\frac{8}{-16} = \frac{a(-16)}{-16}$

$-\frac{1}{2} = a$

$y = -\frac{1}{2}(x+2)(x-8)$

14. a. Complete the square for the function $2x^2 - 12x + 4 = 0$.

$2x^2 - 12x = -4$

$2(x^2 - 6x + 9) = -4 + 18$

$2(x-3)^2 = 14$

$2(x-3)^2 - 14 = 0$

b. What is the vertex of the quadratic function? Explain your reasoning.

(3, -14)

15. Rewrite each of these quadratic expressions in an equivalent factored form.

a. $x^2 + 13x - 30$

$(x-2)(x+15)$

b. $9x^2 - 25$

$(3x-5)(3x+5)$

c. $28x^2 + 4x$

$4x(7x+1)$

d. $x^2 - 18x + 81$

$(x-9)(x-9)$ or $(x-9)^2$

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16. Rewrite each sum or difference in standard polynomial form.

a. $(5x^3 + 3x^2 - 4) + (x^4 - 3x^2 + 10)$

$x^4 + 5x^3 + 6$

b. $(15 - 3x^3 + 4x) - (5x^3 + 8)$

$-8x^3 + 4x + 7$

17. Rewrite each of these quadratic expressions in equivalent standard form.

a. $(x - 8)(x + 8)$

$x^2 - 64$

b. $(2x + 7)(x + 3)$

$2x^2 + 13x + 21$

c. $(x + 3)^2$

$x^2 + 6x + 9$

d. $(x - 4)(x + 11)$

$x^2 + 7x - 44$

18. Describe the transformations occurring from the parent function $y = x^2$ to each of the following functions.

a. $y = (x+2)^2$

- left 2 units

b. $y = -4x^2$

- reflect over the x-axis
- vertical stretch of 4

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

- left 2 units
- down 3 units

d. $y = \frac{2}{5}(x+2)^2 + 1$

- vertical compression of 2/5
- left 2 units
- up 1 unit

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