Name:_____ Date:_____

Unit 3: Modeling and Analyzing Quadratic Functions REVIEW

1.	The GCF of $3x^5 - 9x^3 + 36x^2$ is $\underline{3x^2}$?

$$3x^2(x^3 - 3x + 12)$$

4,3
6,2

2.	Factor $2x^2 - 17x + 21$ **completely**

42   2,21
      3,14

$$2x^2 - 3x - 14x + 21$$
$$x(2x-1) - 7(2x-1)$$
$$(x-7)(2x-1)$$

3.	Factor $5x^2 + 13x + 8 = x^2 + 1$ **completely**

-36
1,36
2,18
3,12
4, 9

$$4x^2 + 13x + 9 = 0$$
$$4x^2 + 4x + 9x + 9 = 0$$
$$4x(x+1) 9(x+1) = 0$$ $(x+1)(4x+9)$

4.	Which value of "b" would make $x^2 + bx - 63$ **not** factorable

63
1, 63
3, 21
7, 9

ALL OF THE FUNCTIONS THAT
ARE FACTORABLE
$x^2 + 62x - 63$ $(x+1)(x-63)$
$x^2 + 18x - 63$ $(x+21)(x-3)$
$x^2 + 2x - 63$ $(x+9)(x-7)$

So any other value
of b that are
not these

5.	Factor $9x^4 - 16$ completely

$$(3x^2 - 4)(3x^2 + 4)$$ ← DIFFERENCE OF SQUARES

6.	Create a function that has its <u>vertex</u> **below** the x-axis.

$$(x-5)^2 - 3$$

vertex $(5, -3)$

7. What is the **vertex** and **axis of symmetry** of the quadratic: $f(x)=5x^2-30x+101$?
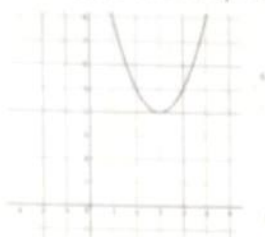
$$\frac{-b}{2a} \quad \frac{30}{2(5)}=3$$

$\boxed{x=3}$ ← Axis of symmetry

vertex
↓

$5(3)^2-30(3)+101$

56

$(3,56)$

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8. Write the equation for the following functions in standard form:
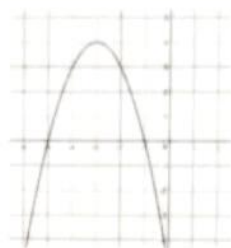

vertex form
↓

$$y=(x-3)^2+4$$

$(x-3)(x-3)+4$

$x^2-3x-3x+9+4$ ← Standard form

$\boxed{y=x^2-6x+13}$

↓ vertex form

$$y=-(x+3)^2+4$$

$-(x+3)(x+3)+4$

$-(x^2+3x+3x+9)+4$

$-x^2-3x-3x-9+4$

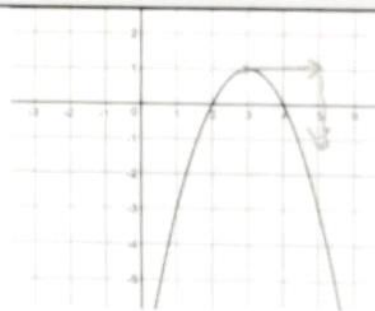$\boxed{y=-x^2-6x-5}$

↑ standard form

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9. Given the following graph, which equation represents the graph after it has been shifted 2 units to the right and 2 units down.

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

new
graph »

$$\boxed{y=-(x-5)^2-1}$$

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10. Write the equation of a quadratic equation that has been transformed from the parent function $f(x) = x^2$ with a narrowing by a factor of 7 and a shift to the right of 10 units and down 2 units.

$$f(x)=7(x-10)^2-2$$

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11. Which best describes the solutions of the quadratic function $F(x)=4x^3-10x^2$

2 rational solutions

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

↑   ↖
0   AND $5/2$

12.	What are the zeros of the following equation $4x^3 - 24x^2 - 108x = 0$

$x = 0$

$x = 9$

$x = -3$

$4x(x^2 - 6x - 27) = 0$

$4x(x - 9)(x + 3)$

13.	What are the solutions to the equation $2(x - 3)^2 + 7 = 23$?

$-7 \quad -7$

$\dfrac{2(x-3)^2}{2} = \dfrac{16}{2}$

$\sqrt{(x-3)^2} = 8$

$x - 3 = \pm 2\sqrt{2}$

$x = \pm 2\sqrt{2} + 3$

14. Describe and correct the error in solving the following equations:

$x^2 - 14x = 11$

$x^2 - 2x - 4 = 0$

$x^2 - 14x = 11$

$x^2 - 14x + 49 = 11 + 49$

$(x - 7)^2 = 11$

$x - 7 = \pm\sqrt{11}$

$x = 7 \pm \sqrt{11}$

To complete the square you need to add the special square to both sides

6

$x^2 - 2x - 4 = 0$

$x^2 - 2x = 4$

$x^2 - 2x + 1 = 4 + 1$

$(x + 1)^2 = 5$

$x + 1 = \pm\sqrt{5}$

$x = 1 \pm \sqrt{5}$

Subtract one

$x = \pm\sqrt{5} - 1$

$6 \quad 10$
$\wedge \quad \wedge$
$2\,3 \quad 2\,5$

$\to x^2 - 14x + 49 = 11 + 49$

$\sqrt{(x-7)^2} = \sqrt{60}$

$x - 7 = \pm\sqrt{60}$

$x - 7 = \pm 2\sqrt{15}$

$x = \pm 2\sqrt{15} + 7$

15. Describe and correct the error in solving the following equation using the quadratic formula:

$x = \dfrac{-7 \pm \sqrt{(-7)^2 - 4(3)(-6)}}{2(3)}$

$= \dfrac{-7 \pm \sqrt{121}}{6}$

$x = \dfrac{2}{3}$ and $x = -3$

no problem! IT IS CORRECT

16. Describe and correct the error in solving the following equation by square roots.
$3x^2-7x-6$
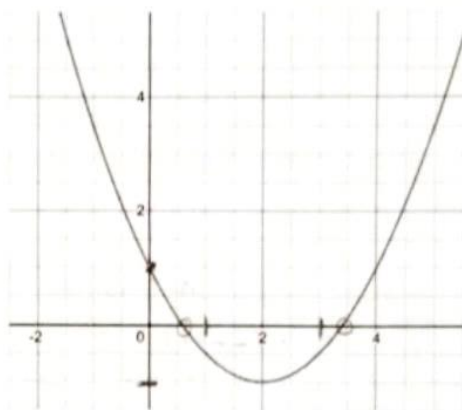
$\times$

$$2x^2 - 33 = 39$$
$$2x^2 = 72$$
$$x^2 = 36$$
$$x = 6$$

► The solution is $x = 6$.

$x = \pm 6$

17) Given the graph below answer the following questions:

a) Vertex: $(2, 1)$

b) Axis of Symmetry: $x = 2$

c) Zeros: $x \approx .6$ $x \approx 1.3$

d) Y-intercept: $(0, 1)$

e) Interval of Decrease: $(-\infty, 2)$

18) Create a quadratic equation meets the following criteria (Your answer must be written in either vertex form or standard form)

~ Must have 2 solutions

~The Axis of Symmetry must be greater than -1

~The equation must be decreasing to the right of the axis of symmetry

$$y = -(x-5)^2 + 1$$

decreasing
right of
A.O.S.
So it needs to
be a reflection

A.O.S
greater
than
$y = 1$

2 solutions

decreasing right
of A.O.S