Unit 3B Review – Quadratics

Name _____
Date _____ **Period** _____

Operations with Complex Numbers
Simplify the following expressions.

1. $(2+3i)+(6-5i)$

$8-2i$

2. $(8-i)+(-2+3i)$

$6+2i$

3. $(1+7i)-(6+5i)$

$1+7i-6-5i$

$-5+2i$

4. $(3-6i)-(1-2i)$

$3-6i-1+2i$

$2-4i$

5. $(3+4i)(2-i)$

$6-3i+8i-4i^2$

$6+5i+4$

$10+5i$

6. $(2+3i)(1+5i)$ (-1)

$2+10i+3i+15i^2$

$2+13i-15$

$-13+13i$

Find the value of c that makes each trinomial a perfect square.

7. $x^2+10x+c$

$\left(\frac{10}{2}\right)^2=25$

8. x^2-4x+c

$\left(-\frac{4}{2}\right)^2=4$

9. $x^2-20x+c$

$\left(\frac{-20}{2}\right)^2=100$

Change to vertex form by completing the square.

10. $y=x^2-6x+2$

$y-2+9=x^2-6x+9$

$y+7=(x-3)^2$

$y=(x-3)^2-7$

11. $y=x^2+10x+14$

$y-14+25=x^2+10x+25$

$y+11=(x+5)^2$

$y=(x+5)^2-11$

12. $y=x^2-12x+3$

$y-3+36=x^2-12x+36$

$y+33=(x-6)^2$

$y=(x-6)^2-33$

Rewrite the following quadratic functions in vertex form and factored form.

13. $y = x^2 + 10x + 9$

Vertex

$y - 9 + 25 = x^2 + 10x + 25$

$y + 16 = (x+5)^2$

$y = (x+5)^2 - 16$

Factored

$y = (x+9)(x+1)$

Vertex form: $y = (x+5)^2 - 16$

Factored form: $y = (x+9)(x+1)$

14. $y = x^2 - 6x + 5$

Vertex

$y - 5 + 9 = x^2 - 6x + 9$

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

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

Vertex form: $y = (x-3)^2 - 4$

Factored form: $y = (x-5)(x-1)$

Quadratic Regression

15. The amount of rock present at the quarry can be modeled by a quadratic function. They started with 8 tons. After 3 days, they had 65 tons. At 5 days, they had 63 tons. At 6 days, they had 50 tons. Use your calculator and quadratic regression to predict the time when there will be no rocks left. (Write down the quadratic equation AND your solution.)

Day	Amount of rock (tons)
0	8
3	65
5	63
6	50

Quadratic equation: $y = -4x^2 + 31x + 8$

Day when there are no rocks left: 8 days

16. The Food Pantry is stocked with canned food. The amount of cans for a given month can be modeled by a quadratic function. They started with only 24 cans. After 3 days, they had 72 cans. At 7 days, they had 80 cans. At 9 days, they had 60 cans. Fill in the table with the data from the situation. Use your calculator and quadratic regression to predict the day when there will be no cans left. (Write down the quadratic equation AND your solution.

Day	Number of cans
0	24
3	72
7	80
9	60

Quadratic equation: $y = -2x^2 + 22x + 24$

Day when there are no rocks left: 12 days

Translations

17. Write the equation of the graph formed when you translate the quadratic parent function 6 units left and 8 units down.

Equation: $y = (x+6)^2 - 8$

Vertex: $(-6, -8)$

+8 +6

Now translate your equation 8 units right and 6 units up. Write the equation of the new graph.

New equation: $y = (x-2)^2 - 2$

$(2, -2)$

18. The function $f(x) = (x+1)^2 - 2$ is moved 5 units to the right and 3 units down. State the new vertex and write the equation of the newer function. $V: (-1, -2) \rightarrow (4, -5)$

+5 −3

$y = (x-4)^2 - 5$

19. List the following functions from widest to narrowest.

$y = \frac{2}{3}x^2$	$y = -5x^2$	$y = x^2$	$y = \frac{-1}{4}x^2$
2	4	3	1

Match the function below with its correct graph and give its roots.

20. $y = (x-7)(x-1)$ function: C roots: 7, 1

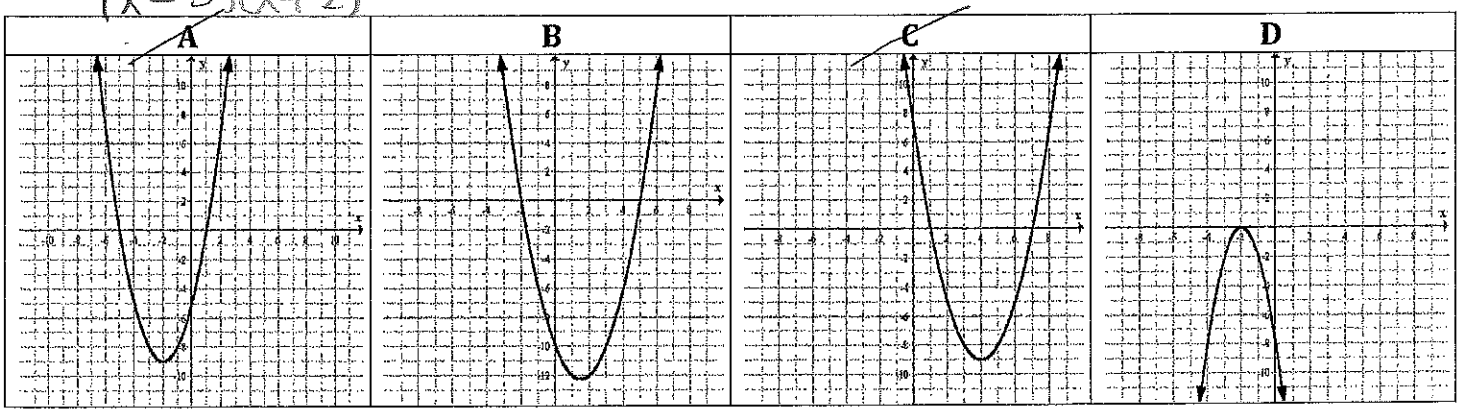
21. $y = (x+5)(x-1)$ function: A roots: −5, 1

22. $y = -2x^2 - 8x - 8$ function: D roots: −2

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

23. $y = x^2 - 3x - 10$ function: B roots: −2, 5

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



Find the discriminant, give the number and type of roots and find the solutions to your function by using the quadratic formula.

Quadratic Equation	Discriminant Value ($b^2 - 4ac$)	Number of Roots	Type of Roots	Solutions $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
24. $2x^2 - 5x = 3$ $2x^2 - 5x - 3 = 0$	$25 - 4(2)(-3)$ $25 + 24$ 49	2	Real Rat.	$x = \frac{5 \pm \sqrt{49}}{2(2)}$ $x = \frac{5+7}{4} = \frac{12}{4} = 3$ $x = \frac{5-7}{4} = \frac{-2}{4} = -\frac{1}{2}$
25. $x^2 - 4x + 5 = 0$	$16 - 4(1)(5)$ $16 - 20$ -4	2	Imag	$x = \frac{4 \pm \sqrt{-4}}{2(1)}$ $x = \frac{4 \pm 2i}{2}$ $x = 2 \pm i$
26. $4x^2 - 8x + 2 = 0$	$64 - 4(4)(2)$ $64 - 32$ 32	2	Real Irr.	$x = \frac{8 \pm \sqrt{32}}{2(4)}$ $x = \frac{8 \pm \sqrt{32}}{8}$
27. $x^2 + 4x + 4 = 0$	$16 - 4(1)(4)$ $16 - 16$ 0	1	Real	$x = \frac{-4 \pm \sqrt{0}}{2(1)}$ $x = \frac{-4}{2}$ $x = -2$