Algebra 2 & Trigonometry Test Review

Unit 2B – Quadratic Functions and Relations

Name: Master 6

Date: _____ Block: _____

Target 1: Simplify an expression containing complex numbers and or radicals.

1-15: Simplify each expression. Circle your final answer.

1. $i + 3 + \sqrt{-4}$

$i+3+2i$

$3+3i$

2. $(-6 - 12i) - (-8 + 23i)$

$-6-12i$
$+8-23i$

$2-35i$

3. $(7 - 3i)(8 + 4i)$

$56+28i-24i-12i^2$
$56+4i+12$

$68+4i$

4. $\sqrt{-180}$

$\sqrt{-1 \cdot 9 \cdot 20}$
$\sqrt{(-1)(9)(4)\,5}$
$i \quad 3 \cdot 2$

$6i\sqrt{5}$

5. $\left(\sqrt{-32}\right)\left(3\sqrt{-48}\right)$

$3\sqrt{(-1)(16)2 \cdot (-1)(16)3}$
$3 \cdot i \quad 4 \qquad i \quad 4$
$48 i^2 \sqrt{6}$

$-48\sqrt{6}$

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

$-30i^3$
$-30i^2 \cdot i$
$-30(-1) \cdot i$

$30i$

7. i^{163}

i
$-1 \qquad 1 \quad i^{160}$
$-i$
$i^{160} \cdot i^3$

$-i$

8. i^{236}

i
$-1 \qquad (1)(i^4)^{59}$
$-i \qquad 1^{59}$

1

9. i^{42}

i
$(-1) \qquad 1(i^4)^{10}$
$-i \qquad 1^{10}$

-1

10. $2i(-8 + 5i)$

$-16i+10i^2$
$-16i+10(-1)$

$-10-16i$

11. $(3 - i)^2$

$(3-i)(3-i)$
$9-3i-3i+i^2$
$9-6i-1$

$8-6i$

12. $(10 - 4i) - (7 + 3i)$

$-7-3i$

$3-7i$

13. $\left(\frac{12-i}{3i}\right) \cdot \frac{i}{i}$

$\frac{12i-i^2}{3i^2} = \frac{12i-(-1)}{3(-1)}$

$\frac{12i+1}{-3} \qquad \frac{1+12i}{-3}$

14. $\frac{(2+i)(2+i)}{(2-i)(2+i)} \quad \frac{4+2i+2i+i^2}{4-i^2}$

$\frac{3+4i}{5}$

15. $\frac{(3-4i)(2-5i)}{(2+5i)(2-5i)} \quad \frac{6-15i-8i+20i^2}{4-25i^2}$

$\frac{6-23i-20}{4+25}$

$\frac{-14-23i}{29}$

Target 2: Solve a quadratic equation over the set of complex numbers using the most efficient method (factoring, square roots /completing the square or the quadratic formula).

16-27: Solve each quadratic using the most efficient method: factoring, taking square roots, completing the square, or the quadratic formula. There are 3 problems per method. *Circle the final answer.*
Irrational answers must be written in simplified radical form (no decimals).

16. $4x^2+20=0$ √

$4x^2=-20$

$x^2=-5$

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

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

17. $7x^2+6x+2=0$ QF

$x=\frac{-6\pm\sqrt{36-4(14)}}{14}$

$\frac{-6\pm\sqrt{-20}}{14}$ -4.5

$\frac{-6\pm 2i\sqrt{5}}{14}=\left\{\frac{-3\pm i\sqrt{5}}{7}\right\}$

18. $x^2-4x=13$ CS

$x^2-4x+4=13+4$

$(x-2)^2=17$

$x-2=\pm\sqrt{17}$

$x=\{2\pm\sqrt{17}\}$

19. $6=x^2-x$ F

$x^2-x-6=0$

$(x-3)(x+2)=0$

3 -2

$x=\{-2,3\}$

20. $x^2-2x+10=0$ CS

$x^2-2x+1=-10+1$

$(x-1)^2=-9$

$x-1=\pm 3i$

$x=\{1\pm 3i\}$

21. $3(x+1)^2+4=22$ √

$3(x+1)^2=18$

$(x+1)^2=6$

$x+1=\pm\sqrt{6}$

$x=\{-1\pm\sqrt{6}\}$

22. $3x^2+2x-1=0$ QF

$x=\frac{-2\pm\sqrt{4-4(-3)}}{6}$

$\frac{-2\pm\sqrt{16}}{6}=\frac{-2\pm 4}{6}$

$\frac{-2+4}{6}=\frac{2}{6}=\frac{1}{3}$ $\frac{-2-4}{6}=\frac{-6}{6}=-1$

$x=\{-1,\frac{1}{3}\}$

23. $\frac{1}{4}x^2+1=33$ √

$\frac{1}{4}x^2=32$

$x^2=128$ 64.2

$x=\pm\sqrt{128}$

$x=\{\pm 8\sqrt{2}\}$

24. $4x^2-25=0$ F

$(2x+5)(2x-5)=0$

$2x+5=0$ $2x-5=0$

$2x=-5$ $2x=5$

$x=-\frac{5}{2}$ $x=\frac{5}{2}$

$x=\{\pm\frac{5}{2}\}$

25. $x^2+16x-7=0$ CS

$x^2+16x+64=7+64$

$(x+8)^2=71$

$x+8=\pm\sqrt{71}$

$x=\{-8\pm\sqrt{71}\}$

26. $4x^2+5x-6=0$ QF

$x=\frac{-5\pm\sqrt{25-4(-24)}}{8}$

$\frac{-5\pm\sqrt{121}}{8}=\frac{-5\pm 11}{8}$

$\frac{-5+11}{8}=\frac{6}{8}=\frac{3}{4}$ $\frac{-5-11}{8}=\frac{-16}{8}=-2$

$x=\{-2,\frac{3}{4}\}$

27. $x^2-9x=0$ F

$x(x-9)=0$

$x=0$ $x=9$

$x=\{0,9\}$

Target 3: Write a quadratic equation in any form given a combination of its parts.

28-36: Write a quadratic function in standard form for the information given.

28. roots: x = {-8, 7} and has a y-intercept of (0, -280)

$y = a(x+8)(x-7)$

$-280 = a(8)(-7)$

$-280 = -56a$

$5 = a$

$y = 5(x+8)(x-7)$

$5(x^2+x-56)$

$y = 5x^2+5x-280$

29. vertex: (-4, 6) and contains the point: (-1, 9)

$y = a(x+4)^2+6$

$9 = a(3)^2+6$

$9 = 9a+6$

$3 = 9a$

$\frac{1}{3} = a$

$y = \frac{1}{3}(x+4)^2+6$

$\frac{1}{3}(x^2+8x+16)+6$

$\frac{1}{3}x^2+\frac{8}{3}x+\frac{16}{3}+\frac{18}{3}$

$y = \frac{1}{3}x^2+\frac{8}{3}x+\frac{34}{3}$

30. x-intercepts: -1, 6 and contains the point: (1, -20)

$y = a(x+1)(x-6)$

$-20 = a(2)(-5)$

$-20 = -10a$

$2 = a$

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

$y = 2(x^2-5x-6)$

$y = 2x^2-10x-12$

31. roots: x = {± 2i}

$y = (x-2i)(x+2i)$

$x^2-2ix+2ix-4i^2$

x^2-4i^2

$y = x^2+4$

32. Max at (-1, 4)and contains the point (2, -14)

$y = a(x+1)^2+4$

$-14 = a(3)^2+4$

$-14 = 9a+4$

$-18 = 9a$

$-2 = a$

$y = -2(x+1)^2+4$

$-2(x^2+2x+1)+4$

$-2x^2-4x-2+4$

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

33. roots: x = {3 ± 3i}

$y = (x-(3+3i)(x-(3-3i)$

$(x-3-3i)(x-3+3i)$

$x^2-3x+3ix$

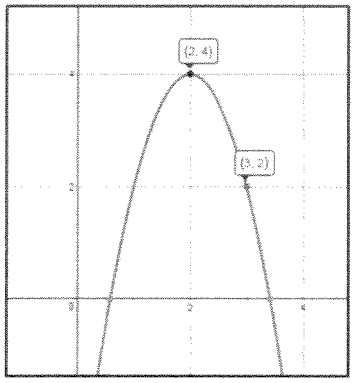
$-3x+9-9i$

$-3ix+9i-9i^2$

$x^2-6x+9-9(-1)$

$y = x^2-6x+18$

34.



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

$2 = a(1)^2+4$

$2 = a+4$

$-2 = a$

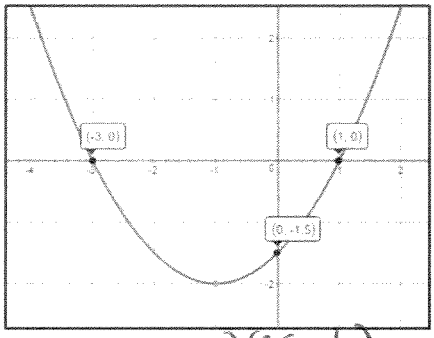
$y = -2(x-2)^2+4$

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

$= -2x^2+8x-8+4$

$y = -2x^2+8x-4$

35.



$y = a(x+3)(x-1)$

$-1.5 = a(3)(-1)$

$-1.5 = -3a$

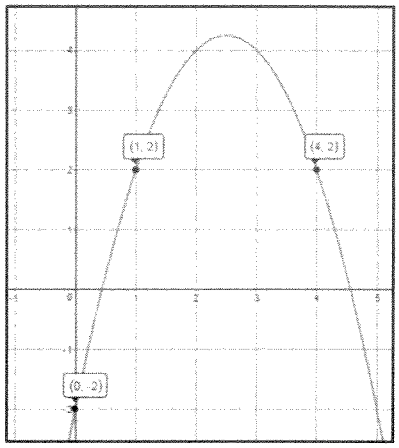
$\frac{1}{2} = a$

$y = \frac{1}{2}(x+3)(x-1)$

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

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

36.



calc: STAT → calc → quadratic regression

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

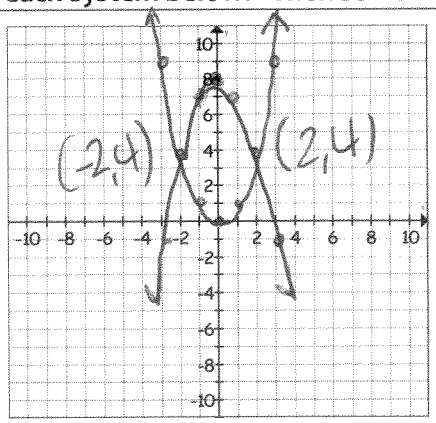
Target 4: Solve non-linear systems of equations algebraically and graphically.

37-39: Graph each system below. Then solve it algebraically in the space on the right.

37.

$y = x^2$

$y = 8 - x^2$



$x^2 = 8 - x^2$

$2x^2 = 8$

$x^2 = 4$

$x = \pm 2$

$x = 2 \therefore y = (2)^2 = 4$

$x = -2 \therefore y = (-2)^2 = 4$

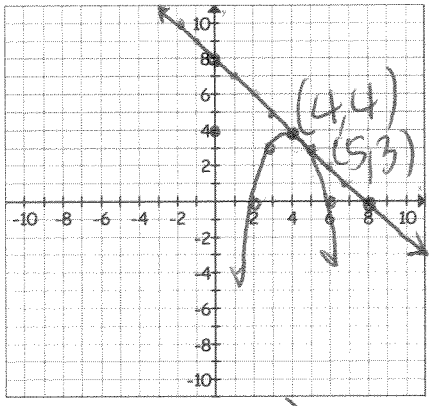
(2,4) (-2,4)

38.

$x + y = 8$

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

$y = -x + 8$



$-(x-4)^2 + 4 = -x + 8$

$-(x^2 - 8x + 16) + 4 = -x + 8$

$-x^2 + 8x - 16 + 4 = -x + 8$

$0 = x^2 - 9x + 20$

$(x-4)(x-5)$

$x = 4, 5$

$x = 4 \therefore y = -4 + 8 = 4$

$x = 5 \therefore y = -5 + 8 = 3$

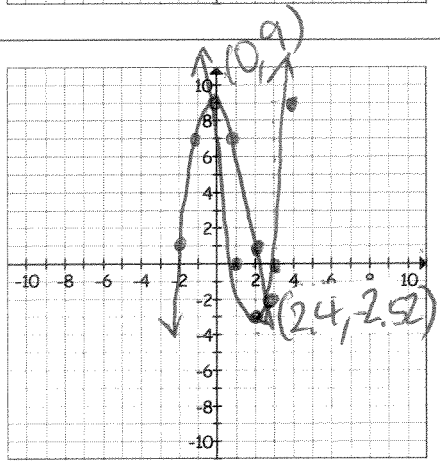
(4,4) (5,3)

39.

$-2x^2 = y - 9$

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

$y = -2x^2 + 9$



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

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

$-2x^2 + 9 = 3x^2 - 12x + 12 - 3$

$0 = 5x^2 - 12x$

$0 = x(5x - 12)$

$x = 0 \text{ or } \frac{12}{5}$

$x = 0 \therefore y = -2(0)^2 + 9 = 9$

$x = \frac{12}{5} \therefore y = -2\left(\frac{12}{5}\right)^2 + 9 = -2\left(\frac{144}{25}\right) + 9 = -2.52$

(0,9) (2.4,-2.52)

Target 5: Answer the essential questions and related questions regarding the unit.

ESSENTIAL QUESTIONS: Be ready to do an essay on any of these questions on the test day!

1. How do the parameters of a function determine the shape of its graph?
2. How do you tell which method to solve quadratic equations is best?
3. Why is it important to learn a variety of methods for solving quadratic equations?
4. What are the zeros of a quadratic function?
5. What real life situations model a quadratic function?
6. Why is it important to know all the forms of a quadratic function?