H. Algebra 2

Unit 2 Review

$-b \pm \sqrt{b^2-4ac}$ / $2a$

Name Key **Date:** **Hour:**

The following are some problems to help you study for your Unit 2 Test. In addition to problems like these, you should review problems from your notes, homework assignments, and quiz to help you prepare.

Lesson 3.1

Solve each quadratic equation by taking square roots. Tell whether each solution is real or imaginary. *Give exact answers. When necessary, express answers in* ***simplified radical form.***

1. $2x^2 - 16 = 0$

$2x^2 = 16$

$x^2 = 8$

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

2. $-5x^2 + 9 = 0$

$5x^2 = 9$

$x^2 = \frac{9}{5}$

$x = \pm \frac{3}{\sqrt{5}}$

$x = \pm \frac{3\sqrt{5}}{5}$

3. $4x^2 = x^2 - 42$

$3x^2 = -42$

$x^2 = -14$

$x = \pm i\sqrt{14}$

4. $x^2 + 12 = 0$

$x^2 = -12$

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

5. $4x^2 + 11 = 6$

$4x^2 = -5$

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

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

6. $-2x^2 + 7 = -1$

$-2x^2 = -8$

$x^2 = 4$

$x = \pm 2$

7. $x^2 - 60 = 4$

$x^2 = 64$

$x = \pm 8$

For 8-9, use the model $h(t) = h_0 - 16t^2$. *Round answers to the nearest tenth.*

8. A bridge is 38 feet above a river. How many seconds does it take a rock dropped from the bridge to pass by a tree limb that is 10 feet above the water?

$10 = 38 - 16t^2$

$16t^2 = 28$

$t^2 = \frac{28}{16}$

$t = \pm \sqrt{\frac{28}{16}}$

$t = \pm \frac{2\sqrt{7}}{4}$

$t = \frac{\sqrt{7}}{2}$ sec

$t \approx 1.3$ sec

9. A seagull drops a fish 15 feet above the surface of a pond. How long will it take for the fish to hit the water?

$0 = 15 - 16t^2$

$16t^2 = 15$

$t^2 = \frac{15}{16}$

$t = \pm \frac{\sqrt{15}}{4}$

$t = \frac{\sqrt{15}}{4}$ sec ≈ 1.0 sec

Lesson 3.2

Perform each operation. State the most specific set the answer belongs to; real, imaginary, or complex.

10. $(-7+2i)+(5-11i)$

$-2-9i$

complex

11. $(18+27i)-(2+3i)$

$18+27i-2-3i$

$16+24i$ complex

12. $(4+9i)(6-2i)$

$24-8i+54i-18i^2$

$24+46i+18$

$42+46i$ complex

13. $(-3+12i)(7+4i)$

$-21-12i+84i+48i^2$

$-21+72i-48$

$-69+72i$ complex

Lesson 3.3

Solve each equation by completing the square. State whether the solutions are real or non-real.

14. $x^2-2x+7=0$

$x^2-2x+1=-7+1$

$(x-1)^2=-6$

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

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

Non-Real

15. $2x^2+3x+4=0$

$x^2+\frac{3}{2}x+\frac{9}{16}=-2+\frac{9}{16}$

$(x+\frac{3}{4})^2=-\frac{23}{16}$

$x+\frac{3}{4}=\pm\sqrt{\frac{-23}{16}}$

$x=-\frac{3}{4}\pm\frac{i\sqrt{23}}{4}$

$-\frac{32}{16}+\frac{9}{16}$

16. A ball is thrown in the air with an initial vertical velocity of 14 m/s from an initial height of 2 m. The ball's height h (in meters) at time t (in seconds) can be modeled by the quadratic function $h(t)=-4.9t^2+14t+2$. Does the ball reach a height of 12 m? *Write an equation and use the discriminant to answer.*

$h(t)=-4.9t^2+14t+2$

$h(t)=12$

$12=-4.9t^2+14t+2$

$0=-4.9t^2+14t-10$

$(14)^2-4(-4.9)(-10)$

$196-196$

$=0$

Yes

1 solution at vertex

Solve each equation using the quadratic formula. $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

17. $-5x^2-2x-8=0$

$x=-\frac{(-2)\pm\sqrt{(-2)^2-4(-5)(-8)}}{2(-5)}$

$x=\frac{2\pm\sqrt{-156}}{-10}$

$x=\frac{-1}{5}\pm\frac{2i\sqrt{39}}{10}$

$x=-\frac{1}{5}\pm\frac{i\sqrt{39}}{5}$

18. $7x^2+2x+3=-1$

$7x^2+2x+4=0$

$x=-\frac{(2)\pm\sqrt{(2)^2-4(7)(4)}}{2(7)}$

$x=\frac{-2\pm\sqrt{4-112}}{14}$

$x=\frac{-2\pm\sqrt{-108}}{14}$

$x=\frac{-2\pm6i\sqrt{3}}{14}$

$x=-\frac{1}{7}\pm\frac{3i\sqrt{3}}{7}$

Lesson 4.1 See last page for #19

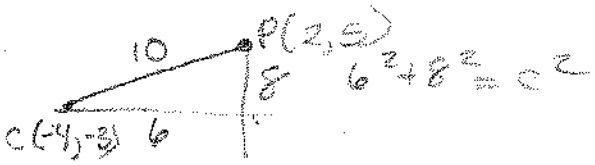
Write the equation of each circle.

19. The circle with center $C(-3, 2)$ and radius $r = 4$.

$(x+3)^2 + (y-2)^2 = 16$

20. The circle with center $C(-4, -3)$ and containing the point $P(2, 5)$.

$(x+4)^2 + (y+3)^2 = 100$



Graph each circle after writing the equation in Standard Form. Identify its center and radius.

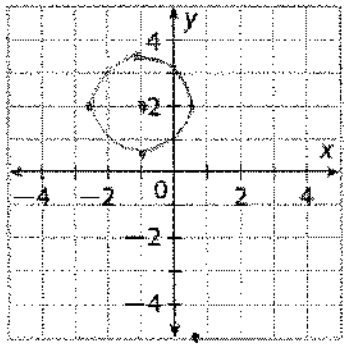
21. $4x^2 + 4y^2 + 8x - 16y + 11 = 0$

$x^2+2x+1+y^2-4y+4 = -\frac{11}{4}+\frac{4}{4}+\frac{16}{4}$

$(x+1)^2+(y-2)^2 = \frac{9}{4}$

$C(-1, 2)$

$r = \frac{3}{2}$



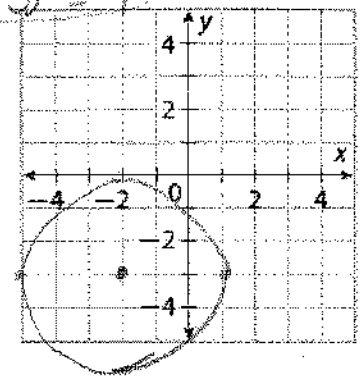
22. $x^2 + y^2 + 4x + 6y + 4 = 0$

$x^2+4x+4+y^2+6y+9 = -4+4+9$

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

$C(-2, -3)$

$r = 3$



Lesson 4.3

Solve each linear-quadratic systems algebraically.

23. $\begin{cases} -4x^2 - 9x - y - 10 = 0 \\ -3x + y = -2 \end{cases}$ $y = 3x - 2$

$-4x^2-9x-(3x-2)-10=0$

$-4x^2-9x-3x+2-10=0$

$-4x^2-12x-8=0$

$x^2+3x+2=0$

$(x+2)(x+1)=0$

$x=-2 \quad x=-1$

$y=3(-2)-2 \quad y=3(-1)-2$

$y=-6-2=-8 \quad y=-3-2=-5$

$(-2, -8)$ & $(-1, -5)$

24. $\begin{cases} x - 6 = \frac{1}{6}y^2 \\ 2x + y = 6 \end{cases}$ $y - 6 = -\frac{1}{6}x^2$

$y = -2x + 6$

$-2x+6-6 = -\frac{1}{6}x^2$

$-2x = -\frac{1}{6}x^2$

$\frac{1}{6}x^2 - 2x = 0$

$x(\frac{1}{6}x - 2) = 0$

$x = 0$ $\quad \frac{1}{6}x - 2 = 0$

$\frac{1}{6}x = 2$

$x = 12$

$y=-2(0)+6$

$y = 6$

$y=-2(12)+6$

$y=-24+6$

$y=-18$

$(0, 6)$ & $(12, -18)$

Solve the given linear-quadratic system graphically.

25. $\begin{cases} y + 3x = 0 \\ y - 6 = -3x^2 \end{cases}$

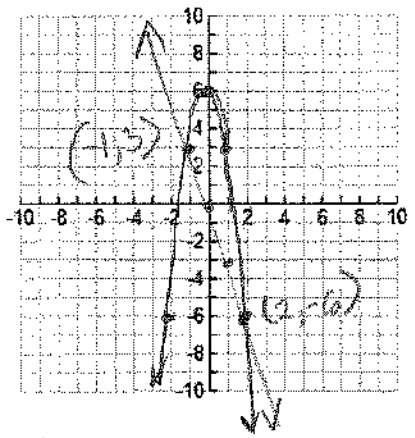
$y = -3x$

$y = -3x^2 + 6$

$V(0,6)$

V.S. -3

reflection over x-axis



$(-1,3)$; $(2,-6)$

26. $h(t) = -16t^2 + 1000t$ $h(t) = -4t^2 + 18t + 10$

A rocket is launched from the ground and follows a parabolic path represented by the equation [redacted]. At the same time, a flare is launched from a height of 10 feet and follows a straight path represented by the equation [redacted]. Find the point where the rocket and the flare intersect.

Bad

$-16t^2 + 1000t = -4t^2 + 18t + 10$

$0 = 12t^2 - 982t + 10$

$0 = 6t^2 - 491t + 5$

$t = \frac{-(-491) \pm \sqrt{491^2 - 4(6)(5)}}{2(6)}$

$t = \frac{491 \pm \sqrt{240961}}{12}$

$t = 81.8$ or $.01$

$(.01, 10)$ $(81.8, -25,259.84)$

Lesson 4.4

Solve the system algebraically. Feel free to check your answers with matrices☺

27. $\begin{cases} -6x - 6y = 6 \\ x = -2z + 7 \\ 3x - 3y + 3z = 27 \end{cases}$

$-6x - 6y + 0z = 6$

$x + 0y + 2z = 7$

$-6(-2z + 7) - 6y = 6$

$+12z - 42 - 6y = 6$

$12z - 6y = 48$

(4) $2z - y = 8$

$3(-2z + 7) - 3y + 3z = 27$

$-6z + 21 - 3y + 3z = 27$

$-3z - 3y = 6$

(5) $z + y = -2$

$2z - y = 8$

$z + y = -2$

$3z = 6$

$z = 2$

$2 + y = -2$

$y = -4$

$x = -2(2) + 7$

$x = -4 + 7$

$x = 3$

★ $(3, -4, 2)$ ★

28. $\begin{cases} -4x + 3y + 2z = 18 \\ 3x + 3y + 2z = 18 \\ x - y - 2z = -6 \end{cases}$

(4) $4x + 2y = 12$

$-4x + 3y + 2z = 18$ (2)

$x - y - 2z = -6$ (3)

(5) $-3x + 2y = 12$

4-5

$4x + 2y = 12$

$+3x - 2y = -12$

$x = 0$

$-3(0) + 2y = 12$

$2y = 12$

$y = 6$

$0 - 6 - 2z = -6$

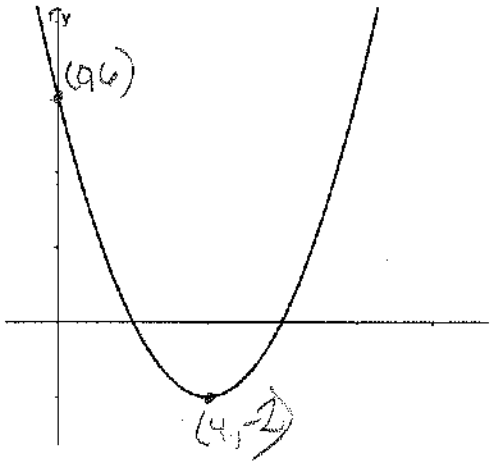
$-2z = 0$

$z = 0$

$(0, 6, 0)$

19. Use the graph below to answer the following questions. The graph of the quadratic function $f(x) = 0.5x^2 + bx + c$ intersects the y-axis at a point A (0, 6) and has its vertex at point B (4, -2).

(a) Calculate the values of b and c.
(b) Write the equation in factored form.
(c) Find the x-intercept(s) of the graph.



$f(x) = .5(x-4)^2 - 2$

$f(x) = .5(x^2 - 8x + 16) - 2$

$= .5x^2 - 4x + 8 - 2$

(a) $f(x) = .5x^2 - 4x + 6$

$b = -4$ $c = 6$

$f(x) = \frac{1}{2}(x^2 - 8x + 12)$

(b) $f(x) = \frac{1}{2}(x-6)(x-2)$

(c) $x = 6$ $x = 2$