Chapter 3 Review  HONORS ALGEBRA 2

DO NOT USE A CALCULATOR FOR ANY PROBLEM. SHOW ALL WORK.

PRIME FACTOR each expression.

1.  $12x^2 - 33x + 18$

2.  $-20x^2 - 45$

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

4.  $x^2 + 6x + 7$

5.  $-36 + 9x^2$

Solve the quadratic equation by FACTORING.

6.  $25x^2 + 20x + 4 = 0$

7.  $8x^2 + 5x - 4 = 2x^2 - 8x + 1$

8.  $7x^2 - 21x = 0$

9.  $1 - 25x^2 = 0$

Solve the quadratic equation using the SQUARE ROOT METHOD.

10.  $\frac{1}{2}x^2 - 7 = 5$

11.  $3(x - 2)^2 + 4 = 52$

12.  $-2x^2 - 324 = 0$
Simplify the expression. Express your answer in STANDARD COMPLEX FORM.

13. $-3i(5 - 2i) - 4i^3(-6 + i)$
14. $(5 - 6i)(3 + 4i)$
15. $(-4 - 2i) - (1 - 5i)$

16. $i^{23} - i^{47}$
17. $(2 - i)(2 + i) \left(2 - i \right)(2 + i)$

Solve the equation by COMPLETING THE SQUARE.

18. $x^2 + 2x + 19 = 0$
19. $-2x^2 + 8x + 10 = 0$
20. $x^2 - 3x = 9$

21. Where does the quadratic formula come from? Be specific.

Use the QUADRATIC FORMULA to solve the equation.

22. $x^2 + 1 = -2x - 9$
23. $2x^2 + x - 4 = 0$
24. $4x^2 - 9x + 2 = 0$
Simplify each expression.

25. \( \sqrt{-98} \)  

26. \( \pm\sqrt{-200} \)  

27. \( \sqrt{-12} \cdot \sqrt{-45} \)  

28. \( \frac{3 \pm \sqrt{-72}}{3} \)  

29. \( \frac{2 \pm \sqrt{18}}{6} \)  

30. What does it mean to solve a quadratic equation?

Using the MOST APPROPRIATE METHOD, solve each quadratic equation. (You will use each method only once.)

31. \( x^2 - 16x - 9 = 0 \)  

32. \( \frac{1}{5} (x + 1)^2 = 4 \)  

33. \( 8x^2 + 15x - 27 = 0 \)  

34. \( -2x^2 - 4x + 5 = 0 \)  

35. Which best describes the discriminant of the function whose graph is shown to the right?

A) Positive  B) Negative  C) Zero  D) Undefined  E) Non-real number

36. Which best describes the graph of a quadratic function with a discriminant of -8?

A) parabola with two x-intercepts  B) parabola with one x-intercept  C) parabola with no x-intercepts

D) parabola opens downward  E) parabola that opens upward
For each equation, find the DISCRIMINANT and state the number of distinct solutions and the type of solutions. SHOW SUBSTITUTIONS.

37. \(-4x^2 + 20x - 25 = 0\)  
   
   # of distinct real # solutions_______  
   
   # of distinct imaginary # sol._______

38. \(-3x^2 + x = 4\)  
   
   # of distinct real # solutions_______  
   
   # of distinct imaginary # sol._______

39. \(x^2 + 2 + 3x = 0\)  
   
   # of distinct real # solutions_______  
   
   # of distinct imaginary # sol._______

Rewrite each function in vertex form. Use completing the square to do so.

40. \(f(x) = x^2 + x - 1\)  
   
   41. \(f(x) = -6x^2 + 36x - 12\)

Find the solutions of each inequality. Show the solution on a NUMBER LINE and express the solution ALGEBRAICALLY.

42. \(-x^2 + 6x + 16 < 0\)  
   
   43. \(10x^2 - 29x \leq -10\)
44. Solve the system of nonlinear equations by graphing. SHOW ALL WORK.
NO CALCULATOR.
Use a different colored pencil for each graph.

\[ y = \left( \frac{1}{2}x \right)^2 - 8 \]
\[ y = \frac{1}{2}x + 4 \]

45. Solve the system of equations using either substitution or elimination.

\[ -x^2 + 16x - 66 = y \]
\[ 2x - y = 18 \]

46. A ball is thrown upward with a velocity of 14 feet per second from a second story balcony (18 feet from the ground) towards a basket placed on top of a 3-foot table located on the pool deck. DO NOT USE A CALCULATOR.

a. Write the function that represents the height of the ball.

b. How long does it take for the ball to land in the BASKET? Show all work. Use the best method.
DO NOT USE A CALCULATOR.
47. A bird that is sitting on a giant Sequoia tree branch 169 feet above the ground drops a rock. DO NOT USE A GRAPHING CALCULATOR for any part of this problem.

a. Write the function that represents the height of the rock.

b. What is the rock’s height after 2 seconds of falling? Show all work.

c. How long does it take for the rock to hit the ground? Show all work. Use the best method.

USE YOUR GRAPHING CALCULATOR TO ANSWER THE FOLLOWING QUESTIONS.

48. The equation \( h(t) = -16t^2 + 88t + 3.2 \) models the height (in feet) of a baseball \( t \) seconds after it is hit.

a. What is the \( h \)-intercept and what does it represent? 

b. Find the maximum height of the baseball.

c. How long does it take to reach that height? 

d. How long does it take to hit the ground?

49. Solve the system of equations by graphing using your calculator. Round to hundredths if necessary. How did you find the answer? Sketch what you see in the window.

\[
\begin{align*}
y &= x - 15 \\
y &= -2x^2 - 6x + 9
\end{align*}
\]