Name:_____ Period:_____

Secondary Math 2H
Unit 3 Factoring and Solving Quadratics Review

1. In your own words, explain what it means to completely factor a polynomial.

2. In your own words, explain how to determine whether a polynomial is prime.

3. In your own words, explain how to recognize a difference of squares.

Factor completely. Don't forget to factor out a GCF if there is one. If the leading coefficient is negative, factor out a negative GCF. If the polynomial is prime, say so.

4. $10x^2 - 5x$

$5x(2x-1)$

5. $x^2 + 6x + 14$

$7 \cdot 2$
$14 \cdot 1$

prime

6. $z^2 - 4$

$(z+2)(z-2)$

7. $v^2 - 4v - 21$

$-7 \cdot 3$

$(v-7)(v+3)$

8. $4rt - 8r + t - 2$

$4r(t-2)+1(t-2)$

$(t-2)(4r+1)$

9. $w^2 + 3w - 10$

$5 \cdot -2$

$(w+5)(w-2)$

10. $15m^3 + 5m^2 - 6m - 2$

$5m^2(3m+1) - 2(3m+1)$

$(3m+1)(5m^2-2)$

11. $7t^2 + 15t - 4$

-28
$14 \cdot 2$
$28 \cdot 1$
$7 \cdot 4$

prime

12. $-12w^3 + 21$

$-3(4w^3-7)$

13. $18x^2 - 200$

$2(9x^2 - 100)$

$\boxed{2(3x+10)(3x-10)}$

14. $5p^2 - 25p + 60$

$\boxed{5(p^2 - 5p + 12)}$

$12 \cdot 1$
$6 \cdot 2$
$4 \cdot 3$

15. $x^2 + 9$

$\boxed{\text{prime}}$

16. $-4k^2 - 20k + 24$

$-4(k^2 + 5k - 6)$

$6 \cdot -1$

$\boxed{-4(k+6)(k-1)}$

17. $4n^2 - 5n - 6$ $\quad -24$

$-8 \cdot 3$

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

$4n(n-2) + 3(n-2)$

$\boxed{(n-2)(4n+3)}$

18. $6n^4 + 10n^3 + 36n^2 + 60n$

$2n(3n^3 + 5n^2 + 18n + 30)$

$n^2(3n+5) + 6(3n+5)$

$\boxed{2n(3n+5)(n^2+6)}$

19. $2q^2 - 13q + 20$ $\quad 40$

$-8 \cdot -5$

$2q^2 - 8q - 5q + 20$

$2q(q-4) - 5(q-4)$

$\boxed{(2q-5)(q-4)}$

20. $75u^2 - 12$

$3(25u^2 - 4)$

$\boxed{3(5u+2)(5u-2)}$

21. $-10y^2 + 35y + 20$ $\quad -8$

$-8 \cdot 1$

$-5(2y^2 - 7y - 4)$

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

$2y(y-4) + 1(y-4)$

$\boxed{-5(2y+1)(y-4)}$

22. $12p^5q + 36p^4q + 8pq$

$\boxed{4pq(3p^4 + 9p^3 + 2)}$

23. $3r^3 + 15r^2 - 42r$

$3r(r^2 + 5r - 14)$

$7 \cdot -2$

$\boxed{3r(r+7)(r-2)}$

24. $49m^2 - 16$

$\boxed{(7m+4)(7m-4)}$

* difference of squares

25. $64 - t^2$

$\boxed{(8+t)(8-t)}$

* perfect square trinomials

26. $9a^2 + 24a + 16$ $\quad 144$

$12 \cdot 12$

$(3a+4)(3a+4)$

or

$\boxed{(3a+4)^2}$

27. $m^2 - 6m + 9$

$(m-3)(m-3)$

or

$\boxed{(m-3)^2}$

Find the zeros of each function in factored form of a quadratic equation.

28. $x(x+4)=0$

$x=0$
$x=-4$

29. $\frac{1}{4}(x-2)(4x+5)=0$

$x=2$
$x=-5/4$

$4x+5=0$
$-5 \quad -5$
$\frac{4x}{4}=\frac{-5}{4}$

Find the zeros of each function in standard form by factoring.

30. $x^2-2x-35=0$

$-7\cdot 5$

$(x-7)(x+5)=0$
$x=7,\ x=-5$

31. $x^2-9=0$

$(x+3)(x-3)=0$
$x=-3,\ x=3$

32. $20x^2=10x$

$20x^2-10x=0$
$10x(2x-1)=0$

$\frac{10x}{10}=\frac{0}{10}$
$x=0$

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

$x=0$
$x=1/2$

33. $6x^2=7x+90$

$6x^2-7x-90=0$

-540
$-27\cdot 20$

$6x^2-27x+20x-90$
$3x(2x-9)+10(2x-9)$
$(2x-9)(3x+10)=0$
$x=9/2,\ x=-10/3$

Write an equation for each problem and then find the solution. Round decimal answers to the nearest hundredth. You must show your work!!!

34. Find two consecutive odd integers whose product is 143.

$x(x+2)=143$
$x^2+2x-143=0$
$-11\cdot 13$
$(x-11)(x+13)=0$
$x=11,\ x=-13$

11 and 13
OR
-13 and -11

35. The product of two numbers is 168. One number is ten more than twice the other number. Find the two numbers.

$x(2x+10)=168$
$2x^2+10x-168=0$
$2(x^2+5x-84)=0$
$12\cdot -7$
$2(x+12)(x-7)=0$
$x=-12 \quad x=7$

-12 and -14
OR
7 and 24

Find all solutions (real and imaginary) to each equation by taking square roots. Write all answers in simplest radical form and write complex answers in the form $a + bi$.

36. $\sqrt{b^2} = \sqrt{24}$

$b = \pm\sqrt{24} = \frac{12}{2} = 6$

$\boxed{b = \pm 2\sqrt{6}}$

37. $6k^2 - 3 = -15$

$+3 \quad +3$

$\frac{6k^2}{6} = \frac{-12}{6}$

$\sqrt{k^2} = \sqrt{-2}$

$\boxed{k = \pm i\sqrt{2}}$

38. $3(w-1)^2 - 6 = -33$

$+6 \quad +6$

$\frac{3(w-1)^2}{3} = \frac{-27}{3}$

$\sqrt{(w-1)^2} = \sqrt{-9}$

$w - 1 = \pm 3i$

$+1 \quad +1$

$\boxed{w = 1 \pm 3i}$

39. $2(p+3)^2 = 20$

$\frac{2(p+3)^2}{2} = \frac{20}{2}$

$\sqrt{(p+3)^2} = \sqrt{10}$

$p + 3 = \pm\sqrt{10}$

$-3 \quad -3$

$\boxed{p = -3 \pm \sqrt{10}}$

40. $-25 = \frac{1}{4}x^2$

$\sqrt{-100} = \sqrt{x^2}$

$\boxed{\pm 10i = x}$

41. $-9\left(z + \frac{1}{3}\right)^2 = 4$

$\frac{-9\left(z+\frac{1}{3}\right)^2}{-9} = \frac{4}{-9}$

$\sqrt{\left(z+\frac{1}{3}\right)^2} = \sqrt{-\frac{4}{9}}$

$z + \frac{1}{3} = \pm\frac{2i}{3}$

$-\frac{1}{3} \quad -\frac{1}{3}$

$z = -\frac{1}{3} \pm \frac{2i}{3}$

or

$z = \frac{-1 \pm 2i}{3}$

42. A rock is thrown upward off the top of a cliff. It's height in feet after t seconds is given by the formula $h(t) = -16t^2 + 280$.

a. What is the height of the cliff? (In other words, how high is the rock at $t = 0$?)

$h(0) = -16(0)^2 + 280$

$= \boxed{280 \text{ feet}}$

b. How high is the rock after 1.5 seconds?

$h(1.5) = -16(1.5)^2 + 280$

$= -36 + 280 = \boxed{244 \text{ feet}}$

c. How long does it take for the rock to hit the ground? (hint: when the rock hits the ground the height will be 0 so h(t)=0)

$0 = -16t^2 + 280$

$-280 \quad -280$

$\frac{-280}{-16} = \frac{-16t^2}{-16}$

$\sqrt{17.5} = \sqrt{t^2}$

$\pm 4.18 = t$

$\boxed{t = 4.18 \text{ seconds}}$

Solve each equation by completing the square.

43. $x^2 + 16x + 84 = 0$

$x^2 + 16x + 64 = -84 + 64$

$\sqrt{(x+8)^2} = \sqrt{-20}$ $10 < 2, 5$

$x + 8 = \pm 2i\sqrt{5}$

$-8 \quad -8$

$\boxed{x = -8 \pm 2i\sqrt{5}}$

44. $x^2 = 18x - 92$

$x^2 - 18x + 81 = -92 + 81$

$\sqrt{(x-9)^2} = \sqrt{-11}$

$x - 9 = \pm i\sqrt{11}$

$+9 \quad +9$

$\boxed{x = 9 \pm i\sqrt{11}}$

45. $x^2 + 20 = 10x$

$x^2 - 10x + 25 = -20 + 25$

$\sqrt{(x-5)^2} = \sqrt{5}$

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

$+5 \quad +5$

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

46. $x^2 - \frac{3}{2}x = \frac{1}{2}$

$x^2 - \frac{3}{2}x + \frac{9}{16} = \frac{1}{2} + \frac{9}{16}$

$\sqrt{(x - 3/4)^2} = \sqrt{\frac{17}{16}}$

$x - 3/4 = \pm\frac{\sqrt{17}}{4}$

$+3/4 \quad +3/4$

$\boxed{x = \frac{3}{4} \pm \frac{\sqrt{17}}{4} \text{ or } x = \frac{3 \pm \sqrt{17}}{4}}$

47. $9x^2 - 18x - 54 = 0$

$9(x^2 - 2x + 1) = 54 + 9$

$\frac{9(x-1)^2}{9} = \frac{63}{9}$

$\sqrt{(x-1)^2} = \sqrt{7}$

$x - 1 = \pm\sqrt{7}$

$+1 \quad +1$

$\boxed{x = 1 \pm \sqrt{7}}$

48. $8x^2 = -16x + 10$

$8x^2 + 16x = 10$

$8(x^2 + 2x + 1) = 10 + 8$

$\frac{8(x+1)^2}{8} = \frac{18}{8}$

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

$x + 1 = \pm 3/2$

$-1 \quad -1$

$\boxed{x = -1 \pm 3/2 = 1/2, -5/2}$

Find the discriminant of each quadratic equation and state the number and type of solutions.

$b^2 - 4ac$

49. $2k^2 - 8k + 8 = 0$

$(-8)^2 - 4(2)(8)$

$64 - 64$

0

$\boxed{\text{1 real solution}}$

50. $-2r^2 - 5r - 2 = 0$

$(-5)^2 - 4(-2)(-2)$

$25 - 16$

9

$\boxed{\text{2 real solutions}}$

51. $-3t^2 - 5 = -7t$

$-3t^2 + 7t - 5 = 0$

$7^2 - 4(3)(-5)$

$49 - 60$

-11

$\boxed{\text{2 imaginary solutions}}$

Solve each equation using the quadratic formula.

52. $x^2 - 5x - 24 = 0$

$a = 1$
$b = -5$
$c = -24$

$x = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-24)}}{2(1)}$

$= \frac{5 \pm \sqrt{121}}{2} = \frac{5 \pm 11}{2}$

$= \boxed{8, -3}$

53. $4x^2 - 8x = -1$

$a = 4$ $\quad 4x^2 - 8x + 1 = 0$
$b = -8$
$c = 1$

$x = \frac{8 \pm \sqrt{(-8)^2 - 4(4)(1)}}{2(4)} = \frac{8 \pm \sqrt{48}}{8}$ $48 < 6, 8, 4$ $2, 2, 2$

$= \frac{8 \pm 4\sqrt{3}}{8} = \boxed{\frac{2 \pm \sqrt{3}}{2}}$

54. $7h^2 + 2 = 2h$

$7h^2 - 2h + 2 = 0$

$a = 7$
$b = -2$
$c = 2$

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

$= \frac{2 \pm \sqrt{-52}}{14}$ $52 < 2, 26 < 2, 13$

$= \frac{2 \pm 2i\sqrt{13}}{14} = \boxed{\frac{1 \pm i\sqrt{13}}{7}}$

55. $2x^2 + 1 = 0$

$a = 2$
$b = 0$
$c = 1$

$x = \frac{0 \pm \sqrt{0^2 - 4(2)(1)}}{2(2)} = \frac{\pm\sqrt{-8}}{4}$ $8 < 4, 2$ $2, 2$

$= \frac{\pm 2i\sqrt{2}}{4} = \boxed{\frac{\pm i\sqrt{2}}{2}}$