Name:_____ Period: Key

Secondary Math 2H
Unit 3 Test Review

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

Factor polynomial until it can't be factored any further.

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

If nothing can be factored out of the polynomial.

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

2 terms
both terms perfect squares
subtract

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. $10x^2 - 5x$ GCF

$5x(2x-1)$

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

Prime

x	+
14	6
1	14
2	7

no #'s work

6. $z^2 - 4$ Dif. of Squares

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

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

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

x	+
-21	-4
-7	3

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

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

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

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

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

x	+
-10	3
-2	5

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

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

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

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

Prime

x	+
-28	15
1	28
2	14
4	7

12. $-12w^3 + 21$ GCF

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

GCF

13. $18x^2 - 200$

$2[9x^2 - 100]$ ← dif. of squares

$2(3x+10)(3x-10)$

GCF

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

$5[p^2 - 5p + 12]$

x	+
12	-5
1, 12	
2, 6	
3, 4	

* NOT Prime *

15. $x^2 + 9$ not a difference of squares

Prime

GCF / Short cut

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

$-4[k^2 + 5k - 6]$

x	+
-6	5
-1	6

$-4(k-1)(k+6)$

Grouping

17. $4n^2 - 5n - 6$

x	+
-24	-5
3	-8

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

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

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

GCF / Grouping

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

$2n[3n^3 + 5n^2 + 18n + 30]$

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

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

Grouping

19. $2q^2 - 13q + 20$

x	+
40	-13
-5	-8

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

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

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

20. $75u^2 - 12$

GCF

$3[25u^2 - 4]$ ← dif. of squares

$3(5u+2)(5u-2)$

GCF / Grouping

21. $-10y^2 + 35y + 20$

x	+
-8	-7
-8	1

$-5[2y^2 - 7y - 4]$

$-5[2y^2 - 8y + y - 4]$

$-5[2y(y-4) + 1(y-4)]$

$-5(2y+1)(y-4)$

GCF

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

$4pq(3p^4 + 9p^3 + 2)$

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

GCF $3r[r^2 + 5r - 14]$

x	+
-14	5
-2	7

$3r[r^2 - 2r + 7r - 14]$

$3r[r(r-2) + 7(r-2)]$

$3r(r-2)(r+7)$

24. $49m^2 - 16$

$(7m+4)(7m-4)$

25. $64 - t^2$

$(8+t)(8-t)$

26. $9a^2 + 24a + 16$

x	+
144	24
12	12

$9a^2 + 12a + 12a + 16$

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

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

or

$(3a+4)^2$

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

x	+
9	-6
-3	-3

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

or

$(m-3)^2$

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

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

$X=0$ $X=-4$

29. $\frac{1}{4}(x-2)(x+9)=0$

$X=2$ $X=-9$

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

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

x | $+$
-35 | -2
-7 | 5

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

$x-7=0$ $x+5=0$

$X=7$ $X=-5$

31. $x^2-9=0$ ← difference of squares

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

$x-3=0$ $x+3=0$

$+3\ +3$ $-3\ -3$

$x=3$ $x=-3$

$X=3$ $X=-3$

32. $20x^2=10x$

$20x^2-10x=0$

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

$10x=0$ $2x-1=0$

$x=0$ $2x=1$ $x=\frac{1}{2}$

$X=0$ $X=\frac{1}{2}$

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

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

$6x^2+20x-27x-90=0$

$2x(3x+10)-9(3x+10)=0$

$(3x+10)(2x-9)=0$

$2x-9=0$

$2x=9$

$x=9/2$

factor by grouping

x | $+$
-540 | -7
20 | -27

$3x+10=0$

$-10\ -10$

$3x=-10$ $x=\frac{-10}{3}$

$X=9/2$

$X=-10/3$

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.

1st # x

2nd # $x+2$

$x(x+2)=143$

$x^2+2x-143=0$

$(x+13)(x-11)=0$

$x=-13$ $x=11$

x | $+$
-143 | 2
13 | -11

11 and 13

-11 an -13

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. $b^2 = 24$ $2 \cdot 2 \cdot 6$

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

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

$+3 \quad +3$

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

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

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

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

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

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

$-3 \quad -3$

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

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

$+6 \quad +6$

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

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

$w - 1 = \pm 3i$

$+1 \quad +1$

$w = 1 \pm 3i$

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

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

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

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

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

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

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

$x = \pm 10i$

$\pm$

$3 \pm 2i$

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 $t = 0$?)

280 ft

b. How high is the rock after 1.5 seconds?

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

$= -36 + 280$

$= 244$ ft

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)

$0 = -16t^2 + 280$

$16t^2 = 280$

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

$t = 4.18$ sec.

Solve each equation by completing the square.

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

$x^2+16x+8^2 = -84+8^2$

$(x+8)^2 = -20$ $2\cdot2\cdot5$

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

$-8 \quad -8$

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

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

$x^2-18x+9^2 = -92+9^2$

$(x-9)^2 = -11$

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

$+9 \quad +9$

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

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

$x^2-10x+5^2 = -20+5^2$

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

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

$+5 \quad +5$

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

46. $x^2-\frac{3}{2}x=\frac{1}{2}$ $\frac{3}{2}\cdot\frac{1}{2}=\frac{3}{4}$

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

$\left(x-\frac{3}{4}\right)^2 = \frac{8}{16}+\frac{9}{16}$

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

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

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

47. $\frac{9x^2-18x-54}{9}=\frac{0}{9}$

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

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

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

$+1 \quad +1$

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

48. $\frac{8x^2}{8}=\frac{-16x+10}{8}$

$x^2+2x+1^2 = \frac{5}{4}+1^2$

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

$x+1 = \pm\frac{3}{2}$

$-1 \quad -1$

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

$x = 1/2$ $x = -5/2$

Find the discriminant of each quadratic equation and state the number and type of solutions. b^2-4ac

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

$a=2 \quad b=-8 \quad c=8$

$64-4(2)(8)$

$64-64=0$

1 Real Solution

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

$a=2 \quad b=-5 \quad c=-2$

$25-4(2)(-2)$

$25+16 = 9$

2 Real Solutions

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

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

$a=-3 \quad b=7 \quad c=-5$

$49-4(-3)(-5)$

$49-60 = -11$

2 imaginary solutions

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

Solve each equation using the quadratic formula.

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

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

$$x = \frac{5 \pm \sqrt{25-4(1)(-24)}}{2(1)} \qquad 25+96$$

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

$$x = \frac{5+11}{2} = \frac{16}{2} \qquad x = \frac{5-11}{2} = \frac{-6}{2}$$

$$\boxed{x = 8} \qquad \boxed{x = -3}$$

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

$4x^2 - 8x + 1 = 0$

$a=4 \quad b=-8 \quad c=1$

$$x = \frac{8 \pm \sqrt{64-4(4)(1)}}{2(4)} \qquad 64-16$$

$$x = \frac{8 \pm \sqrt{48}}{8} \qquad 16 \cdot 3$$

$$x = \frac{8 \pm 4\sqrt{3}}{8} \qquad \div 4 \quad \div 4$$

$$\boxed{x = \frac{2 \pm \sqrt{3}}{2}}$$

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

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

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

$$h = \frac{2 \pm \sqrt{4-4(7)(2)}}{2(7)} \qquad 4-56$$

$$h = \frac{2 \pm \sqrt{-52}}{14} \qquad 2 \cdot 2 \cdot 13$$

$$h = \frac{2 \pm 2i\sqrt{13}}{14} \qquad \div 2 \quad \div 2$$

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

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

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

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

$$x = \frac{\pm\sqrt{-8}}{4} \qquad x = \frac{\pm 2i\sqrt{2}}{4}$$

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