Algebra 2 CP 10th & 11th grade
Final Review Sheet

NAME: Answer Key

1.) Solve the quadratic: $\frac{4x^2}{4} = \frac{80}{4}$.

$x^2 = 20$

$x = \pm\sqrt{20}$

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

2.) Solve the quadratic: $x^2 - 7x - 18 = 0$

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

$x-9=0$ $\quad$ $x+2=0$

$x=9$ $\quad$ $x=-2$

3.) Solve the quadratic: $3x^2 + 2x = 21$

$3x^2+2x-21=0$

$(3x-7)(x+3)=0$

$3x-7=0$ $\quad$ $x+3=0$

$x=7/3$ $\quad$ $x=-3$

4.) Solve using the quadratic formula: $4x^2 + 3x - 8 = 0$

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

$a=4 \quad b=3 \quad c=-8$

$\frac{-3 \pm \sqrt{9-4(4)(-8)}}{2(4)} = \frac{-3 \pm \sqrt{137}}{8}$

5.) Solve using the quadratic formula: $x^2 - 3x - 1 = 0$

$a=1$
$b=-3$
$c=-1$

$\frac{3 \pm \sqrt{(-3)^2-4(1)(-1)}}{2(1)} = \frac{3 \pm \sqrt{9+4}}{2} = \frac{3 \pm \sqrt{13}}{2}$

6.) Find the value that completes the square: $x^2 - 12x + \underline{36}$.

$\left(\frac{b}{2}\right)^2 = \left(\frac{12}{2}\right)^2 = 6^2 = 36$

7.) Solve by completing the square: $x^2 - 6x + 3 = 0$

$\left(\frac{6}{2}\right)^2 = 3^2 = 9$

$(x^2-6x+9) = -3+9$

$(x-3)^2 = 6$

$x-3 = \pm\sqrt{6}$

$x = 3 \pm \sqrt{6}$

8.) Find the discriminant of $2x^2 - 11x + 6 = 0$.

b^2-4ac

$(-11)^2 - 4(2)(6) = 121 - 48 = 73$

9.) Find the number and type of solutions of $3x^2 - 5x + 4 = 0$.

b^2-4ac

$(-5)^2-4(3)(4) = 25-48 = -23 < 0$

2 imaginary solutions

OR

2 non-real solutions

10.) Which direction does the graph of $f(x)=5x^2+3x-8$ open?

$a=5$

$a>0$

graph opens upward

11.) Find the axis of symmetry of $f(x)=x^2-6x+9$.

$\frac{-b}{2a}$ = axis of symmetry $\frac{-(-6)}{2(1)}=\frac{6}{2}=3$

$x=3$

12.) Find the vertex of $f(x)=x^2-6x+9$.

$\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$ $3^2-6(3)+9$

$9-18+9$

0

$V(3,0)$

13.) If given quadratic functions how do you determine which graph will be the narrowest?

Given: ax^2+bx+c

The greatest $|a|$ will be the narrowest graph

14.) How do you determine if a quadratic will have a vertex that is a minimum or a maximum?

If $a>0$ graph will have a minimum

If $a<0$ graph will have a maximum

15.) Find the y-intercept of $f(x)=5x^2+2x-11$. Let $x=0$

$5(0)^2+2(0)-11$

$y=-11$

$(0,-11)$

16.) Find the vertex of the following quadratic equation: $y=x^2-8x+48$

$-\frac{b}{2a}=\frac{-(-8)}{2}=\frac{8}{2}=4$

$4^2-8(4)+48=32$

$V(4,32)$

17.) Find the x intercepts of the following quadratic equation: $y=x^2+8x+15$

$(0,-5)$ and $(0,-3)$

$0=(x+5)(x+3)$

$x+5=0$ $x+3=0$

$x=-5$ $x=-3$

18.) Simplify: $\frac{x^2-25}{x-5}=\frac{(x+5)(x-5)}{x-5}=x+5$

19.) Simplify: $\frac{x^2+x-90}{x^2+14x+40} = \frac{(x+10)(x-9)}{(x+10)(x+4)} = \boxed{\frac{x-9}{x+4}}$

20.) Multiply: $\frac{5x^2}{3y^2} \cdot \frac{3}{10x} = \boxed{\frac{3x^2}{2y}}$

21.) Multiply: $\frac{x^2-4x-5}{x^2-3x+2} \cdot \frac{x^2-4}{x^2-3x-10} = \frac{(x-5)(x+1)}{(x-2)(x-1)} \cdot \frac{(x+2)(x-2)}{(x-5)(x+2)}$

$\boxed{\frac{x+1}{x-1}}$

22.) Divide: $\frac{1}{x+3} \div \frac{x^2}{x^2-2x-15} = \frac{1}{x+3} \cdot \frac{(x-5)(x+3)}{x^2} = \boxed{\frac{x-5}{x^2}}$

23.) Simplify: $\frac{\frac{6}{y}}{\frac{11}{x}} = \frac{6}{y} \cdot \frac{x}{11} = \boxed{\frac{6x}{11y}}$

24.) Simplify: $\left[\frac{-3}{\frac{2}{y}+x}\right] \cdot \frac{y}{y} = \boxed{\frac{-3y}{2+xy}}$

25.) Solve: $\frac{6}{x-4} = \frac{2}{x-4}$ and state any restrictions

$2(x-4) = 6(x-4)$

$2x-8 = 6x-24$

$16 = 4x$

$\boxed{\begin{array}{l} x \neq 4 \\ \text{No Solution} \end{array}}$

LCD = $24x$ $\boxed{x \neq 0}$

26.) Solve: $\frac{1}{3x}+\frac{1}{8}=\frac{4}{3x}$, and state any restrictions

$\frac{8}{24x}+\frac{3x}{24x}=\frac{4}{3x}$

$\frac{8+3x}{24x}=\frac{4}{3x}$

$\frac{1}{3x}\cdot\frac{8}{8}+\frac{1}{8}\cdot\frac{3x}{3x}=\frac{4}{3x}$

$4(24x)=3x(8+3x)$

$96x=24x+9x^2$

$0=9x^2-72x$

$9x(x-8)=0$

$9x=0$ $x\neq 0$

$x-8=0$

$\boxed{x=8}$

CK:

27.) Solve: $\sqrt{2x-3}-9=0$

$(\sqrt{2x-3})=(9)^2$

$2x-3=81$

$2x=84$

$\boxed{x=42}$

$\sqrt{2(42)-3}-9=0$

$\sqrt{84-3}-9=0$

$\sqrt{81}-9=0$

$9-9=0$

$0=0$ ✓

28.) Solve: $\sqrt{5+2x}=3$

$(\sqrt{5+2x})^2=(3)^2$

$5+2x=9$

$2x=4$

$\boxed{x=2}$

CK:

$\sqrt{5+2(2)}=3$

$\sqrt{9}=3$

$3=3$ ✓

29.) Solve: $\sqrt{6x-1}-\sqrt{7x+8}=0$

$(\sqrt{6x-1})^2=(\sqrt{7x+8})^2$

$6x-1=7x+8$

$\boxed{-9=x}$

CK:

$\sqrt{6(-9)-1}-\sqrt{7(-9)+8}=0$

$\sqrt{-55}-\sqrt{-63+8}=0$

$\sqrt{-55}-\sqrt{55}=0$ ✓

30.) Solve: $(\sqrt[3]{7x+3})^3=(\sqrt[3]{1+6x})^3$

$7x+3=1+6x$

$\boxed{x=-2}$

CK:

$\sqrt[3]{7(-2)+3}=\sqrt[3]{1+6(-2)}$

$\sqrt[3]{-11}=\sqrt[3]{-11}$ ✓

31.) What is 'k' referred to as in the equation: $y = kx$

'k' is the constant of variation

32.) What type of variation is represented by the following equation? $y=\frac{k}{x}$

inverse variation

33.) What type of variation is represented by the following equation? $y=kxz$

joint variation

34.) What type of variation is represented by the following equation? $y = kx$

direct variation

35.) Find the constant of variation, k, if y varies directly as x and x = 3 and y = -6.

$y = kx$ $\quad$ $\boxed{k = -2}$

$-6 = k(3)$

36.) Find the constant of variation, k, if y varies jointly as x and z and x = -3, y = 21 and z = -1.

$y = kxz$ $\quad$ $\boxed{K = 7}$

$21 = k(-3)(-1)$

$21 = 3k$

37.) Find the constant of variation, k, if y varies inversely as x and y= -5 when x = 4.

$y = \frac{k}{x}$ $\quad -5 = \frac{k}{4}$ $\quad \boxed{K = -20}$

38.) Multiply $(x + 3)(2x^2 - 5x + 7)$

$2x^3 - 5x^2 + 7x + 6x^2 - 15x + 21$ Combine Like Terms!

$\boxed{2x^3 + x^2 - 8x + 21}$

39.) Multiply: $(x - y^2)(x + y^2)$

$x^2 + xy^2 - xy^2 - y^4 = \boxed{x^2 - y^4}$

40.) Multiply: $(9x + 2)(9x - 2)$

$81x^2 - 18x + 18x - 4 = \boxed{81x^2 - 4}$

41.) Multiply: $(5x - 3)^2 = (5x-3)(5x-3) = 25x^2 - 15x - 15x + 9 =$

$\boxed{25x^2 - 30x + 9}$

42.) Multiply: $(8x + 1)(x - 4)$ FOIL

$8x^2 - 32x + x - 4$

$\boxed{8x^2 - 31x - 4}$

43.) Multiply: $(2x + 5)(x^2 - 6x - 3)$

$2x^3 - 12x^2 - 6x + 5x^2 - 30x - 15 = \boxed{2x^3 - 7x^2 - 36x - 15}$

44.) Subtract: $(4x^3 - 17x^2 + 2x + 7) - (x^3 - 25x^2 - 20)$

$4x^3 - 17x^2 + 2x + 7 - x^3 + 25x^2 + 20$

$\boxed{3x^3 + 8x^2 + 2x + 27}$

45.) Add: $(10xy - 6x^2y + 3xy^2 - 13) + (-5xy^2 + 11x^2y - 12xy + 21)$

$10xy - 6x^2y + 3xy^2 - 13 - 5xy^2 + 11x^2y - 12xy + 21$

$-2xy + 5x^2y - 2xy^2 + 8$

46.) Add: $-5x + 6y - 11 + 8x - 3y - 2x + 16 - y$

$x + 2y + 5$

47.) Find the remainder when $x^3 - 7x^2 + 15x - 9$ is divided by $x + 1$? $c = -1$

$(-1)^3 - 7(-1)^2 + 15(-1) - 9$

$-1 - 7 - 15 - 9$

-32 Remainder

OR

$-1 \mid 1 \quad -7 \quad 15 \quad -9$

$\quad\quad\quad -1 \quad 8 \quad -23$

$\quad 1 \quad -8 \quad 23 \mid -32$

$R -32$

48.) Divide: $-4x^3 + 5x^2 + 6$ by $x - 1$

$1 \mid -4 \quad 5 \quad 0 \quad 6$

$\quad\quad -4 \quad 1 \quad 1$

$\quad -4 \quad 1 \quad 1 \mid 7$

$-4x^2 + x + 1 + \frac{7}{x-1}$

49.) Divide: $3x^4 - 51x^2 + 7x + 10$ by $x - 4$

$4 \mid 3 \quad 0 \quad -51 \quad 7 \quad 10$

$\quad\quad 12 \quad 48 \quad -12 \quad -20$

$\quad 3 \quad 12 \quad -3 \quad -5 \mid -10$

$3x^3 + 12x^2 - 3x - 5 - \frac{10}{x-4}$

50.) Divide using synthetic division: $(3x^3 + 2x^2 + x - 8) \div (x - 5)$

$5 \mid 3 \quad 2 \quad 1 \quad -8$

$\quad\quad 15 \quad 85 \quad 430$

$\quad 3 \quad 17 \quad 86 \mid 422$

$3x^2 + 17x + 86 + \frac{422}{x-5}$

51.) Make a list of all the possible rational zeros of the polynomial function:
$f(x) = 3x^3 + 5x^2 - 6x + 2$

factors of constant / factors of leading coefficient $= \frac{\pm 1, \pm 2}{\pm 1, \pm 3} =$ $\pm 1, \pm 2, \pm \frac{1}{3}, \pm \frac{2}{3}$

52.) List the possible rational zeros of the function $f(x) = x^3 - 2x - 16$ ← constant

$\frac{\pm 1, \pm 2, \pm 4, \pm 8, \pm 16}{\pm 1} = \pm 1, \pm 2, \pm 4, \pm 8, \pm 16$

53.) What are the factors of: $x^3 - x^2 - 5x - 3$?

$\pm 1, \pm 3$

$-1 \mid 1 \quad -1 \quad -5 \quad -3$

$\quad\quad -1 \quad 2 \quad 3$

$\quad 1 \quad -2 \quad -3 \mid 0$

$(x+1)(x^2 - 2x - 3)$

$(x+1)(x-3)(x+1)$

$(x+1)^2(x-3)$

54.) Factor the polynomial completely: $x^3 - 7x^2 + 15x - 9$

$\pm 1, \pm 3, \pm 9$

1	1	-7	15	-9
		1	-6	9
	1	-6	9	0

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

$(x-1)(x-3)(x-3)$

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

55.) Factor the polynomial completely. $x^3 - 2x^2 - 48x$ $= x(x^2-2x-48)$

$\boxed{x(x-8)(x+6)}$

56.) Find the zeros of the polynomial function: $f(x) = x^3 + 8x^2 + 5x - 14$

$\pm 1, \pm 2, \pm 7, \pm 14$

1	1	8	5	-14
		1	9	-14
	1	9	14	0

$x^2+9x+14$

$(x+7)(x+2)$

$(x-1)(x+7)(x+2)=0$

Zeros: $x = 1, -7, -2$

57.) Find the zeros of the polynomial function: $f(x) = x^3 - 25x$

$x(x^2-25)=0$

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

Zeros: $\boxed{x = 0, 5, -5}$

58.) Find all real zeros of the function: $f(x) = x^4 + 3x^3 - 6x^2 - 8x$

$x(x^3+3x^2-6x-8)=0$

$\pm 1, \pm 2, \pm 4, \pm 8$

-1	1	3	-6	-8
		-1	-2	8
	1	2	-8	0

x^2+2x-8

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

$x(x+1)(x+4)(x-2)=0$

Zeros: $\boxed{x = 0, -1, -4, 2}$

59) Describe the end behavior of the function: $f(x) = x^2 + 9x^3 - 3x^4 + 6$

leading coefficient: negative $f(x) = -3x^4+9x^3+x^2+6$

highest degree: even

End Behavior: down, down

60) Describe the end behavior of the function: $f(x) = 7x^4 + 2x^2 + 3x - 1$

leading coefficient: positive

highest degree: even

End behavior: up, up