PreCalculus **Summer Assignment**

Name ANSWER KEY **Date**__________

Show all work! Exact answers only unless the problem asks for an approximation.

These are important topics from previous courses that you must be comfortable doing before you can be successful in PreCalculus.

If you find that you need some assistance, please feel free to Google or YouTube the concepts. Within the directions of each problem, you will see key words that you should be using in your research. I also recommend that you use the Desmos app for your phone or desmos.com on your computers to analyze the graph of functions if you do not have a <u>graphing</u> calculator.

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1) Solve the linear equation.

$$5x-3(3x+1)-8x=45$$

$5x-9x-3-8x=45$

$-12x=48$

$x=-4$

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2) Solve the linear equation.

$$2x+8=14-10x$$

$12x=6$

$x=1/2$

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3) Solve the linear equation.

$$3(x+4)-2(3x-1)=4x$$

$3x+12-6x+2=4x$

$-7x=-14$

$x=2$

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4) Solve the equation.

CLEAR THE FRACTIONS

$$24\left(7-\frac{x}{8}=\frac{x}{6}\right)$$

$168-3x=4x$

$168=7x$

$x=24$

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5) Solve the equation.

CROSS PRODUCT

$$\frac{2x+5}{4}=\frac{x-2}{3}$$

$6x+15=4x-8$

$2x=-23$

$x=-\frac{23}{2}=-11.5$

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6) Solve the inequality & graph the solution set.

$$-6x+4<40$$

$-6x<36$

$x>-6$

SWITCH

7) Solve the inequality & graph the solution set.

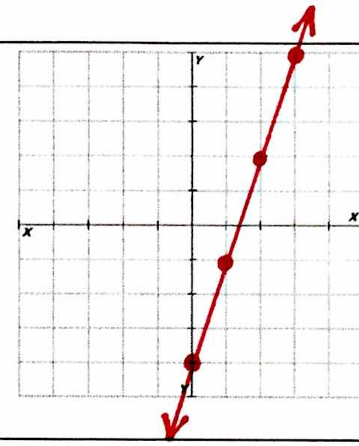
$$3x - 7 < 6x + 20$$

$-3x < 27$

$x > -9$

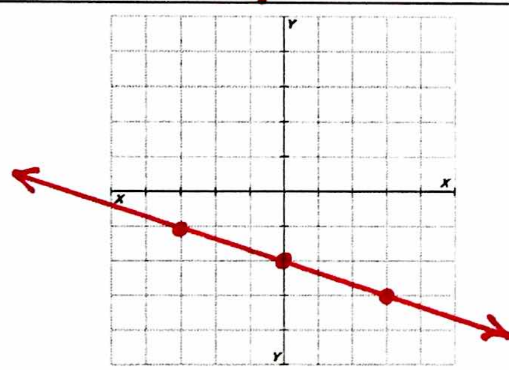
8) Graph the linear function.

$$y = 3x - 4$$



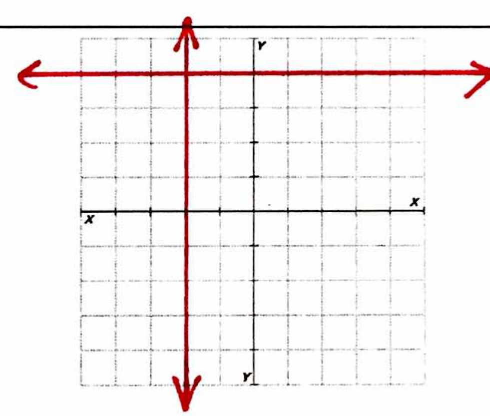
9) Graph the linear function.

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



10) Graph the linear functions.

$y = 4$ and $x = -2$



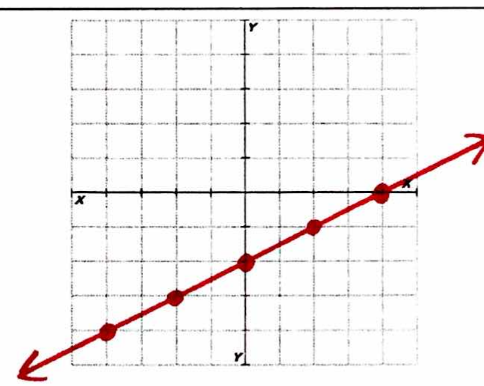
11) Graph the linear function.

$$3x - 6y = 12$$

$(4,0)$ $(0,-2)$

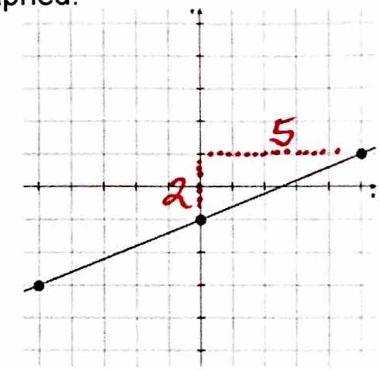
$-6y = -3x + 12$

$y = \frac{1}{2}x - 2$



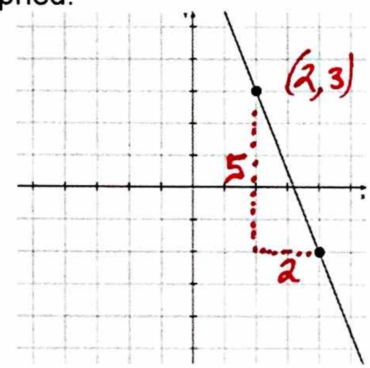
WILLEMS

12) Write the equation in slope-intercept form for the line that is graphed.



$y=\frac{2}{5}x-1$

13) Write the equation in slope-intercept form for the line that is graphed.



$y=-\frac{5}{2}x+b \longrightarrow y=-\frac{5}{2}x+8$

$3=-\frac{5}{2}(2)+b$

$3=-5+b \longrightarrow b=8$

14) Find the slope-intercept equation for a line with the given properties.

$Slope=\dfrac{3}{4}$ & containing the point $(-8,-16)$

$-16=\frac{3}{4}\bullet -8+b$ $\quad b=-10$ $\quad y=\frac{3}{4}x-10$

$-16=-6+b$

15) Find the slope-intercept equation for a line with the given properties.

Containing the points $(4,-4)$ & $(-6,21)$

$\dfrac{21--4}{-6-4}=\dfrac{25}{-10}=-5/2$ $\quad -4=-5/2\bullet 4+b$ $\quad y=-\frac{5}{2}x+6$

$-4=-10+b$

$6=b$

16) Find the slope & y-intercept of the line.

$y=-4$

Slope ZERO Y-intercept (0,-4)

17) Find the slope & y-intercept of the line.

$x=5$

Slope UNDEFINED Y-intercept NONE

18) Find the slope-intercept equation for a line with the given properties.

Parallel to $y=-2x+7$ & containing the point $(-7,6)$

SAME SLOPE

$6=-2\bullet -7+b$

$6=14+b \longrightarrow b=-8$ $\quad y=-2x-8$

WILLEMS

19) Find the slope-intercept equation for a line with the given properties.

Perpendicular to $y = 4x$ & containing the point $(-8,9)$

OPPOSITE RECIPROCAL

$9 = -\frac{1}{4} \cdot -8 + b \longrightarrow 9 = 2 + b \rightarrow b = 7$ $\quad y = -\frac{1}{4}x + 7$

20) Find the equation for a line with the given properties.

Perpendicular to $y = -5$ & containing the point $(11,-9)$

HORIZONTAL

VERTICAL $x = 11$

21) Find the zero of the linear function.

$f(x) = 5x + 14$

$0 = 5x + 14$ $\quad 5x = -14$ $\quad x = -\frac{14}{5} = -2.8$

22) A taxi company charges \$3.20 plus \$1.15 per mile. Write a linear function that relates the cost C, in dollars, of riding the taxi for x miles. What is the cost of riding the taxi if the ride is 23 miles?

$C = 1.15x + 3.20$

$C(23) = \$29.65$

23) Simplify using properties of exponents.

$(4xy^7)(-3x^5y^2) = -12x^6y^9$

24) Simplify using properties of exponents.

$\frac{18x^3y^7}{12xy^{10}} = \frac{3x^2}{2y^3}$

25) Simplify using properties of exponents.

$(-3x^5y^3)^4 = 81x^{20}y^{12}$

26) Simplify using properties of exponents.

$(4xy^7)^2(-3x^5y^2) = (16x^2y^{14})(-3x^5y^2) = -48x^7y^{16}$

27) Simplify using properties of exponents.

$\frac{-8x^{-3}y^{-7}z^5}{12x^{-1}y^{10}z^{-6}} = \frac{-2xz^5z^6}{3x^3y^{10}y^7} = \frac{-2z^{11}}{3x^2y^{17}}$

28) Rewrite the expression using rational exponent notation.

$\sqrt[6]{x^4} = x^{4/6} = x^{2/3}$

WILLEMS

29) Rewrite the expression using radical notation.

$7^{\frac{1}{5}} = \sqrt[5]{7^1} = \sqrt[5]{7}$

30) Evaluate the expression.

$3^{-4} = \frac{1}{3^4} = \frac{1}{81}$

31) Evaluate the expression.

$64^{\frac{2}{3}} = \sqrt[3]{64^2} = \left(\sqrt[3]{64}\right)^2 = 4^2 = 16$

32) Evaluate the expression.

$36^{-\frac{3}{2}} = \frac{1}{36^{3/2}} = \frac{1}{\left(\sqrt[2]{36}\right)^3} = \frac{1}{6^3} = \frac{1}{216}$

33) Multiply the polynomials.

$(x^3 - 7x - 4)(6x^2 + 5x - 8)$

$$\begin{array}{r} 6x^5+5x^4-8x^3 \qquad\qquad\qquad\qquad \\ -42x^3-35x^2+56x \qquad\quad \\ -24x^2-20x+32 \\ \hline 6x^5+5x^4-50x^3-59x^2+36x+32 \end{array}$$

34) Factor the polynomial (greatest common factor).

$12x^2 + 16xy - 4x^4 = 4x(3x + 4y - x^3)$

35) Factor the polynomial.

$x^2 + 10x - 24 = (x + 12)(x - 2)$

36) Factor the polynomial.

$x^2 - 12x + 27 = (x - 3)(x - 9)$

37) Factor the polynomial.

$2x^2 - 5x - 12 = (2x + 3)(x - 4)$

38) Factor the polynomial.

$3x^2 - 37x + 12 = (3x - 1)(x - 12)$

39) Factor the polynomial.

$4x^2 + 20x + 25 = (2x + 5)(2x + 5)$

WILLEMS

40) Factor the polynomial.

$2x^2 - 14x + 24 = 2(x^2 - 7x + 12) = 2(x-3)(x-4)$

41) Factor the polynomial.

$3x^3 - 12x = 3x(x^2 - 4) = 3x(x-2)(x+2)$

42) Graph the quadratic function.

$y = x^2 - 4x + 3 = (x-1)(x-3)$

Identify the following:

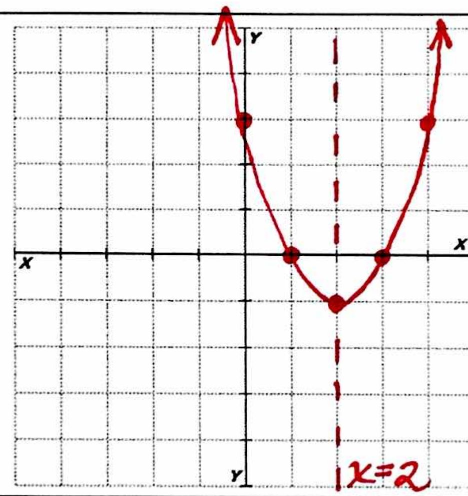
$a>0$ Direction of Opening UP

$(0,c)$ Y-intercept $(0,3)$

$x = \frac{-B}{2A}$ Axis of Symmetry $x=2$

Vertex $(2,-1)$

X-intercept(s) $(3,0)\ (1,0)$



43) Graph the quadratic function.

$y = -3x^2 - 6x - 1$

Identify the following:

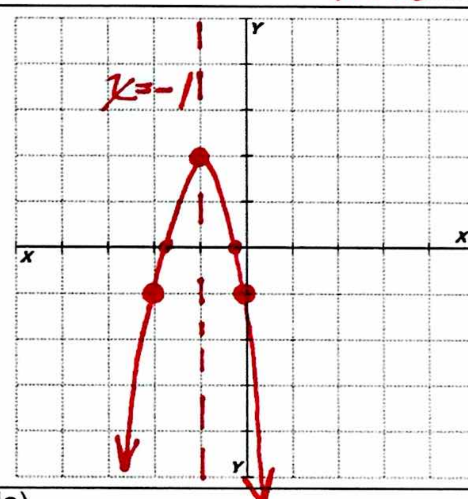
$a<0$ Direction of Opening DOWN

$(0,c)$ Y-intercept $(0,-1)$

$x = \frac{-B}{2A}$ Axis of Symmetry $x=-1$

Vertex $(-1,2)$

X-intercept(s) $(-1.82, 0)\ (-0.18, 0)$



44) Solve the quadratic equation (factor or quadratic formula).

$x^2 - 5x - 6 = 0$

$(x-6)(x+1) = 0$

$x = 6 \quad x = -1$

45) Solve the quadratic equation (factor or quadratic formula).

$x^2 + 10x = -25$

$x^2 + 10x + 25 = 0$

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

$x = -5$

46) Solve the quadratic equation (factor or quadratic formula).

$x^2 = -2x - 5$

NOT FACTORABLE

$x^2 + 2x + 5 = 0$

$x = \frac{-2 \pm \sqrt{-16}}{2} = \frac{-2 \pm 4i}{2} = -1 \pm 2i$

WILLEMS

47) Solve the quadratic equation (factor or quadratic formula).

$$3x^2 - 20x - 32 = 0$$

$(3x+4)(x-8)=0$ $\quad x = -4/3 \quad x = 8$

48) Solve the quadratic equation (square root method).

$$(x-5)^2 = 18$$

$x-5 = \pm\sqrt{18}$ $\quad x = 5 \pm \sqrt{9 \cdot 2} = 5 \pm 3\sqrt{2}$

49) Solve the square root equation.

$$\sqrt{x-2} = 6$$

$x = 38$

$x-2=36$

50) Solve the square root equation.

ISOLATE THE RADICAL

$$5\sqrt{x+6} - 1 = 39$$

$5\sqrt{x+6} = 40$

$\sqrt{x+6} = 8$

$x+6=64$

$x=58$

51) Simplify the radical.

$$\sqrt{128} = \sqrt{64 \cdot 2} = 8\sqrt{2}$$

52) Multiply the radicals and simplify.

$$\sqrt{3} \bullet \sqrt{15} = \sqrt{3} \bullet \sqrt{3}\sqrt{5}$$

$3\sqrt{5}$

53) Multiply the radicals and simplify.

$$3\sqrt{8} \bullet 2\sqrt{6} = 3\sqrt{4}\sqrt{2} \bullet 2\sqrt{3}\sqrt{2} = 3 \cdot 2 \cdot 2 \cdot 2\sqrt{3} = 24\sqrt{3}$$

54) Multiply the radicals and simplify.

$$6\sqrt{2} \bullet 5\sqrt{18} = 6\sqrt{2} \bullet 5\sqrt{9}\sqrt{2} = 6 \cdot 5 \cdot 2 \cdot 3 = 180$$

55) Add the radicals.

$$\sqrt{12} + \sqrt{75}$$

$\sqrt{4 \cdot 3} + \sqrt{25 \cdot 3} = 2\sqrt{3} + 5\sqrt{3} = 7\sqrt{3}$

56) Add the radicals.

$$3\sqrt{8} + 5\sqrt{18}$$

$3\sqrt{4 \cdot 2} + 5\sqrt{9 \cdot 2} = 6\sqrt{2} + 15\sqrt{2} = 21\sqrt{2}$

WILLEMS

57) Evaluate the function notation.

$h(x) = 4x^2 - 3x + 11$ $\qquad h(-3) =$ 56

$4(-3)^2 - 3(-3) + 11 = 36 + 9 + 11$

58) Evaluate the function notation.

$f(x) = \dfrac{x^3 - 337}{2x - 11}$ $\qquad f(7) =$ 2

$\dfrac{(7)^3 - 337}{2(7) - 11} = \dfrac{343 - 337}{14 - 11} = \dfrac{6}{3}$

59) Find the value of x in the function notation equation.

$g(x) = -\dfrac{3}{5}x + 4$ $\qquad$ *Find x so that* $g(x) = 10$

$10 = -\frac{3}{5}x + 4$ $\qquad x = 6 \cdot -\frac{5}{3} = -10$

$6 = -\frac{3}{5}x$

60) Find the value of c.

$f(-3) = -11$ & $f(x) = 2x^3 + x^2 - 7x + c$

$-11 = 2(-3)^3 + (-3)^2 - 7(-3) + c$ $\qquad c = 13$

$-11 = -54 + 9 + 21 + c$

$-11 = -24 + c$

61) Use the graph of $p(x)$ to answer the following questions.

A) *Find* $p(-9)$ = −3

B) *Find* $p(4)$ = 0

C) *Find* $p(8)$ = 2

D) *Find x so that* $p(x) = 5$

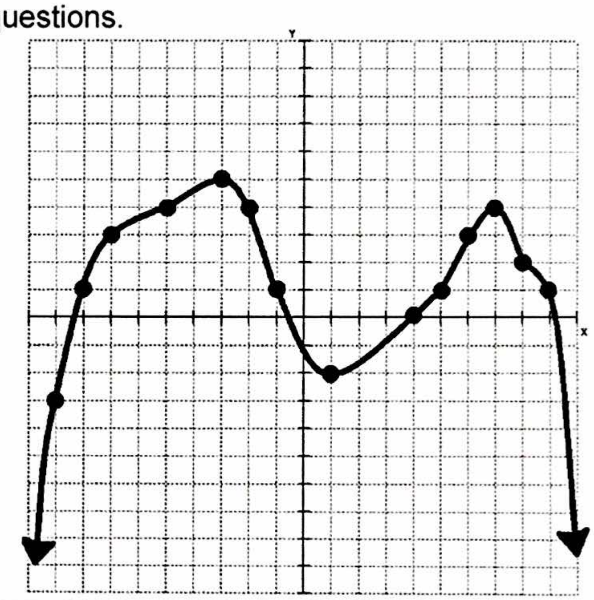
x = −3

E) *Find x so that* $p(x) = 4$

x = −5, −2, 7

F) *Find x so that* $p(x) = 1$

x = −8, −1, 5, 9



62) Determine whether the relation represents a function, then find the domain & range.

$(4,-5)$, $(-2,7)$, $(1,-3)$, $(5,3)$ & $(-2,-8)$

Function? No, DOES NOT PASS THE VERTICAL LINE TEST.

Domain $\{4, -2, 1, 5\}$ Range $\{-5, 7, -3, 3, -8\}$

WILLEMS