Name _____ Block _____ Date _____

Unit 9: Quadratics Study Guide (INACTIVE)

1.) The function $-2t^2 + 11t + 6$, models the approximate height of an object, t seconds after it is launched. How many seconds until the object hits the ground? → ROOTS!

AC = −12

−1	12
−2	6
−3	4

$(-2t^2 - t)(+12t + 6)$

$-t(2t+1)+6(2t+1)$

$(-t+6)(2t+1)$

$-t=-6$ $t=6$ sec

2.) Find the smallest of three consecutive positive integers if the product of the smaller two integers is 6 less than six times the largest integer.

n = 1st #

$n+1$ = 2nd #

$n+2$ = 3rd #

$n(n+1) = 6(n+2) - 6$

$n^2 + n = 6n + 12 - 6$

$n^2 + n = 6n + 6$

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

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

$n = 6$

3.) A company models its net income, in thousands of dollars, with the function $f(x) = 3x^2 - 8x - 16$, where x is the number of units of its product sold. How many units of its product does the company need to sell in order for the net income to equal $0?

AC = −48

−1	48
−2	24
−3	16
−4	12
−6	8

$3x^2 - 8x - 16 = 0$

$(3x^2 - 12x) + 4x - 16 = 0$

$3x(x-4) + 4(x-4) = 0$

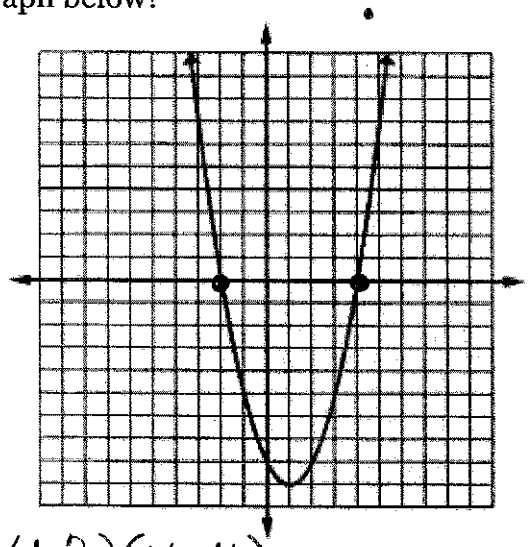
$(3x-4)(x-4) = 0$

$3x - 4 = 0$ $x - 4 = 0$

$3x = 4$ $x = 4$ units

$x = 4/3$

4.) Which two binomial factors would represent the graph below?



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

5.) What is the minimum value of this function $f(x) = x^2 + 2x - 3$?

$x = \frac{-2}{2(1)} = -1$ (−1, −4)

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

$f(x) = -4$

6.) What is the ***positive*** zero of the function $y = x^2 - 81$?

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

$x + 9 = 0$ $x - 9 = 0$

$x = -9$ $x = 9$

7.) Given a parabola has the roots $x = -6$ and $x = -3$. Write the quadratic function in standard form using a leading coefficient of 1. Circle one term from each column to represent the function.

A	B	C
$-x^2$	$-6x$	-3
x^2	$6x$	18
	$+9x$	6
	$-9x$	-18

$(x+6)(x+3)$

$x^2 + 9x + 18$

Name_____ Block _____ Date_____

Unit 9: Quadratics Study Guide (ACTIVE)

1.) What are the solutions of the equation $x^2 + 2x - 7 = -4$?

$+4 \quad +4$

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

$(x+3)(x-1)=0$

$x+3=0 \quad x-1=0$

$-3 \quad -3 \quad +1 \quad +1$

$x=-3 \quad x=1$

2.) How many root(s) does the equation have?

$f(x) = x^2 + 9$

NO Real Roots

3.) What is the smaller of two consecutive **negative** odd integers whose product is 35?

$n = 1^{st} \#$

$n+2 = 2^{nd} \#$

$n(n+2) = 35$

$n^2+2n=35$

$n^2+2n-35=0$

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

$n+7=0$

$n=-7$

4.) Suppose the equation $f(t) = -2t^2 + 18t$ approximates (in yards) the height, $f(t)$, that a kicked football will reach after t seconds.

a. When does the football reach the ground?

$-2t(t-9)=0$

$-2t=0 \quad t-9=0$

$t=0 \quad t=9$ sec

b. What are the coordinates of the point where the ball starts to fall? → VERTEX

$t=\frac{-18}{2(-2)}$

$t=4.5$

$-2(4.5)^2+18(4.5)$

40.5

(4.5, 40.5)

5.) What is the minimum value of the function?

$f(x) = x^2 - 2x - 15$

$x=\frac{2}{2(1)}=1$

$f(x)=(1)^2-2(1)-15$

$f(x)=-16$

(1, -16)

6.) The sum of a number and its square is 30. What are the number(s)?

$n^2+n=30$

$n^2+n-30=0$

$(n+6)(n-5)=0$

$n+6=0 \quad n-5=0$

$n=-6 \quad n=5$

7.) What are the solutions to the equation

$4x^2 + 30x + 239 = 215$

2

A. $\{2, -3\}$
B. $\{-2, 3\}$
C. $\{2, 3\}$
D. $\{-2, -3\}$

$4x^2+20x+24=0$

$4(x^2+5x+6)=0$

$4(x+2)(x+3)=0$

$x+2=0 \quad x+3=0$

$x=-2 \quad x=-3$

8.) What are the x-intercept(s) of the equation?

$f(x) = 2n^2 - 11n + 12$

$(2n^2-8n)(-3n+12)$

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

$(2n-3)(n-4)=0$

$2n-3=0 \quad n-4=0$

$2n=3$

$n=\frac{3}{2} \quad n=4$

9.) Tonisha hit a ball into the air with an initial upward velocity of 80 feet per second. The height, $h(t)$, in feet of the ball above the ground can be modeled by $h(t) = -16t^2 + 80t + 3$ where t is the time in seconds after she hit the ball. How long does it take the ball to reach its maximum height?

$t = \frac{-80}{2(-16)}$

t = 2.5 sec

10.) Calculate the vertex and state whether it is a maximum or minimum.

$y = -3x^2 + 12x + 1$

$x = \frac{-12}{2(-3)}$

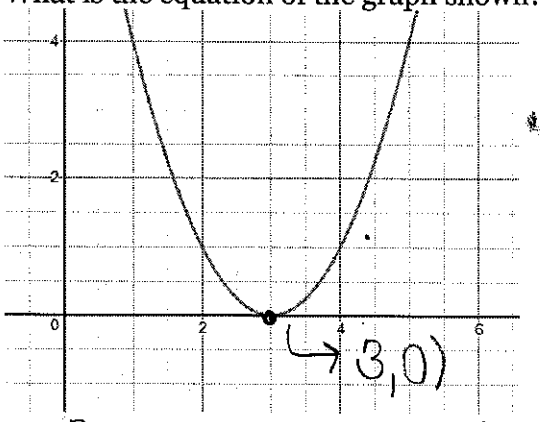
$x = 2$

$y = -3(2)^2 + 12(2) + 1$

$y = 13$

max at (2, 13)

11.) What is the equation of the graph shown?



$x = 3$

$-3 \quad -3$

$x - 3 = 0$

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

$y = x^2 - 6x + 9$

12. What is the distance, in units, between the y-intercept of $f(x) = 2x^2 - 3x - 14$ and the y-intercept of the linear function represented by the table below?

x	y
-3	-5
3	7
9	19
21	43

+6 +12; +6 +12; +12 +24

linear

$y = 2x + 1$

$-14 + d = 1$

d = 15 units

13.) Three times the greater of two consecutive even integers is two more than the square of the smaller. Find one of the numbers.

1st # = n

2nd # = $n + 2$

$3(n+2) = n^2 + 2$

$3n + 6 = n^2 + 2$

$-3n - 6 \quad -3n - 6$

$n^2 - 3n - 4 = 0$

$(n+1)(n-4) = 0$

$n - 4 = 0$

$n = 4$

14.) What is the sum of the roots of the following equation?

$f(x) = x^2 - 8x + 7$

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

$x - 7 = 0 \quad x - 1 = 0$

$x = 7 \quad x = 1$

sum: 8

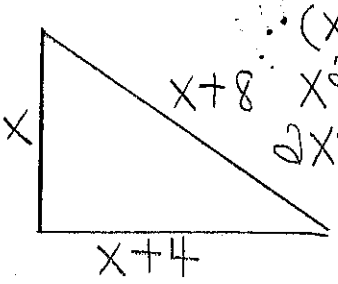
15.) Suppose the equation $V = 40x^2 - 500x + 5000$ describes the value of a car from 1960 to 2012. What year did the car have the least value?

A. 1965
B. 1966
C. 1967
D. 1968

$10+ X=0$ by 1960

$X=5 \rightarrow 3500$
$X=6 \rightarrow 3440$
$X=7 \rightarrow 3400$
$X=8 \rightarrow 3500$

16.) The larger leg of a right triangle is 4 inches longer than the shorter leg. The hypotenuse is 8 inches longer than the shorter leg. Use the Pythagorean Theorem, $a^2 + b^2 = c^2$, determine the length of the shorter leg.



$\therefore (X)^2+(X+4)^2=(X+8)^2$
$X^2+X^2+8X+16=X^2+16X+64$
$2X^2+8X+16=X^2+16X+64$
$X^2-8X-48=0$
$(X+4)(X-12)=0$
$X+4=0 \quad X-12=0$
$X=12$ in

17.) Trisha is looking at a rectangle and a right triangle.

- The length of the rectangle is 2 more than its width.
- The length of the shorter leg of the triangle is equal to the width of the rectangle.
- The length of the longer leg of the triangle is twice the length of the rectangle.

Write the function $f(w)$, to represent the combined area of the rectangle and triangle.

RECT
$L=W+2$
$W=W$
$AREA=W^2+2W$

TRI
$h=W$
$b=2(W+2)=2W+4$
$A=\frac{1}{2}(2W+4)(W)$
$A=(W+2)(W)$
$A=W^2+2W$

$\text{combined area} = (W^2+2W)+(W^2+2W)$
$= 2W^2+4W$

18. Look at the functions below:

$f(x) = x^2 - 5x + 7$
$g(x) = 2x + 1$

Select **all** points at which the two functions intersect.

A. (0,7)
B. (6,13)
C. (0,1)
D. (1,3)
E. (3,1)

desmos!