Name: _____ Date: _____

THE SUM AND PRODUCT OF A QUADRATIC'S ROOTS
ALGEBRA 2 WITH TRIGONOMETRY

As a consequence of the results of the quadratic formula, every quadratic equation has two roots. These two roots are given by:

$$x_1 = \frac{-b - \sqrt{b^2 - 4ac}}{2a} \quad \text{and} \quad x_2 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

Today, we will find and use relationships between the sum and product of these two roots and the quadratic coefficients *a*, *b*, and *c*.

***Exercise* #1:** Find expressions for the sum and product of the two quadratic roots in terms of *a*, *b*, and *c*. Place your final answers in the box below this exercise.

(a) The sum: $x_1 + x_2$

(b) The product: $x_1 \cdot x_2$

THE SUM AND PRODUCT OF THE ROOTS OF A QUADRATIC

For the quadratic equation $ax^2 + bx + c = 0$, the sum and product of the roots are given by:

Sum = Product =

***Exercise* #2:** For each of the following quadratic equations, state the sum and product of their roots.

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

(b) $5x^2 + 2x - 20 = 0$

***Exercise* #3:** A quadratic equation has roots that sum to 5 and have a product of -3. Which of the following could be the equation of the quadratic?

(1) $x^2+5x-3=0$ (3) $x^2-3x+5=0$

(2) $x^2-5x-3=0$ (4) $x^2+3x-5=0$

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***Exercise* #4:** Which of the following quadratic equations has roots of $x=5\pm\sqrt{7}$?

(1) $x^2-10x+18=0$ (3) $x^2-5x+7=0$

(2) $x^2+7x-5=0$ (4) $x^2+10x-3=0$

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***Exercise* #5:** Find two different quadratic equations that could have roots that sum to 9 and have a product of 6.

***Exercise* #6:** Find the equation of a quadratic function if its leading coefficient is 3 and it has irrational *x*-intercepts of $x=4\pm\sqrt{3}$.

***Exercise* #7:** Find the equation of a quadratic function if it has roots of $x=3\pm\sqrt{10}$ and a *y*-intercept of -2.

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THE SUM AND PRODUCT OF A QUADRATIC'S ROOTS
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

1. Find the sum and product for each of the following quadratic equations.

(a) $x^2+8x-16=0$ (b) $4x^2-4x+8=0$ (c) $\frac{1}{2}x^2+6x-5=0$

(d) $-3x^2+12x-1=0$ (e) $\frac{3}{2}x^2-\frac{15}{8}x+\frac{1}{3}=0$ (f) $-0.25x^2+1.75x+2.25=0$

2. Which of the following quadratic equations has roots that sum to -8 and have a product of 15?

(1) $x^2-8x-15=0$ (3) $x^2-15x+8=0$

(2) $x^2+8x+15=0$ (4) $x^2+15x-8=0$

_____

3. Which of the following equations would have roots of -5 and 8?

(1) $x^2-5x+8=0$ (3) $x^2+40x-3=0$

(2) $x^2+8x-5=0$ (4) $x^2-3x-40=0$

_____

4. A quadratic whose roots are $-6\pm\sqrt{2}$ could have the equation

(1) $x^2+12x+34=0$ (3) $x^2-6x+2=0$

(2) $x^2-4x-6=0$ (4) $x^2-12x+38=0$

_____

5. A quadratic function has a leading coefficient of 5 and roots that sum to -8 and have a product of 14. Its equation is

   (1) $y = 5x^2 + 8x + 14$ (3) $y = 5x^2 + 40x + 70$

   (2) $y = x^2 + 5x + 14$ (4) $y = 5x^2 - 8x - 70$ _____

6. Determine one equation of a quadratic function that has zeros of -10 and 5.

7. Determine an equation for a quadratic function that has x-intercepts given by $x = 8 \pm \sqrt{2}$ if its leading coefficient is equal to 2.

8. Determine the equation for a quadratic function in standard form if it has x-intercepts given by $x = -5 \pm \sqrt{11}$ and a y-intercept of -42.