

SOLVING INCOMPLETE QUADRATIC EQUATIONS ALGEBRA 2 WITH TRIGONOMETRY

Quadratic equations of the form $ax^2 + c = 0$ are known as **incomplete** and arise frequently in applied settings such as physics. Because these equations lack a linear term, they can be solved without the use of factoring and the Zero Product Law. The first exercise will walk through the basic order of inverses when solving these equations.

Exercise #1: Solve each of the following incomplete quadratics for all value(s) of x . If an equation fails to have any real number solutions, state so.

(a) $x^2 - 16 = 0$

(b) $2x^2 = 50$

(c) $5x^2 - 8 = 12$

(d) $\frac{2}{3}x^2 + 7 = 1$

(e) $4x^2 - 7 = -6$

(f) $\frac{2}{9}x^2 + 4 = 22$

Unlike those quadratics that we factored and used the Zero Product Rule to solve, incomplete quadratics can have irrational answers as solutions.

Exercise #2: Solve each of these incomplete quadratics for all value(s) of x . Place all answers in simplest radical form.

(a) $3x^2 - 5 = 19$

(b) $10x^2 + 1 = 6$

(c) $4x^2 + 5 = 8$

As long as we undo the operations that have been done to the variable, in the inverse order that they were done, many different types of equations can be solved.

Exercise #3: Solve each of the following equations for all values of x .

(a) $(x-2)^2 = 36$

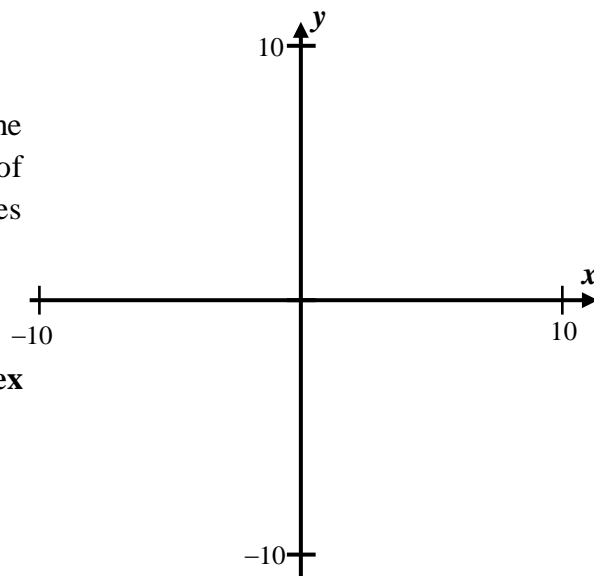
(b) $2(x+4)^2 = 64$



By combining this equation solving process with the technique of **completing the square**, zeros can be found for quadratic expressions that cannot otherwise be factored.

Exercise #4: Consider the quadratic function $y = x^2 - 4x - 6$.

(a) Using your calculator, create a sketch of this function on the axes to the right. Use your calculator to find the two zeros of the function and label them on your graph. Round their values to the nearest *hundredth*.



(b) Write the right-hand side of the quadratic function in its **vertex form** by completing the square on the quadratic.

(c) Find the zeros of this quadratic algebraically by setting the vertex form in part (b) equal to zero and solving for x . Verify that these values match those on the graph.

Exercise #5: Solve each of the following prime quadratic equations by first completing the square on the quadratic. Express your answers in simplest radical form.

(a) $x^2 - 10x + 23 = 0$

(b) $x^2 + 12x + 18 = 0$



Name: _____

Date: _____

SOLVING INCOMPLETE QUADRATIC EQUATIONS
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

1. Solve each of the following incomplete quadratics for all values of x . All answers in this problem will be rational numbers.

(a) $3x^2 = 108$

(b) $\frac{1}{2}x^2 - 7 = 25$

(c) $500x^2 - 5 = 0$

(d) $(x-5)^2 = 81$

(e) $4(x+6)^2 = 484$

(f) $2(x+7)^2 - 5 = 27$

2. Solve each of the following quadratics for all values of x . Express your answers in simplest radical form.

(a) $5x^2 = 100$

(b) $2x^2 - 20 = 70$

(c) $6x^2 + 10 = 12$

(d) $(x-10)^2 = 8$

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

(f) $(2x-6)^2 = 12$



3. Which of the following represents the solution set of the equation $8x^2 - 4 = 0$?

(1) $x = \pm\sqrt{2}$ (3) $x = \pm\frac{\sqrt{2}}{2}$

(2) $x = \pm\frac{\sqrt{3}}{2}$ (4) $x = \pm 2$

4. The solution set of the quadratic equation $\frac{(x-2)^2}{4} = 25$ is

(1) $\{-8, 12\}$ (3) $\{-12, 28\}$

(2) $\{-4, 16\}$ (4) $\{-2, 10\}$

5. Solve the following prime quadratic equation by first completing the square on the quadratic. Express your answers in simplest radical form.

$$x^2 - 10x + 13 = 0$$

APPLICATIONS

6. A ball drops from the top of a 200 foot tall building. Its height above the ground can be modeled by the equation $h = 200 - 16t^2$. Which of the following gives the amount of time, to the nearest *tenth* of a second, that it takes for the ball to reach the ground (a height of zero)?

(1) 4.7 (3) 3.5

(2) 1.8 (4) 7.6

7. The price of oil rises and then falls over the span of the winter in the Northeastern United States. The average price of oil, in dollars per gallon, can be modeled using the equation $P = 4.20 - \frac{(t-45)^2}{1350}$, where t represents the number of days since winter began. After how many days (to the nearest day), will the price first hit \$3.50 per gallon?

(1) 17 (3) 12

(2) 22 (4) 14

