Solving Quadratic Equations By Factoring

Practice Questions

Solve the following 5 quadratic equations by factoring.

1. $9x^2 - 18x = 0$

2. $4x^3 + 12x^2 = 0$

3. $v^2 + 5v - 24 = 0$

4. $w^2 - 21w + 14 = -6$

5. $6y^2 + 90y + 156 = 0$

6. The following quadratic equation is written in factored form: $(x - 5)(x - \mathbf{k}) = 0$, where **k** is an integer. If the **sum** of the roots of this quadratic equation is 12, what is the value of **k**?

7. If the solutions of a quadratic equation are $x = -4$ and $x = -12$, when this quadratic equation is written in the form $ax^2 + \mathbf{b}x + c = 0$, what is the value of **b**?

8. If the solutions of a quadratic equation are $x = \frac{-3}{4}$ and $x = 7$, when this quadratic equation is written in the form $ax^2 + bx + \mathbf{c} = 0$, what is the value of **c**?

9. Suppose there are 2 quadratic equations, A and B.

If the equation for A is $x^2 - 2x - 3 = 0$, and the equation for B is $x^2 + 6x + 5 = 0$, what is the solution common to both A and B?

10. Jim was asked to solve the following quadratic equation, $3x^2 + 9x = 30$, by factoring. Unfortunately, he made a few errors. Identify and correct all of the errors in his answer below.

Step 1 $3x^2 + 9x - 30 = 0$

Step 2 $3(x^2 + 3x - 10) = 0$

Step 3 $3(x + 2)(x - 5) = 0$

Step 4 The solutions are 3, 2 and 5.

Solving Quadratic Equations By Factoring

Practice Questions Answers

Solve the following 5 quadratic equations by factoring.

1. $9x^2 - 18x = 0$

   ALWAYS look for a common factor first. There is a common **9x** that can be divided out of each term on the left side of the equal sign.

   $9x(x - 2) = 0$

Using the zero principle, either,	$9x = 0$	or	$(x - 2) = 0$
	$x = 0$	or	$x = 2$

   The solutions are 0 and 2.

2. $4x^3 + 12x^2 = 0$

   ALWAYS look for a common factor first. There is a common $\mathbf{4x^2}$ that can be divided out of each term on the left side of the equal sign.

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

Using the zero principle, either,	$4x^2 = 0$	or	$(x + 3) = 0$
	$x = 0$	or	$x = -3$

   The solutions are 0 and -3.

3. $v^2 + 5v - 24 = 0$

   Since there is no common factor, and the equation is in the form, $ax^2 + bx + c$, where a = 1, the sum/product method is used.
   We are looking for 2 numbers that **sum** to 5, and at the same time, produce a product of -24.

$(v + 8)(v - 3) = 0$

Using the zero principle, either, $(v + 8) = 0$ or $(v - 3) = 0$

$v = -8$ or $v = 3$

The solutions are -8 and 3.

4. $w^2 - 21w + 14 = -6$

Add 6 to both sides of the equal sign, in order to set the equation equal to zero.

$w^2 - 21w + 20 = 0$

Since there is no common factor, and the quadratic equation is in the form, $ax^2 + bx + c$, $a = 1$, the sum/product method is used.

We are looking for 2 numbers that **sum** to -21, and at the same time, produce a **product** of 20.

$(w - 20)(w - 1) = 0$

Using the zero principle, either, $(w - 20) = 0$ or $(w - 1) = 0$

$w = 20$ or $w = 1$

The solutions are 20 and 1.

5. $6y^2 + 90y + 156 = 0$

ALWAYS check for a common factor first. There is a common 6 that can be divided out of each of the 3 terms on the left side of the equal sign.

$6(y^2 + 15y + 26) = 0$

The quadratic equation in the brackets is now in the form, $ax^2 + bx + c$, $a = 1$, and the sum/product method is used to factor the equation.

We are looking for 2 numbers that **sum** to 15, and at the same time, produce a **product** of 26.

$(y + 13)(y + 2) = 0$

Using the zero principle, either, $(y + 13) = 0$ or $(y + 2) = 0$

$y = -13$ or $y = -2$

The solutions are -13 and -2.

6. The following quadratic equation is written in factored form:
   (x – 5) (x – **k**) = 0, where **k** is an integer. If the **sum** of the roots of this quadratic equation is 12, what is the value of **k**?

   Using the zero principle, either, (x - 5) = 0 or (x - k) = 0
   x = 5 or x = k

   We now know that one of the roots is 5. Since the sum of the roots is 12, the other root must be 7 (12 – 5).

   Therefore, k is 7.

7. If the solutions of a quadratic equation are x = -4 and x = -12, when this quadratic equation is written in the form ax^2 + **b**x + c = 0, what is the value of **b**?

   Re-write (x = -4) and (x = -12) as equations set equal to zero.

   (x + 4) = 0 and (x + 12) = 0

   An equivalent form is: (x + 4) (x + 12) = 0

   Using the box method to multiply these 2 binomials:

	x	4
x	x^2	4x
12	12x	48

(x + 4) (x + 12) = x^2 + 16x + 48

Given the quadratic equation, x^2 + 16x + 48 = 0, the value of **b** is 16.

8. If the solutions of a quadratic equation are $x = \frac{-3}{4}$ and x = 7, when this quadratic equation is written in the form $ax^2 + bx + \mathbf{c} = 0$, what is the value of **c**?

Re-write ($x = \frac{-3}{4}$) and (x = 7) as equations set equal to zero.

For ($x = \frac{-3}{4}$), multiply both sides of the equal sign by 4, and then add 3 to both sides, to get (4x + 3) = 0.

For (x = 7), subtract 7 from both sides of the equal sign, to get (x – 7) = 0

We can now write the 2 binomials as: $(4x + 3)(x - 7) = 0$

Using the box method to multiply these 2 binomials:

	4x	3
x	$4x^2$	3x
-7	-28x	-21

$(4x + 3)(x - 7) = 4x^2 - 25x - 21$

Given the quadratic equation, $4x^2 - 25x - 21 = 0$, the value of **c** is -21.

9. Suppose there are 2 quadratic equations, A and B.

If the equation for A is $x^2 - 2x - 3 = 0$, and the equation for B is $x^2 + 6x + 5 = 0$, what is the solution common to both A and B?

Both quadratic equations, A and B, can be factored using the sum/product method.

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

$x^2 + 6x + 5 = (x + 5)(x + 1)$

For $(x - 3)(x + 1) = 0$, the solutions are 3 and -1.

For $(x + 5)(x + 1) = 0$, the solutions are -5 and -1.

The solution common to both A and B is -1.

10. Jim was asked to solve the following quadratic equation, $3x^2 + 9x = 30$, by factoring. Unfortunately, he made a few errors. Identify and correct all of the errors in his answer below.

Step 1 $3x^2 + 9x - 30 = 0$

Step 2 $3(x^2 + 3x - 10) = 0$

Step 3 $3(x + 2)(x - 5) = 0$

Step 4 The solutions are 3, 2 and 5.

The first error was made in step 3. The factoring should be $(x + 5)(x - 2)$.

Step 4 has incorrect solutions. The number 3 is not a solution. Any number by itself in front of the factored component, is not a solution. Given the correct factoring of $(x + 5)(x - 2)$, the correct solutions are -5 and 2.