9.4 – 9.6 Factoring Quadratic Equations

Study Guide Questions

Answer Key

9.4: Factor Using the GCF –

You should be able to:

1. Identify the GCF of a quadratic expression and factor using this method.

   Ex: $2x^2 - 4x$ becomes $\boxed{2x(x-2)}$ when factored. The circled portion would be your answer.

TRY SOME:
Factor using the GCF:

Ex: $-4y + 16y^2$ $\quad\quad$ **Ex:** $3xy + 8xy^2$

$-4y(1 - 4y)$ $\quad\quad$ $xy(3 + 8y)$

2. Solve a quadratic equation in factored form.

   Ex: Solve: $(3x - 1)(x + 2) = 0$**;** Since you are multiplying two quantities and the answer is 0, then one of the two quantities being multiplied must be equal to zero. This is either $3x - 1$ or $x + 2$.

   If: $3x - 1 = 0$ you would:

   $+1 \quad +1$ first add 1 to both sides

   $3x = 1$

   $\frac{3}{3} \quad \frac{1}{3}$ then divide by three so:

   $\boxed{x = \frac{1}{3}}$

   If: $x + 2 = 0$ you would:

   $x + 2 = 0$

   $-2 \quad -2$ subtract 2 so:

   $\boxed{x = -2}$

TRY SOME:
Solve:

Ex: $x(2x - 5) = 0$ $\quad\quad$ **Ex:** $x(3x - 7)(4x - 1) = 0$

$\boxed{x = 0 \text{ and } x = \frac{5}{2}}$ $\quad\quad$ $\boxed{x = 0,\ x = \frac{7}{3} \text{ and } x = ¼}$

3. Solve a quadratic equation by factoring using the GCF first!

   Ex: $7x^2 + 21x = 0$

   $7x(x + 3) = 0$ Factor using GCF of $7x$

   So either $7x = 0$ or $x + 3 = 0$

   $\boxed{x = 0}$ or $\boxed{x = -3}$

TRY SOME:
Solve:

Ex: $8x^2 - 16x = 0$

$8x(x - 2) = 0$

$x = 0$ and $x = 2$

Ex: $2x^2 = -7x$

$2x^2 + 7x = 0$

$x(2x + 7) = 0$

$x = 0$ and $x = \frac{7}{2}$

4. Use the vertical motion model to solve problems involving a problem's height and time. ($h = -16t^2 + vt + s$)

Ex: An object is launched from the ground with an initial vertical velocity of 32 feet per second. How long before the object reaches the ground?

$h = -16t^2 + vt + s$	Set up equation.
$h = -16t^2 + 32t$	Substitute. (Initial height is zero, and initial velocity is 32 feet per second.)
$0 = -16t^2 + 32t$	Replace h with 0 since that will be the object's height when it reaches the ground.
$0 = -16t(t - 2)$	Factor using the GCF.
$t = 0$ or $t = 2$	Solve. Choose the answer that makes sense.
$t = 2$	

9.5: Factor Quadratics in the Form $y = x^2 + bx + c$ –

You should be able to:

1. Factor trinomials in the form $x^2 + bx + c$ by factoring into two binomials in the form:

$(x + p)(x + q)$

*To find p and q you find the factors of c that add up to b.

Ex: $x^2 - 7x + 12$ becomes $\boxed{(x-3)(x-4)}$ when factored because –4 and –3 first multiply to get +12, but also add up to –7.

Factor:

Ex. $x^2 - 2x - 24$

$(x - 6)(x + 4)$

Ex: $-x^2 - 9x - 18$

$-1(x + 6)(x + 3)$

2. Solve quadratic equations by factoring first.

Ex: $x^2 - 7x + 12 = 0$ Factor first

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

$\boxed{x=3}$ or $\boxed{x=4}$

Ex: $x^2-17x+60=0$

x = 12 and x = 5

Ex: $x^2+8x=-12$

x = –6 and x = –2

3. Use the vertical motion model to solve problems involving a problem's height and time. ($h=-16t^2+vt+s$)

Ex: An object is launched from a height of 48 feet with an initial vertical velocity of 32 feet per second. How long before the object reaches the ground?

$h = -16t^2 + vt + s$	Set up equation.
$h = -16t^2 + 32t + 48$	Substitute. (Initial height is 48 feet, and initial velocity is 32 feet per second.)
$0 = -16t^2 + 32t + 48$	Replace h with 0 since that will be the object's height when it reaches the ground.
$0 = -16(t^2 - 2t - 3)$	Factor out GCF so coefficient of t^2 is 1.
$0 = -16(t - 3)(t + 1)$	Factor.
$t = 3$ or $t = -1$	Solve.
$\boxed{t = 3\text{sec}}$	Choose the answer that makes sense.

9.6: Factor Quadratics in the Form $y = ax^2 + bx + c$ –

You should be able to:

1. Factor quadratics in the form $y = ax^2 + bx + c$ into two binomials. Be sure to check outer and inner!

Ex: $3x^2+x-2$

$\boxed{(x+1)(3x-2)}$

Factor:

Ex: $5x^2-6x+1$

$(5x - 1)(x - 1)$

Ex: $3x^2+13x+4$

$(3x + 1)(x + 4)$

2. Solve quadratics in the form $y = ax^2 + bx + c$ by factoring first.

Solve:

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

$(3x - 2)(x + 1) = 0$ Factor first.

$x = -1$ or $x = \frac{2}{3}$ Solve.

Solve:

Ex: $2x^2 - 3x - 35 = 0$

$(2x + 7)(x - 5)$

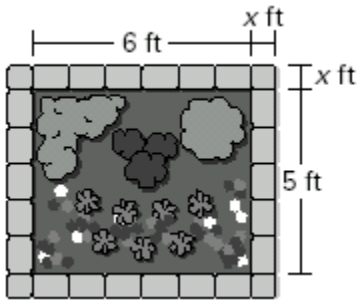
$x = -\frac{7}{2}$ and $x = 5$

Ex: $4x^2 + 11x = 3$

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

$x = -3$ and $x = ¼$

Ex: You are designing a rectangular flower bed that you will border using brick pavers. The width of the border around the bed will be the same on every side, as shown. The area of the flower bed and border is 72 square feet. What is the width of the border?



$(2x + 6)(2x + 5) = 72$
$4x^2 + 22x + 30 = 72$
$4x^2 + 22x - 42 = 0$
$2(2x^2 + 11x - 21) = 0$
$2(2x - 3)(x + 7) = 0$
$x = \frac{3}{2}$ $x = -7$

$x = \frac{3}{2}$ *A dimension can't be negative!