

9-3 Study Guide and Intervention *(continued)***Factoring Trinomials: $x^2 + bx + c$**

Solve Equations by Factoring Factoring and the Zero Product Property from Lesson 9-2 can be used to solve many equations of the form $x^2 + bx + c = 0$.

Example 1 Solve $x^2 + 6x = 7$. Check your solutions.

$x^2 + 6x = 7$	Original equation
$x^2 + 6x - 7 = 0$	Rewrite equation so that one side equals 0.
$(x - 1)(x + 7) = 0$	Factor.
$x - 1 = 0$ or $x + 7 = 0$	Zero Product Property
$x = 1$ $x = -7$	Solve each equation.

The solution set is $\{1, -7\}$. Since $1^2 + 6 = 7$ and $(-7)^2 + 6(-7) = 7$, the solutions check.

Example 2 **ROCKET LAUNCH** A rocket is fired with an initial velocity of 2288 feet per second. How many seconds will it take for the rocket to hit the ground?

The formula $h = vt - 16t^2$ gives the height h of the rocket after t seconds when the initial velocity v is given in feet per second.

$h = vt - 16t^2$	Formula
$0 = 2288t - 16t^2$	Substitute.
$0 = 16t(143 - t)$	Factor.
$16t = 0$ or $143 - t = 0$	Zero Product Property
$t = 0$ $t = 143$	Solve each equation.

The value $t = 0$ represents the time at launch. The rocket returns to the ground in 143 seconds, or a little less than 2.5 minutes after launch.

Exercises

Solve each equation. Check your solutions.

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|-----------------------|-----------------------|-------------------------|
| 1. $x^2 - 4x + 3 = 0$ | 2. $y^2 - 5y + 4 = 0$ | 3. $m^2 + 10m + 9 = 0$ |
| 4. $x^2 = x + 2$ | 5. $x^2 - 4x = 5$ | 6. $x^2 - 12x + 36 = 0$ |
| 7. $c^2 - 8 = -7c$ | 8. $p^2 = 9p - 14$ | 9. $-9 - 8x + x^2 = 0$ |
| 10. $x^2 + 6 = 5x$ | 11. $a^2 = 11a - 18$ | 12. $y^2 - 8y + 15 = 0$ |
| 13. $x^2 = 24 - 10x$ | 14. $a^2 - 18a = -72$ | 15. $b^2 = 10b - 16$ |

Use the formula $h = vt - 16t^2$ to solve each problem.

16. FOOTBALL A punter can kick a football with an initial velocity of 48 feet per second. How many seconds will it take for the ball to return to the ground?

17. BASEBALL A ball is thrown up with an initial velocity of 32 feet per second. How many seconds will it take for the ball to return to the ground?

18. ROCKET LAUNCH If a rocket is launched with an initial velocity of 1600 feet per second, when will the rocket be 14,400 feet high?