

1a. $\{7, -4\}$ b. $\left\{\frac{5}{2}, -\frac{2}{3}\right\}$

1-13 HW Answer Key

2a. $\{5 \pm \sqrt{37}\}$ b. $\{\pm\sqrt{14}\}$

3. $\{5 \pm \sqrt{42}\}$

4. $\left\{\frac{3 \pm 3\sqrt{21}}{10}\right\}$

5. $\{\pm\sqrt{5}, -7\}$

6. If we set the equation to 0, and factor the left side, we can set each factor to 0 and solve. ($ab=0$, then $a=0$ or $b=0$).

7. $(2x+7)(4x^2-14x+49)$

8. $4x(2x-3)(3x+1)$

9. $(x+1)(x+3)(x-3)$

10. $2x^2+11x-4$

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Solve each quadratic using the method given.

1. Factoring: a) $x^2-3x-28=0$

$$p=-28 \quad (x-7)(x+4)=0$$

$$s=-3 \quad x=7 \quad x=-4$$

$$\{-7, 4\} \quad \{7, -4\}$$

b) $6x^2-11x=10$

$$6x^2-11x-10=0 \quad p=-60$$

$$6x^2-15x+4x-10=0 \quad s=-11$$

$$3x(2x-5)+2(2x-5)=0 \quad 4, 15$$

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

$$x=5/2 \quad x=-2/3 \quad \{5/2, -2/3\}$$

2. Square roots: a) $(x-5)^2=37$

$$\sqrt{(x-5)^2} = \pm\sqrt{37}$$

$$x-5 = \pm\sqrt{37}$$

$$x = \{5 \pm \sqrt{37}\}$$

b) $x^2-14=0$

$$\sqrt{x^2} = \pm\sqrt{14}$$

$$x = \{\pm\sqrt{14}\}$$

3. Completing the square: $x^2-10x=17$

$$x^2-10x+25 = 17+25$$

$$\sqrt{(x-5)^2} = \pm\sqrt{42}$$

$$x-5 = \pm\sqrt{42}$$

$$x = \{5 \pm \sqrt{42}\}$$

4. Quadratic formula: $5x^2-3x-9=0$

$$disc = (-3)^2 - 4(5)(-9) = 9 + 180 = 189$$

$$x = \frac{-(-3) \pm \sqrt{189}}{2(5)} = \frac{3 \pm \sqrt{189}}{10}$$

$$x = \left\{ \frac{3 \pm 3\sqrt{21}}{10} \right\}$$

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5. Grouping: $x^3 + 7x^2 - 5x - 35 = 0$

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

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

$$\begin{array}{l|l} x^2 - 5 = 0 & x+7 = 0 \\ x^2 = 5 & x = -7 \\ x = \pm\sqrt{5} & \end{array} \quad \{ \pm\sqrt{5}, -7 \}$$

6. How does factoring an equation help us solve it?

If we set the equation equal to 0, and the left side is made up of its factors, we can set each factor to 0 and solve. ($a \cdot b = 0$ then $a = 0$ or $b = 0$)

Factor completely.

7. $8x^3 + 343$ $a = 2x$, $b = 7$

$$= (2x+7)(4x^2-14x+49)$$

8. $24x^3 - 28x^2 - 12x$

$$= 4x(6x^2 - 7x - 3) \quad p = -18 \quad q = -7$$

$$= 4x(6x^2 - 9x + 2x - 3) \quad -9, 2$$

$$= 4x[3x(2x-3) + 1(2x-3)]$$

$$= 4x(2x-3)(3x+1)$$

9. $x^3 + x^2 - 9x - 9$

$$= x^2(x+1) - 9(x+1)$$

$$= (x+1)(x^2 - 9)$$

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

10. Divide $(2x^3 + 5x^2 - 37x + 12)$ by $(x-3)$.

$$\begin{array}{r} 2x^2 + 11x - 4 \\ x-3 \overline{) 2x^3 + 5x^2 - 37x + 12} \\ \underline{-2x^3 + 6x^2} \\ 11x^2 - 37x \\ \underline{-11x^2 + 33x} \\ -4x + 12 \\ \underline{+4x - 12} \\ 0 \end{array}$$

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QUIZ

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What is the difference between factoring and solving for x?

Factoring is breaking down an expression into its smallest factors.
Solve for x is getting a value for x.
Factoring sometimes helps us to solve for x.

Challenge question.

A quadratic in standard form is $ax^2 + bx + c = 0$. We can use completing the square in order to derive the quadratic formula. Start by dividing each term by a.

$$\begin{aligned}
 ax^2 + bx + c &= 0 \\
 x^2 + \frac{b}{a}x + \frac{c}{a} &= 0 \\
 x^2 + \frac{b}{a}x + \boxed{} &= -\frac{c}{a} + \boxed{} \\
 x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 &= -\frac{c}{a} + \left(\frac{b}{2a}\right)^2 \\
 \left(x + \frac{b}{2a}\right)^2 &= -\frac{c}{a} + \frac{b^2}{4a^2} \\
 \left(x + \frac{b}{2a}\right)^2 &= \frac{-4ac}{4a^2} + \frac{b^2}{4a^2} \\
 \sqrt{\left(x + \frac{b}{2a}\right)^2} &= \pm \sqrt{\frac{-4ac + b^2}{4a^2}} \\
 x + \frac{b}{2a} &= \pm \frac{\sqrt{b^2 - 4ac}}{2a} \\
 x &= \frac{-b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a} \\
 x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
 \end{aligned}$$

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1-14 (Review) HW Answer Key

- | | |
|---|---|
| 1. $8x^2 - 4x - 5$ | 10. $\{0, 6, -2\}$ |
| 2. $2x^2 - 10x + 5$ | 11. $\{1, -2/5\}$ |
| 3. $9x^2 + 36x + 36$ | 12. $\{4, \pm\sqrt{3}\}$ |
| 4. $8x^3 - 12x^2y + 2x^2 - 3xy - 10x + 15y$ | 13. $\left\{ \frac{-2 \pm \sqrt{10}}{2} \right\}$ |
| 5. $5x - 6 - \frac{7}{2x + 3}$ | 14. $\{4 \pm 2\sqrt{3}\}$ |
| 6. $(x-4)(x-3)$ | 15. 1.2 seconds |
| 7. $(x-1)(3x-1)$ | |
| 8. $(y-4)(y^2 + 4y + 16)$ | |
| 9. $(4x^2 + 9)(2x + 3)(2x - 3)$ | |

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Alg 2 Homework 1-14(Review)

Name KEY

1. Add: $(5x^2 - 7x) + (3x^2 + 3x - 5) = 8x^2 - 4x - 5$

2. Subtract: $(5x^2 - 7x) - (3x^2 + 3x - 5) = 2x^2 - 10x + 5$

3. Multiply: $(3x + 6)^2 = (3x+6)(3x+6) = 9x^2 + 36x + 36$

4. Find the product: $(2x - 3y)(4x^2 + x - 5) = 8x^3 + 2x^2 - 10xy - 12x^2y - 3xy + 15y$
 $= 8x^3 - 12x^2y + 2x^2 - 3xy - 10x + 15y$

5. Divide $(10x^2 + 3x - 18)$ by $(2x + 3)$ using long division.

$$\begin{array}{r}
 5x - 6 \\
 2x+3 \overline{) 10x^2 + 3x - 18} \\
 \underline{10x^2 + 15x} \\
 -12x - 18 \\
 \underline{-12x - 18} \\
 -7
 \end{array}$$

Factor:

6. $x^2 - 7x + 12 =$

$(x-4)(x-3)$

7. $3x^2 - 4x + 1 =$

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

$3x(x-1) - 1(x-1) =$

$(x-1)(3x-1)$

8. $y^3 - 64 = y^3 - 4^3$

$(y-4)(y^2 + 4y + 16)$

9. $16x^4 - 81 =$

$(4x^2 + 9)(4x^2 - 9) =$

$(4x^2 + 9)(2x+3)(2x-3)$

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Solve:

10. $2x^3 - 8x^2 = 24x$

$2x^3 - 8x^2 - 24x = 0$

$2x(x^2 - 4x - 12) = 0$

$(2x)(x-6)(x+2) = 0$

$2x=0 \quad x-6=0 \quad x+2=0$

$x=0 \quad x=6 \quad x=-2$

$\{0, 6, -2\}$

11. $5x^2 - 3x = 2$

$5x^2 - 3x - 2 = 0$

$5x^2 - 5x + 2x - 2 = 0$

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

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

$x-1=0 \quad 5x+2=0$

$x=1 \quad x=-2/5$

$\{1, -2/5\}$

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

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

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

$x-4=0 \quad x^2-3=0$

$x=4 \quad x^2=3$

$x=\pm\sqrt{3}$

$\{4, \pm\sqrt{3}\}$

13. Solve by using the quadratic formula: $2x^2 + 4x = 3$

$2x^2 + 4x - 3 = 0$

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

$x = \frac{-4 \pm \sqrt{40}}{4}$

$x = \frac{-4 \pm 2\sqrt{10}}{4}$

$x = \left\{ \frac{-2 \pm \sqrt{10}}{2} \right\}$

14. Solve by completing the square: $x^2 - 8x + 4 = 0$

$x^2 - 8x + 16 = -4 + 16$

$(x-4)^2 = 12$

$x-4 = \pm\sqrt{12}$

$x-4 = \pm 2\sqrt{3}$

$x = 4 \pm 2\sqrt{3}$

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15. In a basketball game, Michael shoots a shot from a position of about 7' above the ground with an initial vertical and horizontal velocity of 13 ft/sec. The height of the shot is modeled by the function $h(t) = -16t^2 + 13t + 7$, where t is the time in seconds after the shot. Unfortunately, Michael shot an air ball. How long does it take the shot to reach the ground? Solve algebraically and round to the nearest tenth.

$$0 = -16t^2 + 13t + 7$$

$$16t^2 - 13t - 7 = 0$$

$$t = \frac{13 \pm \sqrt{(-13)^2 - 4(16)(-7)}}{2(16)}$$

$$t = \frac{13 \pm \sqrt{617}}{32}$$

$$t = \frac{13 + \sqrt{617}}{32}$$

$$t \approx 1.182$$

$$1.2 \text{ seconds}$$

$$t = \frac{13 - \sqrt{617}}{32}$$

reject

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