

1-7 HW Answer Key

1 & 2. Answers will vary

3. $(x-3)(x-2)$

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

5. $(2x+1)(4x^2-2x+1)$

6. $(3x-4)(9x^2+12x+16)$

7. $2y(y+3)(2y-1)$

8. $7a(a+2)(3a^2-5)$

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

10. x^2+2x+6

11. $6x^3+12x^2-8x+6$

12. $9x^2-2x+2$

Requiz by end of week

Wednesday Open House 6-8pm

Thursday Quiz 2 (Days 4-9)

Next Wednesday Test

Tues 9/24 1st Math League

Meeting in LGR 2:30pm

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1. Create expressions that have a structure that allows them to be factored using the specified identity. Be creative and produce challenging problems! Be prepared to share. Use scrap paper first to work them out.

a. Difference of squares $9x^2 - 16y^2$

b. Sum of cubes $27 + x^6$

c. Long product/sum $2x^2 + x - 3$

2. Factor each of your examples from above.

a. $(3x-4y)(3x+4y)$

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

c. $(2x+3)(x-1)$

Factor Completely.

3. $x^2 - 5x + 6$ $p=6, s=-5$
 $= (x+3)(x-2)$

5. $8x^3 + 1$ $a=2x, b=1$
 $= (2x+1)(4x^2-2x+1)$

$$\begin{aligned} 2x^2 + x - 3 & \quad p=-6, s=1 \\ & \quad 3, -2 \\ & = 2x^2 + 3x - 2x - 3 \\ & = x(2x+3) - 1(2x+3) \\ & = (2x+3)(x-1) \end{aligned}$$

$$\begin{aligned} 4. 8x^2 + 6x - 9 & \quad p=-12, s=6 \\ & \quad -6, 12 \\ & = 8x^2 - 6x + 12x - 9 \\ & = 2x(4x-3) + 3(4x-3) \\ & = (4x-3)(2x+3) \end{aligned}$$

$$\begin{aligned} 6. 27x^3 - 64 & \quad a=3x, b=4 \\ & = (3x-4)(9x^2+12x+16) \end{aligned}$$

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7. $4y^3 + 10y^2 - 6y$ $p = -6, 5 = 5$
 $= 2y(2y^2 + 5y - 3)$
 $= 2y(2y^2 + 6y - y - 3)$
 $= 2y[2y(y+3) - 1(y+3)]$
 $= 2y(y+3)(2y-1)$

8. $21a^4 + 42a^3 - 35a^2 - 70a$
 $= 7a(3a^3 + 6a^2 - 5a - 10)$
 $= 7a[3a^2(a+2) - 5(a+2)]$
 $= 7a(a+2)(3a^2 - 5)$

9. $162x^4 - 32$
 $= 2(81x^4 - 16)$
 $= 2(9x^2 - 4)(9x^2 + 4)$
 $= 2(3x+2)(3x-2)(9x^2 + 4)$

Simplify:

10. $\frac{x^3 + 2x - 12}{x - 2}$, and check your solution.

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

$$(x-2)(x^2 + 2x + 6)$$

$$= x^3 + 2x^2 + 6x - 2x^2 - 4x - 12$$

$$= x^3 + 2x - 12 \checkmark$$

11. $(6x^3 + x^2 - 5x) + (11x^2 - 3x + 6)$
 $= 6x^3 + 12x^2 - 8x + 6$

12. From $(3x^2 - 2x + 9)$ subtract $(7 - 6x^2)$
 $(3x^2 - 2x + 9) - (7 - 6x^2)$
 $= 3x^2 - 2x + 9 - 7 + 6x^2$
 $= 9x^2 - 2x + 2$

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1-8: Solve Quadratic Equations by Factoring

Vocabulary Tip: Functions have zeros or x-intercepts, while equations have solutions or roots.

We can find the roots of a quadratic equation in the form $ax^2 + bx + c = 0$ by factoring.

If $ab=0$, then what do you know about a or b ? Why?

Either $a=0$, $b=0$ or both.

If $(x)(3x-5)(2x-2)=0$, what do you know about the factors?

At least one is = zero

Algebraic steps to solve (find the roots) of a quadratic equation:

1. Get one side equal to zero. $ax^2 + bx + c = 0$
2. Factor
3. Set each factor equal to zero (T-chart)
4. Solve (check if required)
5. Write the solution

Example: Find the roots of the equation $0 = -x^2 - 2x + 3$ algebraically.

$$x^2 + 2x - 3 = 0 \quad p = -3, s = 2$$

$$(x-1)(x+3) = 0 \quad -1, 3$$

$x-1=0$	$x+3=0$
$x=1$	$x=-3$

$$x = \{1, -3\}$$

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Find the roots of the following equations by factoring.

1. $x^2 - 5x - 6 = 0$ $P = -6, S = -5$
 $(x-6)(x+1) = 0$ $-6, 1$
 $x-6=0$ $x+1=0$
 $x=6$ $x=-1$
 $\{6, -1\}$

2. $x^2 - 8x = 0$
 $x(x-8) = 0$
 $x=0$ $x-8=0$
 $x=8$
 $\{0, 8\}$

3. $25x^2 = 9$
 $25x^2 - 9 = 0$
 $(5x-3)(5x+3) = 0$
 $5x-3=0$ $5x+3=0$
 $5x=3$ $5x=-3$
 $x=3/5$ $x=-3/5$
 $\{\pm 3/5\}$

4. $40x = 8x^2 + 50$
 $-40x$ $-40x$
 $8x^2 - 40x + 50 = 0$ $P = 100$
 $4x^2 - 20x + 25 = 0$ $S = -20$
 $4x^2 - 10x - 10x + 25 = 0$ $-10, 10$
 $2x(2x-5) - 5(2x-5) = 0$
 $(2x-5)(2x-5) = 0$
 $2x-5=0$ $2x-5=0$
 $x=5/2$ $x=5/2$
 $X = \{5/2\}$

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Find the zeros of the following functions by factoring.

5. $f(x) = x^4 - 13x^2 + 36$ $f(x) = y$
 $0 = x^4 - 13x^2 + 36$
 $P = 36, S = -13$
 $(x^2-4)(x^2-9) = 0$
 $(x+2)(x-2)(x+3)(x-3) = 0$
 $x = -2, x = 2, x = -3, x = 3$
 $\{\pm 2, \pm 3\}$

6. $f(x) = x^3 - 2x^2 - 9x + 18$
 $x^3 - 2x^2 - 9x + 18 = 0$
 $x^2(x-2) - 9(x-2) = 0$
 $(x-2)(x^2-9) = 0$
 $(x-2)(x+3)(x-3) = 0$
 $x = 2, x = -3, x = 3$
 $\{2, \pm 3\}$

7. What is the solution of $(x-5)^{50} = 0$?

$x = \{5\}$

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

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If we know the zeros of a function we can work backward to write a rule for the function.

$f(x) = (x - z_1)(x - z_2)$ where z_1 and z_2 are the zeros of the function.

(You can also use the roots of an equation)

Example:

1. Write a quadratic function in standard form with zeros 2 and -1.

$$x = \{2, -1\}$$

$$f(x) = (x - 2)(x + 1)$$

$$f(x) = x^2 + x - 2x - 2$$

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

2. Write a quadratic function in standard form with zeros 5 and -5.

$$f(x) = (x - 5)(x + 5)$$

$$f(x) = x^2 + 5x - 5x - 25$$

$$f(x) = x^2 - 25$$

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