

4.3 Notes Day 1

Objectives: Write a quadratic equation from given roots.

Factor Quadratic Functions (GCF and trinomials with a = 1)

Warm-up: Multiply the two binomials

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

$$\begin{aligned} & x^2 - 4x + 3x - 12 \\ & \underline{\hspace{1.5cm}} \\ & x^2 - x - 12 \end{aligned}$$

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

$$\begin{aligned} & 6x^2 - 9x - 4x + 6 \\ & \underline{\hspace{1.5cm}} \\ & 6x^2 - 13x + 6 \end{aligned}$$

In order to write a quadratic equation given roots, use the pattern $(x-p)(x-q) = 0$. Where p and q represent the roots of the quadratic equation.

1. Write a quadratic equation in standard form with 2 and 6 as its roots.

$$\begin{aligned} & (x-2)(x-6) = x^2 - 6x - 2x + 12 \\ & \underline{\hspace{1.5cm}} \\ & x^2 - 8x + 12 \end{aligned}$$

$$x^2 - 8x + 12$$

2. Write a quadratic equation in standard form with -2 and -6 as its roots

$$\begin{aligned} & (x - (-2))(x - (-6)) \\ & = (x+2)(x+6) = x^2 + 6x + 2x + 12 \\ & \underline{\hspace{1.5cm}} \\ & x^2 + 8x + 12 \end{aligned}$$

3. Write a quadratic equation in standard form with 8 and -5 as its roots.

$$\begin{aligned} & (x-8)(x+5) \\ & x^2 + 5x - 8x - 40 \\ & \underline{\hspace{1.5cm}} \\ & x^2 - 3x - 40 \end{aligned}$$

$$x^2 - 3x - 40$$

4. Write a quadratic equation in standard form with -8 and 5 as its roots.

$$\begin{aligned} & (x+8)(x-5) \\ & x^2 - 5x + 8x - 40 \\ & \underline{\hspace{1.5cm}} \\ & x^2 + 3x - 40 \end{aligned}$$

$$x^2 + 3x - 40$$

Factor GCF: Find the GCF of the terms of the quadratic equation.

4. $10xy - 15x^2y^2$

$$5xy(2 - 3xy)$$

5. $10x - 15x^3$

$$5x(2 - 3x^2)$$

6. $3ab^2 - 6a^2b$

$$3ab(b - 2a)$$

Zero Product Property:

For any real numbers a and b , if $a \cdot b = 0$, then either $a = 0$, $b = 0$ or both a and b equal zero.

Ex. If $(x + 3)(x - 5) = 0$, then $x + 3 = 0$ or $x - 5 = 0$.

Factor by GCF and solve the following:

7. $2x^2 + 16x = 0$

$2x(x + 8) = 0$
 $\frac{2x}{2} = \frac{0}{2}$ or $\frac{x+8}{-8 \quad -8} = 0$
 $x = 0$ $x = -8$

8. $5x^2 - 20x = 0$

$5x(x - 4) = 0$
 $\frac{5x}{5} = \frac{0}{5}$ or $\frac{x-4}{+4 \quad +4} = 0$
 $x = 0$ $x = 4$

Factor trinomials: Find two values, m and p , such that their product equals ac and their sum equals b .

9. $x^2 - 2x - 15$

$(x + 3)(x - 5)$

-15	
1	-15
3	-5
5	-3

 $+ = -2$

10. $x^2 - 8x + 16$

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

16	
-1	16
-2	-8
-4	-4

 $+ = -8$

Use the Zero Product Property to find the solutions of each quadratic equation. Remember that the solutions to a quadratic equation are the roots or x-intercepts (where $x = 0$).

11. $x^2 + 4x - 45 = 0$

$(x - 5)(x + 9) = 0$
 $x - 5 = 0$ or $x + 9 = 0$
 $+5 \quad +5$ $-9 \quad -9$
 $x = 5$ $x = -9$

-45	
-3	15
-5	9
-9	5

 $= 4$

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

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

2	
1	2

 $+ = 3$

13. $x^2 - 4x - 21 = 0$

$(x + 3)(x - 7) = 0$
 $x + 3 = 0$ or $x - 7 = 0$
 $-3 \quad -3$ $+7 \quad +7$
 $x = -3$ $x = 7$

-21	
3	-7
1	-21

 $+ = -4$

14. $x^2 - 12x + 32 = 0$

$(x - 4)(x - 8) = 0$
 $x - 4 = 0$ or $x - 8 = 0$
 $+4 \quad +4$ $+8 \quad +8$
 $x = 4$ $x = 8$

32	
2	16
4	8
8	4

 $+ = -12$