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Module 13 Solving Quadratic Equations of One Variable

Lesson 1 Defining Quadratic Equations of One Variable

independent practice

Determine if each equation is quadratic, linear, or neither.

1. $a^2 = 2$

   Quadratic

2. $2x^2 - 7x = 8$

   Quadratic

3. $b^3 + 3b + 5 = 0$

   Neither

4. $4x - 9x = 7$

   Linear

5. $4x(x - 3) = 4$

   Quadratic

6. $3x^2 = 3x^2 - 7x + 3$

   Linear

7. $3y(y^2 + 1) = 0$

   Neither

8. $6^2m + 4m = 7$

   Linear

9. $2t^2 - 4t + 1 = t^2 - 6t$

   Quadratic

10. $3x^2 + 2x = 8(x + 1)$

    Quadratic

11. $4^2x + x = 7^2$

    Linear

12. $2(4m^2 - 3) = 8m^2$

    Neither

Determine if each equation is quadratic, linear, or neither. If it is a quadratic equation in one variable, put it into standard form and identify the coefficients *a*, *b*, and *c*.

13. $b^2 + 3 = 8b$ **Quadratic; $b^2 - 8b + 3 = 0$**

    $a = 1$, $b = -8$, and $c = 3$

14. $2g(g + 3) = 0$ **Quadratic; $2g^2 + 6g + 0 = 0$**

    $a = 2$, $b = 6$, and $c = 0$

15. $2x^2 + 4x = 2x^2 - 3$ **Linear**

16. $9 = 4x - 3$ **Linear**

17. $8 = 2b^2 + 4b$ **Quadratic; $-2b^2 - 4b + 8 = 0$**

    $a = -2$, $b = -4$, and $c = 8$

18. $(c - 2)^2 - 3 = 0$ **Quadratic; $c^2 - 4c + 1 = 0$**

    $a = 1$, $b = -4$, and $c = 1$

19. $x^2(x^2 - 2x) = 3$ **Neither**

20. $(h^2 - 4)^2 = 0$ **Neither**

21. $(k - 4)^2 + 2 = k^2 - 1$ **Linear**

22. $6(c + 2)^2 - 2c^3 = 4$ **Neither**

23. $(n + 1)^2 + n = 0$ **Quadratic; $n^2 + 3n + 1 = 0$**

$a = 1$, $b = 3$, and $c = 1$

24. $(3c - 2)^2 + 4c = 6$ **Quadratic; $9c^2 - 8c - 2 = 0$**

$a = 9$, $b = -8$, and $c = -2$

Journal

1. Explain how to identify a polynomial equation.
2. Explain how to identify a linear equation in one variable.
3. Explain how to identify a quadratic equation in one variable.
4. Write a quadratic equation in one variable where $a = 2$, $b = -3$, and $c = 5$.
5. Marci is having trouble with her assignment. Explain to her why $(x + 3)^2 - 3x = x + 2$ is a quadratic equation.

Cumulative Review

Simplify.

1. $(t^2 - 4t - 3) - (3t^2 + 2)$ **$-2t^2 - 4t - 5$**
2. $(6b^2 + 3b + 8) + (9b^2 - 8b + 1)$ **$15b^2 - 5b + 9$**
3. $4a^2b(6b - 3ab^2 + 2b^2)$ **$24a^2b^2 - 12a^3b^3 + 8a^2b^3$**
4. $(3m - 4n)(5m + 2n)$ **$15m^2 - 14mn - 8n^2$**
5. $(r - 3)(r^2 + 2r - 7)$ **$r^3 - r^2 - 13r + 21$**
6. $(10x^2 - 23x - 5) \div (2x - 5)$ **$5x + 1$**

Factor, if possible.

7. $16g^2h - 12h^2 + 4gh^2$ **$4h(4g^2 - 3h + gh)$**
8. $w^2 - 9w + 20$ **$(w - 4)(w - 5)$**
9. $4uv + 8v - 3u - 6$ **$(4v - 3)(u + 2)$**
10. $6a^2 - 7a - 5$ **$(3a - 5)(2a + 1)$**

Possible Journal Answers

1. In a polynomial equation, the expressions on both sides of the equation are polynomials.

2. A linear equation in one variable is an equation that can be written in the form $ax + b = 0$, where a does not equal zero. The highest power of the variable is one.

3. A quadratic equation in one variable is an equation that can be written in the form $ax^2 + bx + c = 0$, where a does not equal zero. The highest power of the variable is two.

4. One possible equation is $2x^2 - 3x + 5 = 0$. It could also be written as $2x^2 = 3x - 5$ or as other equivalent variations, using any choice of variable.

5. It is helpful to write the equation in standard form to determine whether it is a quadratic equation. The first step is to expand the term $(x + 3)^2$. This makes the original equation: $x^2 + 6x + 9 - 3x = x + 2$. Combine like terms on the left side of the equation to get $x^2 + 3x + 9 = x + 2$. When the terms on the right are subtracted from those on the left, the polynomial equation becomes $x^2 + 2x + 7 = 0$. This equation is in standard form. The highest power of the variable is two and a does not equal zero. It is, therefore, a quadratic equation.