

Topic	Solving Quadratic Equations	Complex Numbers	Polynomials	Exponents
Skills	<ul style="list-style-type: none"> - by square root - by quadratic formula - by completing the square - by factoring - including complex solutions 	<ul style="list-style-type: none"> - adding - subtracting - multiplying - dividing (rationalizing the denominator) 	<ul style="list-style-type: none"> - long and synthetic division - graphing functions - Binomial Theorem: expanding binomials - Solving polynomial equations 	<ul style="list-style-type: none"> - Properties of exponents - rational exponents - Radical equations

Solving Quadratic Equations



Solve each quadratic equation by factoring.

1. $x^2 - 7x - 18 = 0$

2. $2m^2 - m - 21 = 0$

Steps to solve by factoring:

Find the solutions of the equations by completing the square.

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

4. $r^2 + 2r = 15$

Steps to solve by completing the square:

5. $x^2 - 16x + 100 = 0$



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Use the quadratic formula to solve each equation.

6. $3x^2 + 3x - 8 = 0$

7. $x^2 + 3x - 6 = 0$

Quadratic Formula

8. $2x^2 - 4x + 8 = 0$



Solve each equation by taking the square root.

9. $-2(x+4)^2 + 6 = 0$

10. $\frac{1}{2}(x-5)^2 - 8 = 0$

Steps to solve by
square root:

11. $-2(x-1)^2 + 3 = 6$



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Complex Numbers

Simplify each expression by performing the given operations.

10. $(5 + 3i) + (2 + 4i)$

11. $(3 - 2i) + (1 + i)$

12. $(7 + 2i) - (3 + 3i)$

17. $3i(-1 + 2i)$

19. $(1 + 3i)(1 - i)$

20. $(5 - i)(1 - 2i)$

25. $(5 - 4i)(3 + 6i)$

26. $(2 + 5i)^2$

27. $(4 + 8i)(4 - 8i)$

31. $2(2 + i) + (1 - i)^2$

33. $(1 - 5i)(2 + i) - i(3 - 4i)$

20. $\frac{2 + 3i}{4 + i}$

21. $\frac{1 - 2i}{3 - 5i}$

22. $\frac{3}{1 + i}$

23. $\frac{5}{2 - i}$

24. $\frac{3 - i}{2 + i}$

28. $\frac{6}{2 + 3i}$

29. $\frac{3 + i}{-2 + i}$

32. $\frac{1}{3 - 5i} - (6 - 2i)$

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Polynomials

Divide using synthetic division.

9. $(2x^3 - 7x^2 - x - 12) \div (x - 4)$

10. $(x^3 - 2x + 12) \div (x + 3)$



11. $(x^4 - 5x^3 + 4x - 17) \div (x - 5)$

12. $(3x^3 - 2x^2 + 5x - 1) \div (x + 2)$

Divide using polynomial long division.

1. $(x^2 + 2x + 6) \div (x - 3)$

2. $(2x^2 + x - 3) \div (x - 1)$



5. $(3x^3 + 2x^2 - 5x + 1) \div (3x + 1)$

6. $(8x^2 - 5x + 1) \div (2x - 3)$

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Use the binomial theorem to expand each binomial.

4. $(x + 3)^4$

5. $(x + 2y)^4$

7. $(2x - 3y)^5$

8. $(3 - i)^4$

Use the binomial theorem to find the 3rd term of each expansion.

1. $(2a - 4)^5$

2. $(2x^2 - 8)^9$

3. $(x^3 + y^2)^7$



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Solve each polynomial equation by factoring.

1. $8x^3 - 27 = 0$

2. $8x^3 = -27$

3. $x^4 - 12x^2 + 11 = 0$

4. $x^3 - 3x^2 - 9x = -15$

5. Find the real solution(s) of $6x^3 - 10x^2 = 5x$ by graphing.

6. Your mother is 25 years older than you. Your father is 3 years older than your mother. The product of all three ages is 32,130. How old is your father? Show your formula and solve by graphing.

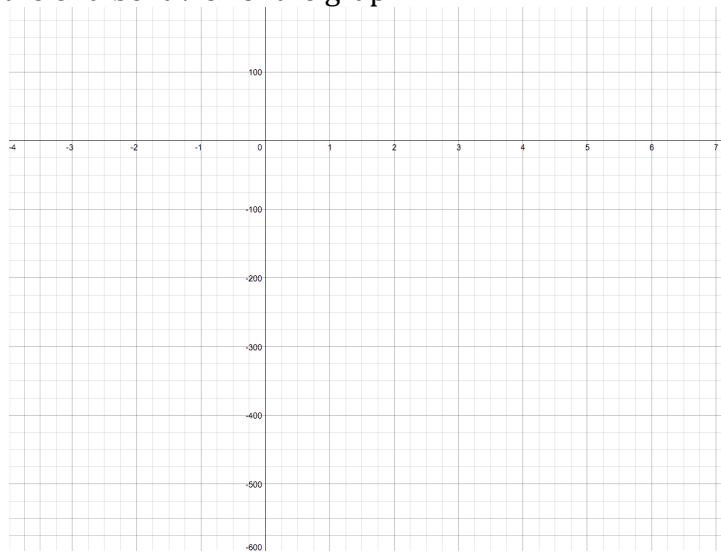


1. Write a polynomial function in standard form with zeros -5, 3, 0. Then classify it by degree and by number of terms.

2. Find the zeros of the function. State the multiplicity of each zero.

$$y = -(x + 2)^3(x - 5)^2$$

3. Graph the function from #2 *by hand*. Show work for additional points and explain the end behavior of the graph.



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4. Find the zeros of the function $y = x^3 + 11x^2 + 30x$ by graphing. Then find the relative maximum(s) and relative minimum(s) using a graphing calculator.

5. The length of a box is 2 times the height. The sum of the length, width, and height of the box is 10 centimeters.

- a. Write expressions for the dimensions of the box.
- b. Write a polynomial function for the volume of the box. (To start, write the function in factored form).
- c. Find the maximum volume of the box and the dimensions of the box that generates this volume.

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Rational Exponents

Simplify each expression using positive exponents.

1. $\left(32x^{-\frac{2}{3}}\right)^{\frac{3}{5}}$

2. $\left(x^{\frac{1}{2}}x^{\frac{1}{3}}\right)^4$

3. $\frac{\sqrt[5]{x^2}}{\sqrt[10]{x^2}}$

4. $\frac{\sqrt[8]{x^3}}{\sqrt[4]{x^2}}$

5. Find the real roots of $x^4 = \frac{2401}{625}$.

6. Find the real roots of $x^3 = \frac{27}{125}$.

Solve each equation for the variable. Check your solutions.

7. $(6x-5)^{\frac{1}{3}} + 3 = -2$

8. $\sqrt{x-2} = x-8$

9. $\sqrt{2x+4} - 2 = \sqrt{x}$