

PRACTICE 1 OF 5

Quadratic functions

Use the form of the function to decide what to find. Show factoring or formula work when you solve for roots.

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- 1 State the vertex of $f(x) = (x - 3)^2 - 5$.

- 2 Solve: $x^2 - 7x + 12 = 0$.

- 3 Solve: $x^2 + 6x + 5 = 0$.

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

- 5 For $y = -2(x + 1)^2 + 4$, state the vertex and axis of symmetry.

- 6 Factor completely: $3x^2 - 12x$.

- 7 Describe the transformation from $y = x^2$ to $y = (x - 2)^2 + 3$.

- 8 Solve using any valid method: $x^2 - 2x - 8 = 0$.

- 9 Solve by completing the square: $x^2 + 8x + 7 = 0$.

- 10 Find the discriminant of $2x^2 - 4x + 5 = 0$ and state the number of real roots.

PRACTICE 2 OF 5

Polynomials and complex numbers

Keep powers in descending order. Use a strategy that matches the expression: multiply, factor, evaluate, divide, or simplify with i .

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11 Multiply: $(2x - 3)(x + 4)$.

12 Divide $x^3 - 4x^2 + x + 6$ by $x - 2$.

13 Factor completely: $x^3 - 4x$.

14 Find $P(2)$ for $P(x) = x^3 + 2x^2 - 5x + 1$.

15 Simplify i^{23} .

16 Multiply: $(3 + 2i)(1 - 4i)$.

17 Solve: $x^2 + 4x + 13 = 0$.

18 State the end behavior of $f(x) = -3x^4 + 2x - 1$.

19 Simplify: $(4 + i) + (2 - 5i)$.

20 State the degree of $P(x) = x^4 - 3x^2 + 1$ and how many roots it has.

PRACTICE 3 OF 5

Rational expressions and radicals

Record restrictions before simplifying. When you square a radical equation, test every candidate in the original equation.

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- 21 Simplify $(x^2 - 9) / (x^2 - 3x)$. State restrictions.

- 22 State the domain restriction for $2 / (x + 5)$.

- 23 For $y = (x + 1) / (x - 4)$, state the vertical and horizontal asymptotes.

- 24 Solve: $1/x + 1/2 = 3/2$.

- 25 Simplify $\sqrt{50}$.

- 26 Solve: $\sqrt{x + 5} = x - 1$.

- 27 Evaluate $16^{(3/4)}$.

- 28 Simplify cube root(54).

- 29 Simplify: $\sqrt{12} + \sqrt{27}$.

- 30 Rationalize the denominator: $6 / \sqrt{3}$.

PRACTICE 4 OF 5

Exponential and logarithmic functions

Use inverse relationships. Check that every logarithm has a positive argument before finalizing an answer.

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31 Solve: $2^x = 32$.

32 Evaluate $A = 200(1.08)^t$ when $t = 3$. Round to the nearest tenth.

33 For $y = 5(2)^x$, state the initial value and what happens for each 1-unit increase in x .

34 Evaluate log base 10 of 1000.

35 Solve: log base 2 of $x = 5$.

36 Evaluate log base 3 of 81.

37 Condense: $\log(x) + \log(4) - \log(y)$.

38 Solve: log base 10 of $x = 2.5$. Round to the nearest tenth.

39 Solve: $3^{(2x)} = 81$.

40 Expand: $\log(x^3 y)$.

PRACTICE 5 OF 5

Sequences, series, and modeling

Identify the pattern first. State units in model answers and use the context to decide whether an arithmetic, geometric, exponential, or quadratic model fits.

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- 41 Find a_{10} for the arithmetic sequence with $a_1 = 7$ and $d = 4$.

- 42 Find a_6 for the geometric sequence with $a_1 = 3$ and $r = 2$.

- 43 Find S_{20} for the arithmetic sequence with $a_1 = 5$ and $d = 3$.

- 44 Find the sum of the first 6 terms: $2 + 6 + 18 + \dots$

- 45 Write the circle equation with center $(2, -1)$ and radius 3.

- 46 State the vertex of $y = (x + 2)^2 - 1$.

- 47 $h = -16t^2 + 64t + 80$. Find h when $t = 2$. State units as feet.

- 48 Write an exponential decay model for a quantity starting at 500 and decreasing 20% each period.

- 49 Find the common ratio of the geometric sequence 81, 27, 9, 3.

- 50 Find the sum to infinity of $12 + 6 + 3 + \dots$

ANSWER KEY

Answers with strategy reminders

Finish the practice first, then use this page to compare method and result. Bring the question numbers that did not match your work to the next tutoring session.

Use an answer key as feedback: identify the first step that changed your result, not only the final answer.

Quadratics

1. Vertex (3, -5)
2. $x = 3$ or 4
3. $x = -1$ or -5
4. $x = -2 \pm 2i$
5. Vertex (-1, 4); axis $x = -1$
6. $3x(x - 4)$
7. Right 2, up 3
8. $x = 4$ or -2
9. $x = -1$ or -7
10. -24; no real roots

Exponential and log

31. $x = 5$
32. About 251.9
33. Initial 5; doubles each 1 unit
34. 3
35. $x = 32$
36. 4
37. $\log(4x / y)$
38. About 316.2
39. $x = 2$
40. $3\log(x) + \log(y)$

Polynomials and complex

11. $2x^2 + 5x - 12$
12. $x^2 - 2x - 3$
13. $x(x - 2)(x + 2)$
14. $P(2) = 7$
15. -i
16. $11 - 10i$
17. $x = -2 \pm 3i$
18. Both ends down
19. $6 - 4i$
20. Degree 4; 4 roots with multiplicity

Sequences and modeling

41. $a_{10} = 43$
42. $a_6 = 96$
43. $S_{20} = 670$
44. $S_6 = 728$
45. $(x - 2)^2 + (y + 1)^2 = 9$
46. Vertex (-2, -1)
47. 144 feet
48. $500(0.8)^t$
49. $r = 1/3$
50. 24

Rational and radical

21. $(x + 3) / x$; $x \neq 0, 3$
22. $x \neq -5$
23. $x = 4$ and $y = 1$
24. $x = 1$
25. $5\sqrt{2}$
26. $x = 4$
27. 8
28. 3 cube root(2)
29. $5\sqrt{3}$
30. $2\sqrt{3}$