

Precalculus Summer Review

If you would like to do some additional independent practice, Khan Academy has a course that you can use to preview the topics in your course in fall.

<https://www.khanacademy.org/math/get-ready-for-precalculus>

<https://www.khanacademy.org/math/precalculus>

★ Topic 1: Exponent Properties / Simplifying Radicals

[Khan Academy Expressions with Exponents](#)

[Khan Academy Rational Exponents](#)

[Khan Academy Simplifying Square Roots](#)

[Khan Academy Exponent Review](#)

[Khan Academy Rational Exponents and Radicals](#)

DIRECTIONS: Simplify the following WITHOUT a calculator.

1. $(-2^2)^3$	2. $-\left(\frac{2}{5}\right)^{-2}$	3. $(3x^2y)^3$
4. $\frac{y^8}{5y^{10}}$	5. $\frac{x^3y}{xy^2}$	6. $\frac{3xy^9}{2y^2} \cdot \frac{-7y}{42x^5}$
7. $8^{\frac{2}{3}}$	8. $4^{\frac{-1}{2}}$	9. $(\sqrt[4]{16})^2$
10. $\sqrt[3]{1000^2}$	11. $(\sqrt[3]{-27})^{-4}$	12. $-(25^{\frac{-3}{2}})$

13. $\sqrt{80}$	14. $\sqrt{32}$	15. $\sqrt[3]{54x^3}$
16. $\sqrt{\frac{1}{4}}$	17. $\sqrt{\frac{4}{75}}$	18. $4\sqrt{3} \cdot \sqrt{21}$

★ Topic 2: Factoring

[Khan Academy Intro to Factoring & Factoring Quadratics](#)

[Khan Academy Factoring Trinomials and Polynomials](#)

DIRECTIONS: Factor each of the following by GCF (Greatest Common Factor)

1. $3x^4 - 9x^2$	2. $49xy + 28x - 14y$	3. $18x^3y^5 - 12xy^2$
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DIRECTIONS: Factor each quadratic Expression

4. $x^2 - 3x + 2$	5. $x^2 + 5x - 6$	6. $2x^2 + 5x - 3$
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7. $3x^2 - 8x + 4$	8. $3x^2 + 17x + 10$	9. $10x^2 - 19x + 6$
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DIRECTIONS: Factor each special case.

Difference of Two Squares: $a^2 - b^2 = (a + b)(a - b)$

10. $x^2 - 144$	11. $9x^2 - 16$	12. $81x^2 - 25y^2$
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Perfect Square Trinomials: $a^2 + 2ab + b^2 = (a + b)^2$ and $a^2 - 2ab + b^2 = (a - b)^2$

13. $x^2 + 6x + 9$	14. $4x^2 - 4x + 1$	15. $25x^2 - 30x + 9$
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Sum/Difference of Two Cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ and $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

16. $x^3 - 8$	17. $125x^3 + y^3$	18. $27y^6 - 64$
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DIRECTIONS: Use synthetic division to factor as indicated.

19. $x^3 - 4x^2 + 2x + 1 = (x - 1)(\quad)$

20. $2x^3 + 5x + 7 = (x + 1)(\quad)$

21. $x^4 - 3x^3 + x^2 + x + 2 = (x - 2)(\quad)$

22. $4x^4 + 3x^2 - 1 = (2x - 1)(\quad)$

★ Topic 3: Solving Equations and Inequalities

[Khan Academy Solve Equations with Fractions](#)

[Khan Academy Solve Linear Equations](#)

[Khan Academy Solve Quadratic Equations by Factoring](#)

[Khan Academy Solve Quadratic Equations by the Quadratic Formula](#)

[Khan Academy Solve Radical Equations](#)

[Khan Academy Solve Rational Equations](#)

DIRECTIONS: Solve for the unknown variable.

1. $\frac{2x+1}{5} = \frac{3x+1}{2}$	2. $\frac{x}{2} + \frac{5x}{6} = \frac{2x}{3} + \frac{1}{12}$	3. $4x + 3(x - 8) = 5x - (x + 7)$
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DIRECTIONS: Solve each quadratic for the unknown variable.

4. $4x^2 - 81 = 0$	5. $8x^2 - 5 = 6x$	6. $6x^2 + 7x + 5 = 0$
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DIRECTIONS: Solve each radical equation.

7. $\sqrt{x} = 3x - 1$	8. $1 + 3\sqrt{2x} = 7$	9. $\sqrt{2x - 10} = \sqrt{8 - x}$
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DIRECTIONS: Solve each rational equation.

10. $\frac{3}{2x} - \frac{9}{2} = 6x$

11. $\frac{2}{3x} + \frac{2}{3} = \frac{8}{x+6}$

12. $\frac{2}{x+1} + \frac{x}{x-1} = \frac{2}{x^2-1}$

★ Topic 4: Functions

[Khan Academy Evaluate Functions](#)

[Khan Academy Operations with Functions](#)

[Khan Academy Composing Functions](#)

[Graphing the 12 Basic Functions](#)

[Khan Academy Transformations of Functions](#)

DIRECTIONS: Evaluate the following. (function notation)

Given $f(x) = -x^2 + x$, find the following.

1. $f(0)$

2. $f(-\frac{1}{3})$

3. Find x when $f(x) = 0$

DIRECTIONS: Evaluate the following. (function notation)

Given $f(x) = \frac{x}{3} + \frac{7}{4}$, find the following.

4. Find the x and y intercepts of $f(x)$.

5. Find x, when $f(x) = \frac{1}{8}$

6. $f(\frac{-9}{8})$

DIRECTIONS: Perform the following function operations.

Given the functions $f(x) = 2x^2$ and $g(x) = 3 - 4x$, find the following.

7. $f(g(x))$

8. $g(f(x))$

9. $(f - g)(x)$

10. $f(f(x))$

11. $g(g(x))$

12. $fg(x)$

DIRECTIONS: Match the function with its name.

____ 1. $f(x) = \frac{2}{3}|4x+5| - 3$

____ 2. $f(x) = \frac{2}{3}\sqrt[3]{4x+5} - 3$

____ 3. $f(x) = \frac{2}{3} \cdot \frac{1}{4x+5} - 3$

____ 4. $f(x) = \frac{2}{3}(4x+5)^4 - 3(4x+5)^2 - 2$

____ 5. $f(x) = \frac{2}{3}(4x+5)^3 - 3$

____ 6. $f(x) = \frac{2}{3}(4x+5) - 3$

____ 7. $f(x) = \frac{2}{3}(4x+5)^2 - 3$

____ 8. $f(x) = \frac{2}{3}\sqrt{4x+5} - 3$

A. Linear Function

B. Quadratic Function

C. Absolute Value Function

D. Cubic Function

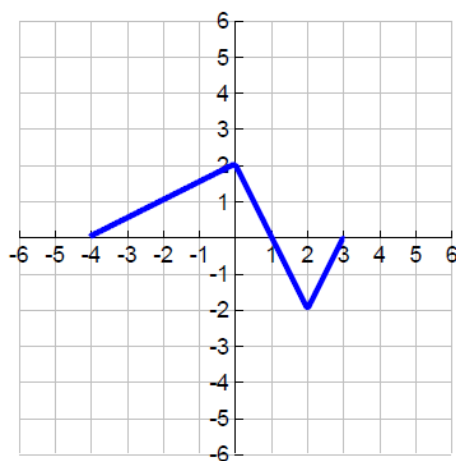
E. Cube Root Function

F. Square Root Function

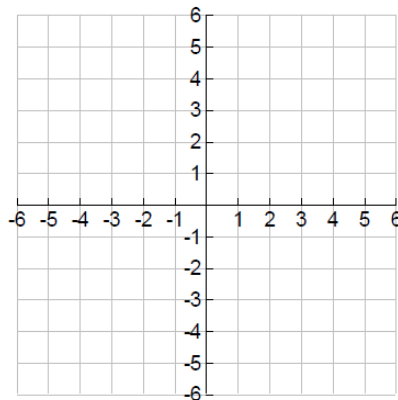
G. Rational Function

H. Polynomial Function

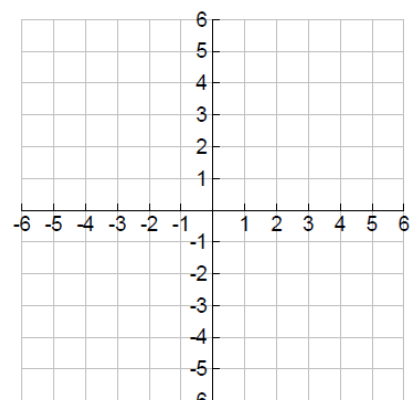
DIRECTIONS: Use the graph of $y = f(x)$ to below to sketch the following transformations.



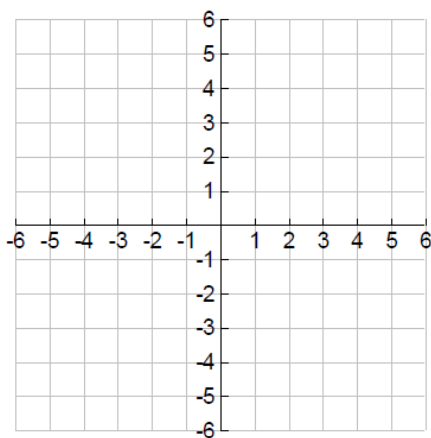
1. $y = 2f(x)$



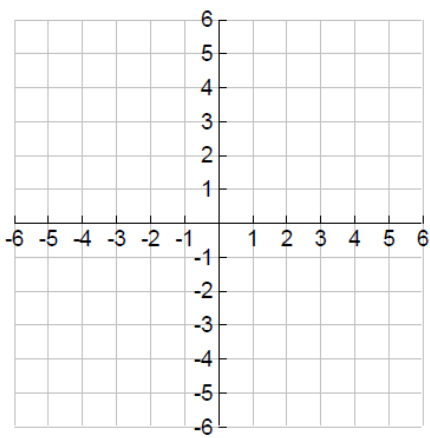
2. $y = -f(x)$



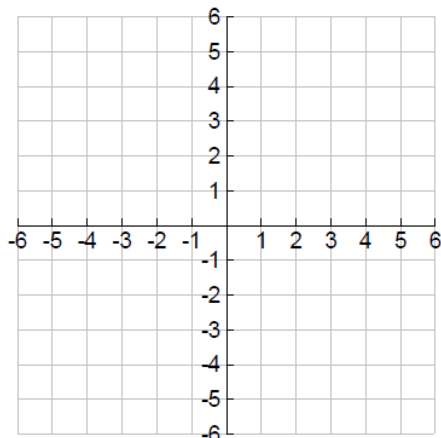
3. $y = f(x-1)$



4. $y = f(x) + 2$



5. $y = f(-x)$



★ Topic 5: Miscellaneous

[Khan Academy Distance and Midpoint Formulas](#)

[Khan Academy Writing Equations of Lines](#)

[Khan Academy Unit Circle](#)

DIRECTIONS: Find the distance and midpoint between the two points.

1. $(-2, 5); (6, -1)$

2. $\left(\frac{3}{2}, -\frac{1}{2}\right); \left(-\frac{3}{2}, \frac{7}{2}\right)$

3. $\left(\frac{5}{2}, -\frac{3}{2}\right); (1, -4)$

DIRECTIONS: Find the equation of the line that has the given characteristics. Write the equation in any form.

4. slope = $\frac{3}{4}$
y-intercept = $\frac{-2}{3}$

5. Parallel to $2x + 3y = 4$
through $(-3, 6)$

6. Perpendicular to $4x - 7y = 23$
through $(-2, 1)$

Unit Circle – In Algebra 2, the focus was on degrees. This year, we will primarily use radians. It is beneficial to memorize the unit circle!

