

Summer 2026

Honors Algebra 2 Summer Packet

Welcome to Algebra 2 Honors! All students entering Honors Algebra 2 are expected to have mastered topics presented in Algebra 1 and Geometry. Below is a list of the top skills for success in Algebra 2, plus a diagnostic self-check for you to see what you need to practice (**skills that most frequently cause issues in Algebra 2 are marked with *** so you can prioritize your review**). There is no minimum amount of summer practice required, but be prepared to hit the ground running when school starts!

If you need help understanding what something on the skills list means or have any other questions about the course, please email me at sbelmar@saintjohnsprep.org.

- ☐ ***Memorize the perfect squares and square roots up to 225 and the perfect cubes up to 1000
- ☐ ***Memorize the powers of 2 up to 2^8 , powers of 3 up to 3^5 , and 4 up to 4^5
- ☐ ***Fluently work with fractions using all operations
- ☐ ***Solving linear equations (including no solution and infinitely many solutions)
- ☐ ***Graphing Linear equations (recognizing positive/negative/zero/undefined slopes, using standard form, point-slope form, and slope-intercept form, rearranging equations between those forms, slopes and equations of parallel and perpendicular lines, equations of horizontal and vertical lines)
- ☐ Literal equations (rearranging science equations to isolate a particular variable)
- ☐ ***Absolute value (solving equations that involve absolute value)
- ☐ ***Linear inequalities (solving and graphing)
- ☐ ***Compound inequalities (OR/AND, solving and graphing on a number line, using correct inequality notation to give answers)
- ☐ Functions and function characteristics (function notation, writing domain/range of a function in inequality notation, x- and y-intercepts)
- ☐ ***Exponent laws and using them to simplify monomials
- ☐ ***Negative exponents and using them to simplify monomials
- ☐ Multiplying polynomials (up to a binomial times a trinomial) and squaring binomials
- ☐ ***Factoring (greatest common factor, guess and check, AC method, factor by grouping, difference of 2 perfect squares, and perfect square trinomials)
- ☐ Systems of Equations (graphing, substitution, elimination, recognizing no solution/infinite solutions)
- ☐ ***Simplifying radicals
- ☐ Operations with like radicals (simplify radicals to simplify an expression by finding and combining like radicals using addition and subtraction)
- ☐ Solving equations that involve radicals
- ☐ ***Solving quadratics by factoring, completing the square, and quadratic formula
- ☐ ***Be comfortable with word problems – we will do lots of word problems in Algebra 2!

The following materials will be required for Algebra 2 Honors:

- Graphing calculator (TI-84 Plus or TI-84 Plus CE). If you choose to use a TI-NSpire or other graphing calculator, be aware that lessons will teach the use of the TI-84 Plus CE only.
- **Two composition notebooks (at least 100 pages each, no spirals, and no vinyl/plastic covers). We will fill both notebooks!**
- **Double-sided tape roller (no glue or gluesticks!), scissors, and 6-inch ruler**
- Graph paper and loose leaf paper
- 3-ring binder (can be shared with other subjects as long as Alg 2 has its own section)
- Pencils (work must be done in pencil)
- Highlighters (2-3 colors)
- Colored pencils
- 2 colored pens (red, green, purple, pink, not blue or black) for grading your work

Below is a list of courses and modules from Khan Academy that can help you check your understanding and brush up on skills. Use the quizzes and tests in each module listed, and then go back to the lessons where you had trouble.

“Algebra Basics” Course

- Unit 4 – Graphing Lines and Slope
- Unit 5 – Systems of Equations
- Unit 6 (through Quiz 2) – Expressions with Exponents
- Unit 7 – Quadratics and Polynomials

“Get Ready for Algebra 2” Course

- Unit 1- Get ready for polynomial operations and complex numbers
- Unit 2 (through Quiz 2) – Get ready for equations
- Unit 3 (through Quiz 2) - Get ready for transformations of functions and modeling with functions
- Unit 6 – Get ready for rational functions

“College Algebra” Course

- Unit 1 – Linear equations and inequalities
- Unit 2 – Graphs and forms of linear equations

In addition to Khan Academy, we also recommend the following websites and YouTube channels:

- Mathbitsnotebook.com
- The Organic Chemistry Tutor on YouTube (Playlists on Linear Equations and Slope, Fractions, Percentages, Algebra, Pre-Algebra, and Geometry)
- MathAntics on YouTube (Algebra Basics 1/2/3, Exponents, and Fractions Playlists)
- Mashup Math on YouTube (Algebra 1, Slope and Linear Functions, Exponents, Geometry Transformations Playlists)
- Mario’s Math Tutoring on YouTube (Fractions, Exponents, Learn Algebra 1, Equations of Lines, and Factoring playlists)

Self-Check for Students Entering Algebra 2

1. Evaluate each expression carefully:

- (a) -3^2
- (b) $(-3)^2$
- (c) 2^6

No calculator
on #1-13. Calculator
allowed on #14

2. Evaluate each root:

- (a) $\sqrt{169}$
- (b) $\sqrt[3]{64}$
- (c) $\sqrt{8}$

3. Simplify completely:

- (a) $\frac{5}{6} + \frac{7}{12}$
- (b) $\frac{4}{9} \div \frac{2}{3}$

4. Solve and justify your steps: $5x - \frac{3}{4} = \frac{1}{2}$

5. Write the equation of a line that passes through (3, -2) with a slope of -5. Express your answer in point-slope form and slope-intercept form.

6. Convert to standard form: $y = \frac{2}{3}x - 5$

7. Evaluate $|2x + 5| - 3|x - 4|$ when $x = -3$.

8. Solve the inequality: $4 - 2x \leq 10$

9. Simplify the expressions using exponent rules:

- (a) $(x^3y^4) \cdot (x^2y^{-1})$
- (b) $\frac{5x^{-3}}{10x^{-5}}$

10. Factor completely:

- (a) $x^2 - 9x + 14$
- (b) $4x^2 - 25$
- (c) $3x^2 - 5x - 2$

11. Simplify:

- (a) $\sqrt{50} + \sqrt{18}$
- (b) $\frac{3}{\sqrt{7}}$ (Rationalize the denominator)

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

13. Solve by completing the square: $x^2 + 4x - 5 = 0$

14. Create and solve an equation: A rectangle has a length that is 3 more than twice its width. Its area is 50 square units. Find its dimensions. Use a calculator

Algebra 2 Summer Self-Check

$$\textcircled{1} \textcircled{a} -3^2 = \boxed{-9}$$

$$\textcircled{b} (-3)^2 = \boxed{9}$$

$$\textcircled{c} 2^6 = \boxed{64}$$

$$\textcircled{2} \textcircled{a} \sqrt{169} = \boxed{13}$$

$$\textcircled{b} \sqrt[3]{64} = \boxed{4}$$

$$\textcircled{c} \sqrt{8} = \boxed{2\sqrt{2}}$$

$$\textcircled{3} \textcircled{a} \frac{5}{6} + \frac{1}{12} = \frac{10}{12} + \frac{1}{12} \\ = \boxed{\frac{11}{12}}$$

$$\textcircled{b} \frac{4}{9} \div \frac{2}{3} = \frac{4}{9} \times \frac{3}{2} \\ = \frac{4}{6} = \boxed{\frac{2}{3}}$$

$$\textcircled{4} 5x - \frac{3}{4} = \frac{1}{2}$$

$$4 \left[5x - \frac{3}{4} = \frac{1}{2} \right]$$

$$20x - 3 = 2$$

$$20x = 5$$

$$\boxed{x = \frac{1}{4}}$$

$$\textcircled{5} (3, -2) \quad m = -5$$

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

$$y = -5x + 15 - 4$$

$$\boxed{\begin{array}{l} y = -5x + 11 \text{ slope-intercept} \\ y + 2 = -5(x - 3) \text{ point-slope} \end{array}}$$

$$\textcircled{6} y = \frac{2}{3}x - 5$$

$$3 \left[y - \frac{2}{3}x - 5 \right]$$

$$3y = 2x - 15$$

$$\boxed{2x - 3y = 15}$$

$$\textcircled{7} |2x + 5| - 3|x - 4| \text{ when } x = -3$$

$$|2(-3) + 5| - 3|-3 - 4|$$

$$|-1| - 3|-7| = 1 - 3(7) = 1 - 21 = \boxed{-20}$$

$$\textcircled{8} 4 - 2x \leq 10$$

$$-2x \leq 6$$

$$\boxed{x \geq -3}$$

$$\textcircled{9} \textcircled{a} (x^3 y^4) \cdot (x^2 y^{-1})$$

$$= \boxed{x^5 y^3}$$

$$\textcircled{b} \frac{5x^{-3}}{10x^{-5}} = \frac{5x^5}{10x^3} = \boxed{\frac{x^2}{2}}$$

$$(10) \text{ a) } x^2 - 9x + 14$$

$$(x-7)(x-2)$$

$$\text{b) } 4x^2 - 25$$

$$(2x-5)(2x+5)$$

Diff. of 2 Squares

$$\text{c) } 3x^2 - 5x - 2$$

$$3x^2 - 6x + x - 2$$

$$3x(x-2) + 1(x-2)$$

$$(3x+1)(x-2)$$

$$(11) \text{ a) } \sqrt{50} + \sqrt{18}$$

$$\sqrt{25 \cdot 2} + \sqrt{9 \cdot 2}$$

$$5\sqrt{2} + 3\sqrt{2}$$

$$= 8\sqrt{2}$$

$$\text{b) } \frac{3}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$$

$$(12) x^2 + 7x + 12 = 0$$

$$(x+4)(x+3) = 0$$

$$x = -4 \quad x = -3$$

$$(13) x^2 + 4x - 5 = 0$$

$$x^2 + 4x + \boxed{4} = 5 + \boxed{4}$$

$$(x+2)^2 = 9$$

$$\sqrt{(x+2)^2} = \pm \sqrt{9}$$

$$x+2 = \pm 3$$

$$\boxed{x=1 \quad x=-5}$$

(14)

$$\boxed{} \times$$

$$2x + 3$$

$$x(2x+3) = 50$$

$$2x^2 + 3x = 50$$

$$2x^2 + 3x - 50 = 0$$

Quadratic Formula

$$a=2 \quad b=3 \quad c=-50$$

$$x = \frac{-3 \pm \sqrt{9 - 4(2)(-50)}}{4}$$

$$x = \frac{-3 \pm \sqrt{409}}{4}$$

$$x \approx 4.306 \quad \frac{50}{4.306} = 11.6$$

The dimensions are approximately
4.3 units x 11.6 units