

Summer 2026

Honors Geometry Summer Packet

Welcome to Honors Geometry! All students entering Honors Geometry are expected to have mastered topics presented in middle school math and Algebra 1. Below is a list of the top skills for success in Geometry, plus a diagnostic self-check for you to see what you need to practice (skills that most frequently cause issues are marked with *** so you can prioritize your review):

- ☐ ***Memorize the perfect squares and square roots up to 225 (15×15)
- ☐ ***Fluently work with fractions using all operations
- ☐ ***Solve linear equations (including no solution and infinitely many solutions)
- ☐ ***Calculate slope, recognize and use slopes of parallel and perpendicular lines
- ☐ ***Use point-slope form of a linear equation
- ☐ Graph linear equations (recognize positive/negative/zero/undefined slopes, use standard form, point-slope form, and slope-intercept form, fluidly rearrange equations between those forms, clear fractions to convert between forms, write equations of parallel and perpendicular lines, equations of horizontal and vertical lines)
- ☐ ***Factoring (GCF's, guess and check, AC method, factor by grouping, difference of 2 perfect squares, and perfect square trinomials)
- ☐ Literal equations (rearrange any equation to isolate a particular variable, including when the variable is in the denominator)
- ☐ ***Simplify radicals
- ☐ ***Operations with like radicals (simplify radicals to simplify an expression by finding and combining like radicals using addition and subtraction)
- ☐ ***Memorize formulas for area of a circle, rectangle, triangle, trapezoid
- ☐ ***Memorize formula for circumference of a circle
- ☐ ***Memorize formulas for volume of a cube and a cylinder
- ☐ Find area of composite shapes (i.e., a single shape made up of a rectangle with a semicircle on each end)
- ☐ Middle school geometry vocabulary (complementary, supplementary, perpendicular, radius, diameter, equilateral, isosceles, etc.)
- ☐ Pythagorean Theorem
- ☐ ***Solve proportions using cross-multiplication
- ☐ ***Solve quadratics by completing the square and factoring

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.

The following materials will be required for Geometry 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.
- **Composition notebook (no spirals, and no vinyl/plastic covers).**
- **Double-sided tape roller (no glue or gluesticks!)**
- **Compass, 6-inch ruler, and scissors**
- Graph paper and loose leaf paper
- 3-ring binder (can be shared with other subjects as long as Geometry 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 3 – Linear Equations and Inequalities (includes solving proportions)
- Unit 4 – Graphing Lines and Slope
- Unit 7 – Quadratics and Polynomials

“College Algebra” Course

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

“6th Grade” Course

- Unit 8 – Plane Figures
- Unit 10 – 3D figures

“7th Grade” Course

- Unit 9 – Geometry

“8th Grade” Course

- Unit 5 – Geometry (through Quiz 2)

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 Honors Geometry

1. Evaluate without a calculator:

$$\sqrt{225}, \sqrt{196}, \text{ and } \sqrt{289}.$$

2. Simplify completely:

(a) $\frac{5}{8} + \frac{7}{12}$

(b) $\frac{4}{9} \div \frac{2}{3}$

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

4. Solve the linear equation and classify the solution as unique, no solution, or infinitely many solutions:

$$3(x - 2) = 3x - 6$$

5. Calculate the slope of the line passing through $(-4, 5)$ and $(2, -3)$. Identify whether it is positive, negative, zero, or undefined.

6. Write the equation of a line in point-slope and slope-intercept form that passes through $(1, 6)$ with a slope of $-\frac{3}{4}$.

7. Solve the proportion using cross-multiplication: $\frac{x+3}{5} = \frac{4}{10}$.

8. Determine the slope of a line perpendicular to a line with slope $\frac{2}{3}$.

9. Factor completely:

(a) $x^2 - 9x + 14$

(b) $4x^2 - 25$

(c) $3x^2 - 5x - 2$

10. Find the area of the composite shape consisting of a rectangle measuring 8×5 and a semicircle attached to one of its shorter sides.

11. Solve the following:

(a) Find the area of a circle with a radius of 7 cm.

(b) Find the circumference of the same circle.

(c) Find the area of a triangle with a base of 10 cm and a height of 6 cm.

(d) Solve for h in the equation for the area of a triangle:

12. Two angles are supplementary. One angle measures $3x + 10^\circ$ and the other measures $2x + 20^\circ$. Find the value of x and both angle measures.

13. Write the equation of a line perpendicular to $y = \frac{3}{5}x - 2$ that passes through $(4, 1)$.

Honors Geometry Summer Diagnostic

KEY

$$\textcircled{1} \sqrt{225} = \boxed{15}$$

$$\sqrt{196} = \boxed{14}$$

$$\sqrt{289} = \boxed{17}$$

$$\textcircled{2} \textcircled{a} \frac{5}{8} + \frac{7}{12} = \frac{15}{24} + \frac{14}{24} \\ = \boxed{\frac{29}{24}}$$

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

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

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

$$20x - 3 = 2$$

$$20x = 5$$

$$x = \frac{5}{20} = \boxed{\frac{1}{4}}$$

$$\textcircled{4} \frac{3(x-2)}{3} = \frac{3x-6}{3}$$

$$x-2 = x-2$$

Infinitely many solutions

$$\textcircled{5} (-4, 5) (2, -3)$$

$$\frac{5 - (-3)}{-4 - 2} = \frac{8}{-6} = \boxed{-\frac{4}{3}}$$

$$\textcircled{6} (1, 6) m = -\frac{3}{4}$$

$$\boxed{y - 6 = -\frac{3}{4}(x - 1)} \text{ point-slope form}$$

$$y = -\frac{3}{4}x + \frac{3}{4} + 6$$

$$y = -\frac{3}{4}x + \frac{27}{4} \text{ slope-intercept form}$$

$$\textcircled{7} \frac{x+3}{5} = \frac{\cancel{4}}{\cancel{10}} \frac{2}{5}$$

$$5x + 15 = 10$$

$$5x = -5$$

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

$$\textcircled{8} m_1 = \frac{2}{3} \quad \boxed{m_2 = -\frac{3}{2}}$$

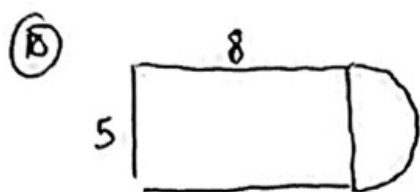
$$\textcircled{9} \textcircled{a} x^2 - 9x + 14 \\ \boxed{(x-7)(x-2)}$$

$$\textcircled{b} 4x^2 - 25 \\ \boxed{(2x-5)(2x+5)}$$

Diff. of 2 squares

$$\textcircled{c} 3x^2 - 5x - 2 \\ 3x^2 - 6x + x - 2 \\ 3x(x-2) + 1(x-2) \\ \boxed{(3x+1)(x-2)}$$

$$\begin{array}{r} -6 \\ \times 1 \\ \hline -6 \\ -5 \\ \hline \end{array}$$



$$\text{Rectangle Area} = 40 \text{ units}^2$$

$$\begin{aligned} \text{Semicircle Area} &= \frac{1}{2} (\pi \cdot (2.5)^2) \\ &= 3.125\pi \text{ or} \\ &9.817 \text{ units}^2 \end{aligned}$$

$$\begin{aligned} \text{Total Area: } 40 + 9.817 \\ = \boxed{49.817 \text{ units}^2} \end{aligned}$$

⑪ ④ $A = \pi r^2 = \boxed{49\pi}$

⑥ $C = 2\pi r \text{ or } \pi d$
 $= \boxed{14\pi}$

③ $A = \frac{1}{2}bh$
 $A = \frac{1}{2} \cdot 10 \cdot 6 = \boxed{30 \text{ units}^2}$

④ $A = \frac{1}{2}bh$
 $\boxed{h = \frac{2A}{b}}$

⑫ $(3x+10) + (2x+20) = 180$
 $5x+30 = 180$
 $5x = 150 \quad \boxed{x = 30}$

The angles are 100° and 80°

⑬ $y = \frac{3}{5}x - 2 \quad (4,1) \perp$
 $m_1 = \frac{3}{5} \quad m_2 = -\frac{5}{3}$

$y - 1 = -\frac{5}{3}(x - 4)$ point-slope

$y = -\frac{5}{3}x + \frac{20}{3} + 1$

$y = -\frac{5}{3}x + \frac{23}{3}$ slope-intercept