

*The Art of Problem Solving Online Classes*

Are You Ready for

**Introduction to Geometry?**

---

If you've mastered arithmetic, fractions, and the basic algebraic concepts illustrated in the problems below, you are ready for the Art of Problem Solving Online Class, **Introduction to Geometry**. (Answers to these problems can be found on the page following the test questions.)

1. **Solving linear equations.** Sample questions:

- (a) Find  $x$ :  $31x + 24 = 365$ .
- (b) Find  $n$ :  $7n - 4 = 2n + 16$ .

2. **Simplifying fractions containing algebraic expressions.** Reduce the following fractions:

- (a)  $\frac{3x + 6}{3}$ .
- (b)  $\frac{n(n - 1)}{n(n + 1)(r - 1)}$ .

3. **Addition and subtraction of quotients with different algebraic denominators.** Write each of the following as a single fraction in simplest terms:

- (a)  $\frac{1}{mn} + \frac{1}{m(2n - 2)}$ .
- (b)  $\frac{r}{r - 1} - \frac{r - 1}{r}$ .

4. **Multiplication of polynomials and binomials.** Expand each of the following:

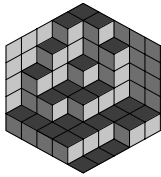
- (a)  $(x + 2)(x + 3)$ .
- (b)  $(x + y)(x^2 + 2xy + y^2)$ .
- (c)  $(x - 1)^4$ . (Hint:  $(x - 1)^4 = (x - 1)(x - 1)^3$ .)

5. **Solving polynomial equations.** Sample questions:

- (a) Find  $x$ :  $x^2 - 18x + 80 = 0$ .
- (b) Find  $x$ :  $2x^2 + 5x + 2 = 0$ .
- (c) Find  $x$ :  $x^4 - 13x^2 + 36 = 0$ . (Hint: let  $y = x^2$ .)

6. **Solving inequalities.** Sample questions:

- (a) Find the solution set:  $2x + 3 \leq 5x - 6$ .
- (b) Find the solution set:  $|x - 3| > 4$ .
- (c) Find the solution set:  $|x - 3| \leq 4$ .



*The Art of Problem Solving Online Classes*  
Are You Ready for  
**Introduction to Geometry?**

---

The answers to Are You Ready for Introduction to Geometry are below. (The answers to problem sets and challenges given in the class will include full detailed solutions as opposed to the mere answers provided below.)

1.

- (a)  $x = 11$
- (b)  $n = 4$ .

2.

- (a)  $x + 2$ .
- (b)  $\frac{n-1}{(n+1)(r-1)}$  or  $\frac{n-1}{nr+r-n-1}$ .

3.

- (a)  $\frac{3n-2}{mn(2n-2)}$  or  $\frac{3n-2}{2mn^2-2mn}$ .
- (b)  $\frac{2r-1}{r(r-1)}$  or  $\frac{2r-1}{r^2-r}$

4.

- (a)  $x^2 + 5x + 6$ .
- (b)  $x^3 + 3x^2y + 3xy^2 + y^3$ .
- (c)  $x^4 - 4x^3 + 6x^2 - 4x + 1$ .

5.

- (a)  $x = 8, 10$ .
- (b)  $x = -2, \frac{-1}{2}$ .
- (c)  $x = -3, -2, 2, 3$ .

6.

- (a)  $x \geq 3$ .
- (b)  $x < -1$  or  $x > 7$ .
- (c)  $-1 \leq x \leq 7$ .