

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 text, **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:  $|x - 3| \leq 4$ .

**Don't look at the next page until you've attempted all the problems!**

The answers to Are You Ready for **Introduction to Geometry** are 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)  $-1 \leq x \leq 7$ .