Are You Ready? Scholars Math 7.1: Introduction to Counting & Probability

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, **Scholars Math 7.1: Introduction to Counting & Probability**. (Answers to these problems are on the following page.)

Solving linear equations

1. Find x: $31x + 24 = 365$.
2. Find n: $7n - 4 = 2n + 16$.

Simplifying fractions containing algebraic expressions

3. Reduce the following fractions:
   (a) $\frac{3x+6}{3}$.
   (b) $\frac{n(n-1)}{n(n+1)(r-1)}$.

Addition and subtraction of quotients with different algebraic denominators

4. Write each of the following as a single fraction in simplest terms:
   (a) $\frac{1}{mn} + \frac{1}{m(2n-2)}$.
   (b) $\frac{r}{r-1} - \frac{r-1}{r}$.

Multiplication of polynomials and binomials

5. Expand each of the following:
   (a) $(x+2)(x+3)$.
   (b) $(x+y)(x^2+2xy+y^2)$.
   (c) $(x-1)^4$. (Hint: $(x-1)^4 = (x-1)(x-1)^3$.)

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

The answers to Are You Ready 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. $x = 11$
2. $n = 4$.
3. (a) $x + 2$.
   (b) $\frac{n-1}{(n+1)(r-1)}$ or $\frac{n-1}{nr+r-n-1}$.
4. (a) $\frac{3n-2}{mn(2n-2)}$ or $\frac{3n-2}{2mn^2-2mn}$.
   (b) $\frac{2r-1}{r(r-1)}$ or $\frac{2r-1}{r^2-r}$
5. (a) $x^2 + 5x + 6$.
   (b) $x^3 + 3x^2y + 3xy^2 + y^3$.
   (c) $x^4 - 4x^3 + 6x^2 - 4x + 1$.