

The Art of Problem Solving Online Classes
Are You Ready for
Introduction to Number Theory?

If you've mastered division, remainders, integer exponents and basic linear equations as illustrated in the problems below, then you are ready for the Art of Problem Solving Online Class, **Introduction to Number Theory**. (Answers to these problems are on the following page.)

1. **Integers.** An integer is a number with no fractional part. Which of the following are integers?

- (a) 2
- (b) -4
- (c) 0.5
- (d) 0
- (e) $493/7$
- (f) $248/4$

2. **Remainders.** Find the remainder in each division problem.

- (a) $22/8$
- (b) $32/6$
- (c) $248/8$
- (d) $399/13$
- (e) $1333/109$

3. **Integer exponents.** Evaluate the following:

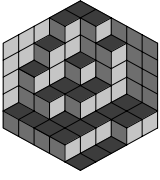
- (a) 2^4
- (b) $(-1)^6$
- (c) 3^3
- (d) 12^{-1}
- (e) 8^2

4. **Linear equations.** Solve each of the following for x .

- (a) $4x + 7 = 23$
- (b) $5x + 9 = 54$
- (c) $3x - 4 = x + 2$

5. **Algebraic expressions.**

- (a) Simplify: $(3x + 2) + (5x + 7)$.
- (b) Expand the product $(4n + 1)(4n + 3)$.



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The answers to Are You Ready for Introduction to Number Theory 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), (b), (d), and (f) are integers ($248/4 = 62$).

2.

- (a) 6
- (b) 2
- (c) 0
- (d) 9
- (e) 25

3.

- (a) 16
- (b) 1
- (c) 27
- (d) $1/12$
- (e) 64

4.

- (a) $x = 4$
- (b) $x = 9$
- (c) $x = 3$

5.

- (a) $8x + 9$
- (b) $16n^2 + 16n + 3$