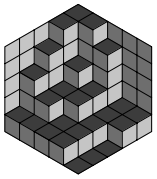


The Art of Problem Solving

Pre-Test

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 book **Introduction to Number Theory**.

Answers to these problems are on the following page. **Do not use a calculator.**

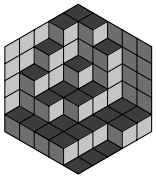
1. **Integers**. An integer is a number with no fractional part. Which of the following are integers?
   (a) 2
   (b) -4
   (c) 0.5
   (d) 0
   (e) 493/7
   (f) 248/4

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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Answers

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) $16n^2 + 16n + 3$

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