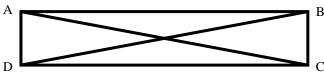
Answers in red boxes.

- 1. Find (the principal value of) $\sin^{-1}(\sin 10)$ (10 radians, not degrees) $3\pi 10$
- 2. What is the highest power of 5 that divides 2011! ? 501
- 3. How many real solutions are there to the equation $\sqrt{x} 1 = \sqrt[4]{x}$?
- 4. *True* or False (circle one)? No path that begins and ends at A traverses each segment exactly once. (The two diagonals each count as one segment; ignore their point of intersection.)



- 5. Use digits a, b, and c to form a three-digit number abc. How many such numbers between 100 and 200 are prime and have the property that ab, ac, and bc (each considered as two-digit numbers) are themselves all prime?
- 6. Which of the following Greek mathematicians was known as "Beta"? (circle one)
 - A. Archimedes
- B. Eratosthenes
- C. Euclid
- D. Pythagoras
- 7. Put the following events in order from the least likely to the most likely (use the indicated letters):
 - E: Tossing six fair coins and getting exactly three heads (5/16)
 - F: Rolling two fair six-sided dice and getting a sum of 6 or 7 (11/36)
 - G: Choosing a letter from the English alphabet (26 letters) at random and getting a letter that either immediately precedes or immediately follows a vowel. (Here we are not counting Y as a vowel and we assume that the alphabet ends at Z—it doesn't wrap back to A.) (9/26)

FEG (above values not required)

- 8. How many non-real solutions are there to the equation $12x^8 3x^4 15 = 0$?
- 9. A unit cube (each side has length 1) is inscribed in a sphere. What is the surface area of the sphere?
- 10. How many positive numbers x satisfy the equation ? $x^{x-1}=10$?