

Individual Round — Arithmetic

(1) Order the following numbers from least to greatest:

_____ (a) 1,000,000

_____ (b) The sum of the integers from 1 to 100.

_____ (c) Your height in inches.

_____ (d) 2^{30}

(2) A careful study has determined that 40% of all statistics quoted in math competitions are false. Of the remaining statistics, one-third are irrelevant to daily life. What percentage of the statistics quoted in math competitions are both true and relevant?

(3) Calculate the sum of the *digits* of all the positive integers less than 100.

Individual Round — Algebra

(1) Rewrite $1 + x(2 + x(3 + 5x))$ in the form $ax^3 + bx^2 + cx + d$.

(2) If r_1 and r_2 are solutions of the quadratic equation $ax^2 + bx + c = 0$, which of the following is a representation of $(r_1)^2 + (r_2)^2$?

(a) $\frac{b^2 + 4b^2a^2 - 16a^3c}{2a^2}$

(b) $\frac{b^2 - 2ac}{a^2}$

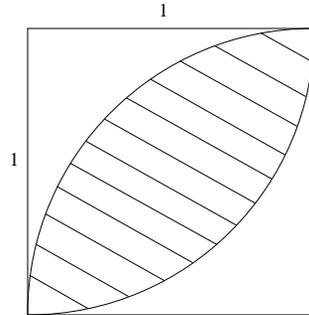
(c) $\frac{b^2}{4a^2}$

(d) $\frac{2b^2 - 4ac}{a^2}$

(3) Solve for x : $\frac{\sqrt{2x} - \sqrt{2}}{4} = \sqrt{\frac{1 - \frac{\sqrt{x}}{2}}{2}}$

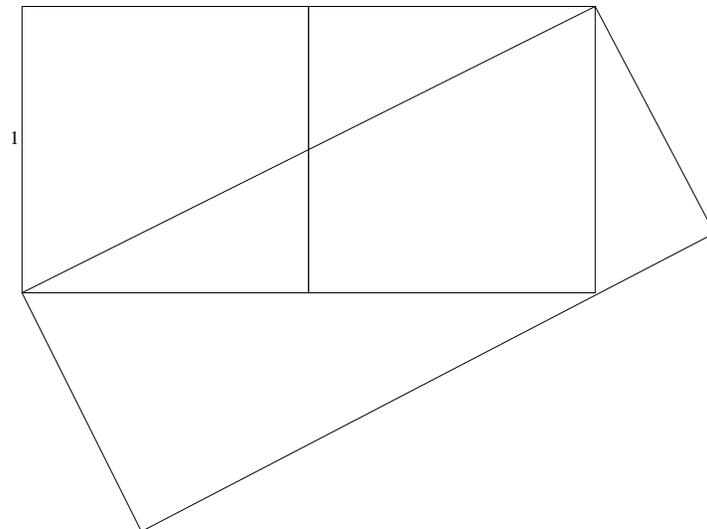
Individual Round — Geometry

- (1) Find the area of the striped region. Assume the square is 1 unit on a side and the arcs are portions of circles that are centered on opposite corners of the square.



- (2) A plain white cube is on your teacher's desk as a paperweight. You grab it and put it back before the teacher notices. How many different ways can you place it back so the teacher can't tell it has been moved?

- (3) Find the dimensions of the slanted rectangle. (Both of the squares are 1 unit on a side.)



Team Round — CAPT

As part of a promotion, a radio station is giving away 25 cell phones. To keep it interesting, they decided that 4 of the phones will have a \$100 bill slipped in behind the battery, so they will appear to be broken.

- (1) Suppose you are the first person selected to receive a phone. What is the probability that you get a “broken” phone?

- (2) Suppose you are the 10th person to receive a phone and you know that 2 people who went before you are complaining their phones are broken. What is the probability now that you get a “broken” phone?

- (3) After all the phones have been given out a friend tells you that both she and her cousin got phones. (For this question, assume that you have no further information – you don’t know where they were in line, etc.) What is the probability that at least one of them got a phone with a \$100 bill?

