SET 16
OLYMPIAD 1

1A
3 MINUTES
76%

2013 is multiplied by 10,001. Find the sum of the digits in the product.

1B
3 MINUTES
47%

Six consecutive whole numbers are each divided by 6. Find the sum of the resulting six remainders.

1C
5 MINUTES
24%

On a number line, two different integers are each twice as far from +7 as from –2. Find both of these integers.

1D
6 MINUTES
16%

The arithmetic mean (average) of five positive integers is 30. What is the greatest possible value of their median?

1E
7 MINUTES
9%

A $10 \times 10 \times 10$ cube is painted red on all faces and then cut into ten $10 \times 10 \times 1$ slices. Each slice is then cut into twenty-five $2 \times 2 \times 1$ blocks. How many of the 250 blocks have exactly one face painted red?

Solutions start on page 283.

SET 16
OLYMPIAD 2

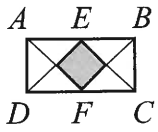
2A
4 MINUTES
43%

October 25, 2018 will be a Thursday. What day of the week will August 1, 2018 be?

[*August has 31 days, while September has 30 days.*]

2B
5 MINUTES
53%

In rectangle $ABCD$, E and F are the midpoints of sides $\overline{AB}$ and $\overline{DC}$ as shown. $\overline{AF}$, $\overline{FB}$, $\overline{DE}$, and $\overline{EC}$ are line segments. If $AB = 16$ centimeters and $BC = 8$ centimeters, find the area of the shaded region.



2C
5 MINUTES
47%

Find the whole number P such that each of the following conditions is satisfied:

- P is a two-digit prime,
- $P + 3$ is a perfect square,
- $P + 6$ is the next greater two-digit prime.

2D
6 MINUTES
25%

A train is $\frac{1}{4}$ mile long and travels at a constant speed of 8 miles per hour. A boy on a bicycle, traveling at a constant speed of 11 miles per hour, rides on a road next to the track. From the moment he passes the rear of the train, it takes him M minutes to reach the front. Find M.

2E
7 MINUTES
15%

Find the least value of the fraction $\frac{a}{b}$, such that $\frac{a}{b}$ is an improper fraction in lowest terms; and if $\frac{a}{b}$ is divided by either $\frac{6}{25}$ or $\frac{8}{15}$, the quotient is a whole number.

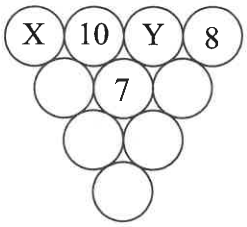
Solutions start on page 285.

SET 16

OLYMPIAD 3

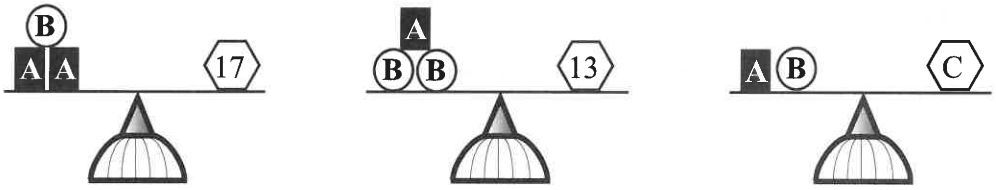
3A
3 MINUTES
53%

The integers from 1 through 10 inclusive are placed in the 10 circles shown, one integer in each circle. Each number in the lower 3 rows is the positive difference between the numbers in the 2 circles immediately above it. Find the values of X and Y.



3B
4 MINUTES
75%

A, B, and C represent weights in the three balance scales shown. Find C.

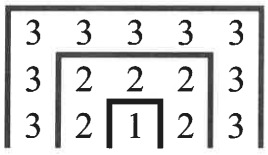


3C
5 MINUTES
13%

Two boys and six girls are seated randomly in 8 chairs around a circular table. Express as a fraction, in lowest terms, the probability that the two boys are seated next to each other.

3D
6 MINUTES
32%

One year, a farmer planted 1 tree. Each year thereafter, he planted a group of trees in the pattern "⌐¬" as shown. The diagram shows the result at the end of Years 1, 2, and 3. By the end of Year 9, how many trees had he planted in all?



(Each number in the diagram indicates the year that tree was planted.)

3E
7 MINUTES
7%

The coordinates of the vertices of a rectangle are $A(-5, 4)$, B(3,4), C(3,–2), and $D(-5,-2)$. The length of $\overline{AC}$ is 10. Point E is on $\overline{AC}$ such that $\overline{BE}$ is perpendicular to $\overline{AC}$. What is the length of $\overline{BE}$?

Solutions start on page 287.

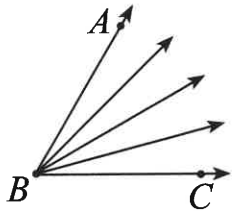
SET 16
OLYMPIAD 4

4A
3 MINUTES
29%

On graph paper, Maya draws a path from point $A(-1,0)$ to point $B(3,5)$, and then to point $C(7,-3)$. The path follows the lines of the paper, always moving right, left, up or down. How long is the shortest path Maya can draw?

4B
4 MINUTES
51%

Five rays share a common vertex, as shown. The measure of angle ABC is less than 90°. In all, how many acute angles are in the diagram?

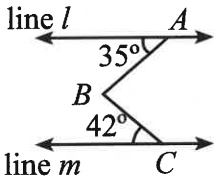


4C
5 MINUTES
17%

A sports arena has a total capacity of 20,000 fans and ushers. One usher is required for every 30 fans. What is the greatest number of fans that can be in attendance?

4D
5 MINUTES
47%

Lines l and m are parallel. Point A is on line l and point C is on line m. Point B is in the interior of the two parallel lines. The angle measures are shown at the right. Find the number of degrees in the acute angle ABC.



4E
7 MINUTES
6%

How many fractions, in lowest terms, between $\frac{1}{4}$ and $\frac{3}{8}$ *inclusive*, are exactly equivalent to a decimal that is written using three decimal places?

Solutions start on page 289.

SET 16
OLYMPIAD 5

5A
4 MINUTES
61%

The faulty odometer of a used car registers 4.6 miles for every 5 miles actually driven. When travelling from Acton to Bywater, the faulty odometer registers 92 miles. How far apart are Acton and Bywater?

5B
4 MINUTES
47%

The first four terms of the sequence 2, –3, –2, 3, 2, –3, –2, 3, … repeat endlessly. Find the sum of the first 2013 terms.

5C
5 MINUTES
42%

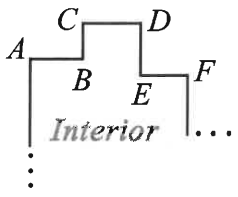
Suppose $5x - 2y = 30$. Find the integer value of $y - \frac{5}{2}x$.

5D
6 MINUTES
26%

This year, 1 out of every 55 adults started a new business. This rate represented an increase of 20% over last year's rate of 1 new business start-up out of every N adults. Find N.

5E
7 MINUTES
18%

The floor plan of an enclosed area consists entirely of straight walls meeting at right angles. The room partly shown has "inside" corners at A, C, D, and F and "outside"corners at B and E. The complete room has 23 inside corners and P outside corners. Find P.



Solutions start on page 291.