3A *Time: 3 minutes*

Find the number of digits to the left of the decimal point when 500 million is divided by one hundred seventy thousand.

3B *Time: 5 minutes*

Kim multiplies all the counting numbers from 30 through 2 inclusive:

$$30 \times 29 \times 28 \times 27 \times \cdots \times 4 \times 3 \times 2.$$

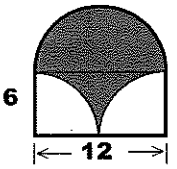
If this expression is rewritten as the product of prime numbers, how many times will 7 be used as a factor?

3C *Time: 4 minutes*

Chloe and Jack play 3 games. The probability that Chloe wins any game is $\frac{3}{5}$. What is the probability that Chloe wins for the first time in the third game?

3D *Time: 5 minutes*

A semicircle rests atop a 12 cm by 6 cm rectangle. Two quarter-circles, each of radius 6 cm are removed from the bottom corners of the rectangle. Find the number of square cm in the area of the shaded region thus formed.



3E *Time: 7 minutes*

Find whole numbers a, b, and c so that

$$a + \cfrac{1}{b + \cfrac{1}{c}} = \frac{45}{7}$$

4A *Time: 3 minutes*

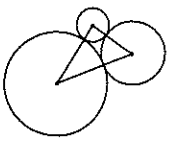
Suppose $52 \times 50 \times N = 40 \times 13 \times 35$.
Find the whole number N.

4B *Time: 5 minutes*

Two consecutive positive integers are each less than 100. One integer is divisible by 17 and the other integer is divisible by 21. Find the greater of the two integers.

4C *Time: 5 minutes*

Three circles are externally tangent as shown. Their areas are 9π, 25π, and 100π sq cm. A triangle is formed by connecting the centers of the three circles. Find the perimeter of the triangle, in cm.

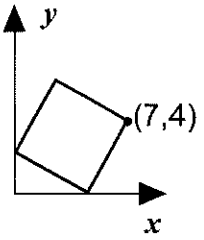


4D *Time: 6 minutes*

The four-digit whole number 3▮11 is exactly divisible by 13.
Find the missing digit ▮.

4E *Time: 7 minutes*

A square is positioned in quadrant I on graph paper so that two vertices lie on the axes, while a third vertex lies at the point (7,4).
Find the area of the square.



5A ***Time: 3 minutes***

For any two numbers a and b, define the value of $a \divideontimes b$ as $a + 3 \times b$. For example, $4 \divideontimes 5$ means $4 + 3 \times 5 = 19$. If $2 \divideontimes 6$ and $N \divideontimes 4$ represent the same number, what is the value of N?

5B ***Time: 5 minutes***

Express the product as a fraction in simplest terms.

$$\frac{1}{3} \times \frac{2}{4} \times \frac{3}{5} \times \frac{4}{6} \times \frac{5}{7} \times \frac{6}{8} \times \frac{7}{9} \times \frac{8}{10}.$$

5C ***Time: 5 minutes***

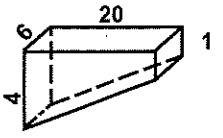
The sum of the integers from -10 through N, inclusive, equals 50. Find N.

5D ***Time: 5 minutes***

The Pumas lost 7 of their first 9 games. By winning 75% of their remaining games, they ended with victories in exactly $\frac{2}{3}$ of all their games. In all, how many games did they win?

5E ***Time: 7 minutes***

The rectangular top of an in-ground swimming pool is 20 m by 6 m. The pool is 4 m deep at one end and 1 m deep at the other. How many cubic meters of water can the pool hold?



Not drawn to scale.
All measures in meters.

5A ***Time: 4 minutes***

How many 2-digit numbers are there in which the ones digit is greater than the tens digit?

5B ***Time: 5 minutes***

A bank has two plans for checking accounts. In plan A, the charge is $7.50 a month with no fee for each check. In plan B, the charge is $3 a month plus an additional 20 cents for each check written. What is the least number of checks a customer must write each month so that plan A costs less than plan B?

5C ***Time: 5 minutes***

Suppose the base of a triangle is increased by 20%, and its height is increased by 30%. By what percent is the area of the triangle increased?

5D ***Time: 6 minutes***

Starting with 1, Sara lists the counting numbers in order but omits all those that use the digit 9. What is the 300th number on her list?

5E ***Time: 8 minutes***

Line segments form a path that starts at (0,0), is drawn to (1,0), and then to (1,2). Each new segment forms a right angle with the segment before it and is 1 unit longer than that segment. The path ends at (0,0). How many segments are in the shortest possible path?

(*Hint: Consider horizontal and vertical segments separately.*)