RULES

• Teams must have either three or four competitors.
• The competition will consist of five rounds, each lasting ten minutes.
• In each round there are five questions, but only your *best three* questions will contribute to your score. The questions have 1, 2, 3, 4 and 5 points allocated respectively.
• You will not lose points for incorrect answers.
• Prizes will be awarded to the top three school teams.
• You must have fun!

ROUND ONE

1. If there are approximately $10^k$ seconds in one day, then what is the value of the positive integer $k$?

2. Nick has a stamp collection which consists of a mixture of 20c and 26c stamps worth $2.22 in total. How many 20c stamps are there in Nick’s collection?

3. Express the number 
$$0.87^2 + 0.79^2 + 0.71^2 + 0.63^2$$
$$-0.37^2 - 0.29^2 - 0.21^2 - 0.13^2$$
in simplest form.

4. A circle with radius $r$ and an equilateral triangle with side length $s$ have the same area. What is the value of $\frac{r}{s}$?

5. Find two integers, $a$ and $b$, each consisting of five distinct digits, such that $b$ is twice the value of $a$ and none of the digits in $b$ is the same as the digits in $a$.

ROUND TWO

1. If the 7-digit number 1234$x$67 is divisible by 9 what is the value of $x$?

2. In a triangle $ABC$, $D$ is a point lying on $AC$ and $E$ is a point lying on $AB$. Also, it is known that $AD = 3DC$ and that $DE$ is parallel to $CB$. If the area of triangle $ADE$ is 99, then what is the area of the triangle $ABC$?
3. Norm and Damjan play a game in which they each roll one die. Norm wins the game if he rolls a number greater than Damjan’s, while Damjan wins if he rolls a number greater than or equal to Norm’s. Assuming the two dice are fair, what is the probability that Norm wins the game? Express your answer as a fraction in simplest terms.

4. Express the number
\[\frac{1}{100} + \frac{3}{100} + \frac{5}{100} + \frac{7}{100} + \cdots + \frac{299}{100}\]
in simplest form.

5. What is the largest 3-digit number that is increased by 75% when its digits are reversed?

**ROUND THREE**

1. The average age of the 11 players in a soccer team is 22 years. During a match, one player had to leave the game due to injury. The average age of the remaining players was then 21 years. How old is the player who was hurt?

2. If \((2x - 1)^4 = a_0 + a_1x + a_2x^2 + a_3x^3 + a_4x^4\), then what is the value of \(a_0 + a_1 + a_2 + a_3 + a_4\)?

3. What is the sum of all 2-digit prime numbers which have 1 even digit and 1 odd digit?

4. What is the least number of squares that a 34 \(\times\) 55 rectangle can be cut into? (Note that the squares can be of different sizes.)

5. If the two quadratic equations
\[
\begin{align*}
x^2 + (3 - 2a)x - 6a &= 0 \\
x^2 + (a - 11)x + 24 - 8a &= 0
\end{align*}
\]
have exactly one root in common, then what are the possible values of \(a\)?

**ROUND FOUR**

1. Andrew and Joanna are enjoying a leisurely walk through the forest. On the way, Andrew decides to count the number of birds he sees perched in the trees. After they come to the end of their stroll, Joanna asks Andrew how many birds he saw. When he tells her, Joanna thinks a bit and then says, “You counted three times as many birds as the difference in ages between you and your sister!” Given that Andrew is 19 now, and will be twice as old as his sister in five years, how many birds did Andrew see?
2. At a local cinema (which is not Cinema Nova), the price of a movie ticket has increased by 40%, but the takings have increased by only 26% compared to the previous year. What percentage has the number of movie goers fallen by?

3. Which two positive integers, neither ending in zero, when multiplied together give 1,000,000?

4. A tape takes four minutes to rewind. It consists of a really thin film wound around a really really thin spindle, and it rewinds at a constant number of revolutions per second. What fraction of the tape is rewound in the first minute?

5. Twelve chocoholics are seated at a round table and are discussing which five of them should get the last five crispy M & M’s. It is agreed that no two people who are sitting next to each other should both be allowed to receive an M & M. In how many ways can the lucky five be chosen?

ROUND FIVE

1. If the sum of two numbers is 1002 and and their product is 2004, then what is the sum of the reciprocals of the two numbers?

2. If \( p \) is a prime number and \( p((p - 1)! + 1) \) is divisible by \( 2p \), then find all possible values of \( p \). (Note that \( N! = 1 \times 2 \times 3 \times \cdots \times N \).)

3. A thin red stripe in the shape of a coil is painted around a cylinder which is 80cm tall. The red stripe makes a constant angle of 60° with the vertical. How long is the red stripe in centimetres?

4. A regular hexagon \( ABCDEF \) has side length 2. Joining the midpoints of the 6 sides of \( ABCDEF \) forms a regular hexagon \( PQRSTU \). What is the area of \( PQRSTU \)?

5. A cube can be folded out of a “net” whose shape consists of six squares all joined together. How many differently shaped nets are there? (We will consider two shapes as the same if they can be rotated and/or flipped to look the same.)

TIE-BREAKER

1. What is the remainder when \( 2^{1344452457} \) is divided by 11?

2. If \( a_1 = 5 \), \( a_2 = 7 \) and \( a_{n+2} = 3a_{n+1} - 2a_n \) for \( n \geq 1 \), what is the value of \( a_{2004} \)?