

Advanced Level Relay Round 1

R1-A 20 lines in the plane are such that no two are parallel and no three are concurrent. Find the number of regions the plane is divided by these lines.

R1-B $T = \text{TNYWR}$ (The Number You Will Receive). Let a, b and c be positive integers such that $ab + bc + ca$ attains its maximum value when $a < b < c$ and $a + b + c = T$. Find b .

Advanced Level Relay Round 2

R2-A A five-digit number without digit 0 is called nice if it coincides with any of the numbers 12345 and 23456 in exactly two positions (for example 12457 is nice but 12456 is not). Determine the number of nice numbers.

R2-B $T = \text{TNYWR}$ (The Number You Will Receive). Points C and D lie on a circle of center O and diameter 700 cm. If $CD = T$ cm find the distance from the point C to the line OD .

Advanced Level Relay Round 3

R3-A Consider the sequence $a_1 = 3, a_2 = 2$ and $\frac{2}{a_n} = \frac{1}{a_{n-1}} + \frac{1}{a_{n+1}}$ for $n \geq 2$. If

$a_{2018} = \frac{p}{q}$ where p and q are relatively prime find q .

R3-B $T = \text{TNYWR}$ (The Number You Will Receive). A word has length w and is composed by three letters only – a, b and c . The word is called *good* if it is possible to replace these letters by 1, 2 and 3 in some order such that the number obtained is divisible by 3. For how many values of w in the interval $[T, 2018]$ all words of length w are good?