21. Two players take turns in tossing a fair coin. The winner is the first one to toss a head and the game is played until there is a winner. What is the probability that the first player, the player who tosses first, wins the game?

(A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{2}{3}$ (E) $\frac{3}{4}$

22. Each cell of a 10×10 square grid should be colored in red or blue such that each 2×2 square has an odd number of blue squares. If each cell is distinct then how many different colorings are there?

(A) 99 (B) 100 (C) 2^{10} (D) 2^{19} (E) 2^{99}

23. All integers from 1 to 2018 are written on a white board. Two players take turns in selecting two numbers and erasing them and writing their positive difference instead. If the last number written on the board is odd then the first player, the player who plays first, wins. Otherwise the second player wins. Which of the following is/are true?

I. The first player always wins.
II. The second player always wins.
III. The second player has a winning strategy.

(A) I only (B) II only (C) III only (D) II and III only (E) None

24. A set A consists of 2019 integers such that the sum of any 2018 elements of A is divisible by 2018. Which of the following statements is/are necessarily true?

I. Every element of A is divisible by 2018.
II. Every element of A has the same remainder when it is divided by 2018.
III. At least one element of A is divisible by 2018

(A) I only (B) II only (C) III only (D) All (E) None

25. How many 4 digit numbers are there such that any 4 digit number obtained by a rearrangement of its digits is divisible by 5? (Note that a number with 4 digits has its first digit of the four digits non zero.)

(A) 1 (B) 8 (C) 16 (D) 20 (E) 25

26. One of Kanchana, Damitha, Ranjan, Pooja and Roshan broke a vase. The following is what each of them had to say about the person who broke the vase:

Kanchana: If Ranjan did not break the vase then Pooja or Roshan broke it.
Damitha: Ranjan broke the vase.
Ranjan: Pooja broke the vase.
Pooja: Roshan broke the vase.
Roshan: Kanchana broke the vase.

If only one of these 5 statements is true, who broke the vase?

(A) Kanchana (B) Damitha (C) Ranjan (D) Pooja (E) Roshan

6. Which of the following statements is true for all real values (positive, negative and zero) of the number a?

(A) $7a > 3a$ (B) $7a^2 > 3a^2$ (C) $7(a+1) > 3(a+1)$ (D) $5 - 7a > 5 - 3a$
(E) $217 + a > 3 + a$

7. The hypotenuse of a right triangle is 2018 cm and a side is 1118 cm. What is the length of the other side in cm? (Note: $\sqrt{3136}$=56)

(A) 1675 (B) 1680 (C) 1685 (D) 1690 (E) 1695

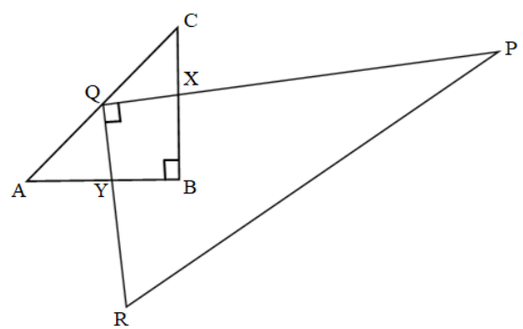
8. A regular triangle (equilateral triangle), a regular quadrilateral (square), a regular pentagon and a regular hexagon have interior angles measured in integer degrees. In total, how many types of regular polygons have interior angles measured in integer degrees?

(A) 20 (B) 22 (C) 23 (D) 26 (E) 30

9. In a primary school, the number of participants in a sports meet is 75. For the three events A, B and C of the sports meet, the participants are in the ratio 2 : 5 : 4 and each participant participated in at least one of these three events. Every student who participated in event A also participated in event B and no student participated in all three events. If the ratio of the number who participated in both events B and C to the number who participated in event A is 1:3, how many students participated in exactly one event?

(A) 50 (B) 51 (C) 52 (D) 53 (E) 54

10. In the figure given below (not drawn to scale), ABC is an isosceles right triangle with the two equal sides of length 2 cm each and PQR is a right triangle. Q is the midpoint of AC.



What is the area of the quadrilateral $XQYB$ in cm^2?

(A) 1 (B) 1.5 (C) 2 (D) 2.5 (E) 3