

# Revision VII

December 24, 2025

- Let 'a' and 'b' be real numbers. If a and  $-a$  are roots of the equation  $2x^3 + bx^2 - 6x + 9 = 0$ , then what is the value of 'b'?

- A vessel contains 20 liters of pure milk. A person takes out 2 liters of milk from the vessel and replaces it with 2 liters of water. Again, 2 liters of the mixture is taken out and replaced with 2 liters of water. If this process is repeated one more time but the mixture taken out is replaced with 2 liters of milk, then what is the quantity (in liters) of milk left in the mixture?

- $\triangle ABC$  is an equilateral triangle. Let  $D$  be a point on  $BC$  such that the ratio of the area of triangle  $ABD$  to that of triangle  $ADC$  is  $3 : 1$ . If the length of  $AD$  is  $13$  cm, then the length (in cm) of the side of triangle  $ABC$  is

- In an Arithmetic Progression, the sum and product of first five numbers are 25 and 2520 respectively. If one of these five numbers is  $-1/2$ , then the greatest number amongst first five numbers is

- Three workers Tarak, Palak and Jatak are appointed to do a job. They started the job together but Jatak left after 12 days when 60% of the job was done. The remaining job was completed by Tarak and Palak in 10 days. The ratio of efficiency of Tarak and Palak is 3 : 7. Find the number of days required by the fastest worker to complete 70% of the job alone.

- A cyclist travelled from point P to Q at the constant speed of 25 km/h. When he covered the distance of  $\frac{25}{3}$  km, he was overtaken by a bike that left point P, 12 minutes after the cyclist and travelled at a constant speed too. When the cyclist travelled another 30 km, he encountered the bike returning from Q. Assume that the bike did not stop at point Q. Find the distance (in km) between P and Q.

- In how many ways can a teacher create 4 teams of two students each, out of 10 available students, to compete against each other in a quiz competition?

- Sarah's age 6 years ago was equal to the sum of the present ages of her son and her daughter. Five years hence, the ratio between her daughter's age and her son's age will be 7 : 6 respectively. Sarah's husband, Shan, is 9 years older than her. Shan's present age is thrice the present age of his son. What is his daughter's present age (in years)?

- Let  $f(x) = ax^2 + bx + c$  be a quadratic polynomial in  $x$  such that  $f(x) \geq 0$  for all real numbers  $x$ . If  $f(3) = 0$  and  $f(6) = 9$ , then what is the value of  $f(-1) - f(-3)$ ?

- Let the set  $S = \{5, 6, 7, \dots, 2n + 1\}$ , where  $n$  is a positive integer larger than 2023. If  $A$  is the average of the odd integers in  $S$  and  $B$  is the average of the even integers in  $S$ , then  $A - B$  is

- A class of students decided to do a work in 5 hours. But since 6 students left after the first hour, 2 more students left after the second hour, 2 more students left after the third hour and so on, the work was completed after 8 hours. How many students were there in the class?

- When five is added to three times a number and the result is squared, the result obtained is four times the square of the sum of the number and its next multiple. What could be the number?

- In an arithmetic progression with 23 terms, the sum of its 21<sup>st</sup>, 22<sup>nd</sup> and 23<sup>rd</sup> terms is 264, and the sum of the three middle terms is 144. How many terms of the progression can be expressed in the form of  $2^n$ , where  $n$  is a natural number?

- A car and a bus start from a same point in the same direction. After 'T' hours the car is 45 km ahead of the bus, while after '9' hours distance between the car and the bus is same as distance covered by the car in one hour. If relative speed of the car and the bus if they move towards each other is 255 km/h, then how much distance (in km) can the car cover in  $(T - 1/2)$  hour?

- Kamal bought 5 Burgers, 7 Samosas and 4 Ice-creams. Rohit bought 6 Burgers, 14 Samosas and 8 Ice creams for an amount which was 50% more than what Kamal paid. What percentage of the total amount spent by Kamal was spent on the Burgers?

- Two regular polygons are such that the ratio between their number of sides is  $2 : 3$  and ratio of measures of their interior angles is  $3 : 4$ . The difference between the number of sides of the two polygons is

- Biswa purchased two items A and B. If he earns profit of 10% on A and 12% on B, overall profit earned by him is Rs. 84. But if he earns 20% on A and 10% on B, overall profit earned by him is 14% of total price of items. Find initial total purchasing price (in Rs.) of both items.

- Sonu and Monu are climbing on a moving escalator that is going up. Sonu takes 48 steps to reach the top but Monu takes 54 steps to reach the top. Sonu can take 4 steps in a second while Monu can take 6 steps in a second. Calculate the total number of steps in the escalator.

- Five men and eight women complete a task in 28 days. If the women are at least half as efficient as the men, but not more efficient than the men, then the possible number of days for 4 women and 3 men to complete the same task lies in the range?

- Bob randomly selects two distinct numbers from the set  $\{1, 2, 3, 4, 5\}$ , and Sam randomly selects a number from the set  $\{1, 2, 3, 4, \dots, 10\}$ . In how many ways can Bob choose two numbers such that Sam's number is larger than the sum of the two numbers chosen by Bob?

- Suman borrowed Rs.1.5 lakh at 12% per annum compound interest for two years. Instead of repaying the entire amount at the end of the second year, he repaid an installment of Rs.1 lakh at the end of the first year and the remaining at the end of the second year. Find the amount (in Rs.) that saved in this manner.

- Thomas uses 100 grams of lemon juice, 100 grams of sugar, and 400 grams of water to make lemonade. There are 25 calories in 100 grams of lemon juice and 386 calories in 100 grams of sugar. Water contains no calories. How many calories are in 200 grams of his lemonade?