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**Logical Reasoning Tricks and Techniques for**

**Exam: IAS, PCS, UPSC, Bank PO, NDA, RRB, SSC, Indian Air Force, Etc.**

**VERBAL REASONING- LOGICAL SEQUENCE AND WORD (English)**

**Q1: In a class of 40 students, John is ranked 15th from the top. What is his rank from the bottom?**

**Long Method:** To determine John's rank from the bottom, we need to consider the total number of students in the class. If John is ranked 15th from the top, it means there are 14 students ahead of him. The total number of students minus the number of students ahead of him gives us his position from the bottom. We calculate this as follows:  $40$  (total students) -  $14$  (students ahead) =  $26$ . Therefore, John is ranked 26th from the bottom.

**Short Method:** Subtract John's rank from the total number of students and add 1:  $40 - 15 + 1 = 26$ . John's rank from the bottom is 26th.

**Q2: In a list of numbers, if the second smallest number is 10 and the largest number is 50, what is the range of the list?**

**Long Method:** To find the range of a list of numbers, we subtract the smallest number from the largest number. Here, the problem provides the second smallest number (10) and the largest number (50). To proceed, we need the smallest number, which must be less than 10. Assuming the smallest number is  $x$  (where  $x < 10$ ), the range is  $50 - x$ . Without the exact smallest number, the range would be between 40 (if the smallest number is 10) and 50 (if the smallest number is 0).

**Short Method:** Range = Largest number - Smallest number. Without the exact smallest number, the range is between 40 and 50.

**Q3: If a man can type 60 words per minute, how many words can he type in 45 minutes?**

**Long Method:** First, determine the number of words typed per minute, which is given as 60. Multiply this rate by the number of minutes to find the total words typed:  $60$  words/minute \*  $45$  minutes =  $2700$  words. Thus, the man can type 2700 words in 45 minutes.

**Short Method:**  $60$  words/minute \*  $45$  minutes =  $2700$  words.

**Q4: A train travels at a speed of 80 km/h. How long will it take to travel 320 kilometers?**

**Long Method:** To determine the travel time, use the formula: Time = Distance / Speed. Given the distance is 320 kilometers and the speed is 80 km/h, the calculation is  $320 \text{ km} / 80 \text{ km/h} = 4$  hours. Hence, it will take 4 hours to travel 320 kilometers.

**Short Method:**  $320 \text{ km} / 80 \text{ km/h} = 4$  hours.

**Q5: If the ratio of boys to girls in a class is 3:2 and there are 30 students in total, how many boys are there?**

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**Long Method:** Let the number of boys be  $3x$  and the number of girls be  $2x$ . The total number of students is given as 30, so we set up the equation:  $3x + 2x = 30$ . Combining like terms gives  $5x = 30$ . Solving for  $x$ , we get  $x = 6$ . Therefore, the number of boys is  $3x = 3 * 6 = 18$  boys.

**Short Method:** Total ratio parts =  $3 + 2 = 5$ . Each part is  $30/5 = 6$ . Number of boys = 3 parts =  $3 * 6 = 18$  boys.

**Q6: If a car's fuel efficiency is 25 miles per gallon and it has a 12-gallon tank, how far can it travel on a full tank?**

**Long Method:** To find the total distance the car can travel on a full tank, multiply the fuel efficiency by the tank capacity:  $25 \text{ miles/gallon} * 12 \text{ gallons} = 300 \text{ miles}$ . Thus, the car can travel 300 miles on a full tank.

**Short Method:**  $25 \text{ miles/gallon} * 12 \text{ gallons} = 300 \text{ miles}$ .

**Q7: A store sells 5 different types of fruits. If a customer buys 3 types, how many different combinations of fruits can they choose?**

**Long Method:** To determine the number of combinations, we use the combination formula:  $C(n, k) = n! / (k!(n-k)!)$ , where  $n$  is the total number of items, and  $k$  is the number of items to choose. Here,  $n = 5$  and  $k = 3$ , so  $C(5, 3) = 5! / (3!(5-3)!) = 5! / (3!2!) = (5 * 4 * 3 * 2 * 1) / ((3 * 2 * 1)(2 * 1)) = 10$ . Therefore, there are 10 different combinations of fruits.

**Short Method:** Using the combination formula:  $C(5, 3) = 10$ .

**Q8: If a box contains 12 red balls, 8 blue balls, and 10 green balls, what is the probability of randomly picking a blue ball?**

**Long Method:** First, find the total number of balls:  $12 \text{ (red)} + 8 \text{ (blue)} + 10 \text{ (green)} = 30$  balls. The probability of picking a blue ball is the number of blue balls divided by the total number of balls:  $8/30$ . Simplify the fraction by dividing the numerator and denominator by their greatest common divisor (2):  $8/30 = 4/15$ . Therefore, the probability is  $4/15$ .

**Short Method:** Probability =  $8 \text{ blue balls} / 30 \text{ total balls} = 4/15$ .

**Q9: If the sum of three consecutive even numbers is 54, what is the middle number?**

**Long Method:** Let the three consecutive even numbers be  $x$ ,  $x+2$ , and  $x+4$ . The sum is given by  $x + (x+2) + (x+4) = 54$ . Combine like terms to get  $3x + 6 = 54$ . Subtract 6 from both sides to get  $3x = 48$ . Divide by 3 to find  $x = 16$ . The middle number is  $x + 2 = 16 + 2 = 18$ .

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**Short Method:** Sum of three numbers = 54. Average =  $54/3 = 18$ . Middle number is 18.

**Q10: If 5 workers can complete a task in 20 days, how many days will it take 10 workers to complete the same task?**

**Long Method:** First, determine the total work in worker-days: 5 workers \* 20 days = 100 worker-days. To find the number of days required for 10 workers, divide the total work by the number of workers: 100 worker-days / 10 workers = 10 days. Therefore, it will take 10 workers 10 days to complete the task.

**Short Method:** Double the workers, halve the days: 20 days / 2 = 10 days.

**Q11: If a man walks at a speed of 5 km/h, how long will it take him to walk 15 kilometers?**

**Long Method:** To determine the walking time, use the formula: Time = Distance / Speed. Given the distance is 15 kilometers and the speed is 5 km/h, the calculation is 15 km / 5 km/h = 3 hours. Hence, it will take him 3 hours to walk 15 kilometers.

**Short Method:** 15 km / 5 km/h = 3 hours.

**Q12: If a rectangle's length is twice its width and the perimeter is 36 cm, what are the dimensions of the rectangle?**

**Long Method:** Let the width be  $x$  cm. Then, the length is  $2x$  cm. The perimeter of a rectangle is given by  $2(\text{length} + \text{width})$ . Set up the equation:  $2(x + 2x) = 36$ . Simplify to get  $2(3x) = 36$ , which simplifies further to  $6x = 36$ . Solving for  $x$ , we get  $x = 6$ . Therefore, the width is 6 cm and the length is  $2*6 = 12$  cm.

**Short Method:** Width + Length = Half of Perimeter: 18 cm. Length is twice the width: 6 cm and 12 cm.

**Q13: A store offers a 25% discount on a shirt that originally costs \$40. What is the sale price of the shirt?**

**Long Method:** First, calculate the discount amount by multiplying the original price by the discount percentage:  $\$40 * 0.25 = \$10$ . Subtract the discount amount from the original price:  $\$40 - \$10 = \$30$ . Thus, the sale price of the shirt is \$30.

**Short Method:** 75% of \$40 = \$30.

**Q14: The ratio of the ages of two brothers is 4:3. If the sum of their ages is 28, what are their ages?**

**Long Method:** Let the ages be  $4x$  and  $3x$ . The sum of their ages is given by  $4x + 3x = 28$ . Combining like terms, we get  $7x = 28$ . Solving for  $x$ , we find  $x = 4$ . Thus, the ages of the brothers are  $4*4 = 16$  and  $3*4 = 12$ .

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**Short Method:** Total parts =  $4 + 3 = 7$ . Each part =  $28/7 = 4$ . Ages =  $44 = 16$  and  $34 = 12$ .

**Q15: If the price of a commodity increases by 20% and then decreases by 20%, what is the net change in price?**

**Long Method:** Let's assume the original price of the commodity is \$100. An increase of 20% means the new price becomes  $\$100 + (\$100 * 0.20) = \$120$ . A subsequent decrease of 20% on the new price means the new price becomes  $\$120 - (\$120 * 0.20) = \$96$ . Therefore, the net change in price is  $\$100 - \$96 = \$4$  decrease.

**Short Method:** Initial price \$100 increases to \$120, then decreases to \$96. Net decrease = \$4.

**Q16: A car covers a distance of 150 miles in 3 hours. What is the average speed of the car?**

**Long Method:** Average speed is calculated by dividing the total distance by the total time. Here, the distance is 150 miles and the time is 3 hours. So, average speed =  $150 \text{ miles} / 3 \text{ hours} = 50 \text{ miles per hour}$ .

**Short Method:**  $150 \text{ miles} / 3 \text{ hours} = 50 \text{ mph}$ .

**Q17: If a person saves \$200 every month, how much will they save in 5 years?**

**Long Method:** To find the total savings over 5 years, first convert years to months:  $5 \text{ years} * 12 \text{ months/year} = 60 \text{ months}$ . Multiply the monthly savings by the total number of months:  $\$200/\text{month} * 60 \text{ months} = \$12,000$ . Therefore, the person will save \$12,000 in 5 years.

**Short Method:**  $5 \text{ years} = 60 \text{ months}$ .  $\$200 * 60 = \$12,000$ .

**Q18: If an angle in a triangle measures 90 degrees and the other two angles are equal, what is the measure of each of the other two angles?**

**Long Method:** In a triangle, the sum of the angles is always 180 degrees. If one angle is 90 degrees, the sum of the other two angles must be  $180 - 90 = 90$  degrees. Since the other two angles are equal, each angle is  $90 / 2 = 45$  degrees.

**Short Method:** 90 degrees left for two equal angles:  $90 / 2 = 45$  degrees each.

**Q19: If the square of a number is 49, what is the number?**

**Long Method:** To find the number whose square is 49, take the square root of 49. The square root of 49 is 7. Since squaring can give both positive and negative results, the number can be either 7 or -7.

**Short Method:**  $\sqrt{49} = 7$  or  $-7$ .

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**Q20: A bag contains 3 red balls, 4 blue balls, and 5 green balls. What is the probability of picking a green ball?**

**Long Method:** First, determine the total number of balls: 3 (red) + 4 (blue) + 5 (green) = 12 balls. The probability of picking a green ball is the number of green balls divided by the total number of balls:  $5/12$ .

**Short Method:** Probability = 5 green balls / 12 total balls =  $5/12$ .

**Q21: If a book costs \$15 and a pen costs \$1.50, how much do 4 books and 10 pens cost?**

**Long Method:** First, find the cost of 4 books:  $4 * \$15 = \$60$ . Next, find the cost of 10 pens:  $10 * \$1.50 = \$15$ . Add these amounts to find the total cost:  $\$60 + \$15 = \$75$ . Therefore, the total cost is \$75.

**Short Method:** 4 books = \$60, 10 pens = \$15. Total =  $\$60 + \$15 = \$75$ .

**Q22: If  $3x - 5 = 16$ , what is the value of x?**

**Long Method:** To solve for x, first add 5 to both sides of the equation:  $3x - 5 + 5 = 16 + 5$ , which simplifies to  $3x = 21$ . Then, divide both sides by 3:  $3x/3 = 21/3$ , resulting in  $x = 7$ .

**Short Method:**  $3x = 21$ .  $x = 21/3 = 7$ .

**Q23: If a rectangle's area is 48 square meters and its length is 8 meters, what is its width?**

**Long Method:** To find the width, use the area formula for a rectangle: Area = Length \* Width. Rearrange to solve for width: Width = Area / Length. Substituting the given values: Width = 48 sq. meters / 8 meters = 6 meters. Therefore, the width is 6 meters.

**Short Method:** Width = Area / Length =  $48/8 = 6$  meters.

**Q24: A number is increased by 25% and then decreased by 20%. What is the net percentage change?**

**Long Method:** Assume the original number is 100. Increasing by 25% gives:  $100 + (100 * 0.25) = 125$ . Decreasing by 20% from 125 gives:  $125 - (125 * 0.20) = 100$ . Therefore, the net change is 0%.

**Short Method:** Increase by 25%, then decrease by 20% brings the number back to 100, so net change = 0%.

**Q25: If  $2x + 3 = 11$ , what is the value of x?**

**Long Method:** First, subtract 3 from both sides:  $2x + 3 - 3 = 11 - 3$ , which simplifies to  $2x = 8$ . Then, divide both sides by 2:  $2x/2 = 8/2$ , resulting in  $x = 4$ .

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**Short Method:**  $2x = 8$ .  $x = 8/2 = 4$ .

**Q26: If the circumference of a circle is 31.4 cm, what is the radius of the circle? (Use  $\pi = 3.14$ )**

**Long Method:** The circumference of a circle is given by the formula: Circumference =  $2\pi r$ , where  $r$  is the radius. Rearrange to solve for  $r$ :  $r = \text{Circumference} / (2\pi)$ . Substituting the given values:  $r = 31.4 / (2 * 3.14) = 31.4 / 6.28 = 5$  cm. Therefore, the radius is 5 cm.

**Short Method:** Circumference =  $2\pi r$ .  $r = 31.4 / 6.28 = 5$  cm.

**Q27: If a cylinder has a radius of 3 cm and a height of 7 cm, what is its volume? (Use  $\pi = 3.14$ )**

**Long Method:** The volume of a cylinder is given by the formula: Volume =  $\pi r^2 h$ , where  $r$  is the radius and  $h$  is the height. Substituting the given values: Volume =  $3.14 * 3^2 * 7 = 3.14 * 9 * 7 = 3.14 * 63 = 197.82$  cubic cm. Therefore, the volume is 197.82 cubic cm.

**Short Method:** Volume =  $\pi r^2 h$ . Volume =  $3.14 * 9 * 7 = 197.82$  cubic cm.

**Q28: If a triangle has sides of lengths 5 cm, 12 cm, and 13 cm, is it a right triangle?**

**Long Method:** To determine if it is a right triangle, apply the Pythagorean theorem:  $a^2 + b^2 = c^2$ , where  $c$  is the hypotenuse. Check if  $5^2 + 12^2 = 13^2$ :  $25 + 144 = 169$ . Since  $169 = 169$ , the triangle is a right triangle.

**Short Method:** Check:  $5^2 + 12^2 = 13^2$ . True, so it is a right triangle.

**Q29: If a man invests \$1000 at an annual interest rate of 5%, how much will he have after 2 years with simple interest?**

**Long Method:** Simple interest is calculated using the formula: Interest = Principal \* Rate \* Time. Here, Principal = \$1000, Rate = 5% or 0.05, and Time = 2 years. Interest =  $\$1000 * 0.05 * 2 = \$100$ . The total amount after 2 years is Principal + Interest =  $\$1000 + \$100 = \$1100$ .

**Short Method:** Simple interest:  $\$1000 * 0.05 * 2 = \$100$ . Total =  $\$1000 + \$100 = \$1100$ .

**Q30: If two angles of a triangle are 50 degrees and 60 degrees, what is the measure of the third angle?**

**Long Method:** The sum of the angles in a triangle is always 180 degrees. Subtract the sum of the given angles from 180 to find the third angle:  $180 - (50 + 60) = 180 - 110 = 70$  degrees. Therefore, the third angle is 70 degrees.

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**Short Method:** Third angle =  $180 - (50 + 60) = 70$  degrees.

**Q31: If the ratio of the sides of two similar triangles is 3:4, what is the ratio of their areas?**

**Long Method:** The ratio of the areas of two similar triangles is the square of the ratio of their corresponding sides. Given the side ratio is 3:4, the area ratio is  $(3/4)^2 = 9/16$ . Therefore, the ratio of their areas is 9:16.

**Short Method:** Side ratio squared =  $(3/4)^2 = 9/16$ .

**Q32: If  $5x - 2 = 3x + 6$ , what is the value of x?**

**Long Method:** First, isolate x by subtracting 3x from both sides:  $5x - 3x - 2 = 3x - 3x + 6$ , which simplifies to  $2x - 2 = 6$ . Add 2 to both sides:  $2x - 2 + 2 = 6 + 2$ , giving  $2x = 8$ . Divide both sides by 2:  $2x/2 = 8/2$ , resulting in  $x = 4$ .

**Short Method:**  $2x = 8$ .  $x = 8/2 = 4$ .

**Q33: A rectangle has a length of 10 meters and a width of 6 meters. What is its diagonal length?**

**Long Method:** To find the diagonal length, use the Pythagorean theorem:  $\text{Diagonal}^2 = \text{Length}^2 + \text{Width}^2$ . Substituting the given values:  $\text{Diagonal}^2 = 10^2 + 6^2 = 100 + 36 = 136$ . Taking the square root of both sides, we get  $\text{Diagonal} = \sqrt{136} = 2\sqrt{34} \approx 11.66$  meters.

**Short Method:**  $\text{Diagonal} = \sqrt{(10^2 + 6^2)} = \sqrt{136} \approx 11.66$  meters.

**Q34: If a cube has a volume of 64 cubic cm, what is the length of one side?**

**Long Method:** The volume of a cube is given by the formula:  $\text{Volume} = \text{Side}^3$ . Given the volume is 64 cubic cm, we solve for the side:  $\text{Side}^3 = 64$ . Taking the cube root of both sides, we get  $\text{Side} = \sqrt[3]{64} = 4$  cm. Therefore, the length of one side is 4 cm.

**Short Method:**  $\sqrt[3]{64} = 4$  cm.

**Q35: If a number is doubled and then increased by 5, the result is 29. What is the number?**

**Long Method:** Let the number be x. The equation is  $2x + 5 = 29$ . Subtract 5 from both sides:  $2x + 5 - 5 = 29 - 5$ , which simplifies to  $2x = 24$ . Divide both sides by 2:  $2x/2 = 24/2$ , resulting in  $x = 12$ .

**Short Method:**  $2x = 24$ .  $x = 24/2 = 12$ .

**Q36: If a bottle contains 1.5 liters of juice, how many 250 ml cups can be filled?**

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**Long Method:** First, convert 1.5 liters to milliliters:  $1.5 \text{ liters} * 1000 \text{ ml/liter} = 1500 \text{ ml}$ . Divide the total milliliters by the volume of each cup:  $1500 \text{ ml} / 250 \text{ ml} = 6$ . Therefore, 6 cups can be filled.

**Short Method:**  $1500 \text{ ml} / 250 \text{ ml} = 6 \text{ cups}$ .

**Q37: If the average of five numbers is 20, what is their total sum?**

**Long Method:** The average of five numbers is found by dividing the total sum by the number of numbers. Let the total sum be S. The average is given as 20, so we set up the equation:  $S / 5 = 20$ . Multiply both sides by 5:  $S = 20 * 5 = 100$ . Therefore, the total sum is 100.

**Short Method:** Total sum =  $20 * 5 = 100$ .

**Q38: If the cost of 7 apples is \$14, what is the cost of 5 apples?**

**Long Method:** First, find the cost per apple by dividing the total cost by the number of apples:  $\$14 / 7 \text{ apples} = \$2 \text{ per apple}$ . Multiply the cost per apple by 5 to find the cost of 5 apples:  $\$2 * 5 = \$10$ . Therefore, the cost of 5 apples is \$10.

**Short Method:** Cost per apple =  $\$14 / 7 = \$2$ . Cost of 5 apples =  $\$2 * 5 = \$10$ .

**Q39: If a rectangle's perimeter is 50 cm and its length is 15 cm, what is its width?**

**Long Method:** The perimeter of a rectangle is given by the formula: Perimeter =  $2(\text{Length} + \text{Width})$ . Substitute the given values:  $50 = 2(15 + \text{Width})$ . Divide both sides by 2:  $25 = 15 + \text{Width}$ . Subtract 15 from both sides:  $25 - 15 = \text{Width}$ , resulting in Width = 10 cm.

**Short Method:**  $50/2 = 25$ . Width =  $25 - 15 = 10 \text{ cm}$ .

**Q40: If two numbers add up to 45 and their difference is 15, what are the numbers?**

**Long Method:** Let the two numbers be x and y, where  $x > y$ . Set up the equations:  $x + y = 45$  and  $x - y = 15$ . Add the two equations to eliminate y:  $(x + y) + (x - y) = 45 + 15$ , resulting in  $2x = 60$ . Divide by 2:  $x = 30$ . Substitute x back into the first equation:  $30 + y = 45$ , giving  $y = 15$ . Therefore, the numbers are 30 and 15.

**Short Method:**  $x + y = 45$ ,  $x - y = 15$ .  $x = (45 + 15)/2 = 30$ ,  $y = 45 - 30 = 15$ .

**Q41: If the sum of three consecutive even numbers is 54, what are the numbers?**

**Long Method:** Let the three consecutive even numbers be x, x+2, and x+4. Their sum is  $x + (x+2) + (x+4) = 54$ . Simplify the equation:  $3x + 6 = 54$ . Subtract 6 from both sides:  $3x = 48$ . Divide by 3:  $x = 16$ . Therefore, the numbers are 16, 18, and 20.

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**Short Method:**  $3x + 6 = 54$ .  $3x = 48$ .  $x = 16$ . Numbers are 16, 18, and 20.

**Q42: If a train travels 240 miles in 4 hours, what is its speed?**

**Long Method:** Speed is calculated by dividing the total distance by the total time. Here, the distance is 240 miles and the time is 4 hours. So, speed = 240 miles / 4 hours = 60 miles per hour.

**Short Method:** 240 miles / 4 hours = 60 mph.

**Q43: If 5 more than twice a number is 25, what is the number?**

**Long Method:** Let the number be  $x$ . The equation is  $2x + 5 = 25$ . Subtract 5 from both sides:  $2x + 5 - 5 = 25 - 5$ , which simplifies to  $2x = 20$ . Divide both sides by 2:  $2x/2 = 20/2$ , resulting in  $x = 10$ .

**Short Method:**  $2x = 20$ .  $x = 20/2 = 10$ .

**Q44: If a car's fuel efficiency is 30 miles per gallon and it travels 150 miles, how many gallons of fuel does it use?**

**Long Method:** To find the gallons of fuel used, divide the total distance by the fuel efficiency. Here, the distance is 150 miles and the efficiency is 30 miles per gallon. So, fuel used = 150 miles / 30 mpg = 5 gallons.

**Short Method:** 150 miles / 30 mpg = 5 gallons.

**Q45: If a number is decreased by 20% and then increased by 25%, what is the net percentage change?**

**Long Method:** Assume the original number is 100. Decreasing by 20% gives:  $100 - 20 = 80$ . Increasing by 25% from 80 gives:  $80 + (80 * 0.25) = 80 + 20 = 100$ . Therefore, the net change is 0%.

**Short Method:** Decrease by 20%, then increase by 25% brings the number back to 100, so net change = 0%.

**Q46: If a triangle has sides of lengths 9 cm, 12 cm, and 15 cm, is it a right triangle?**

**Long Method:** To determine if it is a right triangle, apply the Pythagorean theorem:  $a^2 + b^2 = c^2$ , where  $c$  is the hypotenuse. Check if  $9^2 + 12^2 = 15^2$ :  $81 + 144 = 225$ . Since  $225 = 225$ , the triangle is a right triangle.

**Short Method:** Check:  $9^2 + 12^2 = 15^2$ . True, so it is a right triangle.

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**Q47: If the area of a square is 81 square cm, what is the length of one side?**

**Long Method:** The area of a square is given by the formula:  $\text{Area} = \text{Side}^2$ . Given the area is 81 square cm, we solve for the side:  $\text{Side}^2 = 81$ . Taking the square root of both sides, we get  $\text{Side} = \sqrt{81} = 9$  cm. Therefore, the length of one side is 9 cm.

**Short Method:**  $\sqrt{81} = 9$  cm.

**Q48: If a person earns \$500 per week, how much do they earn in a year?**

**Long Method:** To find the annual earnings, multiply the weekly earnings by the number of weeks in a year:  $\$500/\text{week} * 52 \text{ weeks/year} = \$26,000$ . Therefore, the annual earnings are \$26,000.

**Short Method:**  $\$500 * 52 = \$26,000$ .

**Q49: If the product of two numbers is 72 and one number is 8, what is the other number?**

**Long Method:** Let the other number be  $x$ . The equation is  $8x = 72$ . Divide both sides by 8:  $8x/8 = 72/8$ , resulting in  $x = 9$ . Therefore, the other number is 9.

**Short Method:**  $72 / 8 = 9$ .

**Q50: If the ratio of two numbers is 3:4 and their sum is 28, what are the numbers?**

**Long Method:** Let the numbers be  $3x$  and  $4x$ . Their sum is  $3x + 4x = 28$ . Simplify the equation:  $7x = 28$ . Divide by 7:  $x = 4$ . Therefore, the numbers are  $3x = 12$  and  $4x = 16$ .

**Short Method:**  $x = 4$ . Numbers are  $3x = 12$  and  $4x = 16$ .

**Q52: If a man works for 8 hours a day and earns \$15 per hour, how much does he earn in a week?**

**Long Method:** To find the weekly earnings, first calculate the daily earnings:  $8 \text{ hours/day} * \$15/\text{hour} = \$120/\text{day}$ . Then, multiply by the number of working days in a week:  $\$120/\text{day} * 5 \text{ days/week} = \$600/\text{week}$ . Therefore, the man earns \$600 per week.

**Short Method:**  $8 \text{ hours} * \$15 * 5 \text{ days} = \$600$ .

**Q53: If a mixture contains 60% water and 40% alcohol, how many liters of alcohol are there in 20 liters of the mixture?**

**Long Method:** To find the amount of alcohol, multiply the total volume by the percentage of alcohol:  $20 \text{ liters} * 0.40 = 8 \text{ liters}$ . Therefore, there are 8 liters of alcohol in the mixture.

**Short Method:**  $20 \text{ liters} * 0.40 = 8 \text{ liters}$ .

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