M. Prakash Institute solution - 8th Std Entrance Test

VIII std **20 April 2025**

1. A four digited number formed by digits 5, 6, 7 and 9 exactly once, is perfect square of a natural number X. Find X.

   Solution: Cleary, the number cannot end in 7. If it ends in 5, it must end in 25, so 5 is also not possible. So, either the number ends in 6 or 9. So, a perfect square ending in 6 or 9, which is four digits and greater than 5000. So, we should start trying numbers from 73.
   $73^2 = 5329, 74^2 = 5476, 76^2 = 5776, 77^2 = 5229, 83^2 = 6889, 84^2 = 7056, 86^2 = 7396, 87^2 = 7569$. So, $X = 87$ **Ans. 87.**

2. If the simple interest on a principal amount at 5 p.c.p.a. for 3 years is Rs. 12000, find the sum of digits of the compound interest on the same principal amount for the same period at the same interest rate.

   Solution: Interest $= \frac{PNR}{100} \Rightarrow 12000 = \frac{P(3)(5)}{100} \Rightarrow P = 80000$.
   For Compound interest, formula is Amount $= 80000\left(1+\frac{5}{100}\right)^3 = 92610$,
   so Interest$= 92610 - 80000 = 12610$. Sum of digits$= 1$. **Ans. 1.**

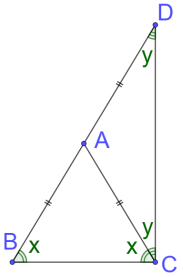
3. Amar, Bhuvan and Chetan have some marbles with them. Bhuvan has 20% more marbles than Amar and Chetan has 10% less marbles than Bhuvan. If the total number of marbles with all three of them is 164, then find the number of marbles with Chetan.

   Solution: Let Amar have x marbles. So, Bhuvan has $1.2x$ marbles and Chetan has $1.2 \times 0.9 = 1.08x$ marbles. So, total marbles$= x + 1.2x + 1.08x = 3.28x$, so, we have $3.28x = 164 \Rightarrow x = 50$, so Chetan has $1.08 \times 50 = 54$ marbles. **Ans. 54.**

4. If $\frac{a}{b} = \frac{1}{5}$, then $\frac{6a+b}{6a-b} =$?

   Solution: $\frac{a}{b} = \frac{1}{5} \Rightarrow b = 5a \Rightarrow \frac{6a+b}{6a-b} = \frac{6a+5a}{6a-5a} = 11$. **Ans. 11.**

5. $\triangle ABC$ is an isosceles triangle with side AB = side AC. Side BA is extended till point D such that AB = AD. Find $m\angle BCD$.

   Solution: As can be seen from the diagram $x + x + y + y = 180$
   $\Rightarrow x + y = 90$ **Ans. 90.**

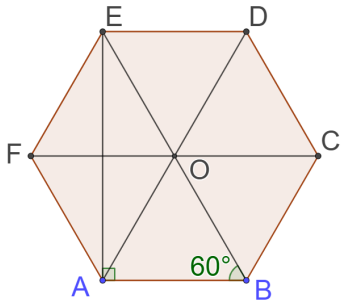
6. Two partners A and B share profit in the ratio $\frac{27}{5} : \frac{15}{4}$. By what % is $A's$ share more than B.

   Solution: If we make the denominator$= 20$, the ratio is $\frac{108}{20} : \frac{75}{20}$, so the answer is $\frac{108-75}{75} \times 100 = 44\%$ **Ans. 44.**

7. Sum of current ages of father and son is 60 yrs. Five years ago, ratio of fathers age to sons age was 4 : 1. Find father's current age.

   Solution: Suppose father's age today is x, so son's age today is $60 - x$. So, five year's ago, their ages were $x - 5$ and $(60 - x) - 5 = 55 - x$,
   so we have $\dfrac{x-5}{55-x} = 4 \Rightarrow 4 \times (55 - x) = x - 5 \Rightarrow 225 = 5x \Rightarrow x = 45$ **Ans. 45.**

8. A regular hexagon has all 6 sides congruent and all 6 angles congruent. If ABCDEF is a regular hexagon having each side length 6 and if the length of diagonal BE = 12, find $\dfrac{AE^2}{2}$.



   Solution: Using properties of $30 - 60 - 90$ triangle,
   $AE = \dfrac{\sqrt{3}}{2} BE = 6\sqrt{3} \Rightarrow \dfrac{AE^2}{2} = 54$ **Ans. 54.**

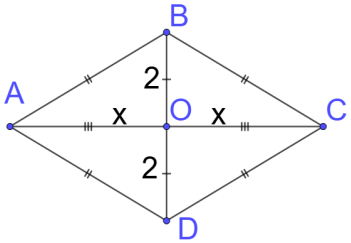
9. The selling price of 2 articles is Rs. 1485 each. After selling, one article incurred 10 % loss while other incurred 10% profit. What is the total loss or profit in Rupees?

   Solution: For 10% loss: If cost price is 100 then selling price is 90. So, if selling price is 1485, then cost price is $\dfrac{1485}{90} \times 100 = 1650$
   For 10% profit, if cost price is 100 then selling price is 110, so if selling price i 1485, then cost price $= \dfrac{1485}{110} \times 100 = 1350$. So total cost price$= 1650 + 1350 = 3000$, total selling price is $1485 + 1485 = 2970$. So, loss$= 3000 - 2970 = 30$, so percentage loss$= \dfrac{(3000 - 2970)}{3000} \times 100 = 1$ **Ans. 1.**

10. 5 chairs and 3 tables cost Rs. 416. 7 chairs and 5 tables cost Rs. 636. Then the difference between the cost of 1 chair and cost of 1 table is?

    Solution:
    Method I: Let the cost of the chair be x and the cost of the table be y. So, we have $5x + 3y = 416$ and $7x + 5y = 636$.
    Multiply first equation by 5. Multiply second equation by 3. We get
    $25x + 15y = 2080$ and $21x + 15y = 1908$. Subtracting second equation from first, we get $4x = 172 \Rightarrow x = 43$. Using this in the first equation, we get
    $5(43) + 3y = 416 \Rightarrow y = 67 \Rightarrow y - x = 67 - 43 = 24$ **Ans. 24.**
    Method II: If we subtract the first equation from the second equation in the first step, we get $2x + 2y = 220 \Rightarrow 4x + 4y = 440$ If we subtract this from the first equation, we get $x - y = -24$ **Ans. 24.**

11. Rhombus is a quadrilateral having all 4 sides equal. Area of a Rhombus is 16 . If the length of one diagonal is 4 and the length of other diagonal is L, find L^2.



    Solution: Area of $\triangle OAB = \dfrac{1}{4}$ area of $\square ABCD = \dfrac{1}{4}(16) = 4$,
    so we get $\dfrac{1}{2}(2)(x) = 4 \Rightarrow x = 4 \Rightarrow L = 2x = 8 \Rightarrow L^2 = 64$.
    Ans. 64.

12. A has taken a loan of Rs. X from B. On the first day A returns Rs. 1 to B, on the second day A returns Rs. 2 to B, on the third day A returns Rs. 3 to B and so on. After 30 days A returned 93% of the loan amount to B. How much is the remaining loan amount?

    Solution: Total amount returned$= 1+2+3+\cdots+30 = \dfrac{30(30+1)}{2} = 465$. This amount is 93% of the loan amount, so remaining amount is 7%. So, remaining loan amount$= \dfrac{7}{93} \times 465 = 35$ **Ans. 35.**

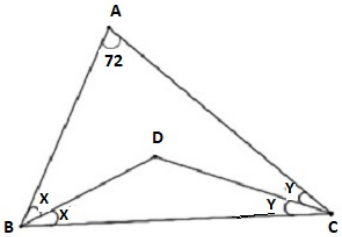
13. A tank has 3 taps. One tap empties the tank in 2 hours. Second tap empties the tank in 5 hours. Third tap empties the tank in 10 hours. If all 3 taps opened simultaneously, after how many minutes the tank will be empty?

    Solution: In hour, the taps empty $\dfrac{1}{2}, \dfrac{1}{5}, \dfrac{1}{10}$ tank respetively. So, when all taps are open, they empty $\dfrac{1}{2}+\dfrac{1}{5}+\dfrac{1}{10} = \dfrac{4}{5}$ tank. So, time required to empty the tank$= \dfrac{5}{4} \times 60 = 75$ minutes. **Ans. 75.**

14. Milind has Rs. 600 in his pocket. Total number of Rs. 10 notes are double of Rs. 50 notes and number of Rs. 5 notes are 8 more than the number of Rs. 10 notes. Find total number of notes in his pocket.

    Solution: Suppose the number of 50 Rs. notes is x. So, number of 10 Rs. notes$= 2x$ and number of 5 Rs. notes$= 2x+8$, so we get $50x+10(2x)+5(2x+8) = 600 \Rightarrow x = 7$. Total number of notes$= x+2x+(2x+8) = 5x+8 = 43$. **Ans. 43.**

15. In $\triangle ABC$, measure of angle A is 72 . Find $\dfrac{m\angle BDC}{2}$.



    Solution: In $\triangle ABC$, we have $72+2x+2y = 180 \Rightarrow x+y = 54$.
    In $\triangle BDC$, we have $x+y+m\angle BDC = 180$
    $\Rightarrow m\angle BDC = 180-54 = 126 \Rightarrow \dfrac{m\angle BDC}{2} = 63$. **Ans. 63.**

16. In the Wimbledon tennis tournament, total 128 tennis players participate. Each losing player goes out of the tournament and the winning player advances to the next round. If the total number of matches played in the entire tournament is T, then find $T-47$.

    Solution: Every match decides one loser. Since we have to decide 127 losers, we need 127 matches. So, $T-47 = 127-47 = 80$. **Ans. 80.**

17. P and Q are single digit natural numbers. If the product of the numbers 834P and Q7 is 55P383, Find P + Q.

    Solution: Since unit place of the product is 3, we get $P = 9$, so we get
    $Q7 = \dfrac{559383}{8349} = 67 \Rightarrow Q = 6$. **Ans. 15.**

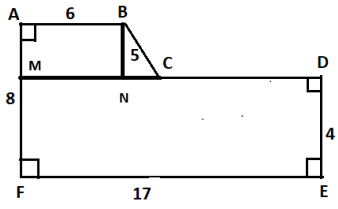
18. $\dfrac{160\sqrt{294}}{7\sqrt{96}}$ = K, where K is a natural number. Find K.

    Solution: $294 = 49 \times 6$ and $96 = 16 \times 6$, so we get $\dfrac{160\sqrt{294}}{7\sqrt{96}} = \dfrac{160 \times 7\sqrt{6}}{7 \times 4\sqrt{6}} = 40$.
    Ans. 40.

19. If P is the smallest integer that leaves remainder 1 when divided by all single digit prime numbers, then find $\sqrt{P+150}$.

    Solution: $P = lcm(2,3,5,7) + 1 = 211 \Rightarrow \sqrt{P+150} = \sqrt{211+150} = \sqrt{361} = 19$.
    Ans. 19.

20. In the below diagram, AB = 6, BC = 5, DE = 4, EF =17 and FA = 8. Find area of the hexagon ABCDEF. (Diagram not to the scale)



Solution: Since $AF = 8, DE = 4$, we have $AM = BN = 4$ and so by Pythagoras, $CN = 3$.
Area$(\square ABNM) = 6 \times 4 = 24$,
area$(\triangle BNC) = \frac{1}{2}(3)(4) = 6$, area$(\square MDEF) = 17 \times 4 = 68$.
Ans. 98.