M. Prakash Institute **STD IX (2 years) – Solutions – Entrance Test 1**
30 November 2025 **Time: 3 hours**
Note: Q1 to Q10 are of 2 marks each, Q11 to Q30 are of 4 marks each.
Total Marks: 100 **Paper Type:AD**
Student Receipt number: **Student Name:**

Ques.	1	2	3	4	5	6	7	8	9	10
Ans.	2	17	5	24	8	64	8	1	5	25
Ques.	11	12	13	14	15	16	17	18	19	20
Ans.	4	17	60	11	32	10	57	50	5	58
Ques.	21	22	23	24	25	26	27	28	29	30
Ans.	72	45	6	7	64	24	0	90	71	0

Q1. $\dfrac{\sqrt{48}+\sqrt{432}}{\sqrt{192}}$ =?

Solution: $\dfrac{\sqrt{48}+\sqrt{432}}{\sqrt{192}} = \dfrac{\sqrt{48}+\sqrt{48\times 9}}{\sqrt{48\times 4}} = \dfrac{1+3}{2} = 2$. **Ans. 2.**

Q2. $\dfrac{3565}{23}+\dfrac{4675}{x} = 430$. Find x.

Solution: $\dfrac{3565}{23}+\dfrac{4675}{x} = 155+\dfrac{4675}{x} = 430 \Rightarrow \dfrac{4675}{x} = 275 \Rightarrow x = \dfrac{4675}{275} = 17$. **Ans. 17.**

Q3. $14\times 627 \div \sqrt{1089} = x^3+141$, and x is a positive real number. Find x.

Solution: $\sqrt{1089} = 33$ so $14\times 627\div\sqrt{1089} = x^3+141 \Rightarrow x^3 = 125 \Rightarrow x = 5$. **Ans. 5.**

Q4. The average sale of a car dealer was 25 cars per week. After a promotional scheme, the average sale increased to 31 cars per week. Find the percentage increase in the sale.

Solution: Percentage increase= $\dfrac{31-25}{25}\times 100 = 24\%$. **Ans. 24.**

Q5. If the work done by $(x-1)$ men in $(x+1)$ days to the work done by $(x+2)$ men in $(x-1)$ days is in the ratio $9:10$, find x.

Solution: $\dfrac{(x-1)(x+1)}{(x+2)(x-1)} = \dfrac{9}{10} \Rightarrow 9x+18 = 10x+10 \Rightarrow x = 8$. **Ans. 8.**

Q6. The difference between 31% and 13% of the same number is 576. Find 2% of that number.

Solution: 18% of a number is 576 so 2% of the same number is $\frac{576}{9} = 64$. **Ans. 64.**

Q7. The average of three numbers is 36 and their ratio is $2:3:4$. Find the smallest of the three numbers.

Solution: $\dfrac{2x+3x+4x}{3} = 36 \Rightarrow x = 4$. **Ans. 8.**

Q8. $\dfrac{20+8\times 0.5}{80\times 0.75-9\times 4}$ =?

Solution: $\dfrac{20+8\times 0.5}{80\times 0.75-9\times 4} = \dfrac{20+4}{60-36} = 1$. **Ans. 1.**

Q9. How much wire will remain if all 211 pieces of length 7 cm are cut from a wire of length 19.77 m?

Solution: $1977-211\times 7 = 500$ cm i.e. 5 meters. **Ans. 5.**

Q10. A rectangular field has length $3\sqrt{2}+5\sqrt{3}$ cm and width $2\sqrt{3}+\sqrt{2}$ cm. If the area of the field is $m+n\sqrt{6}$, find $m-n$.

Solution: $(3\sqrt{2}+5\sqrt{3})(2\sqrt{3}+\sqrt{2}) = 36+11\sqrt{6}$. **Ans. 25.**

Q11. If $a+1=b+2=c+3=d+4=e+5=a+b+c+d+e+3$,
find the value of $5(a+bc+cd+de)$.

Solution:

$$b=a-1, \quad c=a-2, \quad d=a-3, \quad e=a-4$$
Equation becomes $a+(a-1)+(a-2)+(a-3)+(a-4)+3=a+1$
$$\Rightarrow 4a-7=1$$
$$\Rightarrow a=2$$
$$b=1, \quad c=0, \quad d=-1, \quad e=-2$$
$$(ab+bc+cd+de)=(2\times 1)+(1\times 0)+(0\times(-1))+((-1)\times(-2))=2+0+0+2=4$$

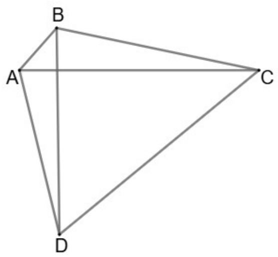
Ans. 4.

Q12. HCF of two numbers having three digits is 17 and their LCM is 714 . Find the difference between the two numbers.

Solution: Let $n_1=17a$ and $n_2=17b$ be two numbers.

$$\text{LCM}(n_1,n_2)=714=17\times a\times b \Rightarrow ab=42$$
Because n_1 and n_2 are three-digit numbers,
$$a=6 \text{ and } b=7 \Rightarrow n_1=17\times 6=102 \text{ and}$$
$$n_2=17\times 7=119$$

Hence, the difference between n_1 and n_2 is 17. **Ans. 17.**

Q13. 

In the given diagram, $AB=20, BC=70, CD=90$ and AC is perpendicular to BD . Find AD.

Solution:
$$\begin{aligned} AD^2 &= AE^2+ED^2 \\ &= \left(20^2-BE^2\right)+\left(90^2-EC^2\right) \\ &= 20^2-BE^2+90^2-\left(70^2-BE^2\right) \\ &= 20^2+90^2-70^2 \\ &= 400+8100-4900 \\ &= 3600 \end{aligned}$$
$\Rightarrow AD=60$. **Ans. 60.**

Q14. If $a^2+b^2=45$ and $b^2+c^2=40$, find $(a+b+c)$ if a,b,c are natural numbers.

Solution: $a^2+b^2=45$ and $b^2+c^2=40$ Subtracting equation (2) from (1) $a^2-c^2=5$
$\Rightarrow (a+c)(a-c)=5\times 1$ Hence $a+c=5$ and $a-c=1$
Solving simultaneously we get, $a=3, c=2, b=6$
$\Rightarrow a+b+c=11$. **Ans. 11.**

Q15. If $2^{x-1} + 2^{x+1} = 1280$, find 2^{x-4}.

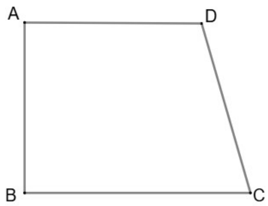
Solution: $2^{x-1}\left(1+2^2\right) = 1280 \Rightarrow 2^{x-1} \times 5 = 1280 \Rightarrow 2^{x-1} = \frac{1280}{5} = 256 = 2^8 \Rightarrow x = 9$
$\therefore 2^{x-4} = 32$. **Ans. 32.**

Q16. In a shop, some quantity of ghee contains 60% pure ghee and 40% vanaspati ghee. If 10 kg of pure ghee is added, then the strength of vanaspati ghee becomes 20%. Find the original quantity of ghee.

Solution: Total quantity of ghee $= x$
$\Rightarrow \frac{60x}{100}$ is pure ghee and $\frac{40x}{100}$ is vanaspati ghee.

After adding 10 liters of vanaspati ghee:
$\Rightarrow \frac{\frac{40x}{100}}{x+10} = \frac{20}{100}$
$\Rightarrow \frac{2x}{5x+50} = \frac{1}{5}$

$\Rightarrow x = 10$. **Ans. 10.**

Q17. 

$AB = 24, BC = 32, AD = CD = 25$ and $\angle B = 90°$.
Find P if area of $\square ABCD = 12P$

Solution: Join AC. Using Pythagoras' theorem, $AC = 40$.
$\triangle ACD$ is an isosceles triangle. Let $DM \perp AC$.

Since $\triangle ADM \cong \triangle CDM$ (RHS),
$AM = CM = 20$.

$$\begin{aligned} DM &= 15, \\ \text{Area}(ABCD) &= A(\triangle ABC) + A(\triangle ADC) \\ &= \tfrac{1}{2}\cdot 24\cdot 32 + \tfrac{1}{2}\cdot 40\cdot 15 \\ &= 384 + 300 \\ &= 684 = 12\times 57, \\ \Rightarrow P &= 57. \quad \textbf{Ans. 57.} \end{aligned}$$

Q18. Cost of diamond varies as the square of its weight. A diamond broke into 4 pieces with their weights in the ratio 1 : 2 : 3 : 4. If the loss in the total value of the diamond was 35000, find N if original price was $1000N$.

Solution: Let the weights of four pieces of a diamond be x, $2x$, $3x$, and $4x$. The original weight $= 10x$.

$$\begin{aligned} &\text{Original price } = k\times(10x)^2 = 100kx^2 \\ &\text{New price } = kx^2 + 4kx^2 + 9kx^2 + 16kx^2 = 30kx^2, \\ &\text{Loss } = 100kx^2 - 30kx^2 = 70kx^2 = 35,000 \\ &\Rightarrow kx^2 = 500. \\ &\text{Therefore, Original price } = 100\times 500 = 50,000 = 1000N, \\ &\Rightarrow N = 50. \quad \textbf{Ans. 50.} \end{aligned} \tag{1}$$

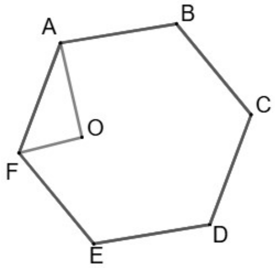
Q19. Let N be smallest positive integer such that $(N + 2N + 3N \ldots\ldots.. + 9N)$ is a perfect square. Find smallest possible value of N.

Solution:

$N + 2N + \cdots + 9N = 45N = 9 \times 5 \times N$
45N is a perfect square. Hence smallest value of $N = 5$. **Ans. 5.**

Q20. $\sqrt{147} - \frac{4}{3}\sqrt{\frac{1}{3}} - \sqrt{\frac{1}{27}} = \frac{a}{9}\sqrt{3}$. Find a.

Solution: $7\sqrt{3} - \dfrac{4}{3\sqrt{3}} - \dfrac{1}{3\sqrt{3}} = 7\sqrt{3} - \dfrac{5}{3\sqrt{3}} = \dfrac{63\sqrt{3} - 5\sqrt{3}}{9} = \dfrac{58\sqrt{3}}{9} \Rightarrow a = 58$. **Ans. 58.**

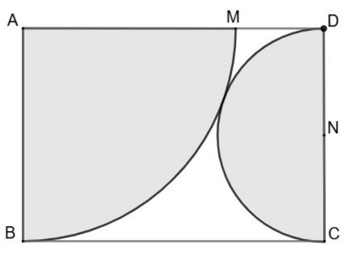
Q21. 

$ABCDEF$ is a regular hexagon.
$FO \parallel ED$ and $AO \perp FO$. If area of $\triangle AFO = 6$, find area of $ABCDEF$.

Solution: $\triangle AOF$ is a $30° - 60° - 90°$ triangle. Let $AF = k \Rightarrow AO = \frac{\sqrt{3}}{2}k$ and $FO = \frac{k}{2}$
$\Rightarrow [\triangle AOF] = \frac{1}{2} \times \frac{k}{2} \times \frac{k\sqrt{3}}{2} = \frac{\sqrt{3}k^2}{8} = 6 \Rightarrow k^2 = 16\sqrt{3}$
Area of Hexagon $= 6 \times \frac{\sqrt{3}}{4} \times k^2 = \frac{12\sqrt{3}}{8}k^2 = \frac{12\sqrt{3}}{8} \times 16\sqrt{3} = 72$. **Ans. 72.**

Q22. How many 3-digit numbers satisfy the property that the digit in the middle is the average of the first and the third digit?

Solution: Average of any two numbers a and b is equal to $(a+b)/2$ This signifies that, for their average to be a natural number, the sum of a and b has to be an even number, which further means that both a and b have to be either even or odd. Let us first consider the case when both of them are odd. a and b, both have 5 possibilities $-1, 3, 5, 7, 9$
This means that there will be $5 \times 5 = 25$ such pairs.
Lets consider the case when both of them are even.
a has 4 possibilities - $2, 4, 6, 8$
b has 5 possibilities- $0, 2, 4, 6, 8$
This means that there will be $4 \times 5 = 20$ such pairs. **Ans. 45.**

Q23. 

Area of given rectangle $ABCD = \sqrt{512}$. If area of shaded region $= M\pi$, find M.

Solution: Let radius of bigger circle $= R$, radius of smaller circle $= \frac{R}{2}$
$R =$ length of rectangle
$\Rightarrow \frac{\sqrt{512}}{R} =$ breadth of rectangle
A and N are centers of circles
$\Rightarrow AN = R + \frac{R}{2} = \frac{3R}{2}$ (Touching circles)
In $\triangle ADN$, by PT,

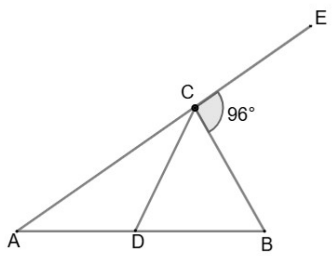
$$\left(\frac{\sqrt{512}}{R}\right)^2 + \left(\frac{R}{2}\right)^2 = \left(\frac{3R}{2}\right)^2 \Rightarrow R = 4$$

$$\begin{aligned} \text{Area of shaded region } &= \frac{\pi R^2}{4} \cdot + \frac{\pi R^2}{2 \times 4} \\ &= 4\pi + 2\pi \\ &= 6\pi \Rightarrow M = 6. \quad \textbf{Ans. 6.} \end{aligned}$$

Q24. If $2^x = 4^y = 8^z$ and $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{4z} = 4$, then find the value of $16x$.

Solution: $2^x = \left(2^2\right)^y = \left(2^3\right)^z \Rightarrow x = 2y = 3z \Rightarrow \frac{1}{2x} + \frac{1}{2x} + \frac{3}{4x} = \frac{7}{4x} = 4 \Rightarrow 16x = 7$. **Ans. 7.**

Q25.



In the given figure, $AD = CD = BC$, Find $m\angle DBC$.
Solution: $\triangle ADC$ is isosceles
$\Rightarrow m\angle DAC = m\angle DCA = x$
By exterior angle thm, $m\angle CDB = 2x$.
$\triangle CDB$ is isosceles
$\Rightarrow m\angle CDB = m\angle CBD = 2x$
In $\triangle ABC$, By exterior angle thm,$3x = 96$, x =32
$\Rightarrow m\angle DBC = 64$. **Ans. 64.**

Q26. A cube is painted with red colour on its all six faces. If this cube is cut into 64 equal small cubes, find the number of small cubes which will have only one face coloured.

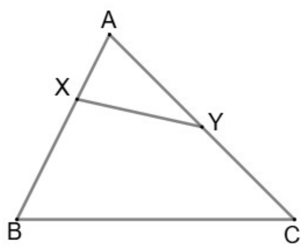
Solution: There will be 4 types of cubes.
1. 0 face painted-completely inside
2. 1 face painted- cubes neither at edge nor corner
3. 2 face painted- cubes at edge and not corner
4. 3 face painted- cubes at corner

For 1 face painted cubes, $4 \times 6 = 24$ faces.
Ans. 24.

Q27. If $\dfrac{a_1}{1-a_1} + \dfrac{a_2}{1-a_2} + \cdots + \dfrac{a_{25}}{1-a_{25}} = 1$, and
$a_1 + a_2 + \cdots + a_{25} = 1$ then find $\dfrac{a_1^2}{1-a_1} + \dfrac{a_2^2}{1-a_2} + \cdots + \dfrac{a_{25}^2}{1-a_{25}}$

Solution: $\frac{a_1^2}{1-a_1} = \frac{a_1^2 - a_1 + a_1}{1-a_1} = \frac{a_1(a_1-1)+a_1}{1-a_1} = -a_1 + \frac{a_1}{1-a_1}$
So, $\dfrac{a_1^2}{1-a_1} + \dfrac{a_2^2}{1-a_2} + \cdots + \dfrac{a_{25}^2}{1-a_{25}} = -(a_1 + a_2 + \cdots + a_{25}) + \dfrac{a_1}{1-a_1} + \dfrac{a_2}{1-a_2} + \cdots + \dfrac{a_{25}}{1-a_{25}} = -1 + 1 = 0$. **Ans. 0.**

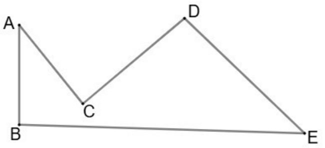
Q28.



In $\triangle ABC$, $\dfrac{AX}{XB} = \dfrac{1}{2}$ and $\dfrac{AY}{AC} = \dfrac{1}{2}$.
If area of $\triangle AXY = 15$, find area of $\triangle ABC$.

Solution: $\dfrac{[AXY]}{[BXY]} = \dfrac{1}{2}$ and $\dfrac{[ABY]}{[ABC]} = \dfrac{1}{2}$,
$\Rightarrow [BXY] = 30 \Rightarrow [ABY] = 15 + 30 = 45$,
$\Rightarrow [ABC] = 45 \times 2 = 90$. **Ans. 90.**

Q29.



In given diagram,
$AB = AC = 3, CD = 4$ and $DE = 5$,
$\angle B = \angle C = \angle D = 90^\circ$. Find BE^2.
Solution: Complete the rectangle $ACDP$ such that $P - D - E$, $PE = 8$
In $\triangle APE$, by PT, $AE^2 = 80$
In $\triangle ABE$ by PT, $BE^2 = 71$. **Ans. 71.**

Q30. The digit in the units place of the number $\left(71^{51} + 245^{198} - 146^{56}\right)$ is?

Solution: Digit in the units place of $71^{51} = 1$
Digit in the units place of $245^{198} = 5$
Digit in the units place of $146^{56} = 6$
$\Rightarrow$ Digit in the units place of $\left(71^{51} + 245^{73} - 146^{54}\right)$ is $(1 + 5 - 6) = 0$. **Ans. 0.**