M. Prakash Institute **Solutions - STD IX - Entrance Test 2**
25 January 2026 **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.	16	98	65	8	52	99	6	4	20	22
Ques.	11	12	13	14	15	16	17	18	19	20
Ans.	4	5	12	2	50	46	77	3	18	76
Ques.	21	22	23	24	25	26	27	28	29	30
Ans.	64	16	36	23	11	10	40	6	2	11

Q1. Find the largest number, which divides 245 and 1029, leaving remainder 5 in each case.

Solution: The required number is gcd of 240 and 1024 which is 16. **Ans. 16.**

Q2. If $a = 2,\ b = 3$ and $c = 6$, then find the value of $\dfrac{7^a a^c b^a}{2^b c^a}$

Solution: $\dfrac{7^a a^c b^a}{2^b c^a} = \dfrac{49 \times 64 \times 9}{8 \times 36} = 98$. **Ans. 98.**

Q3. In a class the ratio of number of boys to number of girls is 5 : 8. If there are 104 girls in the class, what is the number of boys?

Solution: Unitary method: If 8 : 5 then 104 :?, so the answer is $\dfrac{104 \times 5}{8} = 65$. **Ans. 65.**

Q4. If $3^{3.5} \times 21^2 \times 42^{2.5} \div \left(2^{2.5} \times 7^{3.5}\right) = 7 \times 3^x$, then find x.

Solution: $3^{3.5} \times 21^2 \times 42^{2.5} \div \left(2^{2.5} \times 7^{3.5}\right) = \dfrac{3^{3.5} \times (3 \times 7)^2 \times (2 \times 3 \times 7)^{2.5}}{2^{2.5} \times 7^{3.5}} = 7 \times 3^8$. **Ans. 8.**

Q5. N is the smallest natural number, which on adding 2 is exactly divisible by 21 and 30. Find $\dfrac{N}{4}$.

Solution: N is LCM of 21 and 30 minus 2 which is 208. **Ans. 52.**

Q6. A number p increased by $p\%$ of 99 equals to 99 increased by 99% of p. Find p.

Solution: The given condition is $p + \frac{99p}{100} = 99 + \frac{99p}{100} \Rightarrow p = 99$. **Ans. 99.**

Q7. How many 4 digit even numbers are formed using 2, 3, 5, 9, such that every digit is used only once in each number?

Solution: We want even numbers, so it must end with 2. 3,5,9 can be arranged in six ways. $359, 395, 539, 593, 935, 953$. **Ans. 6.**

Q8. $\dfrac{2}{a+b} - \dfrac{2}{a-b} + \dfrac{4a}{a^2-b^2} = x$. Find $x(a+b)$

Solution: $\dfrac{2}{a+b} - \dfrac{2}{a-b} + \dfrac{4a}{a^2-b^2} = \dfrac{2(a-b) - 2(a+b) + 4a}{a^2-b^2} = \dfrac{4}{a+b} \Rightarrow x(a+b) = 4$.
Ans. 4.

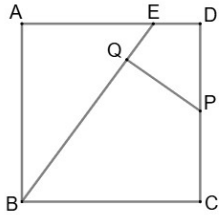
Q9. Two circles S_1 and S_2 have areas in the ratio 2 : 3. Area of S_2 is 30% of the area of a rectangle with sides 10 m and 8 m . What % of the area of rectangle is the area of S_1 ?

Solution: Ans. 20.

Q10. Find the product of $3\frac{1}{7} \times 1\frac{5}{6} \times 1\frac{2}{5} \times 1\frac{1}{11} \times 2\frac{1}{2}$

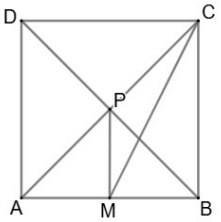
Solution: $3\frac{1}{7} \times 1\frac{5}{6} \times 1\frac{2}{5} \times 1\frac{1}{11} \times 2\frac{1}{2} = \frac{22}{7} \times \frac{11}{6} \times \frac{7}{5} \times \frac{12}{11} \times \frac{5}{2} = 22$. **Ans. 22.**

Q11. Given a square $ABCD$, with side 8 cm. Point E is on AD such that $AE = 6$ cm. Point P is midpoint of DC. $PQ \perp BE$. Find PQ.



Solution: In $\triangle AEB$, by $PT, BE^2 = AE^2 + AB^2 = 6^2 + 8^2 = 100 \Rightarrow BE = 10$
$DP = CP = \frac{DC}{2} = 4; [DEP] = 4, [BPC] = 16, [ABE] = 24, [ABCD] = 64,$
$[BPE] = [ABCD] - [ABE] - [BPC] - [DEP]$
$\frac{BE \times PQ}{2} = 64 - 24 - 16 - 4 \Rightarrow \frac{10 \times PQ}{2} = 20 \Rightarrow PQ = 4$. **Ans. 4.**

Q12. $\square ABCD$ is a square.
Diagonals AC and BD bisect each other at P.
$PM \perp AB, BC = 10$. Find $\frac{MC}{\sqrt{5}}$.



Solution: $\triangle ABC$ is 45 - 45 - 90 triangle, with $AC = 10\sqrt{2}$;
P is mid-point of AC , $AP = CP = 5\sqrt{2}$;
ΔAPM is 45 - 45 - 90 triangle, $AM = PM = 5$; $\quad MB = AB - AM = 5$;
In $\triangle MBC$, by $PT, MC^2 = MB^2 + BC^2 = 5^2 + 10^2 = 125 \Rightarrow MC = 5\sqrt{5}$; $\quad \frac{MC}{\sqrt{5}} = 5$. **Ans. 5.**

Q13. A takes 6 days less than B to complete a work. If both A and B can finish the work together in 4 days, find the time taken by B to complete the work alone.

Solution: Let no. of days required by B to complete the work be b,
then no. of days required by $A = b - 6$
Work done by $B = \frac{1}{b}$ and work done by $A = \frac{1}{b-6}$ in one day.
Work done by A and B together in one day $= \frac{1}{b} + \frac{1}{b-6} = \frac{1}{4} \Rightarrow \frac{b-6+b}{b(b-6)} = \frac{1}{4} \quad \Rightarrow 4(2b-6) = b(b-6)$
$\Rightarrow b^2 - 14b + 24 = 0 \quad \Rightarrow (b-12)(b-2) = 0 \quad \Rightarrow b = 12$ or $b = 2$. Since A requires 6 days less than B, $b = 2$ is not a possible solution, hence $b = 12$. **Ans. 12.**

Q14. Simplify $\dfrac{16 \times 2^{n+2} - 4 \times 2^{n+1}}{16 \times 2^{n+1} - 4 \times 2^n}$

Solution: $\dfrac{4 \times 2^{n+1}\left(4 \times 2^1 - 1\right)}{4 \times 2^n\left(4 \times 2^1 - 1\right)} = \dfrac{2^{n+1}}{2^n} = 2$. **Ans. 2.**

Q15. Find the value of $\left(\frac{1}{2}\sqrt{486} - \sqrt{\frac{27}{2}}\right) 2\sqrt{6} + \sqrt{196}$

Solution: $\left(\frac{1}{2}\sqrt{9 \times 54} - \sqrt{\frac{27 \times 2}{2 \times 2}}\right) 2\sqrt{6} + \sqrt{14^2} = \left(\frac{3\sqrt{54}}{2} - \frac{\sqrt{54}}{2}\right) 2\sqrt{6} + 14$
$= \sqrt{54} \times 2\sqrt{6} + 14 = 3\sqrt{6} \times 2\sqrt{6} + 14 = 36 + 14 = 50$. **Ans. 50.**

Q16. Rs. 49 was divided among 150 children. Each girl got 50 paise and each boy got 25 paise. How many girls were there?

Solution: Let the no. of girls be x and no. of boys be y .
$x + y = 150 \ldots .(1)$
$50x + 25y = 4900 \ldots .(2)$;
substituting $y = 150 - x$ in eq.(2)
$50x + 25(150 - x) = 4900 \quad \Rightarrow x = 46$ **Ans. 46.**

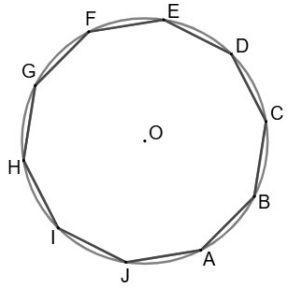
Q17. The average of marks of 40 students in a class is 76 . Due to a technical error, the marks of 2 students were recorded as 45 instead of 60 and marks of other 2 students were recorded as 65 instead of 70 . If the corrections are considered, what will be the new average of the class?

Solution: Average marks of 40 students = 76 $\Rightarrow$Total marks $= 40 \times 76 = 3040$
Marks to be added now $= 15 \times 2 + 5 \times 2 = 40$
Total marks now $= 3040 + 40 = 3080$
Average $= \frac{3080}{40} = 77$. **Ans. 77.**

Q18. A motorboat, whose speed in still water is 9 km/hr, goes 15 km downstream and comes back to the same spot in 3 hrs and 45 minutes. Find the speed of the stream.

Solution: Let the speed of the stream be S.
Relative speed for downstream $= 9 + S$, Relative speed for upstream $= 9 - S$,
Total time taken to go downstream and return = 3 hrs and 45 minutes = 3.75 hrs
Time taken for downstream $= Td = \frac{D}{R.\text{ Speed}} = \frac{15}{9+S}$
Time taken for upstream $= Tu = \frac{D}{R.\text{ Speed}} = \frac{15}{9-S}$
Total time $= Td + Tu \quad \Rightarrow 3.75 = \frac{15}{9+S} + \frac{15}{9-S}$
$\Rightarrow \frac{3.75}{15} = \frac{9-S+9+S}{(9+S)(9-S)} \quad \Rightarrow 0.25 = \frac{18}{81-S^2}$
$\Rightarrow 81 - S^2 = \frac{18}{0.25} \quad \Rightarrow S^2 = 9 \quad \Rightarrow S = 3$. **Ans. 3.**

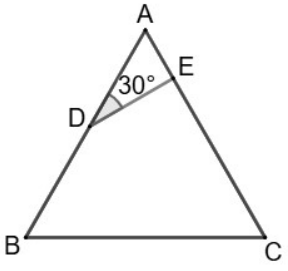
Q19. $ABCDEFGHIJ$ is a regular decagon. Find $m\angle OJD$.



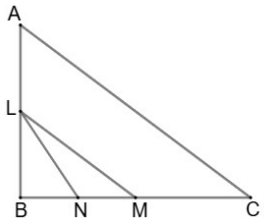
Solution: $ABCDEFGHIJ$ is a regular decagon.
Central angle at O is divided into 10 equal parts, each angle = 36°
$\Rightarrow m\angle JOA = 36^\circ$
$\Rightarrow m\angle JOD = 144^\circ$
$\Rightarrow m\angle OJD = 18$. **Ans. 18.**

Q20.

$\triangle ABC$ is an equilateral triangle.
If $m\angle ADE = 30^\circ, BC = 10, AE = 2$, find DC^2.
Solution: $\triangle ADE$ is $30 - 60 - 90$ triangle, $AE = 2, AD = 4, DE = 2\sqrt{3}$; $EC = AC - AE = 8$; In $\triangle DEC, m\angle DEC = 90^\circ$, hence by PT,
$DC^2 = DE^2 + EC^2 = \left(2\sqrt{3}\right)^2 + 8^2 = 76$ **Ans. 76.**



In $\triangle ABC, m\angle B = 90°$. L is the mid-point of AB,
M is the mid-point of BC, N is the midpoint of MB.
$[LMN] = 8$. Find $[ABC]$



Solution: In $\triangle LBM, LN$ is median, hence $[LMN] = [LBN] = 8$

Q21. $\Rightarrow [LBM] = 2[LMN] = 16$;
In $\triangle LBC, LM$ is median, hence $[LBM] = [LCM] = 16$
$\Rightarrow [LBC] = 2[LBM] = 32$;
In $\triangle ABC, CL$ is median, hence $[LBC] = [ALC] = 32$
$\Rightarrow [ABC] = 2[LBC] = 64$. **Ans. 64.**

Q22. A fraction $\frac{p}{q}$ becomes $\frac{4}{5}$, if 1 is added to both the numerator and denominator.
If, however, 5 is subtracted from both the numerator and denominator, the fraction becomes $\frac{1}{2}$.
Find $(p+q)$.

Solution: $\frac{p+1}{q+1} = \frac{4}{5} \Rightarrow 5p+5 = 4q+4 \Rightarrow 5p-4q = -1 \ldots (1)$
$\frac{p-5}{q-5} = \frac{1}{2} \Rightarrow 2p-10 = q-5 \Rightarrow 2p-q = 5 \ldots (2)$
Substituting $q = 2p-5$ from (2) in (1), $5p-4(2p-5) = -1 \Rightarrow p = 7$
From (2), $q = 9; p+q = 7+9 = 16$. **Ans. 16.**

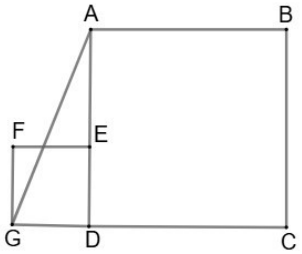
Q23. If $x = \sqrt{3}+2\sqrt{2}$ and $y = \sqrt{3}-2\sqrt{2}$, then find the value of $\dfrac{x^2+y^2-10xy}{2}$

Solution: $x^2 = (\sqrt{3}+2\sqrt{2})^2 = 11+4\sqrt{6}; \quad y^2 = (\sqrt{3}-2\sqrt{2})^2 = 11-4\sqrt{6}$
$\dfrac{x^2+y^2-10xy}{2} = \dfrac{11+4\sqrt{6}+11-4\sqrt{6}-10(\sqrt{3}+2\sqrt{2})(\sqrt{3}-2\sqrt{2})}{2} = 36$. **Ans. 36.**

Q24. The ratio of sugar to water in a solution A is 1:4 and the ratio of salt to water in solution B is $1:26$. To make an ORS solution, A and B are mixed in the ratio $2:3$. If the ratio of sugar to salt in $m:n$ (where m and n have no common factor), find $m+n$.

Solution: Solution A has $\frac{1}{5}$ sugar ; Solution A in mixture $= \frac{2}{5} \Rightarrow$ Sugar in mixture $= \frac{2}{5} \times \frac{1}{5} = \frac{2}{25}$
Solution B has $\frac{1}{27}$ salt ; Solution B in mixture $= \frac{3}{5} \Rightarrow$ Salt in mixture $= \frac{3}{5} \times \frac{1}{27} = \frac{1}{45}$
Ratio of sugar to salt $= \dfrac{\frac{2}{25}}{\frac{1}{45}} = \dfrac{m}{n} \Rightarrow \dfrac{m}{n} = \dfrac{18}{5} \Rightarrow m+n = 23$. **Ans. 23.**

$\square ABCD$ and $\square DEFG$ are squares.
If $GC = 71, AG = 61$, find FE .



Solution: Let $CD = x. \Rightarrow GD = 71-x$

Q25. In $\triangle AGD$, by PT,
$61^2 = x^2 + (71-x)^2 \Rightarrow 2x^2 - 142x + 1320 = 0$
$\Rightarrow x^2 - 71x + 660 = 0 \Rightarrow (x-60)(x-11) = 0$
$\Rightarrow CD = 60 \Rightarrow GD = 11 = FE$. **Ans. 11.**

Q26. A certain amount is tripled in 20 years at a certain simple interest. In how many years will it be doubled at the same rate of interest?

Solution: Let P be the original amount invested.
After 20 years amount received is tripled, $A = P + S.I = 3P \Rightarrow S.I = 2P$
$S.I = \frac{P \times T \times R}{100} \Rightarrow 2P = \frac{P \times 20 \times R}{100} \Rightarrow R = 10$
For amount to be doubled, $A = P + S.I = 2P \Rightarrow S.I = P$
S.I $= \frac{P \times T \times R}{100} \Rightarrow P = \frac{P \times T \times 10}{100} \Rightarrow T = 10$. **Ans. 10.**

Q27. Five years after, the father's age will be three times the age of his son then. Five years ago, the father was seven times as old as his son. Find the present age of the father.

Solution: Let the present age of son be x,
Five years ago, son's age was $x-5$, and father's age was $7(x-5)$
Five years later, son's age will be $x+5$, and father's age will be $3(x+5)$
Father's age will be $3(x+5) = 7(x-5)+10 \quad \Rightarrow x = 10$,
Father's age five years ago $= 7(10-5) = 35 \quad \Rightarrow$ His present age $= 40$. **Ans. 40.**

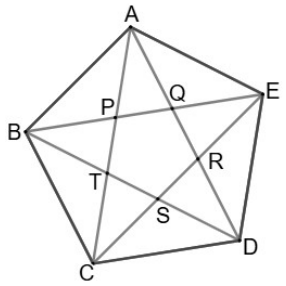
Q28. $\left(\sqrt{4x^2+40x+100}\right)^{2a} = (2x+10)^{12}$, find a.

Solution: $\left(\sqrt{4(x+5)^2}\right)^{2a} = (2(x+5))^{12} \Rightarrow (2(x+5))^{2a} = \big(2(x+5)\big)^{12}$ Since bases are equal, equating powers $\Rightarrow 2a = 12 \Rightarrow a = 6$. **Ans. 6.**

Q29. If the quadratic equations, $8x^2-24x+16=0$ and $3x^2-21x+30=0$ have one solution in common, find the common solution.

Solution: $8x^2-24x+16=0 \Rightarrow 8\left(x^2-3x+2\right)=0 \Rightarrow 8(x-1)(x-2)=0 \Rightarrow x=1$ or $x=2$
$3x^2-21x+30=0 \Rightarrow 3\left(x^2-7x+10\right)=0 \Rightarrow 3(x-2)(x-5)=0 \Rightarrow x=2$ or $x=5$. **Ans. 2.**

Q30.
In the adjoining figure, $ABCDE$ is a regular pentagon.
$[APQ]=5$ and $[SCD]=8$, find [PQRST].
Solution:
Each internal angle $= \dfrac{180(n-2)}{n} = 108^\circ$;



$\Delta ABC \cong \Delta BCD \cong \Delta CDE \cong \Delta DEA \cong \Delta EBA$ by SAS test
$\Delta SCD \cong \Delta RDE \cong \Delta QEA \cong \Delta PAB \cong \Delta TBC$ by ASA test
$\Rightarrow [SCD] = [RDE] = [QEA] = [PAB] = [TBC] = 8$
$\Rightarrow [APQ] = [BPT] = [CTS] = [DRS] = [EQR] = 5$
$\Rightarrow [ABC] = [BCD] = [CDE] = [DEA] = [EBA] = 2\times 8 + 5 = 21$
$\Delta DEA \cong \Delta DTA$ by ASA test
$\Rightarrow [DEA] = [DTA] \Rightarrow 21 = 2\times 5 + [PQRST]$
$\Rightarrow [PQRST] = 11$. **Ans. 11.**