

10TH MATHS · HALF YEARLY EXAM
ANSWER KEY

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1. c) $\{4, 9, 25, 49, 121\}$

2. c) $\frac{2}{9x^2}$

3. b) 2

4. b) an A.P

5. c) $\frac{x^2-7x+40}{(x^2-25)(x+1)}$

6. b) $\begin{bmatrix} 2 & 2 \\ 2 & -1 \end{bmatrix}$

7. a) 2

8. b) 25 sq.units

9. b) $x+y=3$; $3x+y=7$

10. d) 1

11. b) ACM

12. c) 3π

13. c) 10

14. b) 7/10

PART-II.

15 (i) Range of $f = \{1, 8, 27, 64\}$

(ii) one-one function.

16. $2^5 \times 5^2 = 800$

$\Rightarrow a = 2$ or 5
$b = 5$ or 2.

17. $a_n = \frac{2n+1}{6}$

$n=1 \Rightarrow a_1 = \frac{3}{6}$

$n=2 \Rightarrow a_2 = \frac{5}{6}$

$n=3 \Rightarrow a_3 = \frac{7}{6}$

$a = \frac{3}{6}$; $d = \frac{2}{6}$ $\therefore$ It is an A.P.

Alter: $a_n = \frac{2}{6}n + \frac{3}{6} - \frac{2}{6}$.

$= \frac{3}{6} + (n-1)\frac{2}{6}$

$a_n = a + (n-1)d$.

$d = a_2 - a_1 = \frac{5}{6} - \frac{3}{6} = \frac{2}{6}$

$d = a_3 - a_2 = \frac{7}{6} - \frac{5}{6} = \frac{2}{6}$

diff are equal.

18). $= \left(\frac{55+1}{2}\right)^2 = \left(\frac{56}{2}\right)^2 = 784$

19) $\alpha+\beta = -6$; $\alpha\beta = -4$.

$(\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta$

$= 36 + 16 = 52$

$A^T = \begin{bmatrix} 5 & -\sqrt{17} & 8 \\ 2 & 0.7 & 3 \\ 2 & 5/2 & 1 \end{bmatrix}$

20) $(A^T)^T = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{bmatrix} \Rightarrow (A^T)^T = A$.

21. $\frac{3-a}{9+2} = \frac{-1}{2} \Rightarrow \boxed{a = \frac{17}{2}}$

22. Area of $\Delta le = \frac{1}{2}\begin{bmatrix} 1 & -4 & -3 & 1 \\ -1 & 6 & -5 & -1 \end{bmatrix}$

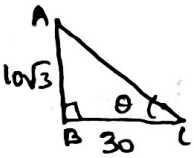
$= \frac{1}{2}[(6+20+3) - (4-18-5)]$

$= \frac{1}{2}(48)$

$= 24$ sq.units

23. $\tan\theta = \frac{10\sqrt{3}}{30} = \frac{1}{\sqrt{3}}$

$\boxed{\theta = 30^\circ}$



24. $r_1 : r_2 = 12 : 16$ Sphere

$C_1 : C_2 = \frac{4\pi r_1}{4\pi r_2} = \frac{12}{16} = \frac{3}{4}$

$\boxed{C_1 : C_2 = 3 : 4}$

25. $\frac{1}{3} \times \frac{22}{7} \times r^2 \times 24 = 11088$

$r^2 = 11088 \times \frac{7}{22} \times \frac{1}{8}$

$r^2 = 441$

$\boxed{r = 21\text{ cm}}$

26. V.O.S = V.O.C.

$\frac{4\pi}{3}r_1^2 = \pi r_2^2 h$ (S: $r_1 = 15$; C: $r_2 = 10$, $h = ?$)

$\frac{4}{3} \times 15 \times 15 \times 15 = 10 \times 10 \times h$

$h = \frac{4 \times 15 \times 15 \times 15}{10 \times 10 \times 3}$

$\boxed{h = 45\text{ cm}}$

27. $R = 36.8$; $S = 13.4$ $L = ?$

$R = L - S \Rightarrow 36.8 = L - 13.4$

$\boxed{L = 50.2}$

28. $S = \{HH, HT, TH, TT\}$; $n(S) = 4$

$A = \{HT, TH\} \Rightarrow n(A) = 2$

$P(A) = \frac{2}{4} = \frac{1}{2}$.

PART - III

29. $A=\{2,3\}$; $B=\{0,1\}$, $C=\{1,2\}$

$B\cap C=\{1\}$

$A\times(B\cap C)=\{(2,1),(3,1)\}$ → ①

$A\times B=\{(2,0)(2,1)(3,0)(3,1)\}$

$A\times C=\{(2,1)(2,2)(3,1)(3,2)\}$

$(A\times B)\cap(A\times C)=\{(2,1)(3,1)\}$ → ②

∴ ① & ② are equal.

30.

$fog=gof$

$(fog)x=(gof)x$

$f[g(x)]=g[f(x)]$

$f(6x-k)=g(3x+2)$

$3(6x-k)+2=6(3x+2)-k$

$-2k=10 \Rightarrow \boxed{k=-5}$

31. $t_4=8$; $t_8=\frac{128}{625}$

$ar^3=8$; $ar^7=\frac{128}{625}$

$r^4=\frac{128}{625}\times\frac{1}{8}$ (16) $\Rightarrow r^4=\frac{2^4}{5^4}$

$\boxed{r=\frac{2}{5}} \Rightarrow \boxed{a=125}$

G.P is 125, 50, 20, ...

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32. $10^2+11^2+\dots+24^2$

$=(1^2+\dots 24^2)-(1^2+\dots 9^2)$

$=\frac{24(24+1)(48+1)}{6}-\frac{9(9+1)(18+1)}{6}$

$=4\times25\times49-\frac{3\times5\times19}{2}$

$=4900-285$

$=4615\ cm^2$

33. $x+y+z=5$; $2x-y+z=9$

$3x+2z=14$

$4x-2y+2z=18$; $-x+y+3z=16$

$3x-z=2$

$3x+2z=14$

$-(3x-z=2)$

$3z=12$

$\boxed{z=4}$ $\boxed{x=2}$ $\boxed{y=-1}$

$x=2$; $y=-1$; $z=4$.

34.

$3x^2$ | $9x^4+12x^3+28x^2+ax+b$; $-(9x^4)$

$6x^2+2x$ | $12x^3+28x^2$; $-(12x^3+4x^2)$

$6x^2+4x+4$ | $24x^2+ax+b$; $24x^2+16x+16$

0

It is perfect square

$a=16$; $b=16$

35. $n(S)=36$

$A=\{(1,1)(2,2)\dots(6,6)\}$

$n(A)=6 \Rightarrow P(A)=\frac{6}{36}$

$B=\{(1,3)(2,2)(3,1)\}$.

$n(B)=3 \Rightarrow P(B)=\frac{3}{36}$

$A\cap B=\{(2,2)\} \Rightarrow P(A\cap B)=\frac{1}{36}$

$P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=\frac{6}{36}+\frac{3}{36}-\frac{1}{36}=\frac{8}{36}=\frac{2}{9}$

$\boxed{P(A\cup B)=\frac{2}{9}}$

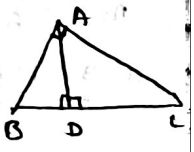
36. $A-B=\begin{bmatrix}-3 & 2\\ 0 & -2\end{bmatrix} \Rightarrow (A-B)^T=\begin{bmatrix}-3 & 0\\ 2 & -2\end{bmatrix}$ → ①

$A^T=\begin{bmatrix}1 & 1\\ 2 & 3\end{bmatrix}$; $B^T=\begin{bmatrix}4 & 1\\ 0 & 5\end{bmatrix} \Rightarrow A^T-B^T=\begin{bmatrix}-3 & 0\\ 2 & -2\end{bmatrix}$ → ②

∴ ① & ② are equal

37.

Statement: In a ΔABC, the square of hyp is equal to sum of square of other two sides



Proof:

Gn: ΔABC, $A=90^\circ$

T.P: $AB^2+AC^2=BC^2$; $AD\perp BC$

1). ΔABC & ΔABD

$\angle B$ is common

$\angle BAC=\angle BDA=90^\circ$

∴ $\Delta ABC\sim\Delta ABD$ By AA Criterion

$\frac{AB}{BD}=\frac{BC}{AB}$

$AB^2=BC\times BD$ → ①

2. Compare ΔABC & ΔADC

$\angle C$ is common

$\angle BAC = \angle ADC = 90^\circ$

$\therefore \Delta ABC \sim \Delta ADC$ By AA.

$\frac{BC}{AC} = \frac{AC}{DC}$

$AC^2 = BC \times DC \rightarrow (2)$

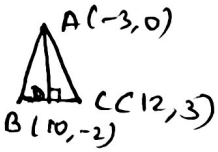
$AB^2 + AC^2 = BC(BD+DC)$

$= BC \times BC$

$AB^2 + AC^2 = BC^2$

H.P.

38.



M_1 = Slope $BC = \frac{3+2}{12-10} = \frac{5}{2}$

Since $BC \perp AD$.

Slope $AD = -\frac{2}{5}$

$M_1 = -\frac{2}{5}$ & pt $(-3,0)$

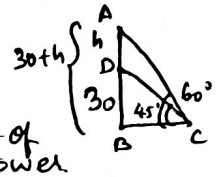
$y - y_1 = M(x - x_1)$

$(y-0) = -\frac{2}{5}(x+3)$

$5y = -2x - 6$

$\Rightarrow 2x + 5y + 6 = 0$

39



$AB = 30 + h$

$BD = 30$

$AD = h$, be height of tower

From ΔDCB

$\tan 30^\circ = \frac{30}{x}$.

$\frac{1}{\sqrt{3}} = \frac{30}{x}$.

$x = 30\sqrt{3}$.

From ΔACB.

$\tan 60^\circ = \frac{30+h}{x}$

$\sqrt{3} = \frac{30+h}{30}$

$30\sqrt{3} = 30 + h$

$h = 30(\sqrt{3} - 1)$

$h = 21.96$ M.

40) H.S Cone

$r = 7$cm $r = 7$cm; $l = 11$cm.

T.S.A of doll $= 2\pi r^2 + \pi r l$

$= \pi r [2r + l]$

$= \frac{22}{7} \times 7 [2(7) + 11]$

$= 22(25)$

$= 550$ cm^2

41)

x	f	$d = x - A = x - 18$	fd	fd^2
10	3	-8	-24	192
15	2	-3	-6	18
18	5	0	0	0
20	8	2	16	32
25	2	7	14	98
	$N=20$		$\Sigma fd = 0$	$\Sigma fd^2 = 340$

$\sigma = \sqrt{\frac{\Sigma fd^2}{N} - \left(\frac{\Sigma fd}{N}\right)^2}$

$= \sqrt{\frac{340}{20} - \left(\frac{0}{20}\right)^2}$

$= \sqrt{17}$

$\sigma = 4.1$

42 $\Delta = b^2 - 4ac$

$\Delta = 0$ (equal roots).

$(b-c)^2 - 4(a-b)(c-a) = 0$

$b^2 + c^2 + 4a^2 + 2bc - 4ac - 4ab = 0$

$(2a - b - c)^2 = 0 \Rightarrow 2a - b - c = 0$

$2a = b + c$.

PART - IV.

43. a) Rough diagram → 2 marks

line segment → 1 marks

Form a triangle → 2 marks

Similar Δle → 3 marks

b) line segment → 1 marks

Draw a circle → 2 marks

Draw a ⊥r bisector → 2 marks

Draw a circle → 1 marks

Verification → 1 marks

44) a) Soln set is $\{4, 5\}$ → 1 marks

Real & unequal roots → 1 marks

Calculation & plot the pts → 5 marks.

Drawing Graph → 1 marks.

b). Soln set is $\{-2, 1\}$ → 1 marks

$y = x^2 + x - x$

$0 = x^2 + x - 2$

$y = 0$. → 1 marks

Calculation & plot the pts → 4 marks

Drawing a Graph → 2 marks.

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