Indian School Al Wadi Al Kabir

Mid-term Examination (2022-23)

22-09-2022

Class X | Mathematics | Marks: 80

22-09-2022

Section A Part-1 (1m each)

SUNITHA

1) HCF × LCM = Pro. of 2 nos.

$27 \times 162 = 54 \times x$ (½)✓

$x = \frac{27 \times 162}{54} = \underline{81}$. (½)✓

SUNITHA

2) Zeroes are −4 and −5

Sum $= (-4)+(-5) = -9$ (½)✓

pro $= (-4)\times(-5) = +20$.

Req. quadratic poly. is (½)✓

$x^2 + 9x + 20$

SUNITHA

3) $2kx + 5y = 7$.

$6x - 5y = 11$

Since the lines are intersecting

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ ✓(½)

WRITING PROPERTY IMPORTANT

$\frac{2k}{6} \neq \frac{5}{-5} \Rightarrow \frac{2k}{6} \neq -1$

$\Rightarrow k \neq -3$ (½)✓

SUNITHA

4) $\frac{PS}{SQ} = \frac{3}{5}$, PR = 24cm

$\frac{PS}{PQ} = \frac{PT}{PR} \Rightarrow \frac{3}{8} = \frac{PT}{24}$ (½)✓

$\Rightarrow PT = \frac{3\times 24}{8}$ (½)✓

$= \underline{9cm}$

SUNITHA

5) $x = 3\sec^2\theta - 1$, $y = 3\tan^2\theta - 2$

$x - y = 3\sec^2\theta - 1 - (3\tan^2\theta - 2)$

$= 3\sec^2\theta - 1 - 3\tan^2\theta + 2$ (½)✓

$= 3(\sec^2\theta - \tan^2\theta) + 1$.

$= 3\times 1 + 1 = \underline{4}$ (½)✓

OR

$\sec\theta + \tan\theta = 7$.

$\sec^2\theta - \tan^2\theta = 1$ (½)✓

$(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$.

$7(\sec\theta - \tan\theta) = 1$

SUNITHA

$\sec\theta - \tan\theta = \frac{1}{7}$ (½)✓

SUNITHA

6) Coor. of centre $= \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$= \left(\frac{3+1}{2}, \frac{-10+4}{2}\right)$ (½)✓

$= \underline{(2,-3)}$. (½)✓

SUNITHA

7) After 5 decimal places. (1)✓

OR

$\frac{33}{2^2\times 5} = \frac{33\times 5}{2^2\times 5^2} = \frac{165}{10^2} = \underline{1.65}$ (½+½) 2+ no.

SUNITHA

8) Multiples of 4 are 4, 8, 12.

P(multiple of 4) $= \frac{3}{15} = \underline{\frac{1}{5}}$ (½+½)✓

OR

P(52 Sundays) $= \frac{6}{7}$. (1)✓

SUNITHA

9) $2x+y=23$

$4x-y=19$

$6x=42 \Rightarrow x=7$. (½)

$14+y=23 \Rightarrow y=9$ (½)

SUNITHA

10) $p(x)=x^2+2x+1$.

$\alpha+\beta=-2, \alpha\beta=1$. (½)

$\frac{1}{\alpha}+\frac{1}{\beta}=\frac{\alpha+\beta}{\alpha\beta}=\frac{-2}{1}=-2$ (½)

OR

$p(x)=x^2-5x+4$.

$p(3)=3^2-5\times3+4$ (½)

$=9-15+4=-2$,

2 is to be added (½)

SUNITHA

11) $x+2y+5=0, -3x-6y+1=0$

$\frac{a_1}{a_2}=\frac{-1}{3}, \frac{b_1}{b_2}=\frac{-1}{3}, \frac{c_1}{c_2}=\frac{5}{1}$

$\frac{a_1}{a_2}=\frac{b_1}{b_2}+\frac{c_1}{c_2}$. (½)

∴ the given pair of eqns have no soln. (½)

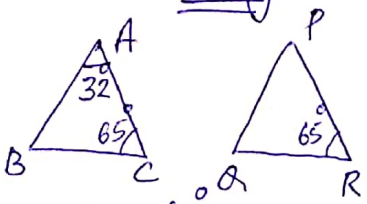
SUNITHA

12) $a=x^3y^2, b=xy^3$

$HCF(a,b)=xy^2$. (1)

SUNITHA

13)



$\angle C=\angle R=65^\circ$ (½)

$\angle B=180-(32+65)$

$=180-97=83^\circ$ (½)

OR

$\triangle ABC \sim \triangle DEF$

$\Rightarrow \frac{AB}{DE}=\frac{BC}{EF}$

$\Rightarrow \frac{AB}{2AB}=\frac{8}{EF}$ (½)

$\Rightarrow EF=16$ cm (½)

SUNITHA

14) Let x be the no. of tickets bought. (½)

$\frac{x}{6000}=0.08 \Rightarrow x=480$ (½)

SUNITHA

15) $p(x)=3x^2-kx+6$. (½)

$\alpha+\beta=\frac{k}{3}=3$ (½)

$\Rightarrow k=9$.

SUNITHA

16) Distance $=\sqrt{x^2+y^2}$

$=\sqrt{(-12)^2+5^2}$ (½)

$=\sqrt{144+25}=\sqrt{169}$

$=13$ units. (½)

WRITING UNITS IMPORTANT

OR

Given $PQ=5$ units

$PQ^2=25$ (½)

$(4-0)^2+(0-x)^2=25$

$16+x^2=25$

$x^2=9 \Rightarrow x=\pm3$. (½)

Section A Part 2 (MCQ) (1 in each)

SHAROL

17) C (intersecting or coincident.)

SHAROL

18) C ($\angle B=\angle D$)

SHAROL

19) B ($6x+8y=18$)

20) C $\left(\frac{7}{2}\right)$ ✓

SHAROL

21) A (5) ✓

SHAROL

22) k. A $\left(\frac{5}{12}\right)$ ✓

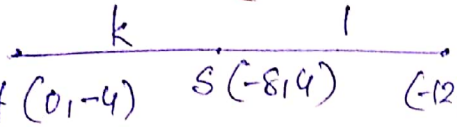
SHAROL

Section A Part-3 (CS) (4m)

SHAROL

23 i) B (−12, 8) ✓ (any 4) (1m each)

ii)



$S(-8,4) = \left(\frac{k\times(-12)+0}{k+1}, \frac{k\times 8-4}{k+1}\right)$ (12)

$(-8,4) = \left(\frac{-12k}{k+1}, \frac{8k-4}{k+1}\right)$ ✓

$-12k = -8k-8$

$-4k = -8$; $k = 2$.

Ratio = 2 : 1.

Ans: (B) ✓

iii) C (Trapezium)

iv) Dist. between bank (4,10) and ~~school~~ house (0,4)

$= \sqrt{(4-0)^2+(10+4)^2}$

$= \sqrt{16+196} = \sqrt{212}$ units.

Dist. between office (−12,8) and house (0,−4)

$= \sqrt{(-12)^2+12^2}$

$= \sqrt{144+144} = \sqrt{288}$ units

~~(iv)~~ D (Office) ✓

v) Coor $= \left(\frac{4+0}{2}, \frac{10-4}{2}\right)$

Ans: (B) $= (2,3)$ ✓

SHAROL

(Q 24) (answer any 4) (1m each) ②

i) B $\frac{5}{36}$ ✓

ii) A $\frac{11}{36}$ ✓

iii) D $\frac{1}{6}$ ✓

iv) C $\frac{1}{12}$ ✓

v) C $\frac{1}{9}$ ✓

SHAROL

25) HCF (54, 72, 63) = 9. (2) ✓

Pages required for football

$= \frac{54}{9} = 6$. (1) ✓

Volley ball $= \frac{72}{9} = 8$. (½) ✓

basket ball $= \frac{63}{9} = 7$. (½) ✓

JOJI

26) i) $x+y = 480$. (½) ✓

$150x + 400y = 134500$. (½) ✓

$y = 250$; $x = 230$ (½ + ½) ✓

ii) Amount = ~~300×230 + 350×250~~

~~= 69000 +~~ (1) ✓

$300 \times 150 + 350 \times 400$

$= 45000 + 140000$ (½) ✓

$= ₹\ 1,85,000$ (½) ✓

Section B Part-1 (2m each)

JOJI

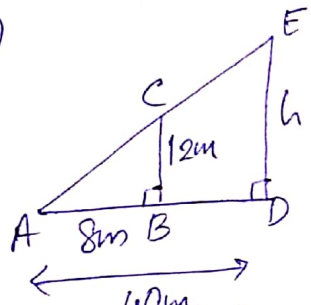
27) $\triangle AOQ \sim \triangle BOP$ (AA).

$\frac{AO}{BO} = \frac{AQ}{BP}$ (½) ✓

$\frac{20}{12} = \frac{AQ}{18} \Rightarrow AQ = \frac{20\times 18^3}{12_2}$ (½) ✓

(½) $= 30$ cm (1½) ✓

OR



Let h be height of tower.

$\Delta ABC \sim \Delta ADE$ (AA) (½)

$\frac{AB}{AD} = \frac{BC}{DE} \Rightarrow \frac{8}{40} = \frac{12}{DE}$ (½)

$DE = \frac{40 \times 12}{8}$ (½)

$= 60m$ (½)

JOJI

28) $\sin(A+2B) = \frac{\sqrt{3}}{2}$

$\Rightarrow A+2B = 60^\circ$ — (1) (½)

$\cos(A+B) = \frac{1}{2}$

$\Rightarrow A+B = 60^\circ$ — (2) (½)

$A+2B = 60^\circ$

$-A+B = 60^\circ$ (½)

$B = 0^\circ$ (½)

$A = 60^\circ$

JOJI

29) $p(x) = x^2 - 2x - 15$

$\alpha+\beta = 2, \alpha\beta = -15$ (½)

$2\alpha + 2\beta = 2(\alpha+\beta) = 4$ (½)

$2\alpha \cdot 2\beta = 4\alpha\beta = -60$ (½)

∴ poly is $x^2 - 4x - 60$ (½)

OR

$p(x) = x^2 - (k+3)x + 2(3k-4)$

$\alpha+\beta = k+3$. (½)

$\alpha\beta = 2(3k-4)$ (½)

$\alpha+\beta = \frac{1}{2}\alpha\beta$ (½)

$k+3 = 3k-4$ (½)

$2k = 7 \Rightarrow k = \frac{7}{2}$.

JOJI

30) $PA = PB$

$\Rightarrow PA^2 = PB^2$ (½)

$(x+5)^2 + (y-3)^2 = (x-7)^2 + (y-2)^2$ (½)

$x^2 + 10x + 25 + y^2 - 6y + 9$ (½)

$= x^2 - 14x + 49 + y^2 - 4y + 4$ (½)

$24x - 2y - 19 = 0$ (½) (½)

JOJI

31) $P(\text{non-face card}) = \frac{40}{52} = \frac{10}{13}$

$P(\text{black king or red queen}) = \frac{4}{52} = \frac{1}{13}$. (½+½)

Section B Part-2 (3m each)

DOLLY

32) $p(x) = 5x^2 + 8x - 4$. Sum = 8

$= 5x^2 + 10x - 2x - 4$ (½) pro = -20, +10, -2

$= 5x(x+2) - 2(x+2)$ (½)

$= (x+2)(5x-2)$ (½)

$\Rightarrow$ zeroes are $-2, \frac{2}{5}$. (½)

Sum $= -2 + \frac{2}{5} = \frac{-8}{5} = \frac{-b}{a}$. (½)

pro $= -2 \times \frac{2}{5} = \frac{-4}{5} = \frac{c}{a}$ (½)

Hence verified.

DOLLY

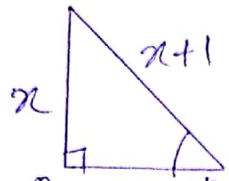
33) Given, to prove (1) ✓

const. fig

Proof. (2) ✓

DOLLY

34)



$x^2 + 9^2 = (x+1)^2$ (½) ✓

$x^2 + 81 = x^2 + 2x + 1$ (½) ✓

$2x = 80$; $x = 40$ cm.

$x+1 = 41$ cm (½) ✓

$\sin R = \frac{40}{41}$, $\cos R = \frac{9}{41}$ (½) ✓

$\sin R + \cos R = \frac{49}{41}$ (½) ✓

OR

LHS

$= \frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A}$

$= \frac{\cos A}{1 - \frac{\sin A}{\cos A}} + \frac{\sin A}{1 - \frac{\cos A}{\sin A}}$ (½) ✓

$= \frac{\cos^2 A}{\cos A - \sin A} + \frac{\sin^2 A}{\sin A - \cos A}$ (½) ✓

$= \frac{\cos^2 A}{\cos A - \sin A} - \frac{\sin^2 A}{\cos A - \sin A}$ (½) ✓

$= \frac{\cos^2 A - \sin^2 A}{\cos A - \sin A}$ (½) ✓

$= \frac{(\cos A + \sin A)(\cos A - \sin A)}{(\cos A - \sin A)}$ (½) ✓

$= \cos A + \sin A = RHS$

DOLLY

35) Graph (1+1+1/2)=(2½) ✓ (3)

Solution is (1,2) (½) ✓

Section - B Part - 3 (5m each)

PRASAD

36) Given, to prove, fig (1½) ✓

const. (3½) ✓

Proof.

PRASAD

37) $\sqrt{2}$ is irrational (3) ✓

$3+3\sqrt{2}$ is irrational (2) ✓

PRASAD

38) LHS $= \frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1}$

÷ by $\cos\theta$

$\frac{\frac{\sin\theta}{\cos\theta} - \frac{\cos\theta}{\cos\theta} + \frac{1}{\cos\theta}}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\cos\theta} - \frac{1}{\cos\theta}}$ (½) ✓

$= \frac{\tan\theta - 1 + \sec\theta}{\tan\theta + 1 - \sec\theta}$ (1) ✓

$= \frac{\tan\theta - 1 + \sec\theta}{\tan\theta - \sec\theta + \sec^2\theta - \tan^2\theta}$ (1) (½) ✓

$= \frac{\tan\theta - 1 + \sec\theta}{-(\sec\theta - \tan\theta) + (\sec\theta - \tan\theta)(\sec\theta + \tan\theta)}$ (½) ✓

$= \frac{\tan\theta - 1 + \sec\theta}{(\sec\theta - \tan\theta)(-1 + \sec\theta + \tan\theta)}$ (½) ✓

$= \frac{1}{\sec\theta - \tan\theta} = RHS$ (½) ✓

PRASAD

(OR)

$m = \tan\theta + \sin\theta$

$n = \tan\theta - \sin\theta$ (1)

$m^2 - n^2 = (\tan\theta + \sin\theta)^2 - (\tan\theta - \sin\theta)^2$

$= \tan^2\theta + 2\tan\theta \cdot \sin\theta + \sin^2\theta - (\tan^2\theta - 2\tan\theta \sin\theta + \sin^2\theta)$ (1) (2)

$= \tan^2\theta + 2\tan\theta \cdot \sin\theta + \sin^2\theta - \tan^2\theta + 2\tan\theta \cdot \sin\theta - \sin^2\theta$ (1)

$= 4\tan\theta \cdot \sin\theta$

$4\sqrt{mn}$

$= 4\sqrt{\tan^2\theta - \sin^2\theta}$ (1/2)

$= 4\sqrt{\frac{\sin^2\theta}{\cos^2\theta} - \sin^2\theta}$ (1/2)

$= 4\sqrt{\sin^2\theta\left(\frac{1}{\cos^2\theta} - 1\right)}$ (1/2)

$= 4\sqrt{\sin^2\theta \cdot (\sec^2\theta - 1)}$

$= 4\sin\theta \cdot \tan\theta$ (1/2)

$\therefore m^2 - n^2 = 4\sqrt{mn}$

31)

A(11, -2) —— P —— Q —— B(-3, 4)

P divides AB in the ratio 1:2 (1)

Coor of P are $\left(\frac{1\times -3 + 2\times 11}{1+2}, \frac{1\times 4 + 2\times -2}{1+2}\right)$

$= \left(\frac{-1}{3}, 0\right)$ (1 1/2)

Q divides AB in the ratio 2:1 (1)

Coor of Q are $\left(\frac{2\times -3 + 1\times 11}{2+1}, \frac{2\times 4 + 1\times -2}{2+1}\right)$

$= \left(\frac{-5}{3}, 2\right)$ (1 1/2)

22-09-2022