R.K ACADEMY SULUR- CBE

FULL PORTION 3

Date : 04-Mar-20

10th Standard

Maths

Reg.No. :

instructions: 1) Check the question paper for fairness of printing. If there is any lack of fairness,inform the Hall supervisor immediately. 2)Use black or blue ink to write and underline and pencil to draw diagrams.

Time : 03:00:00 Hrs

Total Marks : 100

Note: This question paper contains four parts.
Note:i)Answer all questions.
ii) Choose the most suitable answer from the given four altrrnatives and write the option code with the corresponding answer iii)Each question carries 1 mark.

14 x 1 = 14

1) (b) (2,-1)

2) (d) 11

3) (a) $\frac{8}{27}$

4) (a) straight line

5) (a) (i) and (ii) only

6) (c) 2 equal halves

7) (b) 4 cm

8) (d) 4 cm

9) (c) l_2 and l_4 are perpendicular

10) (d) $-\frac{7}{2}$

11) (b) $\frac{b}{3}$

12) (a) $\frac{2}{3}$

13) (c) $\frac{8\pi h^2}{9}$ sq.units

14) (b) $\frac{p}{p+q+r}$

ANSWER THE FOLLOWING (Q. NO 28 IS COMPULSORY)

10 x 2 = 20

15)

f(x) =2x+5, x≠0. $\frac{f(x+2)-f(2)}{x}$

f(1) =2 x 1 + 5=7

f(2)=2 x 2 + 5=9

f(3)=2 x 3 + 5=11

When x=1

$\frac{f(x+2)-f(2)}{x}$

f(x) = 2x + 5 ⇒ f(x + 2)

2(x + 2) + 5

2x+4+5 = 2x+9

2(2) + 5 = 4 + 5 = 9

$\therefore \frac{f(x+2)-f(2)}{x} = \frac{2x+9-9}{x} = \frac{2x}{x}$ =2

16)

f(x) = x-6, g(x)=x^2

fog(x)=f(g(x)) =f(x^2)=x^2-6 ....(1)

gof(x)=g(f(x))=g(f(x)) =g(x-6) =$(x-6)^2$

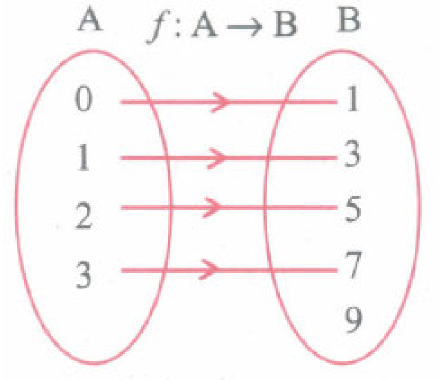
=x^2+36-12x =x^2-12x+36 ....(2)

(1) ≠ (2)

∴ fog(x) ≠ gof(x)

17)

An arrow diagram



18)

Let Senthil's house number be x.

It is given that 1 + 2 + 3 +... + (x -1) = (x + 1) + (x + 2)+ .... +49

1 + 2 + 3 + .. + (x - 1) = [1 + 2 + 3...+49] - [1 + 2 + 3+ . + x]

$\frac{x-1}{2}[1+(x-1)] = \frac{49}{2}[1+49] - \frac{x}{2}[1+x]$

$\frac{x(x-1)}{2} = \frac{49\times 50}{2} - \frac{x(x+1)}{2}$

x^2 -x = 2450 - x2 - x ⇒2x2=2450

x^2 = 1225 gives x = 35

Therefore, Senthil's house number is 35.

19)

$1^3 + 2^3 + 3^3 + ... + 16^3 = \left[\frac{16\times(16+1)}{2}\right]^2 = (136)^2 = 18496$

20)

$\frac{1}{x^2-5x+6} + \frac{1}{x^2-3x+2} - \frac{1}{x^2-8x+15}$

$= \frac{1}{(x-2)(x-3)} + \frac{1}{(x-2)(x-1)} - \frac{1}{(x-5)(x-3)}$

$= \frac{(x-1)(x-5)+(x-3)(x-5)-(x-1)(x-2)}{(x-1)(x-2)(x-3)(x-5)}$

$\frac{x^2-11x+18}{(x-1)(x-2)(x-3)(x-5)} = \frac{(x-9)(x-2)}{(x-1)(x-2)(x-3)(x-5)}$

$= \frac{x-9}{(x-1)(x-)(x-5)}$

21)

$A^T = \begin{pmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{pmatrix}$

$A.A^T = \begin{pmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{pmatrix} \begin{pmatrix} cos\theta & -sin\theta \\ sin\theta & cos\theta \end{pmatrix}$

$= \begin{pmatrix} cos^2\theta + sin^2\theta & -cos\theta sin\theta + cos\theta sin\theta \\ -sin\theta \quad cos\theta + cos\theta sin\theta & sin^2\theta + cos^2\theta \end{pmatrix}$

$= \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = I$

Hence proved.

22)

$\frac{(k-12)}{a}x^2+\frac{2(k-12)}{b}x+\frac{2}{c}=0$

D^2 = b^2 4ac = $(2(k - 12))^2$ - 4(k - 12)(2)

= 4(k - 12)[(k - 12) - 2]

= 4(k-12)(k- 14)

The given equation will have equal roots, if D = 0

⇒ 4(k-12)(k-14) 0

k - 12 = 0 or k - 14 0

k 12, 14

23)

In △ABC, AD is the bisector of ∠A

Therefore by Angle Bisector of ∠A

$\frac{AB}{AC}=\frac{BD}{DC}$

$\frac{10}{14}=\frac{x}{6-x}$ gives $\frac{5}{7}=\frac{x}{6-x}$

so, 12x=30 we get ,$x=\frac{30}{12}=2.5cm.$

24)

If a and b are the intercepts then a + b = 7 or b = 7 − a

By intercept form $\frac{x}{a}+\frac{y}{b}=1...(1)$

We have $\frac{x}{a}+\frac{y}{7-a}=1$

As this line pass through the point (-3,8), we have

$\frac{-3}{a}+\frac{8}{7-a}=1$ gives –3(7–a) + 8a = a(7 – a)

21 + 3a + 8a = 7a − a^2

So, a^2 + 4a − 21 = 0

Solving this equation (a − 3) (a + 7) = 0

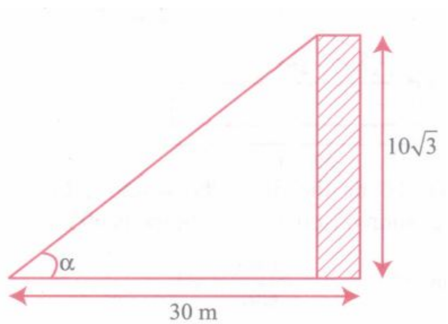
a = 3 or a = −7

Since a is positive, we have a = 3 and b = 7 – a = 7 – 3 = 4.

Hence $\frac{x}{3}+\frac{y}{4}=1$

Therefore, 4x + 3y − 12 = 0 is the required equation.

25)



Angle of elevation of the top of the tower from a point 30 m away is = α

tan α = $\frac{opp.\ side}{adj\ side}$ = $\frac{10\sqrt{3}}{30}=\frac{1}{\sqrt{3}}$

∴ α = $tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ = 30o

26)

27)

Let r and h be the radius and height of the cone respectively.

Given that, volume of the cone = 11088 cm^3

$\frac{1}{3}\pi r^2h=11088$

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

$r^2 = 441$

Therefore, radius of the cone r = 21 cm

28)

Sample space

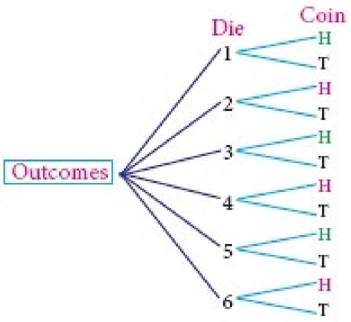
S = {1H,1T,2H,2T,3H,3T,4H,4T,5H,5T,6H,6T};

n(S)=12

Let A be the event of getting an odd number and a head.

A = {1H, 3H, 5H}; n(A)=3

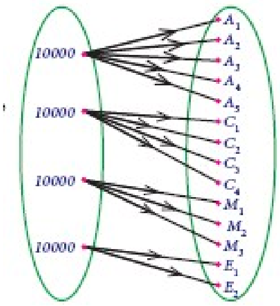
P(A)= $\frac{n(A)}{n(S)} = \frac{3}{12} = \frac{1}{4}$



ANSWER THE FOLLOWING (Q. NO 42 IS COMPULSORY) 10 x 5 = 50

29)

{(10000,A_1), (10000,A_2), (10000,A_3), (10000,A_4), (10000,,A_5), (25000,C_1), (25000,C_2), (25000, C_3), (25000,C_4), (50000, M_1), (50000, M_2), (50000,M_3), (100000,E_1), (100000,E_2)}



30)

gff(x) = g[f{f(x)}] (This means "g of f of f of x")

=g[f(3x+1)] = g[3(x+1)+1] = g(9x+4)

g(9x+4) = [(9x+4)+3] = 9x+7

fgg(x) = f[g{g(x)}] (This means " f of g of g of x")

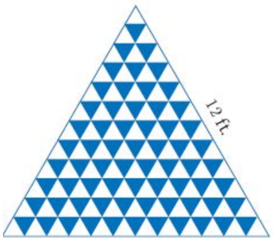
=f[g(x+3)] = f[(x+3)+3] = f(x+6)

f(x+6) = [3(x+6)+1] = 3x+19

These two quantities being equal, we get 9x + 7 = 3x + 19. Solving this equation we obtain x=2.

31)

Since the mosaic is in the shape of an equilateral triangle of 12 ft, and the tile is in the shape of an equilateral triangle of 12 inch (1 ft) there will be 12 rows in the mosaic.



From the figure, it is clear that number of white tiles in each row are 1, 2, 3, 4, ..., 12 which clearly forms an Arithmetic Progression

Similarly the number of blue tiles in each row are 0, 1, 2, 3, ..., 11 which is also an Arithmetic Progression.

Number of white tiles = 1 + 2 + 3 +....+12 = $\frac{12}{2}[1+12]$=78

Number of blue tiles = 0 + 1+ 2 + 3 + +$\frac{12}{2}[0+11]$=66

The total number of tiles in the mosaic = 78 + 66 =144

32)

Let the wo A.Ps be

AP_1 = a_1 + a_1 + d, a_1 + 2d, ...

AP_2 = a_2, a_2 + d, a_2 + 2d, ...

In AP_1 we have a_1 = 2

InAP_2 we have a_2 = 7

t_{10} in AP_1= a_1 + 9d = 2 + 9d ..(1)

t_{10} in AP_2= a_2 + 9d= 7 + 9d ..(2)

The difference between their 10th terms

$= (1) - (2) \;=\; 2 + 9\not{d} - 7 - 9\not{d}$

= -5 . (I)

t_{21} in AP_1 = a_1 + 20d = 2 + 20d ..(3)

t_{21} in AP_2 = a_2 + 20d = 7 + 20d ..(4)

The difference between their 21st terms is (3) ... (4)

$= 2 + \not{20d} - 7 - \not{20d}$

= -5 .. ..(II)

I = II

Hence it is proved

33)

Squaring both sides($\sqrt{y+1}+\sqrt{2y-5}$)^2=3^2

y+1+2y-5+2($\sqrt{y+1}+\sqrt{2y-5}$)=9

3y-4-9=-2$\sqrt{y+1}+\sqrt{2y-5}$

Again squaring both sides

$(3y-13)^2(-2\sqrt{y+1}+\sqrt{2y-5})^2$

$9y^2-78y+169=4(y+1)(2y-5)$

$9y^2-78y+169=4(2y^2+2y-5y-5)$

$9y^2-78y+169=8y^2+8y-20y-20$

$9y^2-78y+169-8y^2+12y+20=0$

$y^2-66y+189=0$

$y^2-63-3y+189=0$

y(y-63)-3(y-63)=0

(y-63)(y-3)=0

y=63,3

34)

Let $\frac{1}{x}$ = p, $\frac{1}{y}$ = q, $\frac{1}{z}$ = r

The given equations are written as

$\frac{p}{2}+\frac{q}{4}-\frac{r}{3}=\frac{1}{4}$

p = $\frac{q}{3}$

p - $\frac{q}{5}$ + 4r = $2\frac{2}{15}$ = $\frac{32}{15}$

By simplifying we get,

6p + 3q - 4r = 3 ....(1)

3p = q ....(2)

15p - 3q + 60r = 32 . ....(3)

Substituting (2) in (1) and (3) we get,

15p - 4r = 3 ......(4)

6p + 60r = 32 reduces to 3p + 30 r = 16 .... (5)

Solving (4) and (5),

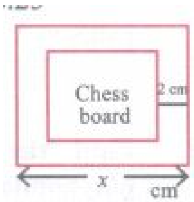
$$\begin{array}{rl} 15p - 4r & = 3 \\ 15p + 150r & = 80 \quad (-) \\ \hline -154r & = -77 \quad \text{we get, } r = \frac{1}{2} \\ \hline \end{array}$$

Substituting r = $\frac{1}{2}$ in (4) we get, 15p 2 = 3 gives, p = $\frac{1}{3}$

From (2), q = 3p we get q = 1

Therefore, x = $\frac{1}{p}$ = 3, y = $\frac{1}{q}$ = 1, z = $\frac{1}{r}$ = 2. That is, x = 3, y = 1, z = 2.

35)



Let the length of the side of the chess board be x cm Then

Area of 64 squares = $(x - 4)^2$

$(x - 4)^2$ = 64 x 6.25

⇒ x^2-8x+ 16=400

⇒X^2- 8x - 384 =0

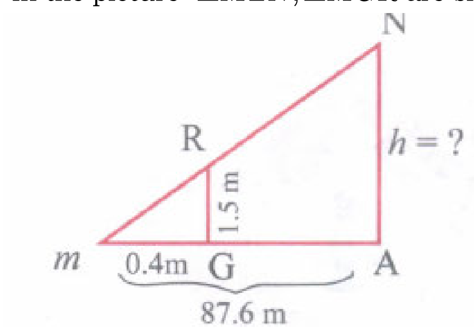
⇒ X^2- 24x + 16x - 384 = 0

⇒(x - 24)(x + 16) = 0

⇒ x=24 cm.

36)

In the picture $\Delta MLN, \Delta MGR$ are similar triangles.



$$\frac{GR}{LN} = \frac{MG}{ML}$$

$$\frac{1.5}{h} = \frac{0.4}{87.6}$$

0.4X4=87.6X1.5

$$\frac{4}{10} \times h = \frac{876}{10} \times \frac{15}{10}$$

$$= \frac{657}{2} = 328.5m$$

∴ Height of the lamppost is 328 5m

37)

Statement :

In a right angle triangle, the square on the hypotenuse is equal to the sum of he squares on the other two sides

Given :

$\Delta ABC, \angle A = 90^0$

To prove :

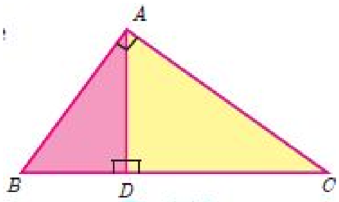


Fig. 4.46

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

Construction :Draw $AD \perp BC$

No.	Statement	Reason
1	Compare ΔABC and ΔABD $\angle B$ is common $\angle BAC = \angle BDA = 90^0$ Therefore,$\Delta ABC \sim \Delta ABD$ $\frac{AB}{BD} = \frac{BC}{AB}$ $AB^2 = BC \times BD$...(1)	Given $\angle BAC = 90^0$ and by construction $\angle BDA = 90^0$
2..	Compare ΔABC and ΔADC $\angle C$ is common $\angle BAC = \angle ADC = 90$ Therefore,$\Delta ABC \sim \Delta ADC$ $\frac{BC}{AC} = \frac{AC}{DC}$ $AC^2 = BC \times DC$ ..(2)	Given $\angle BAC = 90^0$ and by construction $\angle CDA = 90^0$ By AA similarity

Adding 1) and (2) we get

$AB^2 + AC^2 = BC \times BD + BC \times DC$

$= BC(BD + DC) = BC \times BC$

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

Hence the theorem is proved.

38)

980 L@ Rs.14/L

1220L@ Rs.16/L

$\frac{17-16}{x-1220} = \frac{16-14}{1220} - 980$

$\Rightarrow \frac{1}{x-1220} = \frac{2}{240}$

$\Rightarrow$ x-1220=120

$\Rightarrow$ x=1340

He can sell 1340 L@ Rs.17L.

39)

$a^2 = \frac{(1+sin\theta)^2}{cos^2\theta} = \frac{1+sin^2\theta+2sin\theta}{cos^2\theta}$

$\therefore a^2 - 1 = \frac{sin^2\theta+2sin^2\theta+1-cos^2\theta}{cos^2\theta}$

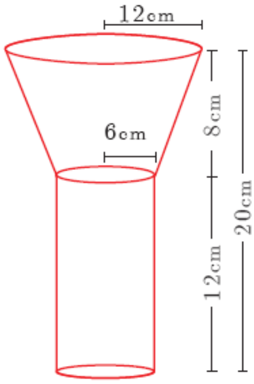
$a^2 + 1 = \frac{sin^2\theta+2sin^2\theta+1+cos^2\theta}{cos^2\theta}$

$\therefore$ L.H.S = $\frac{a^2-1}{a^2+1} = \frac{2sin^2\theta+2sin\theta}{2sin\theta+2}$

$= \frac{2\sin\theta(\sin\theta+1)}{2(\sin\theta+1)}$

= sin θ = R.H.S

40)



Let R, r be the top and bottom radii of the frustum.

Let h_1, h_2 be the heights of the frustum and cylinder respectively

Given that, R = 12 cm, r = 6 cm, h_2 = 12 cm

Now, h_1 = 20–12 = 8 cm

Here, Slant height of the frustum l=$\sqrt{(R-r)^2+h_1^2 units}$

$=\sqrt{36+64}$

l=10cm

Outer surface area =$2\pi r h_2+\pi(R+r) \quad l \quad sq.units$

$=\pi[2rh_2+(R+r)l]$

$=\pi[(2\times6\times12)+(18\times10)]$

$=\pi[144+180]$

$=\frac{22}{7}\times324=1018.28$

Therefore, outer surface area of the funnel is 1018 28 cm^2.

41)

Volume of a cylinder $=\pi r^2 h$

Volume of a cone $=\frac{1}{3}\pi r^2 h$

Volume of a sphere $=\frac{4}{3}\pi r^3$

Their ratio $V_1 : V_2 : V_3$

$\pi r^2 h : \frac{1}{3}\pi r^2 h : \frac{4}{3}\pi r^3$

$h : \frac{h}{3} : \frac{4r}{3}$

3h h: 4r

3h : h : 2(2r) (where 2r = h)

∴ $V_1 : V_2 : V_3$ = 3: 1 : 2

42)

Time Taken X	**Mid Value x_i**	**No. of Students f_i**	**d_i=x_i-**	$d_i=\frac{x_i-A}{C}$	**f_ix_i**	d_i^2	$f_id_i^2$
8 5-9.5	9	6	-2	-2	-12	4	24
9.5-10.5	10	8	-1	-1	-8	1	8
105-11.5	11	17	0	0	0		0
11.5-12.5	12	10	1	1	10	1	10
12.5-13.5	13	9	2	2	18	4	36
		N=50			8		78

Standard deviation

$$\sigma=c\times\sqrt{\frac{\Sigma f_i d^2}{N}-\left(\frac{\Sigma f_i d_i}{N}\right)^2}$$

= $1\times\sqrt{\frac{78}{50}-\left(\frac{8}{50}\right)^2}$

= $1\times\sqrt{1.56-(0.16)^2}$

$= 1 \times \sqrt{1.56 - -0.0256}$ $= 1 \times \sqrt{1.534}$

= 1 x 1 213

1.213

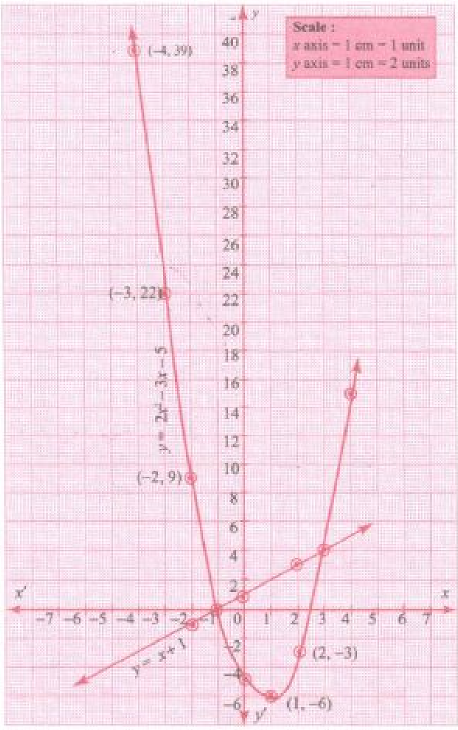
= 1.2

ANSWER THE FOLLOWING 2x 8 = 16

43) a)

x	-4	-3	-2	-1	0	1	2	3	4
x^2	16	9	4	1	0	1	4	9	16
$-2x^2$	32	18	8	2	0	2	8	18	32
-3x	12	9	6	3	0	-3	-6	-9	-12
-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
$y=x^2-3x-5$	39	22	9	0	-5	-6	-3	4	15

Draw the parabola using the points (-4, 39), (-3, 22), (-2, 9), (-1, 10), (0, -5), (1, -6), (2, -3), (3, 4), (4, 15).



To solve $2x^2 - 4x - 6 = 0$, subtract it from $y = 2x^2 - 3x - 5$

$$\begin{aligned} y &= 2x^2 - 3x - 5 \\ 0 &= 2x^2 - 4x - 6 \\ & \quad (-) \ (+) \quad (+) \\ \hline y &= x + 1 \end{aligned}$$

is a straight line

x	-2	0	2
1	1	1	1
y=x+1	-1	1	3

Draw a straight line using the points (-2, -1), (0, 1), (2, 3). The points of intersection of the parabola and the straight line forms the roots of the equation.

The x-coordinates of the points of intersection forms the solution set.

∴ Solution {-1, 3}

(OR)

b)

$x^2 - 6x + 9 = 0$

Let $y = X^2 - 6x + 9$

Step 1:

x	-4	-3	-2	-1	0	1	2	3	4

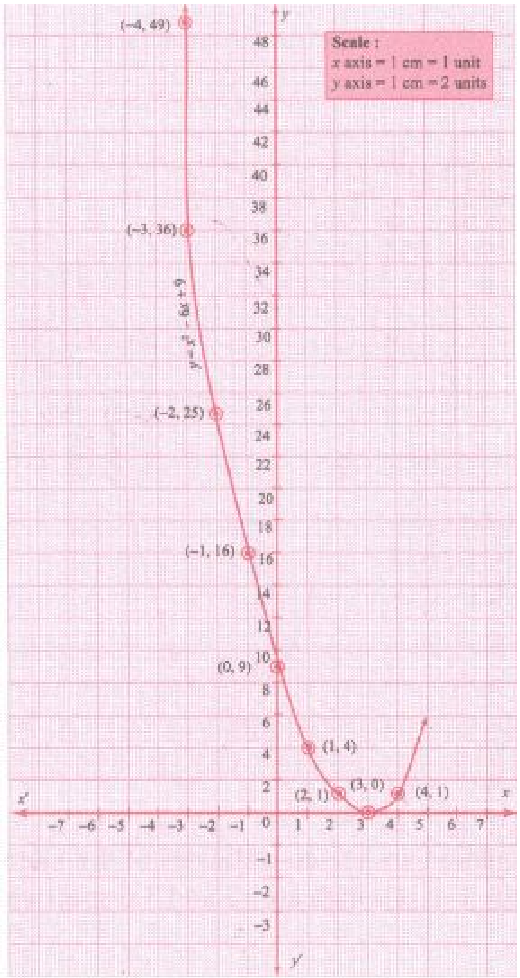
x^2	16	9	4	1	0	1	4	9	16
-6x	24	18	12	6	0	-6	-12	-18	-24
9	9	9	9	9	9	9	9	9	9
$y=x^2-6x+9$	49	36	25	16	9	4	1	0	1

Step 2:

Points to be plotted: (-4,49), (-3, 36), (-2, 25), (-1, 16), (0, 9), (1, 4), (2, 1), (3, 0), (4, 1)

Step 3:

Draw the parabola and mark the co-ordinates of the intersecting points



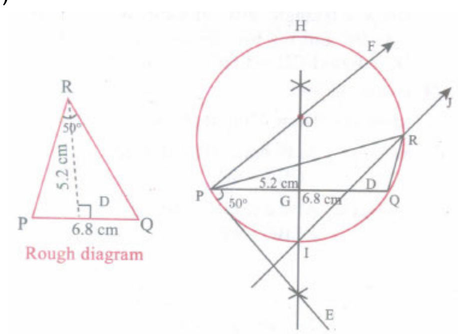
Step 4:

The point of intersection of the parabola with x axis is (3, 0)

Since there is only one point of intersection with the x-axis, the quadratic equation has real and equal roots.

∴ Solution (3, 3)

44) a)



Construction:

Steps (1) Draw a line segment PQ = 6.8 cm

Steps (2) At P, draw PE such that $\angle QPE = 50^0$

Steps (3) At P, draw PF such that $\angle FPE = 90^0$

Steps (4) Draw $\perp'$ bisector to PQ, which intersects PF at O.

Steps (5) With 0 as centre and OP as radius draw a circle.

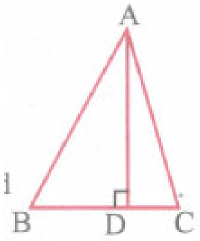
Steps (6) From P mark an arc of 5.2 cm on PQ atD.

Steps (7) The $\perp'$ bisector intersects the circle at I. Join ID.

Steps (8) ID produced meets the circle at R. Now join PR & QR. $\triangle$PQR is the required triangle

(OR)

b)



We have DB = 3 CD.

BC = BD+DC

BC = 3CD+CD

BC = 4CD

$CD = \frac{1}{4}BC$

$CD = \frac{1}{4}BC$

$BD = 3cD = \frac{3}{4}BC$

Since ΔABD is a right triangle (i) right angled . at D.

AB^2 - AD^2 + BD^2

By ΔACD is a right triangle right angled at D

AC^2 = AD^2 + CD^2

Subtracting equation (iii) from equation (ii), we got

AB^2 - AC^2 = BD^2-CD^2

$\Rightarrow AB^2 - AC^2 = \left(\frac{3}{4}BC\right)^2 - \left(\frac{1}{4}BC\right)^2$

$(fromCD = \frac{1}{4}BC, BD = \frac{3}{4}BC)$

(i) $\Rightarrow AB^2 - AC^2 = \frac{9}{16}BC^2 - \frac{1}{16}BC$

$\Rightarrow AB^2 - AC^2 = \frac{1}{2}BC^2$

$\Rightarrow AB^2 - AC^2 = \frac{1}{2}BC2^2$

$\Rightarrow 2(AB^2 - AC^2) = BC^2$

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

R.K ACADEMY SULUR- CBE

FULL PORTION 3

Date 16-Feb-20

10th Standard

Maths

Reg.No. :

instructions: 1) Check the question paper for fairness of printing. If there is any lack of fairness,inform the Hall supervisor immediately. 2)Use black or blue ink to write and underline and pencil to draw diagrams.

Exam Time : 03:00:00 Hrs | Total Marks : 100

Note: This question paper contains four parts.

14 x 1 = 14

Note:i)Answer all questions.

ii) Choose the most suitable answer from the given four altrrnatives and write the option code with the corresponding answer iii)Each question carries 1 mark.

1) If g={(1,1), (2,3), (3,5), (4,7)} is a function givrn by g(x)=αx+β then the values of α and β are

(a) (-1,2) (b) (2,-1) (c) (-1,-2) (d) (1,2)

2) Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n\ 1}+F_{n-2}$ then F5 is

(a) 3 (b) 5 (c) 8 (d) 11

3) Sum of infinite terms of G P is 12 and the first term is 8.what is the fourth term of the G.P?

(a) $\frac{8}{27}$ (b) $\frac{4}{27}$ (c) $\frac{8}{20}$ (d) $\frac{1}{3}$

4) Graph of a linear polynomial is a

(a) straight line (b) circle (c) parabola (d) hyperbola

5)

If A = $\begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{pmatrix}$, B = $\begin{pmatrix} 1 & 0 \\ 2 & -1 \\ 0 & 2 \end{pmatrix}$ and C = $\begin{pmatrix} 0 & 1 \\ -2 & 5 \end{pmatrix}$, Which of the following statements are correct?

(i) AB +C = $\begin{pmatrix} 5 & 5 \\ 5 & 5 \end{pmatrix}$

(ii) BC = $\begin{pmatrix} 0 & 1 \\ 2 & -3 \\ -4 & 10 \end{pmatrix}$

(iii) BA + C = $\begin{pmatrix} 2 & 5 \\ 3 & 0 \end{pmatrix}$

(iv) (AB)C = $\begin{pmatrix} -8 & 20 \\ -8 & 13 \end{pmatrix}$

(a) (i) and (ii) only (b) (ii) and (iii) only (c) (iii) and (iv) only (d) all of these

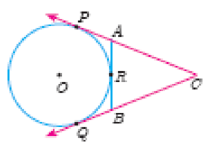
6) Axis of symmetry in the term of vertical line seperates parabola into:

(a) 3 equal halves (b) 5 equal halves (c) 2 equal halves (d) 4 equal halves

7) In a △ABC, AD is the bisector ∠BAC.If AB=5cm and DC=8cm. The length of the side AC is

(a) 6 cm (b) 4 cm (c) 3 cm (d) 8 cm

8) In figure CP and CQ are tangents to a circle with centre at O. ARB is another tangent touching the circle at R. If CP=11 cm andBC =7 cm, then the length of BR is



(a) 6 cm (b) 5 cm (c) 8 cm (d) 4 cm

9) Consider four straight lines

(i) l_1 : 3y = 4x + 5

(ii) l_2 : 4y = 3x - 1

(iii) l_3 : 4y + 3x =7

(iv) l_4 : 4x + 3y = 2

Which of the following statement is true?

(a) l_1 and l_2 are perpendicular (b) l_1 and l_4 are parallel (c) l_2 and l_4 are perpendicular (d) l_2 and l_3 are parallel

10) Find the value of 'a' if the lines 7y=ax+4 and 2y=3-x are parallel

(a) $\frac{7}{2}$ (b) $-\frac{2}{7}$ (c) $\frac{2}{7}$ (d) $-\frac{7}{2}$

11) The electric pole subtends an angle of 30° at a point on the same level as its foot. At a second point 'b' metres above the first, the depression of the foot of the tower is 60° The height of the tower (in metres) is equal to

(a) $\sqrt{3}$ b (b) $\frac{b}{3}$ (c) $\frac{b}{2}$ (d) $\frac{b}{\sqrt{3}}$

12) If 4 tanθ=3, then $\left(\frac{4\sin\theta-\cos\theta}{4\sin\theta+\cos\theta}\right)$ is equal to

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

13) The total surface area of a cylinder whose radius is $\frac{1}{3}$of its height is

(a) $\frac{9\pi h^2}{8}$ sq.units (b) $24\pi h^2$ sq.units (c) $\frac{8\pi h^2}{9}$ sq.units (d) $\frac{56\pi h^2}{9}$ sq.units

14) The probability a red marble selected at random from a jar containing p red, q blue and r green marbles is

(a) $\frac{q}{p+q+r}$ (b) $\frac{p}{p+q+r}$ (c) $\frac{p+q}{p+q+r}$ (d) $\frac{p+r}{p+q+r}$

ANSWER THE FOLLOWING (Q. NO 28 IS COMPULSORY) 10 x 2 = 20

15) Let f(x)=2x+5. If x ≠ 0 then find $\frac{f(x+2)-f(2)}{x}$.

16) Using the functions f and g given below, find f o g and g o f. Check whether f o g = g o f.

f(x) = x-6, g(x)=x^2

17) Let A = {0, 1, 2, 3} and B = {1, 3, 5, 7, 9} be two sets. Letf: A → B be a function given by f(x) = 2x + 1. Represent this function as an arrow .

18) The houses of a street are numbered from 1 to 49. Senthil's house is numbered such that the sum of numbers of the houses prior to Senthil s house is equal to the sum of numbers of the houses following Senthil's house. Find Senthil's house number?

19) Find the sum of

$1^3+2^3+3^3+..+16^3$

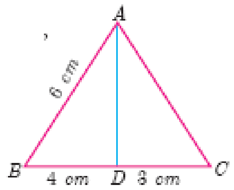
20) Simplify $\frac{1}{x^2-5x+6}+\frac{1}{x^2-3x+2}-\frac{1}{x^2-8x+15}$

21) If A = $\begin{bmatrix}\cos\theta & \sin\theta \\ -\sin\theta & \cos\theta\end{bmatrix}$ prove that AA^T = I.

22) Find the values of k for which the following equation has equal roots.

(k - 12)r + 2(k - 12)x + 2 = 0

23) In the figure, AD is the bisector of ∠A. If BD = 4 cm, DC= 3 cm and AB= 6 cm, find AC.



24) A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through (-3,8). Find its equation

25) Find the angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height $10\sqrt{3}m$

26) A ladder 15 metres long just reaches the top of a vertical wall. If the ladder makes an angle of 60^o with the wall, finf the height of the wall.

27) The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone.

28) A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows a head

ANSWER THE FOLLOWING (Q. NO 42 IS COMPULSORY) 10 x 5 = 50

29) A company has four categories of employees given by Assistants (A), Clerks (C), Managers (M) and an Executive Officer (E). The company provide Rs.10,000, Rs.25,000, Rs.50,000 and Rs.1,00,000 as salaries to the people who work in the categories A, C, M and E respectively. If A_1, A_2, A_3, A_4 and A5 were Assistants; C_1, C_2, C_3, C_4 were Clerks; M_1, M_2, M_3 were managers and E_1, E_2 were Executive officers and if the relation R is defined by xRy, where x is the salary given to person y, express the relation R through an ordered pair and an arrow diagram.

30) Find x if gff(x) = fgg(x), given f(x) = 3x+1 and g(x)=x+3.

31) A mosaic is designed in the shape of an equilateral triangle, 12 ft on each side Each tile in the mosaic is in the shape of an equilateral triangle of 12 inch side. The tiles are alternate in colour as shown in the figure. Find the number of tiles of each colour and total number of tiles in the mosaic.

32) Two A.P.'s have the same common difference The first term of one A.P. is 2 and that of the other is 7. Show that the difference between their 10^{th} terms is the same as the difference between their 21^{st} terms, which is the same as the difference between any two corresponding terms.

33) Solve $\sqrt{y+1} + \sqrt{2y-5} = 3$

34) Solve: $\frac{1}{2x} + \frac{1}{4y} - \frac{1}{3z} = \frac{1}{4}$; $\frac{1}{x} = \frac{1}{3y}$; $\frac{1}{x} - \frac{1}{5y} + \frac{4}{z} = 2\frac{2}{15}$

35) A chess board contains 64 equal squares and the area of each square is 6 25 cm^2, A border round the board is 2 cm wide.

36) A girl looks the reflection of the top of the lamp post on the mirror which is 66 m away from the foot of the lamppost. The girl whose height is 12.5 m is standing 2.5 m away from the mirror. Assuming the mirror is placed on the ground facing the sky and the girl, mirror and the lamppost are in a same line, find the height of the lamp post.

37) Pythagoras Theorem?

38) The owner of a milk store finds that, he can sell 980 litres of milk each week at Rs.14 / litre and 1220 litres of milk each week at Rs. 16 / litre Assuming a linear relationship between selling price and demand, how many litres could he sell weekly at Rs. 17 / litre?

39) if $\frac{cos\theta}{1+sin\theta} = \frac{1}{a}$,then prove that $\frac{a^2-1}{a^2+1}$=sinθ

40) A funnel consists of a frustum of a cone attached to a cylindrical portion 12 cm long attached at the bottom. If the total height be 20 cm, diameter of the cylindrical portion be 12 cm and the diameter of the top of the funnel be 24 cm. Find the outer surface area of the funnel.

41) What is the ratio of the volume of a cylinder, a cone, and a sphere. If each has the same diameter and same height?

42) The time taken by 50 students to complete a 100 meter race are given below. Find its standard deviation.

Time taken(sec)	8 5-9.5	9.5-10.5	10.5-11.5	11.5-12.5	12.5-13 5
Number of students	6	8	17	10	9

ANSWER THE FOLLOWING 2x 8 = 16

43) a) Draw the graph of $y = 2x^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$

(OR)

b) Graph the following quadratic equations and state their nature of solutions.
$x^2 - 6x + 9 = 0$

44) a) Draw ∠PQR such that PQ = 6.8 cm, vertical angle is 50° and the bisector of the vertical angle meets the base at D where PD = 5.2 cm.

(OR)

b) The perpendicular from A on side BC at a △ABC intersects BC at D such that DB = 3 CD. Prove that $2AB^2 = 2AC^2 + BC^2$

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