Dr.K.K.R GOWTHAM (E.M) HIGH SCHOOL :: GUDIVADA

Class : X – State **Marks : 50**

Sub : Mathematics *PRE-FINAL* **Time: 2 ½ hrs**

Paper – I Key

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SECTION – A

1. $0.375 = 0.375 \times \frac{1000}{1000} = \frac{375}{1000} = \frac{3}{8}$

2. Given $x^2 - 5x + 6$
   Here $a = 1, b = -5, c = 6$
   Discriminant = $b^2 - 4ac$
   $= (-5)^2 - 4(1)(6) = 25 - 24 = 1$

3. (C) 5
   because, factors of 12 are 1, 2, 3, 4, 6, 12

4. $15 = 12 \times 1 + 3$
   $12 = 3 \times 4 + 0$
   H.C.F (12, 15) = 3

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

6. (D) Infinitely many solutions

7. Coincident lines : The lines which coincide or lie on top of each other are called coincident lines.

8. Given equation is $x^2 + 7x + 10$
   $= x^2 - (-7)x + 10$
   $\therefore$ sum of zeros = -7

9. Common difference of the given series
   $d = 2 - 1 = 3 - 2 = 4 - 3 = 5 - 4 = - - - - - - - - = 1$
   [If a_1, a_2, a_3 ……… are in A.P common difference $d = a_2 - a_1 = a_3 - a_2 = ...$]

10. Given radius of a sphere, r = 7 cm
    $\therefore$ Volume of sphere = $\frac{4}{3}\pi r^3$
    $= \frac{4}{3} \times \frac{22}{\cancel{7}} \times 7 \times 7 \times \cancel{7}$
    $= 1437.333 cm^3$

11. n(A) = No.of elements in set A = 4

12. Given equation is $ax^2 + bx + c$
    $= a\left(x^2 + \frac{b}{a}x + \frac{c}{a}\right)$
    $= a\left(x^2 - \left(-\frac{b}{a}\right)x + \frac{c}{a}\right)$
    $\therefore$ Product of the roots = $\frac{c}{a}$

SECTION – B

13. Given $A = \{p, q, r, s\}, B = \{1, 2, 3, 4\}$
    Every element in set A is not in set B

Every element in set B is not in set A

$\therefore$ A & B are not equal sets.

14. Given equation is in the form of $ax^2+bx+c=0$

$\therefore a=1, b=-8, c=16$

$b^2-4ac=(8)^2-4(16)=64-64=0$

$\therefore$ Given equation has equal roots.

15. If two lines are parallel lines then the condition is $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$

Ex : Given lines are $4x+8y-30=0$

$2x+4y-62=0$

$\therefore \frac{4}{2}=\frac{8}{4}\neq\frac{-30}{62}$

16. Given surface area of hemisphere is 's'

We know that surface area of hemisphere is $3\pi r^2$

$\therefore s=3\pi r^2$

$3\pi r^2=s$

$r^2=\frac{s}{3\pi}$

$r=\sqrt{\frac{s}{3\pi}}$

17. Given nth term of an A.P is 6n+2

$t_n=6n+2$

$=2+6n-6+6$

$=8+(n-1)6$

This is in the form of $a+(n-1)d$

$\therefore$ common difference d = 6

18. $\log_{\frac{3}{2}}{\frac{27}{8}}=\log_{\left(\frac{3}{2}\right)}{\left(\frac{3}{2}\right)^3}$ $\left[\frac{27}{8}=\frac{3\times3\times3}{2\times2\times2}=\frac{3^3}{2^3}=\left(\frac{3}{2}\right)^3\right]$

$=3\log_{\frac{3}{2}}{\frac{3}{2}}$ $\left[\log_a{x^m}=m\log a^x\right]$

$=3(1)=3$

19. Given $t_n=(-1)^n\,2019$

(We know that nth term of G.P $t_n=ar^{n-1}$]

$t_n=(-1)^n\,2019$

$=2019(-1)^n\times\frac{(-1)}{(-1)}$

$=-2019(-1)^{n-1}$

$\therefore$ common ratio, r=-1

20. Given surface area of a sphere is 616 cm^2

We know that curved surface area of sphere is $4\pi r^2$

$4\pi r^2=616$

$4\times\frac{22}{7}\times r^2=616$

$r^2=7^2$

r = 7 cm

$\therefore$ diameter of sphere is $2(r) = 2(7) = 14\,cm$

SECTION – C

21. Let us assume $2+\sqrt{3}$ is irrational.

That is, we can find coprimes p and q (q≠0)

Such that $2+\sqrt{3} = \frac{p}{q}$

$\sqrt{3} = \frac{p}{q} - 2$

$\sqrt{3} = \frac{p-2q}{q}$ __________ (1)

Since p and q are integers, the R.H.S of the equation (1)

$\frac{p-2q}{q}$ is rational so the LHS $\sqrt{3}$ also rational But this contradicts the fact that $\sqrt{3}$ is irrational

This contradiction has arisen because of our in correct assumption that $2+\sqrt{3}$ is rational.

So, We calculate that $2+\sqrt{3}$ is irrational.

22. Given $\alpha = 2, \beta = -1$

The quadratic polynomial is $k\left(x^2 - (\alpha+\beta)x + \alpha\beta\right)$

$= k\left(x^2 - (2-1)x + (2)(-1)\right)$

$= k\left(x^2 - x - 2\right)$

When k=1, The quadratic polynomial is $x^2 - x - 2$.

23. Given radius of hemisphere, r = 3 cm

Volume of hemisphere is $\frac{2}{3}\pi r^3$

$$= \frac{2}{\not{3}} \times \frac{22}{7} \times 3 \times 3 \times \not{3}$$

$$= \frac{396}{7} = 56.57\,cm^3$$

24. Given 3rd term is 5

$t_3 = 5 \Rightarrow a + 2d = 5$ ____________ (1)

7th term is 9 $t_7 = 9 \Rightarrow a + 6d = 9$ ____________ (2)

(2) – (1) $\Rightarrow$ $\not{a} + 6d - \not{a} - 2d = 9 - 5$

4d = 4

d = 1

Sub d = 1 in equation (1)

$a + 2(1) = 5$

$a = 5 - 2$

a = 3

$\therefore$ A.P series is $a, a+d, a+2d, a+3d, ------$

required A.P series is $3, 3+1, 3+2(1), 3+3(1), -------$

$\Rightarrow 3, 4, 5, 6, ----------$

25. Given $3x - 5y = -1$ ________ (1)

$x - y = -1$ ________ (2)

Equation (2) $\Rightarrow -y = -1 - x$

$y = x + 1$

Substituting $y = x + 1$ in equation (1)

$3x - 5(x + 1) = -1$

$3x - 5x - 5 = -1$

$-2x = -1 + 5$

$-2x = 4 \Rightarrow x = \frac{4}{-2}$

$\therefore$ sub $x - 2$ in $y = x + 1$

$y = -2 + 1$

=-1

$\therefore x = -2, y = -1$

26. Given a sphere, a cylinder and a cone having same radius

Let radius be 'r'

S_1 = curved surface area of sphere = $4\pi r^2$

S_2 = curved surface area of cylinder = $2\pi rh$

S_3 = curved surface area of cone = πrl

Ratio of Sphere, Cylinder and a Cone is $S_1 : S_2 : S_3 = 4\pi r^2 : 2\pi rh : \pi rl$

$= 4r : 2h : l$

27. We know that sum of two supplementary angle is 180^0

Let smaller angle be x^0

Given larger angle exceeds the smaller by 180^0

$\therefore$ larger angle is $x^0 + 18^0$

$x^0 + x^0 + 18^0 = 180^0$

$2x^0 = 180^0 - 18^0$

$2x^0 = 162$

$x^0 = \frac{162^0}{2}$

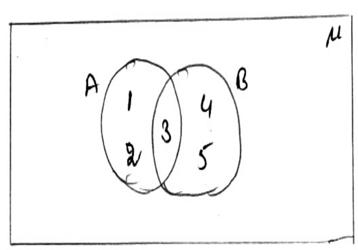
$\therefore$ Two angles are $81^0, 81^0 + 18^0$

$\Rightarrow 81^0, 99^0$

28. Given $A = \{1,2,3\}, B = \{3,4,5\}$

$A \cap B = \{1,2,3\} \cap \{3,4,5\}$

$= \{3\}$



SECTION – D

29.A) Let r be the common radius of a sphere, a cone and a cylinder

Height of a sphere = its diameter = 2r

Then, the height of the cone = height of cylinder

= height of sphere

= 2r

Let l be the slant height of cone = $\sqrt{r^2 + h^2}$

= $\sqrt{r^2 + (2r)^2}$

$= \sqrt{r^2 + 4r^2}$

$$= \sqrt{5}r$$

S_1 = curved surface area of sphere = $4\pi r^2$

S_2 = curved surface area of cylinder = $2\pi rh = 2\pi r \times 2r$

$$= 4\pi r^2$$

S_3 = curved surface area of cone = $\pi rl = \pi r \times \sqrt{5}r$

$$= \sqrt{5}\pi r^2$$

Ratio of curved surface area as

$\therefore S_1 : S_2 : S_3 = 4\pi r^2 : 4\pi r^2 : \sqrt{5}\pi r^2$

$= 4 : 4 : \sqrt{5}$

29. B) Given sum of first 14 terms of an AP is 1050

$\therefore S_{14} = 1050 \qquad \left[\because S_n = \frac{n}{2}\left(2a + (n-1)d\right)\right]$

$\frac{14}{2}\left[2a + (14-1)d\right] = 1050$

$2a + 13d = 150$ ____________ (1)

Also given first term is 10

$\therefore$ a = 10

Sub a= 10 in equation (1)

$2(10) + 13d = 150$

$20 + 13d = 150$

$13d = 150 - 20$

$13d = 130$

$d = 10$

20th term, $T_{20} = a + 19d$

$= 10 = 19(10)$

$= 10 + 190 = 200$

30.A) Let the speed of current = 3 kmph

Speed of the current = 3 kmph

Then speed of the boat in up stream = $(x-3)kmph$

Speed of the boat in down stream = $(x+3)kmph$

By given conditions of problem,

$\therefore \frac{24}{x-3} + \frac{24}{x+3} = 6$

$24\left[\frac{1}{x-3} + \frac{1}{x+3}\right] = 6$

$4\left(\frac{x+3+x-3}{(x-3)(x+3)}\right) = 1$

$4(2x) = (x-3)(x+3)$

$8x = x^2 - 9$

$x^2 - 8x - 9 = 0$

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

$x(x-9) + 1(x-9) = 0$

$(x-9)(x+1) = 0$

$\therefore x = -1, +9$

$\therefore x$ can't be negative

$\therefore x = 9$

i.e., speed of the boat instill water = 9 kmph.

30.B) Side of lead cube = 44 cm

Radius of spherical ball = $\frac{4}{2}$ cm = 2 cm

Now volume of a spherical ball = $\frac{4}{3}\pi r^3$

$$= \frac{4}{3}\times\frac{22}{7}\times 2^3$$

$$= \frac{4}{3}\times\frac{22}{7}\times 8\,cm^3$$

Volume of 'n' spherical balls = $\frac{4}{3}\times\frac{22}{7}\times 8\times ncm^3$

It is clear that volume of 'n' spherical balls = Volume of lead cube

$$\Rightarrow \frac{4}{3}\times\frac{22}{7}\times 8\times x = (44)^3$$

$$\frac{4}{3}\times\frac{22}{7}\times 8\times x = 44\times 44\times 44$$

$$x = \frac{44\times 44\times 44\times 3\times 7}{4\times 22\times 8}$$

$$= 11\times 11\times 3\times 7$$

$$=2541$$

Hence, total number of spherical balls = 2541

31.A) i) $\frac{35}{50} = \frac{7\times 5}{2\times 5\times 5} = \frac{7}{10} = 0.7$

ii) $\frac{21}{25} = \frac{21}{5^2}$

$$= \frac{21}{5^2}\times\frac{2^2}{2^2}$$

$$= \frac{21\times 4}{10^2} = \frac{84}{100} = 0.84$$

iii) $\frac{7}{8} = \frac{7}{2^3}$

$$= \frac{7}{2^3}\times\frac{5^3}{5^3} = \frac{7\times 125}{10^3} = \frac{875}{1000} = 0.875$$

31. B) Given zero's $\alpha = 2, \beta = -\frac{1}{3}$

The required quadratic polynomial is

$$k\left(x^2 - (\alpha+\beta)x + \alpha\beta\right)$$

$$= k\left(x^2 - \left(2-\frac{1}{3}\right)x + (2)\left(\frac{-1}{3}\right)\right)$$

$$= k\left(x^2 - \left(\frac{6-1}{3}\right)x - \frac{2}{3}\right)$$

$$= k\left(x^2 - \frac{5}{3}x - \frac{2}{3}\right)$$

$$= \frac{k}{3}\left(3x^2 - 5x - 2\right)$$

We can put different values of K

When K=3, the quadratic polynomial will be $3x^2 - 5x - 2$

32.A) Disjoint sets : If A and B are disjoint sets then $A \cap B = \phi$

i) False, because $\{2,3,4,5\} n \{3,6\} = \{3\}$

ii) False, because, $\{a,e,i,o,u\} n \{a,b,c,d\} = \{a\}$

iii) True, because $\{2,6,10,14\} n \{3,7,11,15\} = \{\ \} = \phi$

iv) True, because $\{2,6,10\} n \{3,7,11\} = \{\ \} = \phi$

32.B) Let the length of the rectangle, *l*= *x*

Given perimeter = $= 2(l+b) = 28$

$$\Rightarrow l + b = \frac{28}{2} = 14 \Rightarrow x + b = 14 \Rightarrow b = 14 - x$$

$\therefore$ Breadth of a rectangle $b = 14 - x$

Area of rectangle = length × breadth

$$= x(14 - x)$$
$$= 14x - x^2$$

According to the problem $14x - x^2 = 40$

$$x^2 - 14x + 40 = 0$$
$$x^2 - 10x - 4x + 40 = 0$$
$$x(x-10) - 4(x-10) = 0$$
$$(x-4)(x-10) = 0$$
$$\therefore x = 10, 4$$

$\therefore$ length = 10m or 4 m

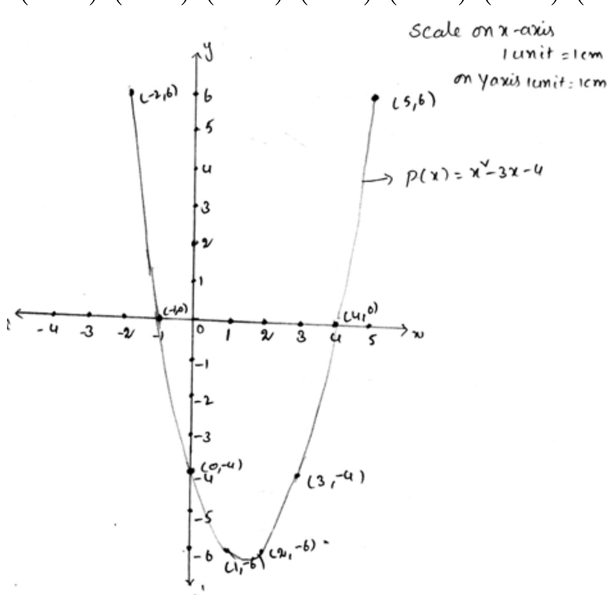
breadth = 14 – 10 (or) 14 – 4

= 4 m (or) 10 m

33.A) Given $P(x) = x^2 - 3x - 4 \Rightarrow y = x^2 - 3x - 4$

x	-2	-1	0	1	2	3	4	5
x^2	4	1	0	1	4	9	16	25
-3x	6	3	0	-3	-6	-9	-12	-15
-4	-4	-4	-4	-4	-4	-4	-4	-4
y	6	0	-4	-6	-6	-4	0	6

Order pairs are $(-2,6);(-1,0);(0,-4);(1,-6);(2,-6);(3,-4);(4,0);(5,6)$



Verification x^2-3x-4

$=x^2-4x+x-4$

$=x(x-4)+1(x-4)$

$=(x+1)(x-4)$

For zeros $x+1=0;\quad x-4=0$

$x=-1\quad x=4$

33.B) Given $3x+4y=2$ __________ (1)

$6x+8y=4$ __________ (2)

Here $a_1 = 3$, $b_1 = 4$, $c_1 = 2$

$a_2 = 6$, $b_2 = 8$, $c_2 = 4$

$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}\Rightarrow\frac{3}{6}=\frac{4}{8}=\frac{2}{4}$

1) $\Rightarrow 3x+4y=2$

$4y=2-3x$

$y=\frac{2-3x}{4}$

x	2	6
$y=\frac{2-3x}{4}$	-1	-4

Order pair (2, -1); (6, -4)

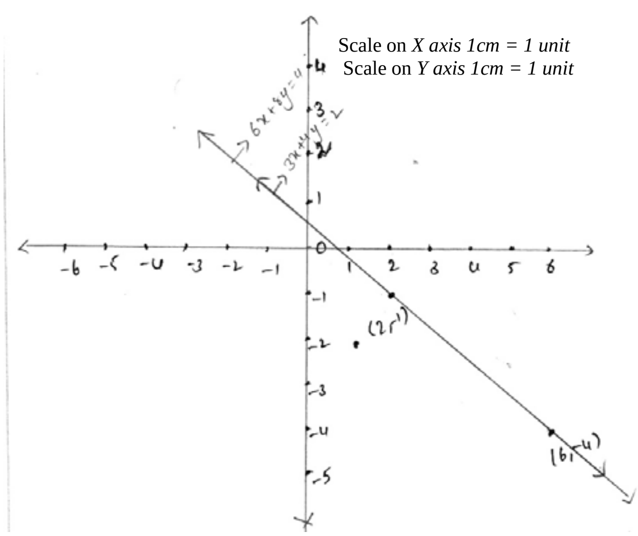
2) $\Rightarrow 6x+8y=4$

$8y=4-6x$

$y=\frac{4-6x}{8}$

x	2	6
$y=\frac{4-6x}{8}$	-1	-4

Order pair (2, -1); (6, -4)



Since $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ therefore, they are coincident lines so, the pair of linear equations is consistent and have infinitely many solutions.