FIRST REVISION TEST [2021-22]

STD : X EM | Model Q. No: 1 | Date:

SUBJECT : MATHS | ANSWER | Marks: 100

PART – I 14 x1 = 14

1.Answer all the 14 questions.

2. Choose the most suitable answer from the given four alternatives and write the option code with the corresponding answer.

1. If $n(A \times B) = 6$ and $A = \{1, 3\}$ then $n(B)$ is

(A) 1 (B) 2 **(C) 3** (D) 6

2. If the ordered pairs $(a+2, 4)$ and $(5, 2a+b)$ are equal then (a, b) is

(A) (2, –2) (B) (5,1) (C) (2,3) **(D) (3, –2)**

3. Let $n(A) = m$ and $n(B) = n$ then the total number of non-empty relations that can be defined from A to B is

(A) m^n (B) n^m **(C) $2^{mn} - 1$** (D) 2^{mn}

4. Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are

(A) 0, 1, 8 (B) 1, 4, 8 (C) 0, 1, 3 (D) 1, 3, 5

5. The sum of the exponents of the prime factors in the prime factorization of 1729 is

(A) 1 (B) 2 (C) 3 **(D) 4**

6. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is

(A) 3 (B) 5 (C) 8 **(D) 11**

7. If 6 times of 6th term of an A.P. is equal to 7 times the 7th term, then the 13th term of the A.P. is

(A) 0 (B) 6 (C) 7 (D) 13

8. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots\ldots is$

(A) $\frac{1}{24}$ **(B) $\frac{1}{27}$** (C) $\frac{2}{3}$ (D) $\frac{1}{81}$

9. A system of three linear equations in three variables is inconsistent if their planes

(A) intersect only at a point (B) intersect in a line

(C) coincides with each other **(D) do not intersect**

10. If $(x-6)$ is the HCF of $x^2-2x-24$ and x^2-kx-6 then the value of k is

(A) 3 (B) 5 (C) 6 (D) 8

11. The square root of $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to

(A) $\frac{16}{5}\left|\frac{x^2z^4}{y^2}\right|$ (B) $16\left|\frac{y^2}{x^2z^4}\right|$ (C) $\frac{16}{5}\left|\frac{y}{xz^2}\right|$ (D) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

12. The solution of $(2x-1)^2=9$ is equal to

(A) -1 (B) 2 (C) –1, 2 (D) None of these

13. Graph of a linear equation is a _____

(A) straight line (B) circle (C) parabola (D) hyperbola

14. The number of points of intersection of the quadratic polynomial $(x+2)^2$ With the X axis is

(A) 0 (B) 1 (C) 0 or 1 (D) 2

PART – II **10 x2 = 20**

II Answer any 10 questions.
Question No. 28 is compulsory.

15. If A = {1,3,5} and B = {2,3}, then (i) find AxB and BxA

(i) find A x B and B x A.

A = {1, 3, 5}

B = {2, 3}

A × B = {1, 3, 5} × {2, 3}

= {(1, 2), (1, 3), (3, 2), (3, 3), (5, 2), (5, 3)} ...(1)

B × A = {2, 3} × {1, 3, 5}

= {(2, 1), (2, 3), (2, 5), (3, 1), (3, 3), (3, 5)} ...(2)

(ii) Is A×B = B×A? If not why?

From (1) and (2)

A × B ≠ B × A

(1, 2) ≠ (2, 1) and
(1, 3) ≠) (3, 1), etc.

16. If B×A = {(−2,3), (−2,4), (0,3), (0,4), (3,3), (3,4)} find A and B.

Answer : Visit Youtube Link Q.no:3 - https://youtu.be/62jStaJkiWM

17. A Relation R is given by the set $\{(x, y) \mid y = x+3, x \in \{0,1,2,3,4,5\}\}$. Find its domain and range.

Answer : Visit Youtube Link Q.no:3 - https://youtu.be/RmN876oEACQ

Visit Youtube Link : https://youtu.be/B1GZ9X76FKQ

18. Show that the square of an odd integer is of the form $4q + 1$, for some integer q.

Any odd integer is of the form : x = 2k +1 *for some integer k.*

$$x^2 = (2k + 1)^2$$
$$= 4k^2 + 4k + 1$$
$$= 4k(k + 1) + 1$$
$$= 4q + 1$$ where $q = k(k+1)$ *is some integer.*

19. Find a_8 and a_{15} whose nth term is $a_n = \begin{cases} \frac{n^2-1}{n+3} ; & n \text{ is even}, n \in N \\ \frac{n^2}{2n+1} ; & n \text{ is odd}, \ n \in N \end{cases}$

Answer : Visit Youtube Link Q.no:5 - https://youtu.be/9_AqHe_xlRc

20. Check whether the sequence are in A.P. or not? $3\sqrt{2}, 5\sqrt{2}, 7\sqrt{2}, 9\sqrt{2}, \ldots..$

ii) $3\sqrt{2}, 5\sqrt{2}, 7\sqrt{2}, 9\sqrt{2}, \ldots$

$$t_2 - t_1 = 5\sqrt{2} - 3\sqrt{2} = 2\sqrt{2}$$
$$t_3 - t_2 = 7\sqrt{2} - 5\sqrt{2} = 2\sqrt{2}$$
$$t_2 - t_1 = t_3 - t_2$$

The differences between consecutive terms are equal

Hence the sequence is in A.P.

21. If nine terms ninth term is equal to the fifteen times fifteenth term, show that six times twenty fourth term is zero.

Answer : Visit Youtube Link Q.no:7 - https://youtu.be/j4qapmo-ZoE

22. If $3 + k, 18 - k, 5k + 1$ are in A.P. then find k.

Answer : Visit Youtube Link Q.no:8 - https://youtu.be/oB2kw_CCAoE

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23. Solve $2x - 3y = 6$, $x + y = 1$

$2x - 3y = 6$ — (1)
$x + y = 1$ — (2)

(1) × 1 gives, $2x - 3y = 6$
(2) × 2 gives, $2x + 2y = 2$

$-5y = 4$

$y = \frac{-4}{5}$

If y = -4/5 Sub. the eqn. (2)

$\therefore x - \frac{4}{5} = 1$

$x = \frac{9}{5}$

$x = \frac{9}{5}, y = \frac{-4}{5}$

24. Find the LCM of the given expressions p^2-3p+2, p^2-4

Answer : Visit Youtube Link Q.no:2[iv] - https://youtu.be/uQrNaUWnhvI

25.. Simplify: $\frac{x^3}{x-y} + \frac{y^3}{y-x}$

Answer : Visit Youtube Link Q.no:1[iii] - https://youtu.be/4EOrRL8-Egk

26. Find the square root of the following rational expressions: $\frac{400x^4y^{12}z^{16}}{100x^8y^4z^4}$

Answer : Visit Youtube Link Q.no:1[i] - https://youtu.be/QYkaXjgdmhg

27. Determine the nature of the roots for the following quadratic equations $15x^2+11x+2 = 0$

Answer : Visit Youtube Link Q.no:1[i] - https://youtu.be/QN3WiZJ8ZdA

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28. Find the values of 'k' for which the quadratic equation $kx^2 - (8k+4)\,x + 81 = 0$ has real and equal roots?

(i) $x^2 - x - 20 = 0$

$a = 1, b = -1, c = -20$

$\Delta = b^2 - 4ac$

$\Delta = (-1)^2 - 4(1)(-20)$

$= 81$

$\Delta = 81 > 0$

So, the equation will have real and unequal roots

PART – III 10 x5 = 50

III Answer 10 questions. Question No. 42 is compulsory.

29. Let A={ $x \in N / 1 < x < 4$}, B ={ $x \in W \mid 0 \leq x < 2$} and C={ $x \in N \mid x < 3$}. Then verify that A x (B U C) = (A x B) U (A x C)

Example 1.3 Let $A = \{x \in N \mid 1<x<4\}$, $B = \{x \in W \mid 0 \ x < 2\}$ and $C = \{x \in W \mid x < 3\}$. Then verify that *(ii)* $A \times (B \cap C) = (A \times B) \cap (A \times C)$

A = {2, 3} B= {0,1} C={1,2}

To Prove : $A\times(B \cap C) = (A\times B)(A\times C)$

$B \cap C = \{0,1\}\{1,2\} = \{1\}$

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

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

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

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

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

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

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

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

From ① and ② are equal

$A\times(B \cap C) = (A\times B) \cap (A\times C)$

Hence , it is Verified

30. Let A={1,2,3,7} and B={3,0, − 1,7}, which of the following are relation from A to B?

(i) R_1={(2,1), (7,1)} (ii) R_2={(−1,1)} (iii) R_3={(2,−1), (7,7), (1,3)}

(iv) R_4={(7,−1), (0,3), (3,3), (0,7)}

Answer : Visit Youtube Link Q.no:1 - https://youtu.be/61MQDZ6lkUo

31. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster form, wherever possible. $\{(x, y) / x=2y, x\in\{2,3,4,5\}, y\in\{1,2,3,4\}$

Answer : Visit Youtube Link Q.no:4[i] - https://youtu.be/bq2_M6tT1gc

32. Use Euclid's Division Algorithm to find the Highest Common Factor (HCF) of 84,90 and 120.

Answer : Visit Youtube Link Q.no:6[iv] - https://youtu.be/Z6oqqt27eJk

33. 'a' *and* 'b' are two positive integers such that $a^b \times b^a = 800$. Find a *and* b.

$$a^b \times b^a = 800.$$

$$= 2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$$

$$a^b \times b^a = 2^5 \times 5^2$$

$a = 2$ and $b = 5$ (or) $a = 5$ and $b = 2$.

Answer Visit: https://www.kanimaths.com/2022/01/blog-post_25.html

34. Find the greatest number consisting of 6 digits which is exactly divisible by 24, 15, 36?

Answer : Visit Youtube Link Q.no:7 - https://youtu.be/2rz28TmZz1E

35. The sum of 3 consecutive terms that are in A.P.is 27 and their product is 288. Find the 3 terms.

Answer : Visit Youtube Link Q.no:11 - https://youtu.be/OwcnkNhTtLw

36. If $(m+1)^{th}$ term of an A.P. is twice the $(n+1)^{th}$ term, then prove that $(3m+1)^{th}$ term is twice the $(m+n+1)^{th}$ term.

Let a be the 1st term and d be the common difference

$t_n = a + (n-1)d$

$(m+1)^{th}$ term $= 2$ [$(n+1)^{th}$ term]

$t_{(m+1)} = 2\ [t_{(n+1)}]$

$a + (m+1-1)d = 2\ [a + (n+1-1)d]$

$a + md = 2[a + nd]$ ------ ①

$(3m+1)^{th}$ term $= t_{(3m+1)}$

$= a + (3m+1-1)d$

$= a + 3md$

$= a + md + 2md$

$= 2(a + nd) + 2md$ [by ①]

$= 2(a + md + nd)$

$= 2[a + (m+n)d]$

$= 2[a + (m+n+1-1)d]$

$= 2[t_{(m+n+1)}]$

$= 2$ [$(3m+1)^{th}$ term]

Hence $(3m+1)^{th}$ term is twice the $(m+n+1)^{th}$ term.

Visit Youtube Link : https://youtu.be/B1GZ9X76FKQ

37. Solve the following system of linear equations in three variables.

$x + y + z = 5$; $2x - y + z = 9$; $x - 2y + 3z = 16$

Answer : Visit Youtube Link Q.no:1 - https://youtu.be/Lm9pITgyYrM

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

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

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

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

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

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

$$= \frac{(x-9)(x-2)}{(x-1)(x-2)(x-3)(x-5)}$$

$$= \frac{x-9}{(x-1)(x-3)(x-5)}$$

39. If A= $\frac{2x+1}{2x-1}$, B=$\frac{2x-1}{2x+1}$, find $\frac{1}{A-B} - \frac{2B}{A^2-B^2}$.

Answer : Visit Youtube Link Q.no:5 - https://youtu.be/j8-izoTEnvw

40. Find the square root of the following polynomials by division method $37x^2 - 28x^3+4x^4+42x+9$

Answer : Visit Youtube Link Q.no:1[ii] - https://youtu.be/wHbKhcs-lgc

41. A bus covers a distance of 90 km at a uniform speed. Had the speed been 15km/hour more it would have taken 30 minutes less for the journey. Find the original speed of the bus.

Answer : Visit Youtube Link Q.no:3 - https://youtu.be/MNNDBZ_jNo4

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42. If α, β are the roots of the equation $2x^2 - x - 1=0$, then form the equation whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}$

whose roots are (i) $\frac{1}{\alpha}, \frac{1}{\beta}$

$2x^2 - x - 1=0$

$a = 2 , b = -1, c = -1$

$\alpha + \beta = \frac{-b}{a}$ $\quad \alpha\beta = \frac{c}{a}$

$= \frac{-(-1)}{2}$ $\quad = -\frac{1}{2}$

$= \frac{1}{2}$

Given roots are $\frac{1}{\alpha}, \frac{1}{\beta}$

Sum of the roots $= \frac{1}{\alpha} + \frac{1}{\beta}$

$= \frac{\alpha + \beta}{\alpha\beta}$

$= \frac{\frac{1}{2}}{-\frac{1}{2}}$

$= -1$

Product of the roots $= \frac{1}{\alpha} \times \frac{1}{\beta}$

$= \frac{1}{\alpha\beta}$

$= \frac{1}{-\frac{1}{2}}$

$= -2$

The required equation is

$x^2 - (\text{Sum of the roots})x + (\text{Product of the roots}) = 0$

$x^2 - (-1)x - 2 = 0$

$x^2 + x - 2 = 0$

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PART – IV $\qquad$ 2 x8 = 16

IV. Answer any one questions.

43. a) Discuss the nature of solutions of the following quadratic equations . $x^2+2x+5=0$

(iii) $x^2+2x+5=0$ $\qquad$ $y = x^2 + 2x + 5$

x	-4	-3	-2	-1	0	1	2	3
x^2	16	9	4	1	0	1	4	9
2x	-8	- 6	- 4	- 2	0	2	4	6
5	5	5	5	5	5	5	5	5
y	13	8	5	4	5	8	13	20

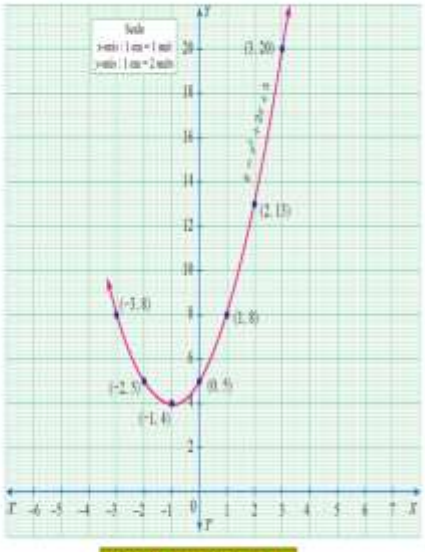
Plot the Point :

(- 4, 13), (- 3, 8), (- 2 5), (- 1, 4), (0, 5), (1, 8), (2, 13), (3, 20)

Point of Intersection : No

Solution : No

Nature of roots : No real roots



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(or)

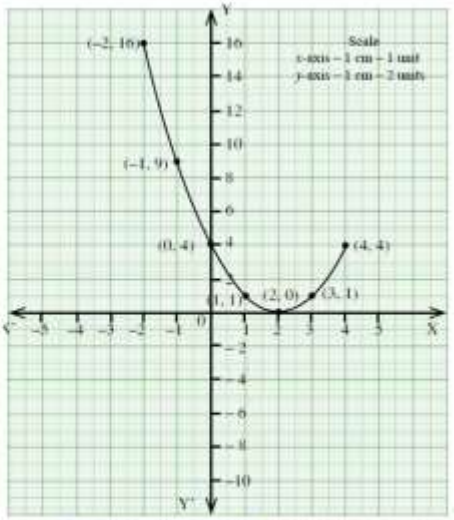
b) Graph the following quadratic equations and state their nature of solutions. $x^2 - 4x+4=0$

(ii) $x^2 - 4x+4=0$ $\quad y = x^2 - 4x + 4$

x	-3	-2	-1	0	1	2	3	4	5	6
x^2	9	4	1	0	1	4	9	16	25	36
- 4x	12	8	4	0	-4	-8	-12	- 16	-20	- 24
4	4	4	4	4	4	4	4	4	4	4
y	25	16	9	4	1	0	1	4	9	16

Plot the Point :

(- 3, 25), (- 2, 16), (- 1, 9), (0, 4), (1 , 1), (2, 0), (3, 1), (4, 4), (5, 9), (4, 16)



Point of Intersection : (2 , 0)

Solution : { 2 }

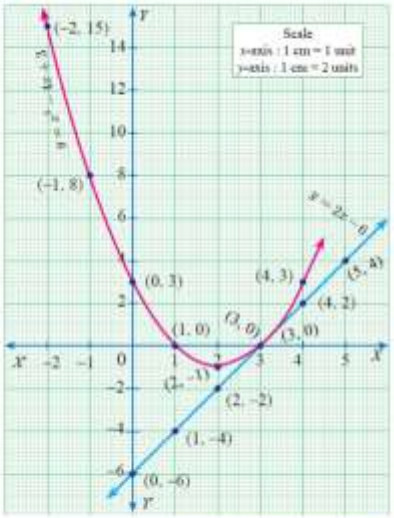
Nature of roots : Real and equal

44. a) Draw the graph of $y=x^2 - 4x+3$ and use it to solve $x^2 - 6x + 9 = 0$.

$y = x^2 - 4x + 3$

x	-3	-2	-1	0	1	2	3	4	5	6
x^2	9	4	1	0	1	4	9	16	25	36
- 4x	12	8	4	0	- 4	- 8	- 12	- 16	- 20	- 24
3	3	3	3	3	3	3	3	3	3	3
y	24	15	8	3	0	- 1	0	3	8	15

Plot the Point : (- 3, 24), (- 2, 15), (- 1, 8), (0, 3), (1 , 0), (2, - 1), (3, 0), (4, 3), (5, 8), (6, 15)



$y = x^2 - 4x + 3$

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

$y = 2x - 6$

x	-3	-2	-1	0	1	2	3	4	5
2x	-6	-4	-2	0	2	4	6	8	10
- 6	- 6	- 6	- 6	- 6	- 6	- 6	- 6	- 6	- 6
y	-12	-10	- 8	-6	- 4	- 2	0	2	4

Plot the Point : (- 3, - 12), (- 2, - 10), (- 1, - 8), (0, - 6), (1 , - 4), (2, - 2), (3, 0) , (4, 2), (5, 4)

Point of Intersection : (3 , 0)

Solution : { 3 }

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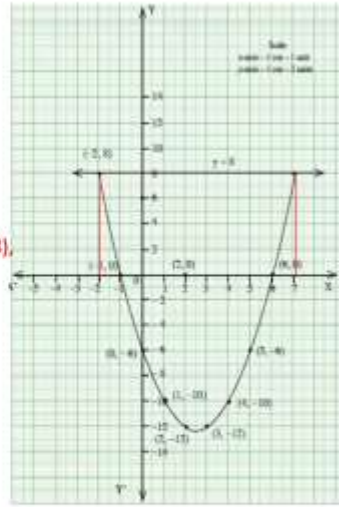
(or)

b) Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$.

$y = x^2 - 5x - 6$

x	-4	-3	-2	-1	0	1	2	3	4	5	6	7
x^2	16	9	4	1	0	1	4	9	16	25	36	49
- 5x	20	15	10	5	0	- 5	-10	-15	-20	-25	-30	-35
- 6	- 6	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6	-6
y	30	18	8	0	- 6	-10	-12	-12	-10	-6	0	8

Plot the Point (- 4, 30), (- 3, 18), (- 2, 8), (- 1,0), (0, - 6), (1 ,-10), (2, -12), (3, -12), (4,-10), (5, -6), (6, 0), (7, 8),



$y = x^2 - 5x - 6$

$x^2 - 5x - 14 = 0$

$y = 8$

x	- 5	- 4	-3	-2	-1	0	1	2	3	4	5
Y= 8	8	8	8	8	8	8	8	8	8	8	8

Plot the Point : (- 5, 8), (- 4, 8), (- 3, 8), (- 2, 8), (- 1, 8), (0, 8), (1 , 8), (2, 8), (3, 8), (4, 8), (5, 8)

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Point of Intersection : (-2, 0) and (7, 0)

Solution : { - 2 , 7}

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Visit Youtube Link : https://youtu.be/B1GZ9X76FKQ

Answer Visit: https://www.kanimaths.com/2022/01/blog-post_25.html

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