



MATHS

BOOKS - SURA MATHS (TAMIL ENGLISH)

BASIC ALGEBRA

Textual Questions Exercise 21

1. Classify each element of
$$\left\{\sqrt{7}, \frac{-1}{4}, 0, 3.14, 4, \frac{22}{7}
ight\}$$
 as a

member of $\mathbb{N}, \mathbb{Q}, \mathbb{R} - \mathbb{Q}$ or \mathbb{Z} .

2. Prove that $\sqrt{3}$ is an irrational number. (Hint: Follow the

method that we have used to prove $\sqrt{2}$ C.)



rational number. Can you find two irrational numbers whose product is a rational number.



 $|4x - 5| \ge -2$



3. Solve for x

$$\left|3-\frac{3}{4}x\right| \leq \frac{1}{4}$$

Watch Video Solution

4. Solve for x

|x| - 10 < -3

5. Solve
$$\frac{1}{|2x-1|} < 6$$
 and express the solution using the

interval notation.



6. Solve -3 |x|+ 5 \leq -2 and graph the solution set in a

number line.

Watch Video Solution

7. Solve $2|x + 1| - 6 \leq 7$ and graph the solution set in a

number line.



8. Solve:
$$rac{1}{5} |10x-2| < 1.$$



 $\mathsf{x} \geq -1 ext{ and } x < 4$

2. Represent the following inequalities in the interval notation:

 $x \leq 5 \,\, {
m and} \,\, x \geq \, -3$

Watch Video Solution

3. Represent the following inequalities in the interval notation:

x < -1 or x < 3



4. Represent the following inequalities in the interval notation:





6. Solve 23x < 100 when

x is a integer







Watch Video Solution

12. To secure A grade one must obtain an average of 90 marks or more in 5 subjects each of maximum 100 marks. If one scored 84,87,95,91 in first four subjects, what is the

minimum mark one scored in the fifth subject to get A

grade in the course?

Watch Video Solution

13. A manufacturer has 600 litres of a 12 percent solution of acid. How many litres of a 30 percent acid solution must be added to it so that the acid contect in the resulting mixture will be more than 15 percent but less than 18 percent?



14. Find all pairs of consecutive odd natural numbers both

of which are larger than 10 and their sum is less than 40.



15. A model rocket is launched from the ground. The height 'h' reached by the rocket after t seconds from lift off is given by h(t) = $-5t^2 + 100t$, $0 \le t \le 20$. At what time the rocket is 495 feet above the ground?

Watch Video Solution

16. A plumber can be paid according to the following schemes, In the first scheme he will be paid rupees 500 plus rupees 70 per hour, and in the second scheme he will paid 120 rupees per hour. If he works x hours. Then for what value of x does the first scheme give better wages?



17. A and B are working on similar jobs but their annual salaries differ by more than ₹ 6000. if B earns rupees 27000 per month, then what are the possibilities of A's salary per month?

Watch Video Solution

Exercise 2 4

1. Construct a quadratic equation with roots 7 and -3.



2. A quadratic polynomial has one of its zeros as 1 + $\sqrt{5}$

and it satisfies p(1) = 2. find the quadratic polynomial.

3. If α and β are the roots of the quadratic equation $x^2 + \sqrt{2x} + 3 = 0$. Form a quadratic polynomial with zeros $\frac{1}{\alpha}, \frac{1}{\beta}$.

Watch Video Solution

4. If one root of $k(x-1)^2 = 5x - 7$ is double the other

root, show that k=2 or -25.



5. If the difference of the roots of the equation $2x^2 - (a + 1)x + a - 1 = 0$ is equal to their product, then prove that a = 2.

Watch Video Solution

6. Find the condition that one of the roots of $ax^2 + bx + c$ may be

(i) negative of the other,



7. Find the condition that one of the roots of $ax^2 + bx + c$

may be

Q (ii) thrice the other

Watch Video Solution

8. Find the condition that one of the roots of $ax^2 + bx + c$ may be

(iii)reciprocal of the other.



9. If the equations $x^2 - ax + b = 0$ and $x^2 - ex + f = 0$

have one root in common and if the second equation has

equal roots, then prove that ae = 2 (b + f).



$$4x^2-x-2$$

12. Discuss the nature of roots of

$$9x^2 + 5x = 0.$$

Watch Video Solution
13. Without sketching the graphs, find whether the graphs

of the following functions will intersect the x-axis and if so in how many points.

$$y = x^2 + x + 2$$
,

Watch Video Solution

14. Without sketching the graphs, find whether the graphs of the following functions will intersect the x-axis and if so

in how many points.

$$\mathsf{y} \, \mathsf{=} \, x^2 - 3x - 7$$

Watch Video Solution

15. Without sketching the graphs, find whether the graphs of the following functions will intersect the x-axis and if so in how many points.

$$y = x^2 + 6x + 9$$

Watch Video Solution

16. Write $f(x) = x^2 + 5x + 4$ in completed square form.

1. Solve
$$2x^2 + x - 15 \leq$$
 0.

Watch Video Solution

2. Solve
$$-x^2 + 3x - 2 \le 0$$
.

Watch Video Solution

Exercise 2 6

1. Find the zeros of the polynomial function $f(x) = 4x^2 - 25$.





4. Solve:
$$(2x + 1)^2 - (3x + 2)^2$$
 = 0

1. Factorize $x^4 + 1$ (Hint: try completing the square.)

Watch Video Solution

2. If $x^2 + x + 1$ is a factor of the polynomial $3x^3 + 8x^2 + 8x + a$, then find the value of a.

Watch Video Solution

Exercise 28

1. Find all values of x for which
$$rac{x^3(x-1)}{(x-2)} > 0.$$



2. Find all values of x that satisfies the inequality $\frac{2x-3}{(x-2)(x-4)} < 0.$

Watch Video Solution

3. Solve:
$$rac{x^2-4}{x^2-2x-15} \leq 0.$$

Watch Video Solution

Exercise 2 9

1. Resolve the following rational expressions into partial fractions.(1)
$$\frac{1}{x^2 - (a^2)}$$

Watch Video Solution

fractions.

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

Watch Video Solution

3. Resolve the following rational expression into partial fractions.

$$\frac{x}{(x^2+1)(x-1)(x+2)}$$



4. Resolve the rational expressions into partial fractions

$$rac{x}{\left(x-1
ight)^3}$$



5. Resolve the following rational expression into partial

$$rac{1}{x^4-1}$$



fractions.

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

Watch Video Solution

7. Resolve the following rational expression into partial

fractions.

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



8. Resolve the following rational expression into partial



fractions.

$$\frac{x+12}{\left(x+1\right)^2(x-2)}$$

Watch Video Solution

10. Resolve the following rational expression into partial

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

fractions.

 $\frac{2x^2 + 5x - 11}{x^2 + 2x - 3}$

Watch Video Solution

12. Resolve the following rational expression into partial

$$\frac{7+x}{(1+x)(1+x^2)}$$





1. Determine the region in the plane determined by the inequalities.

 $x\leq 3y,x\geq y$

Watch Video Solution

2. Determine the region in the plane determined by the inequalities.

 $y\geq 2x,\;-2x+3y\leq 6.$



3. Determine the region in the plane determined by the inequalities.

2x + 3y < 6, x + 4y < 4, x > 0, y > 0.



4. Determine the region in the plane determined by the inequalities.

 $x-2y\geq 0,$ $2x-y\leq -2,$ $x\geq 0,$ $y\geq 0.$

Watch Video Solution

5. Determine the region in the plane determined by the inequalities.

 $2x+y\geq 8, x+2y\geq 8, x+y\leq 6.$



1. Simplify:

 $(125)^{rac{2}{3}}$

Watch Video Solution

2. Simplify:

 $16^{-rac{3}{4}}$



3. Simplify:

$$(1000)^{\frac{-2}{3}}$$





4. Simplify:

$$(3^{-6})^{\frac{1}{3}}$$

Watch Video Solution

5. Simplify:

$$\frac{(27)^{\frac{-2}{3}}}{(27)^{\frac{-1}{3}}}$$



6. Evaluate
$$\left(\left[\left(256\right)^{\frac{-1}{2}}\right]^{\frac{-1}{4}}\right)^3$$





7. If
$$\left(x^{+rac{1}{2}}+x^{-rac{1}{2}}
ight)^2=rac{9}{2},$$
 then find the value of $\left(x^{rac{1}{2}}-x^{-rac{1}{2}}
ight)$ for $x>1.$

Watch Video Solution

Watch Video Solution

8. Simplify and hence find the value of n: $\frac{3^{2n}9^23^{-n}}{3^{3n}}$ = 27

9. Find the radius of the spherical tank whose volume is $\frac{32\pi}{3}$ units.

10. Simplify by rationalising the denominator.
$$\frac{7+\sqrt{6}}{3-\sqrt{2}}$$
.



12. If x =
$$\sqrt{2} + \sqrt{3}$$
 find $\frac{x^2+1}{x^2-2}$.

1. Let b > 0 and $b \neq 1$. Express $y = b^x$ in logarithmic form. Also state the domain and range of the logarithmic function.



4. solve :
$$\log_4 2^{8x} = 2^{\log_2^8}$$

Watch Video Solution

5. If
$$a^2+b^2=7$$
ab, show that $\log\left(rac{a+b}{3}
ight)=rac{1}{2}$ (log a +

log b).

Watch Video Solution

6. Prove
$$\mathrm{log} \frac{a^2}{bc} + \mathrm{log} \frac{b^2}{ca} + \mathrm{log} \frac{c^2}{ab} = 0.$$



10. If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$, then prove that xyz = 1.



11. Solve:
$$\log_2 x - 3 \log_{rac{1}{2}} x = 6$$

Watch Video Solution

12. Solve
$$\log_{5-x} (x^2 - 6x + 65) = 2.$$

Watch Video Solution

Exercise 2 13

1. If $|x + 2| \le 9$, then x belongs to

A.
$$(-\infty, -7)$$

B. $[11, 7]$
C. $(-\infty, -7) \cup [11, \infty)$
D. $(-11, 7)$

Answer: 4

Watch Video Solution

2. Given that x, y and b are real numbers x < y, b > 0,

then

A. xb < yb

 $B.\,xb \ > \ yb$

 $\mathsf{C.\,xb}~\leq~\mathsf{yb}$

$$\mathsf{D}.\,\frac{x}{b} \geq \frac{y}{b}$$

Answer: A



3. If
$$\displaystyle rac{|x-2|}{x-2} \geq \,$$
 0, then x belongs to

A.
$$[2, -\infty)$$

- $\mathsf{B.}\left(2,\infty\right)$
- $\mathsf{C.}\,(\,-\infty,\,2)$

D. $(-2,\infty)$

Answer: B



- **4.** The solution of 5x -1 < 24 and 5x + 1 > -24 is
 - A. (4,5)
 - B. (-5, -4)
 - C. (-5, 5)
 - D. (-5, 4)

Answer:



5. The solution set of the following inequality $|x-1| \leq |x-3|$ is

A. [0,2]

B. [2,∞)

C. (0,2)

D. ($-\infty$, 2)

Answer: B

Watch Video Solution

6. The value of $\log_{\sqrt{2}^{512}}$ is

A. 16

B. 18

C. 9

D. 12

Answer: A

Watch Video Solution

7. The value of
$$\log_3 \frac{1}{81}$$
 is

$$\mathsf{A}.-2$$

B.-8

 $\mathsf{C}.-4$

$$D. - 9$$



9. The value of $\mathrm{log}_a b \mathrm{log}_b \mathrm{clog}_c$ a is

A. 2

B. 1

C. 3

D. 4

Answer: B



10. If 3 is the logarithm of 343, then the base is

A. 5

B.7

C. 6

D. 9

Answer:

Watch Video Solution

11. Find a so that the sum and product of the roots of the equation $2x^2 + (a-3)x + 3a - 5 = 0$ are equal is

A. 1

B. 2

C. 0

D. 4

Answer: B



12. If a and b are the roots of the equation $x^2 - kx + 16 = 0$ and satisfy $a^2 + b^2 = 32$, then the value of k is

A. 10

B.-8

C. -8, 8

D. 6

Answer:



13. The number of solutions of $x^2 + |x - 1|$ = 1 is

A. 1

B. 0

C. 2

D. 3

Answer: C



14. The equation whose roots are numerically equal but opposite in sign to the roots of $3x^2 - 5x - 7 = 0$ is

A.
$$3x^2 - 5x - 7=0$$

B. $3x^2 + 5x - 7 = 0$
C. $3x^2 - 5x + 7 = 0$

D.
$$3x^2+x-7$$

Answer: B



15. If 8 and 2 are the roots of x^2 + ax + c = 0 and 3,3 are the roots of x^2 + dx + b = 0, then the roots of the equation $x^2 + ax + b = 0$ are

A. 1, 2

B. −1, 1

C. 9, 1

D. -1, 2

Answer: A

Watch Video Solution

16. If a and b are the real roots of the equation x^2 - kx + c =

0, then the distance between the points (a, 0) and (b, 0) is

A.
$$\sqrt{k^2-4c}$$

$$\mathsf{B.}\,\sqrt{4k^2-c}$$

C.
$$\sqrt{4c-k^2}$$

D.
$$\sqrt{k-8c}$$

Answer: B::C::D



Answer: C



18. If
$$\displaystyle rac{1-2x}{3+2x-x^2} = \displaystyle rac{A}{3-x} + \displaystyle rac{B}{x+1}$$
 ,then the value of A + B is

A.
$$\frac{-1}{2}$$

B. $\frac{-2}{3}$
C. $\frac{1}{2}$
D. $\frac{2}{3}$

Answer: A::B

19. The number of roots of $\left(x+3
ight)^4+\left(x+5
ight)^4=16$ is

B. 2

C. 3

D. 0

Answer: A

Watch Video Solution

20. The value of $\log_3 11$. $\log_{11} 13$. $\log_{13} 15$. $\log_{15} 27$. $\log_{27} 81$ is

A. 1

B. 2

C. 3

D. 4

Answer: D



A. 2

 $\mathsf{B.}-2$

C. 4

 $\mathsf{D.}-4$

Answer: B



2. If
$$|x - 2| > 5$$
, then x belongs to

A.
$$(-\infty, -2) \cup [5,\infty)$$

$$\texttt{B.} (\ -\infty, \ -3] \cup [7,\infty)$$

$$\mathsf{C}.\,(\,-\infty,\,-3)\cup(7,\infty)$$

D.
$$(\,-\infty,\,-2]\cup(5,\infty)$$

Answer: C



3. For
$$x \geq 2, |x-2|$$
 =

A. 2 - x

B.2 + x

C. x - 2

D. x

Answer: C

Watch Video Solution

4. The value of log 1 is

A. 1

B. 0

 $\mathsf{C}.\infty$

 $\mathsf{D.}-1$

Answer:



5. If quadratic with coefficients has no real roots, then its

discriminant is _____

A. 0

B. < 0

C. > 0

D. 1

Answer:





6. If
$$\sqrt{x+14} < 2, \,\,$$
 then x belongs to

A.
$$[\,-14,\ -10)$$

$$\mathsf{B.}\,(\,-14,\,-10)$$

$$\mathsf{C.}\,(\,-\infty,\,-10)$$

D.
$$[-14, -10]$$

Answer: c



7. Find the odd one out of the following

A.
$$x^3 + 3x^2 + 2x + 1$$

B. $(x^2 + 2x + 1)(x + 4)$
C. $x^2 + 5x + 6$

D.
$$(x + 2)(x + 3)(x + 4)$$

Answer: B



8. Assertion (A) : A plumber will be paid according to following schemes : In first scheme he will be paid ₹500 plus ₹70 her hour and in the second scheme he will paid ₹120 per hour. If he work for less than 10 hours the first scheme give better wages.

Reason (R) : In the first scheme he will get a fixed ₹500

whereas longer than 10 hours second scheme will pay more.

A. Both A and R are true and R is the correct

explanation of A

B. Both A and R are true and R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A::B::C::D



Section B 2 Matrks

1. Find the domain and range of the real valued function

$$\mathsf{f}(\mathsf{x}) = \frac{5-x}{x-5}.$$



the roots of the equation $x^2+{\sf px}$ + 8 = 0 is 2.



7. Prove that $\log_4 2 - \log_8 2 + \log_6 2... is 1 - \log_e 2$.

Section C 3 Marks

1. Solve
$$:rac{|x|-1}{|x|-3}\geq 0, x\in \mathbb{R}, x
eq \pm 3.$$

Watch Video Solution

2. Resolve into partial fractions :
$$rac{x}{(x+3)(x-4)}$$
.

3. Given that $\log_{10}2 = 0.30103$, $\log_{10}3 = 0.47712$ (approximately), find the number of digits in 2^8 , 3^{12} .



1. If x = 1 is one root of the equation

 $x^3-6x^2+11x-6=0, ext{ find the other roots.}$



4. If
$$\frac{\log_e x}{b-c} = \frac{\log_e y}{c-a} = \frac{\log_e z}{a-b}$$
, show that

xyz = 1

5. If
$$rac{\log_e x}{b-c}=rac{\log_e y}{c-a}=rac{\log_e z}{a-b}$$
, show that $x^ay^bz^c$ = 1