



MATHS

BOOKS - V PUBLICATION

MATHEMATICAL REASONING

Question Bank

1. Check whether the following sentences are statements. Give reasons for your answer

(i) 8 is less than 6 .

(ii) Every set is a finite set.

(iii) The sun is a star.

(iv) Mathematics is fun.

(v) There is no rain without clouds

(vi) How far is Chennai from here?



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2. Which of the following sentences are statements. Give reasons for your answer.

i) There are 35 days in a month.



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3. Whether the sentence is statement:

Mathematics is difficult.



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4. Whether the sentence is statement:

The sum of 5 and 7 is greater than 10.



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5. Whether the sentence is statement:

The square of the number is an even number.



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6. Whether the sentence is statement:

The sides of a quadrilateral have equal length.



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7. Whether the sentence is statement:

Answer this question.



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8. Whether the sentence is statement:

The product of -1 and 8 is -8 .



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9. Whether the sentence is statement:

The sum of all interior angles of a triangle is 180 degree.



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10. Whether the sentence is statement:

Today is a windy day.



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11. Whether the sentence is statement:

All real numbers are complex numbers.



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12. Give three examples of sentences which are not statements.



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13. Write the negation of the statement. "both the diagonals of a rectangle have the same length."



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14. Write the negation of the following statements and check whether the resulting statements are true.

(i). Australia is a continent.

(ii) There does not exist a quadrilateral which

has all its sides equal.

(iii) Every natural number is greater than 0.

(iv) The sum of 3 and 4 is 9



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15. Find the component statements of the following compound statements.

(i) The sky is blue and the grass is green.

(ii) It is raining and it is cold.

(iii) All rational numbers are real and all real numbers are complex.

(iv) 0 is a positive number or a negative number.



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16. Write the negation of the following statement:

Chennai is the capital of Tamil Nadu.



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17. Write the negation of the following statement:

$\sqrt{2}$ is not a complex number.



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18. Write the negation of the following statement:

All triangles are not equilateral triangle.



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19. write the negation of the following statement:

The number 2 is greater than 7.



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20. Write the negation of the following statement:

every natural number is an integer.



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21. Are the following pairs of statements negations of each other:

i) The number x is not a rational number.

The number x is not an irrational number.



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22. Are the following pairs of statements negations of each other?

The number x is a rational number.

The number x is an irrational number.



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23. Find the component statements of the following compound statements and check they are true or false.

Number 3 is prime or it is odd.



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24. Find the component statements of the following compound statements and check they are true or false.

100 is divisible by 3,11 and 5.



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25. Write the component statements of the following compound statements and check whether, the compound statement is *true* or *false*.

(i) A line is straight and extends indefinitely in both directions.

(ii) 0 is less than every positive integer and every negative integer.

(iii) All living things have two legs and two eyes.



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26. For each of the following statements, determine whether an inclusive *Or* or exclusive *Or* is used. Give reasons for your answer.

(i) To enter a country, you need a passport or a voter registration card.

(ii) The school is closed if it is a holiday or a Sunday.

(iii) Two lines intersect at a point or are parallel.

(iv) Students can take French or Sanskrit as their third language.



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27. For the following compound statement first identify the connecting words and then break it into component statement:

All rational numbers are real and all real numbers are not complex.



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28. For the following compound statement first identify the connecting words and then break it into component statement:

Square of an integer is positive or negative.



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29. For the following compound statement first identify the connecting words and then break it into component statement:

The sand heats up quickly in the sun and does not cool down fast at night.



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30. For the following compound statement first identify the connecting words and then break it into component statement:

$z = 2$ and $x = 3$ are the $\sqrt{}$ of the equation $3x^2 - x - 10 = 0$



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31. Identify the quantifier in the following statements and write the negation of the statements.

i) There exists a number which is equal to its square.

ii) For every real number x , x is less than $x + 1$

iii) There exists a capital for every state in India



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32. Check whether the following pair of statements are negation of each other. Give reasons for your answer.

i) $x + y = y + x$ is true for every real numbers x and y

ii) There exists real numbers x and y for which

$$x + y = y + x$$



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33. Write the contrapositive and converse of the following statement: 'If a number is

divisible by 9, then it is divisible by 3.'



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34. Write the converse of the following statements.

(i) If a number n is even, then n^2 is even.

(ii) If you do all the exercises in the book, you get an A grade in the class.

(iii) If two integers a and b are such that $a > b$, then $a - b$ is always a positive integer.



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35. For each of the following compound statements, first identify the corresponding component statements. Then check whether the statements are true or not.

(i) If a triangle ABC is equilateral, then it is isosceles.

(ii) If a and b are integers, then ab is a rational number.



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36. Given below are two pairs of statements. Combine these two statements using "if and only if". (i) '(p):' If a rectangle is a square, then all its four sides are equal q: If all the four sides of a rectangle are equal, then the rectangle is a square.' (ii) '(p)' : If the sum of digits of a number is divisible by 3, then the number is divisible by 3 q: If a number is divisible by 3 , then the sum of its digits is divisible by 3 .'



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37. Rewrite the following statement with "If - then" in five different ways conveying the same meaning. . If a natural number is odd, then its square is also odd



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38. Write the contrapositive and converse of the following statement:

If x is a prime number, then x is odd.



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39. Write the contrapositive and converse of the following statement:

If the two lines are parallel, then they do not intersect in the same plane.



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40. Write the contrapositive and converse of the following statement:

Something is cold implies that it has low temperature.



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41. Write the contrapositive and converse of the following statement:

you cannot comprehend geometry if you do not know how to reason deductively.



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42. Write the contrapositive and converse of the following statement:

x is an even number implies that x is divisible by 4.



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43. Write each of the following statements in the form $\text{if } \dots \text{ then } \dots$.
.You get a job implies that your credentials are good.



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44. Write each of the following statements in the form $\text{if } \dots \text{ then}$.

The Banana trees will bloom if it stays warm for a month.



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45. Write the following statements in the form $\text{if } \dots \text{ then}$.

A quadrilateral is a parallelogram if its diagonals bisect each other.





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46. Write the following statements in the form
if – then.

To get an A^+ in the class, it is necessary that
you do all the exercises of the book.



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47. Given statements in (a) and (b). Identify.
the statements given below as contrapositive
or converse of each other. a) If you live in

Delhi, then you have winter clothes. i)' If you do not have winter clothes, then you do not live in Delhi.



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48. If you have winter clothes, then you live in Delhi.



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49. Given below are two statements.

p: 80 is a mutiple of 5

q: 80 is a multiple of 4.

Write the compound statement connecting these two statements with **and** and checks its validity



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50. Given below are two statements

p:25 is a multiple of 5,

q:25 is a multiple of 8.

Write the compound statements connecting these two statements with 'And' and 'Or' in both cases check the validity of the following statements.



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51. Verify by the method of contradiction.

$p: \sqrt{7}$ is irrational.



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52. By giving a counter example, show that the following statement is false.

If n is an odd integer, then n is prime.



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53. Show that the statement p : "If x is a real number such that $x^3 + 4x = 0$ then x is 0" is true by

Direct method.



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54. Show that the statement : "For any real numbers a and b , $a^2 = b^2$ implies that $a = b$ " is not true by giving a counter example.



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55. Write the converse of the statement: 'If a number n is even, then n^2 is even.'



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56. By giving a counter example, show that the following statements are not true.

i) p : If all the angles of a triangle are equal, then the triangle is an obtuse angled triangle.

ii) q : The equation $x^2 - 1 = 0$ does not have, a root lying between 0 and 2 .



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57. Which of the following statements are true and which are false. In each case give a valid

reason for saying so.

i) p: Each radius of a circle is a chord of the circle.



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58. Which of the following statements are true and which are false.?In each case give a valid reason for saying so.

The centre of a circle bisects each chord of the circle.



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59. Which of the following statements are true and which are false? Give valid reason for saying so.

Circle is a particular case of an ellipse.



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60. Which of the following statements are true and which are false? Give valid reason for saying so.

If x and y are integers such that $x > y$, then

$$-x < -y$$



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61. Which of the following statements are true and which are false? Give valid reason for saying so.

$t = \sqrt{11}$ is a rational number.



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62. Check whether *Or* used in the following compound statement is exclusive or inclusive?

Write the component statements of the compound statements and use them to check whether the compound statement is true or not. Justify your answer.

t: you are wet when it rains or you are in a river.



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63. Write the negation of the following statements:

(i) p: For every real number x , $x^2 > (x)$

(ii) q: There exists a rational number x such that $x^2 = 2$.

(iii) r: All birds have wings.

(iv) s : All students study mathematics at the elementary level.



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64. Write the contrapositive of the statement:

“If the integer n is odd, then n^2 is odd.”



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65. Write the negation of the following statements.

p : For every positive real number x , the number $x - 1$ is also positive.



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66. Write the negation of the following statement.

q : All cats scratch



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67. Write the the negation of the following statement.

r : For every real number x , either $x > 1$ or $x < 1$.



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68. Write the negation of the following statement.

s: There exists a number x such that $0 < x < 1$.



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69. State the converse and contrapositive of each of the following statements.

i) p: A positive integer is prime only if it has no divisors other than 1 and itself.





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70. Write each of the statements in the form "if p , then q ".

p : It is necessary to have a password to log on to the server.



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71. Write each of the statements in the form "if p , then q "

q : There is traffic jam whenever it rains.



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72. Write each of the statements in the form "if p , then q "

r : You can access the website only if you pay a subscription fee:



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73. Rewrite each of the following statements in the form " p if and only if q ."

i) p : If you watch television, then your mind is free and if your mind is free, then you watch television.



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74. Rewrite each of the following statements in the form "p if and only if q".

q: For you to get an A grade, it is necessary and sufficient that you do all the homework regularly.



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75. Rewrite each of the following statements in the form "p if and only if q"

r: if a quadrilateral is equi-angular then it is a rectangle and if a quadrilateral is a rectangle then it is equiangular.



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76. Given below are two statements

p: 25 is a multiple of 5,

q: 25 is a multiple of 8.

Write the compound statements connecting these two statements with 'And' and 'Or' in both cases check the validity of the following statements.



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77. Check the validity of the statement given below by contradiction method.

i) p : The sum of an irrational number and a rational number is irrational.



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78. Write the following statement in five different ways conveying the same meaning.

p : If a triangle is equiangular then it is an obtuse angled triangle.



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79. Identify the quantifier in the following statements and write the negation of the statements.

i) There exists a number which is equal to its

square.

ii) For every real number x , x is less than

$$x + 1$$

iii) There exists a capital for every state in

India



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80. Which of the following sentences are statements? Justify your answer.

(i) Paris is in England.

(ii) The moon is made of green cheese.

(iii) May god bless you!

(iv) Who are you?

(v) The number x is a positive integer



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81. Which of the following is a statement?

(i) $x + 2 = 9$ (ii) 6 has three prime factors (iii)

$$x^2 + 5x + 6 = 0$$



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82. Find the component statement of the following compound statements.

(i) There is something wrong with the bulb or wiring ,

(ii) It is raining and it is cold.

(iii) The roof is red and the wall is white.



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83. Write the contrapositive and converse of the following statement:

If x is a prime number, then x is odd.



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84. Consider the statement, "If x is an integer and x^2 is even, then x is also even."

prove the statement by the contrapositive method.



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