MATHS

BOOKS - A N EXCEL PUBLICATION

MATHEMATICAL REASONING

Question Bank

1. Translate the following statement into symbolic form " jack and Jill went up the hill"

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2. Write the truth value of each of the following statement

2 is a prime number and 4 is an even number

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3. Translate the following statement into symbolic form"Jack is tall or smart"

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4. Write the truth value of the following statements :

India is in Asia or 2 + 2 + 2 =6

5. Write the truth value of the following statements :

Delhi is the capital of india or 2 is not a prime number.

6. Write the truth value of the negation of each of the following statements

p : Every square is a rectangle

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7. Write the truth value of the negation of each of the following statements

q : The earth is a star

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8. Write the truth value of the negation of each of the following statements

$r: 2 + 3 < 4$

9. Write the folowing statement in symbolic form, with p for "Asit is smart" and q for :Asoke is smart"

Asit is smart and Asoke is not smart

10. Write the folowing statement in symbolic form, with p for "Asit is smart" and q for :Asoke is smart"

Neither Asit nor asoke is smart

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11. Write the folowing statement in symbolic form, with p for "Asit is smart" and q for :Asoke is smart"

It is not true that Asit and Asoke are both not

smart

12. Write the folowing statement in symbolic

form, with p for "Asit is smart" and q for :Asoke

is smart"

Asit and Asoke are both not smart

13. Let p be "It is hot" and q be "It is dry", Give simple verbal sentence describing each of the following statements.

-p

14. Let p be "It is hot" and q be "It is dry", Give simple verbal sentence describing each of the following statements.

$p \wedge q$

15. Let p be "It is hot" and q be "It is dry", Give simple verbal sentence describing each of the following statements.

$p \lor q$

16. Let p be "It is hot" and q be "It is dry", Give simple verbal sentence describing each of the

following statements.

$$-p \wedge -q$$

17. Let p be "It is hot" and q be "It is dry", Give simple verbal sentence describing each of the following statements.

-(-q)

18. Let p be "It is hot" and q be "It is dry", Give simple verbal sentence describing each of the following statements.

$$-(p \lor q)$$

19. Consider the statement "there exists a rectangle which is not a square " Its negation is ?

20. If x and y are positive real numbers , then prove that $x < y \Leftrightarrow x^2 < y^2$

21. (a)Which of the following sentences are statements?Give reasons for your answer(ii)Mathematics is difficult.

22. (a)Which of the following sentences are statements?Give reasons for your answer(iii)The sum of 5 and 7 us greater tha 10.

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23. (a)Which of the following sentences are statements?Give reasons for your answer(iv)The square of a number is an even number.

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24. (a)Which of the following sentences are statements?Give reasons for your answer(v)The sides of a equilateral have equal length.

25. (a)Which of the following sentences are statements?Give reasons for your answer(vi)Answer this question.

26. (a)Which of the following sentences are statements?Give reasons for your answer(vii)The produvt of (-1) and 8 is 8.

27. Which of the following sentence are statements ?Give reasons for your answer

The sum of all interior angles of a triangle is

$180°$

28. Which of the following sentence are statements ?Give reasons for your answer

Today is a windy day

29. Which of the following sentence are statements ?Give reasons for your answer

All real numbers are complex number.

30. (b)Give three examples of sentences which are not statements.Give reasons for the answers.

31. Write the negation of the following statements.

Chennai is the capital of Tamilnadu

32. Write the negation of the following statements.

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

33. Write the negation of the following statements.

All triangles are not equilateral triangles

34. Write the negation of the following statements.

The number 2 is greater than 7

35. Write the negation of the following statements.

Every natural number is an integer

36. Are the following pairs of statements negations of each other

The number x is not a rational number

The number x is not an irrational number

37. Are the following pairs of statements negations of each other

The number x is a rational number

The number x is an irrational number

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

Number 3 is prime or it is odd

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39. Find the component statements of the following compound statements and check

whether they are true or false.

All integers are positive or negative

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

100 is divisible by 3,11 and 5.

41. For each of the following compound statements first identify the connecting words and then break it into component statements.

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

42. For each of the following compound statements first identify the connecting words

and then break it into component statements.

Square of an integer is positive or negative.

43. For each of the following compound statements first identify the connecting words and then break it into component statements.

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

44. For each of the following compound statements first identify the connecting words and then break it into component statements. $x = 2$ and $x = 3$ are the $\sqrt[s]{}$ of the equation 3x^2-x-10=0`

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

There exists a number which is equal to its square.

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

For every real number x,x is less than x+1

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

there exists a capital for every state in India.

48. 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 number x and y.

(ii)There exist a real number x and y for which x+y = y+x.

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49. State whether the 'or' used in the following statements is "exclusive" or "inclusive".Give reasons for your answer.Sun rises or moon sets

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50. State whether the 'or' used in the following statements is "exclusive" or "inclusive".

Give reasons for your answer.

To apply for a driving licence, you should have a ration card or a passport.

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51. State whether the 'or' used in the following statements is "exclusive" or "inclusive".Give

reasons for your answer.

All integers are positive or negative.

52. 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

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

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

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

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

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

Something is cold implies that it has low temperature.

56. Write the contrapositive and converse of the following statements

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

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

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

58. Write each of the following statement in the form "if,then"

You get a job implies that your credentials are good

59. Write each of the following statement in the form "if,then"

The Bannana trees will bloom if it stays warm for a month

60. Write each of the following statement in the form "if,then"

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

61. Write each of the following statement in the form "if,then"

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

62. In given statement (a) Identify the statements given below as contrapositive or converse of each other .

a) If you live in Delhi, Then you have winter cloths

(i) If you do not have winter cloths, then you donot live in Delhi .

(ii) If you have winter clothes then you live in Delhi

63. In given statement (a) Identify the statements given below as contrapositive or converse of each other .

a) If you live in Delhi, Then you have winter cloths

(i) If you do not have winter cloths, then you donot live in Delhi .

(ii) If you have winter clothes then you live in Delhi

64. Given statement in (a) and (b). Identify the statements given below as contrapositive or converse of each other .

If the quadrilateral is a parallelogram then its diagonals bisect each other

1)If the diagonals of a quadrilateral do not bisect each other, then the quadrilateral is not a parallelogram

2) if the diagonals of a quadrilateral bisect eachother , then it is a parallogram

65. Given statement in (a) and (b). Identify the statements given below as contrapositive or converse of each other .

If the quadrilateral is a parallelogram then its diagonals bisect each other

1)If the diagonals of a quadrilateral do not bisect each other, then the quadrilateral is not a parallelogram

2) if the diagonals of a quadrilateral bisect eachother , then it is a parallogram

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66. 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.

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

Method of contradiction.

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

method of contrapositive.

69. 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.

70. (b)Show that the following statement is true by the method of contrapositive:"If x^2 is evm ,`x in Z,then x is also even".

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

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

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

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

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

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

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

q: The centre of a circle bisects each chord of the circle

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

r: Circle is a particular case of an ellipse

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

s: If x and y are integers such that $x > y$,then $-x < -y$

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

reasons for saying so

t:$\sqrt{11}$ is a rational number

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78. Complete the following table

Statement	Truth value
A triangle has four sides	------
2 +3 < 6	------
Every square is a rectangle	------
Every set is an infinite set	

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79. Write three sentences which are not statement

80. Justify your answer

Let p be "2 + 5 = 8" and q be "all squares are rectangles" what are the truth value of p and q ?

81. Justify your answer

Let p be "2 + 5 = 8" and q be "all squares are rectangles" what are the truth value of p and q ?

82. Give a simple verbal sentence which describes each of the following statements. Also find their truth values $p \lor q$

83. Give a simple verbal sentence which describes each of the following statements. Also find their truth values .

$p \wedge q$

84. Give a simple verbal sentence which describes each of the following statements. Also find their truth values $\sim p$

85. Give a simple verbal sentence which describes each of the following statements. Also find their truth values $\sim q$

86. Suppose p denotes the statement "Kerala is in China" and q denotes the statement "3 + 4 = 8"

Complete the following table

Statement	Truth Value
$\sim p$	------
$\sim q$	------
$p \wedge q$	------
$p \vee q$	------
$p \wedge \sim q$	------
$\sim p \vee q$	------

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87. Suppose p denotes the statement "Kerala is in China" and q denotes the statement "3 + 4 = 8".Write the symbolic form of the following statements in terms of p and q

Kerala is not in China or $3 + 4 \neq 8$

88. Suppose p denotes the statement "Kerala is in China" and q denotes the statement "3 + 4 = 8".Write the symbolic form of the following

statements in terms of p and q

Kerala is not in China and $3 + 4 \neq 8$

89. Suppose p denotes the statement "Kerala is in China" and q denotes the statement "3 + 4 = 8".Write the symbolic form of the following statements in terms of p and q

Kerala is in China or $3 + 4 \neq 8$

90. Suppose p denotes the statement "$\sqrt{3}$ is an irrational number" and q denotes the statement "Kochi is a city in Kerala"

Complete the following table

Statement	~p	~q	$p \to q$	~$q \to p$	$p \leftrightarrow q$
Truth Value	-----	-----	-----	-----	-----

91. Suppose p denotes the statement "$\sqrt{3}$ is an irrational number" and q denotes the statement "Kochi is a city in Kerala".Write the

verbal sentances representing the following statements

$p \rightarrow \sim q$

92. Suppose p denotes the statement "$\sqrt{3}$ is an irrational number" and q denotes the statement "Kochi is a city in Kerala".Write the verbal sentences representing the following statements

$\sim p \rightarrow q$

93. Give a simple verbal sentence which describes each of the following statements. Also find their truth values $\sim p$

94. Consider the following statements p : It is raining, q : it is cloudy

Express the following sentances in symbolic

form using p and q

It is raining but not cloudy

95. Consider the following statements p : It is raining, q : it is cloudy

Express the following sentences in symbolic form using p and q

It is neither raining nor cloudy

96. Consider the following statements:P:it is raining,q:it is cloudy.(i)Express the following sentences in symbolic form using p and q.(a)A necessary condition for raining is that it is cloudy.

97. Consider the following statements:P:it is raining,q:it is cloudy.(i)Express the following sentences in symbolic form using p and q.(b)A

sufficient condition for raining is that it is cloudy.

98. Consider the following statements:P:it is raining,q:it is cloudy.(i)Express the following sentences in symbolic form using p and q.()A necesasary and sufficient condition for raining is that it is cloudy.

99. Write the negation of the following statements

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

100. Write the negation of the following statements

q : All cats scratch

101. Write the negation of the following statements

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

102. Write the negation of the following statements

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

103. State the converse and contrapositive of each of the following statements :

p : A positive integer is prime only if it has no divisiors other than 1 and itself

104. State the converse and contrapositive of each of the following statements :

q : I go to a beach whenever it is a sunny day

105. State the converse and contrapositive of each of the following statements :

r : If it is hot outside, then you feel thristy

106. Write each of the statements in the ofrm"if p,then q".(i)P:It is necessary to have a password to log on to the server.

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

q : There is traffic jam whenever it rains

108. 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

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

p : If you watch television, then your mind is free and if your mind is free, then you watch the television

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

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

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

r : If a quadrilateral is eqitangular, then it is a

rectangle and if a quadrilateral is a rectangle, then it is equiangular

112. 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 compound statement

113. Check the validity of the statement given below by the method given against it.

p : The sum of an irrational number and a rational number is irrational (by contradiction method)

114. Check the validity of the statement given below by the method given against it.

q : If n is a real number with $n > 3$, then $n^2 > 9$ (by contradiction method)

115. 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.

1. The number 6 has two prime factors"Is it a statement?Justify your answer.

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2. Write the truth value of each of the following statement

Kerala is in India and 3+4=7

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3. Write the truth value of each of the following statement

Kerala is in India and 3+4=7

4. Write the truth value of the following statement

Kerala is in China and 3+4=7

5. Write the truth value of the following statement

Kerala is in China or 3+4=7

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6. Write the negation of the following statements.

p: I went to my class yesterday

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7. Write the negation of the following statement q : 5+4=8

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8. Write the negation of the following statements.

r : Not all natural number are integers

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9. Write the negation of the following statements.

s : Not all squares are rectangles.

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10. Suppose P denotes the statement "Raju is a boy" and q denotes the statement "Delhi is the capital of India"

(i) Complete the following table

Statement	p	q	$p \vee q$	$p \wedge q$	$p \Rightarrow q$	$p \Leftrightarrow q$
Truth table	-----	-----	-----	-----	-----	-----

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11. Suppose P denotes the statement "Raju is a boy" and q denotes the statement "Delhi is the capital of India

Write the symbolic form of the statement "Raju is not a boy and Delhi is not the capital of India.

12. Suppose p and q denote two statements whose truth value are T and F respectively

Write the truth value of the following statements

$p \lor \sim q$

13. Suppose p and q denote two statements whose truth value are T and F respectively

Write the truth value of the following

statements

$p \wedge$ ~q

14. Suppose p and q denote two statements whose truth value are T and F respectively

Write the truth value of the following statements

$\sim p \vee q$

15. Suppose p and q denote two statements whose truth value are T and F respectively

Write the truth value of the following statements

$\sim p \vee \sim q$

16. Suppose p and q denote two statements whose truth value are T and F respectively.Write the truth value of the

following statements

$\sim p \lor \sim q$

17. Suppose p and q denote two statements whose truth value are T and F respectively

Write the truth value of the following statements

$\sim p \Rightarrow q$

18. Suppose p and q denote two statements whose truth value are T and F respectively

Write the truth value of the following statements

$\sim q \Rightarrow p$

19. Suppose p and q denote two statements whose truth value are T and F respectively

Write the truth value of the following

statements

$$p \Rightarrow q$$

20. Give a simple verbal sentence which describes each of the following statements. Also find their truth values $\sim p$

21. Suppose p and q denote two statements whose truth value are T and F respectively.Prove that truth value of $\sim p \Rightarrow \sim q$ and $p \vee \sim q$ are the same.

22. Find out which of the following sentences are statements and which are not ?Justify

Every square is a rhombus

23. Find out which of the following sentences are statements and which are not ?Justify

Stand up

24. Find out which of the following sentences are statements and which are not ?Justify

Hurrah! We have won the match.

25. Find out which of the following sentences are statements and which are not ?Justify

Two plus two is four

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26. Write the negation of the following statements.

Ashok reads news paper daily

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27. Write the negation of the statement: "$\sqrt{7}$ is rational.

28. Write the negation of the following statements.

Find the truth value (b)

29. (b)Translate the following compound statement into symbolic form:"The sky is blue and grass is green".

30. Consider the compound statements "35 is divisible by 5 or 6"

Write the component statement of the given statement.

31. Consider the compound statements "35 is divisible by 5 or 6"

Write the truth values of the compound statement and the component statements given above

32. Consider the statement "all prime number are both even and odd"

Write the component statements of the given statement.

33. Consider the statement "all prime number are both even and odd"

Find the truth values of the component statements and the compound statement

34. Suppose P denotes the statement "60 is divisible by 4" and q denotes the statement ''$2 + 4 < 8$''

Write the verbal sentences repesenting the following statements

$p \Rightarrow q$

35. Suppose P denotes the statement "60 is divisible by 4" and q denotes the statement

''$2 + 4 < 8$''

Write the verbal sentences representing the following statement $\sim p \Rightarrow \sim q$

36. Suppose P denotes the statement "60 is divisible by 4" and q denotes the statement ''$2 + 4 < 8$''

Write the verbal sentences representing the following statements $\sim p$

37. Suppose P denotes the statement "60 is divisible by 4" and q denotes the statement

$''2 + 4 < 8''$

Write the verbal sentences repesenting the following statements

$p \Rightarrow q$

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38. Match the following

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39. If p is false and q is true, Write the truth value of statements in column A.

40. Find out which of the following sentences are statements and which are not. Justify your

answer .

br The earth is a planet

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41. Find out which of the following sentences are statements and which are not. Justify your answer .

Who are you?

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42. Find out which of the following sentences are statements and which are not. Justify your answer .$(p \wedge q) \vee (\sim p)$

43. Let p be " It is cold " and q be "It is raining "

Give simple verbal sentence which describe the following statements.

$p \Rightarrow (\sim q)$

44. Let p be " It is cold " and q be "It is raining

" Give simple verbal sentence which describe

the following statements.

$\sim(p \wedge q)$

45. Using truth table prove that $p \vee (q \wedge r) =$

$(p \vee q) \wedge (p \vee r)$