MATHS

BOOKS - PSEB

MATHEMATICAL REASONING

Exercise

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1. Is the following sentence is statement? Give reasons for your answer. There are 35 days in a month.

2. Is the following sentence is statement? Give reasons for your answer. Mathematics is difficult.

3. Is the following sentence is statement? Give reasons for your answer. The sum of 5 and 7 is greater than 10.

4. Is the following sentence is statement? Give reasons for your answer. The square of a number is an even number.

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5. Is the following sentence is statement? Give reasons for your answer. The sides of a quadrilateral have equal length.

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6. Is the following sentence is statement? Give reasons for your answer. Answer this question

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7. Is the following sentence is statement? Give reasons for your answer. The product of (-1) and 8 is 8.

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8. Is the following sentence is statement? Give reasons for your answer. The sum of all interior angles of a triangle is $180°$.

9. Is the following sentence is statement? Give reasons for your answer. Today is a windy day.

10. Is the following sentence is statement? Give reasons for your answer. All real numbers are complex numbers.

11. Give three examples of sentences which are not statements. Give reasons for the answers.

12. Write the negation of the following statement :- Chennai is the capital of Tamil Nadu.

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13. Write the negation of the following statement :- $\sqrt{2}$ is not a complex number

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14. Write the negation of the following statement :- All triangles are not equilateral triangle.

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15. Write the negation of the following statement :- The number 2 is greater than 7.

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16. Write the negation of the following statement :- Every natural number is an integer.

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17. 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.

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18. Are the following pairs of statements negations of each other: The number x is a rational number. The number x is an irrational number.

19. Find the component statements of the following compound statement and check whether they are true or false.:- Number 3 is prime or it is odd.

20. Find the component statements of the following compound statement and check whether they are true or false.:- All integers are positive or negative.

21. Find the component statements of the following compound statement and check

whether they are true or false.:- 100 is divisible by 3, 11 and 5.

22. For the following compound statement first identify the connecting words and then break it into component statements. All rational numbers are real and all real numbers are not complex.

23. For the following compound statement first identify the connecting words and then break it into component statements. Square of an integer is positive or negative.

24. For the following compound statement first identify the connecting words and then break it into component statements. The sand heats up quickly in the Sun and does not cool down fast at night.

25. For the following compound statement first identify the connecting words and then break it into component statements. x = 2 and x = 3 are the roots of the equation $3x^2 - x - 10 = 0$.

26. Identify the quantifier in the following statement and write the negation of the statement.:- There exists a number which is equal to its square.

27. Identify the quantifier in the following statement and write the negation of the statement.:- For every real number x, x is less than $x + 1$.

28. Identify the quantifier in the following statement and write the negation of the statement.:- There exists a capital for every state in India.

29. Check whether the following pair of statements are negation of each other. Give reasons for your answer. $x + y = y + x$ is

true for every real numbers x and y. There exists real numbers x and y for which $x + y = y + x.$

30. State whether the "Or" used in the following statement is "exclusive "or" inclusive. Give reasons for your answer. Sun rises or Moon sets.

31. State whether the "Or" used in the following statement is "exclusive "or" inclusive. Give reasons for your answer. To apply for a driving licence, you should have a ration card or a passport.

32. State whether the "Or" used in the following statement is "exclusive "or" inclusive. Give reasons for your answer. All integers are positive or negative.

33. 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'.

34. Write the contrapositive and converse of the following statement:- If x is a prime

number, then x is odd.

35. Write the contrapositive and converse of the following statement:- If the two lines are parallel, then they do not intersect in the same plane.

36. Write the contrapositive and converse of the following statement:- Something is cold implies that it has low temperature.

37. Write the contrapositive and converse of the following statement:- You cannot comprehend geometry if you do not know how to reason deductively.

38. 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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39. Write the following statement in the form "if-then" You get a job implies that your credentials are good

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40. Write the following statement in the form "if-then" The Bannana trees will bloom if it stays warm for a month.

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41. Write the following statement in the form "if-then" A quadrilateral is a parallelogram if its diagonals bisect each other.

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42. Write the following statement in the form "if-then" To get an A^+ in the class, it is necessary that you do all the exercises of the book.

43. Given statement below. Identify the statement given below as contrapositive or converse of each other. 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. (ii) If you have winter clothes, then you

live in Delhi.

44. Given statement below. Identify the statement given below as contrapositive or converse of each other. If a quadrilateral is a parallelogram, then its diagonals bisect each other. (i) If the diagonals of a quadrilateral do not bisect each other, then the quadrilateral is not a parallelogram. (ii) If the diagonals of a

quadrilateral bisect each other, then it is a

parallelogram.

45. 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.

46. 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.

47. Show that the statement p: "If x is a real number such that x3 + 4x = 0, then x is 0" is true by method of contrapositive.

48. 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.

49. Show that the following statement is true by the method of contrapositive. p: If x is an integer and x^2 is even, then x is also even.

50. By giving a counter example, show that the following statement is not true:- p: If all the angles of a triangle are equal, then the triangle is an obtuse angled triangle.
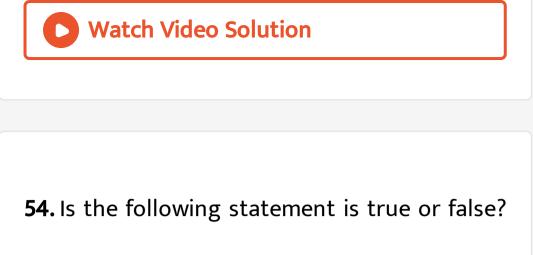
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51. By giving a counter example, show that the following statement is not true:- q: The equation $x^2 - 1 = 0$ does not have a root lying between 0 and 2.

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52. Is the following statement is true or false? In each case give a valid reason for saying so.

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

53. Is the following statement is true or false? In each case give a valid reason for saying so.

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

54. Is the following statement is true or false?

In each case give a valid reason for saying so.

r: Circle is a particular case of an ellipse.

55. Is the following statement is true or false?

In each case give a valid reason for saying so.

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

56. Is the following statement is true or false? In each case give a valid reason for saying so.

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

57. Write the negation of the following statement:- p: For every positive real number x, the number x - 1 is also positive.

58. Write the negation of the following statement:- q: All cats scratch.

59. Write the negation of the following statement:- r: For every real number x, either x > 1 or x < 1.

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60. Write the negation of the following statement:- s: There exists a number x such that 0 < x < 1.

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61. State the converse and contrapositive of the following statement : p: A positive integer is prime only if it has no divisors other than 1 and itself.

62. State the converse and contrapositive of the following statement : q: I go to a beach whenever it is a sunny day.

63. State the converse and contrapositive of the following statement : r: If it is hot outside, then you feel thirsty.

64. Write the statement in the form "if p, then q" :- p: It is necessary to have a password to log on to the server.

65. Write the statement in the form "if p, then q" :- q: There is traffic jam whenever it rains.

66. Write the statement in the form "if p, then q" :- r: You can access the website only if you pay a subsciption fee.

67. Rewrite the following statement 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 television.

68. Rewrite the following statement 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.

69. Rewrite the following statement in the form"p if and only if q":- r: If a quadrilateral is equiangular, then it is a rectangle and if a quadrilateral is a rectangle, then it is equiangular.

70. 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.

71. 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).

72. 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).

73. 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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