MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

MATHEMATICAL REASONING

1. Show that none of the following sentences is a statement :

Is (-4) a positive integer ?

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2. Show that none of the following sentences is a statement :
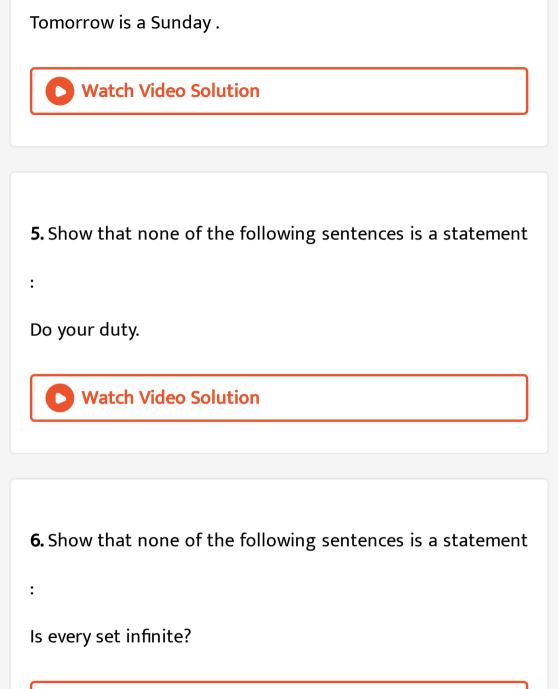
Give me a cup of tea .

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3. Show that none of the following sentences is a statement :

May god bless you !

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4. Show that none of the following sentences is a statement :

Tomorrow is a Sunday .

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5. Show that none of the following sentences is a statement

:

Do your duty.

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6. Show that none of the following sentences is a statement

:

Is every set infinite?

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7. Show that none of the following sentences is a statement :

Close the window .

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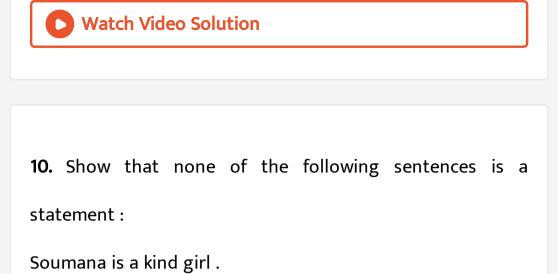
8. Show that none of the following sentences is a statement :

Howdo you do ?

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9. Show that none of the following sentences is a statement :

$2x + 7 = 0.$

10. Show that none of the following sentences is a statement :

Soumana is a kind girl .

11. Show that none of the following sentences is a statement :

Mathematics is very tough .

12. Show that none of the following sentences is a statement :
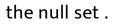
The sum of a and b is greater than 2 .

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13. Show that none of the following sentences is a statement :

a , b , c are the lenghts of the sides of a triangle .

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14. Show that none of the following sentences is a statement : $A \cap B = \phi$ where A and B are two sets and ϕ is

the null set .

15. Show that none of the following sentences is a statement :

The sum of two complex numbers is real .

16. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

There is no rain without clouds .

17. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

The sun sets in the east .

18. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

Every set is finite set .

19. Examine whether the follwing sentences are statements or not . Give reasons for your answers . How far is Mumbai from here ?

20. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

Delhi is far from here .

21. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

The sum of two natural numbers is a natural number .

22. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

She is a B.Com . (Hons .) gradute.

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23. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

Seven plus four is less than ten .

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24. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

what are you doing ?

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25. Examine whether the follwing sentences are statements

or not . Give reasons for your answers .

Every rhombus is a parallelogram .

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26. Examine whether the follwing sentences are statements

or not . Give reasons for your answers .

Every rectangle is a square .

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27. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

The number y is a natural number .

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28. Examine whether the follwing sentences are statements or not . Give reasons for your answers .
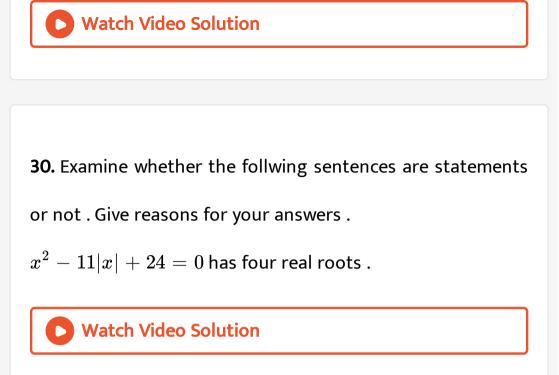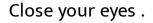
Every prime number is odd .

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29. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

Yesterday was Sunday .

30. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

$x^2 - 11|x| + 24 = 0$ has four real roots .

31. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

How black is the cat !

32. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

Arati is a beautiful girl .

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33. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

Every rational number is an integer .

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34. Examine whether the follwing sentences are statements or not . Give reasons for your answers .

Close your eyes .

35. Examine whether the follwing sentences are statements

or not . Give reasons for your answers .

Every relation is not a function .

36. State , with reasone , the truth value of each of the

following propositions (or, statements) :

Three plus five is eight .

37. State , with reasone , the truth value of each of the following propositions (or, statements) :

the set of prime integers is finite

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38. State , with reasone , the truth value of each of the following propositions (or, statements) :

The numbers 15 has three prime factors .

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39. State , with reasone , the truth value of each of the following propositions (or, statements) :

If x is real number , then $7x - 3x = 4x$.

40. State , with reasone , the truth value of each of the

following propositions (or, statements) :

The product of 5 and (-2) is 10.

41. State , with reasone , the truth value of each of the

following propositions (or, statements) :

The product of (-5) and (-2) is greater then -(10) .

42. State , with reason , the truth value of each of the following propositions (or, statements) : Every rectangle is a square .

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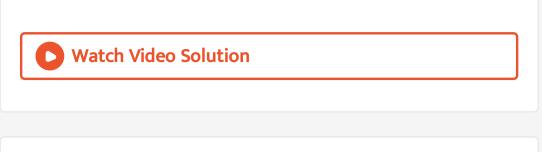**43.** State , with reasone , the truth value of each of the following propositions (or, statements) :

All real numbers are complex numbers .

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44. State , with reasone , the truth value of each of the following propositions (or, statements) :

There are 34 days in a month .

45. State , with reasone , the truth value of each of the following propositions (or, statements) :

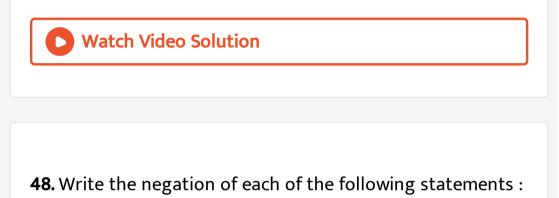$\left(2 + \sqrt{5}\right)$ is an irrational number.

46. Write the negation of each of the following statements :

Kolkata is a town .

47. Write the negation of each of the following statements :

Delhi is in India .

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48. Write the negation of each of the following statements :

The integer 4 is greater than the integer 6 .

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49. Write the negation of each of the following statements :

Both the diagonals of a rhombus have the same . Length .

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50. Write the negation of each of the following statements :

$\sqrt{5}$ is an irrational number.

51. Write the negation of each of the following statements :

All rational numbers are integers .

52. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

The sum of 3 and 2 is 6

53. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

$5 < 9$

54. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

$n + 3 \geq 2 \text{for all} \quad n \in \mathbb{N}$

55. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

There does not exist a parallelogram which has all its sides equal .

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56. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

Let $A = \{1, 3, 5, 7\}$ be a given set , then $\exists x \in A$ such that x + 4 = 8 .

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57. Write the negation of each of the following statements :

$(n^2 + n + 41)$ is a prime number for all $n \in A$.

58. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

Every odd integer is divisible by 3 .

59. Write the negation of each of the following statements and find in each case the truth value of the resulting

statement :

All complex numbers are real numbers .

60. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

Every natural number is grater than zero .

61. State with reasons wheater the statemnts given below in

(i) and (ii) are negation of to each other or not :

(a) the relation $x + y = y + x$ is true for every rational

numbers x and y .

(b) there have some rational number x and y for which x+y !=

y+x

62. State with reasons wheater the statemnts given below is

negation of to each other or not :

(a) There exists a natural number which is not an integer .

(b) Some natural numbers are not integers .

63. Find the component statements of the following

compound statement and show there is no relation

between them :

3 is an odd number and the sky is blue .

64. Find the value of each of the following compound statements :

The earth is almost round and the grass is green .

65. Find the value of each of the following compound statements :

The number 12 is both prime and even .

66. Find the value of each of the following compound statements :

$7 > 5$ and $4 > 5$

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67. Find the value of each of the following compound statements :

$4 + 1 > 7$ and $2 + 5 < 6$

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68. Examine whether the connective 'or' used in the following compound statements is inclusive or exclusive :

100 is multiple of 4 or 5

69. Examine whether the connective 'or' used in the following compound statements is 'inclusive or' or 'exclusive or' :

$4 < 6$ or $5 > 8$

70. Write the truth value of each of the following compound statenments :

$2 - 3i \left(i = \sqrt{-1}\right)$ is a real number or it is a complex number .

71. Write the truth value of each of the following compound statenments :

7 + 8 =15 or , 7 + 8= 16

72. Write the truth value of each of the following compound statenments : The school is clossed if there is a holiday or Sunday .

73. Write the truth value of each of the following compound statenments :

98 is a multiple of 6 or 8 .

74. Determine the truth of falsity (i.e , the truth value) of each of the following if - then implications :

If the six- digit natural number 718326 is divisible by 3 , then the sum of the digits in 718326 is divisible by 3

75. Determine the truth of falsity (i.e , the truth value) of each of the following if - then implications :

If the six- digit natural number 718324 is divisible by 3 , then the sum of the digits in 718324 is divisible by 3

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76. Determine the truth of falsity (i.e , the truth value) of each of the following if - then implications :

If the six- digit natural number 718326 is divisible by 3 , then the sum of the digits in 718326 is not divisible by 3

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77. Determine the truth of falsity (i.e , the truth value) of each of the following if - then implications :

If the six- digit natural number 718324 is divisible by 3 , then the sum of the digits in 718324 is not divisible by 3

78. Rwrite the following statement with the connective phrase 'if .... Then ....' in three different ways conveying the same meaning :

If a number is a multiple of 10 , then it is a multiple of 5 .

79. Find the truth or falsiity (i.e., the truth value) of each of the following biconditinal statements (or , if and ony if implications) :

A rectangle is a square if and only if its four sides are equal .

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80. Find the truth or falsiity (i.e., the truth value) of each of the following biconditinal statements (or , if and ony if implications) :

$7 > 9$ if and only if $5 < 8$

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81. Find the truth or falsiity (i.e., the truth value) of each of the following biconditinal statements (or , if and ony if implications) :

$11 < 10 + 2$ if and only if $7 > 9$

82. Find the truth or falsiity (i.e., the truth value) of each of the following biconditinal statements (or , if and ony if implications) :

$9 > 11$ if and only if $8 < 7$

83. Let $S = \{0, 1, 2, 3, 4, 5\}$ be a given set , find the truth value of each of the following statement :

$\forall x \in S, x + 3 \leq 8$

84. Let $S = \{0, 1, 2, 3, 4, 5\}$ be a given set , find the truth value of each of the following statement :

$\forall x \in S, x + 4 > 5$

85. Let $S = \{0, 1, 2, 3, 4, 5\}$ be a given set , find the truth value of each of the following statement :

$\exists x \in S,$ such that $x + 2 = 8$

86. Let $S = \{0, 1, 2, 3, 4, 5\}$ be a given set , find the truth value of each of the following statement :

$\exists x \in S,$ such that $x + 7 \geq 12$

87. Write the negation of each of the following quantified statements :

$\left[\forall x \in \mathbb{N}, x^2 + x + 41 \quad \text{is a prime number} \right]$

88. Write the negation of each of the following quantified statements :

$$\{\, \exists x \in \mathbb{N}, x \quad \text{such that } 3x = 12 \,\}$$

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89. Write the negation of each of the following quantified statements :

$$\{\, \forall x \in \mathbb{N}, x + 5 > 4 \,\}$$

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90. Write the negation of each of the following quantified statements :

{If A is the set of all rectangles , then $\exists x \in A$ such that all sides of x are equal }

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91. Write the negation of each of the following quantified statements :

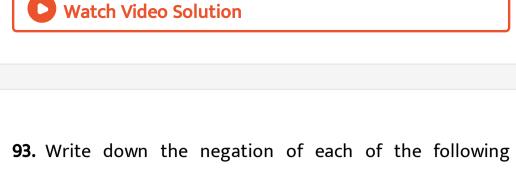{ $\exists x \in \mathbb{R}$, such that x is rational } [here $\mathbb{R}$ is the set of real numbers]

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92. Write down the negation of each of the following compound statements:

$4 + 7 = 11$ and $3 + 5 \leq 9$

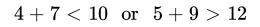**93.** Write down the negation of each of the following compound statements:

It is raining and it is cold

94. Write the negation of the following compound statement: Square of an integer is positive or negative.

95. Write down the negation of each of the following compound statements:

$4 + 7 < 10$ or $5 + 9 > 12$

96. Write down the negation of each of the following compound statements:

If triangle ABC is isosceles , then the base angles B and C are equal .

97. Write down the negation of each of the following compound statements:

If $8 > 9$ then $12 < 10$

98. Write down the negation of each of the following compound statements: Sets P and Q are equal if and only if ($P \subseteq Q$ and $Q \subseteq P$).

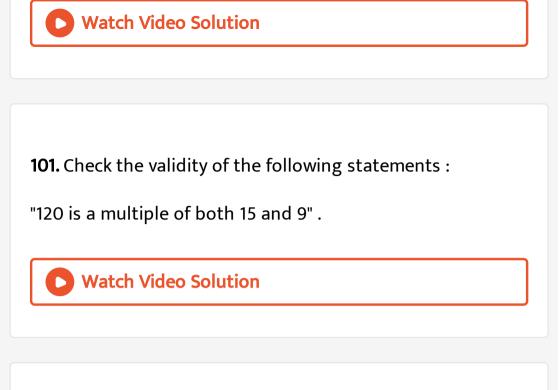**99.** Write down the negation of each of the following compound statements:

$|x| \leq 3$ if and only if $x \geq -3$ and $x \leq 3$.

100. Check the validity of the following statements :

"72 is a multiple of both 4 and 9 ".

101. Check the validity of the following statements :

"120 is a multiple of both 15 and 9" .

102. Examine the validity of the follwing compound statements :

$3 + 4i \left(i = \sqrt{-1}\right)$ is a real number or it is a complex number.

103. Examine the validity of the follwing compound statements :

112 is a multiple of 5 or 9 .

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104. Examine the validity of the follwing compound statements :

If a and b are odd integers , then ab is an odd integer .

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105. Examine the validity of the follwing compound statements :

If a and b are integers such that ab is an odd integer , then

both a and b are odd integers .

106. Check the validity of the following compound statement

using

Direct Method

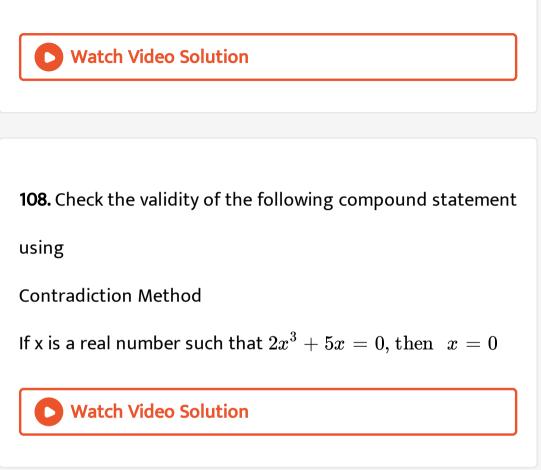If x is a real number such that $2x^3 + 5x = 0$, then $x = 0$

107. Check the validity of the following compound statement

using

Contrapositive Method

If x is a real number such that $2x^3 + 5x = 0$, then $x = 0$

108. Check the validity of the following compound statement using

Contradiction Method

If x is a real number such that $2x^3 + 5x = 0$, then $x = 0$

109. Show that the following statement is true by the method of contrapositive p: if x is an integer and x^2 is odd then x is also odd.

110. Prove that the following biconditional compound statement is true :

The integer x is even if and only if x^2 is even .
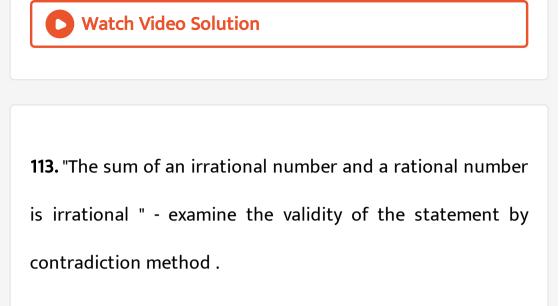
111. Prove that $\sqrt{2}$ is not a rational number.

112. Check the validity of the following statement using contracdiction method :

If x is real number with $x > 4$, then $x^2 > 16$

113. "The sum of an irrational number and a rational number is irrational " - examine the validity of the statement by contradiction method .

114. By giving a counter example show that the following statement is false :

The equation $4x^2 - 25 = 0$ does not have a root lying between (-3) and (-2) .

115. Prove that the statement "If all the the angles of a triangle are equal , then the triangle is an obtuse angled triangle " is false .

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116. "If n is an odd integer , then n is prime" = by giving a counter exmple prove that the given statement is not true .

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Exercise Multiple Choice Type Questions

1. Which of the following sentences is statement ?

A. The sum of two odd numbers is even .

B. How beautiful !

C. The sum of x and y is greater than 4 .

D. Close the door of the room .

Answer: A

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2. Which of the following sentences is not statement ?

A. 9 is less than 7

B. If $x \in P \Rightarrow x \in Q$, then $P \leq Q$

C. She is kind girl .

D. $7 + 9 > 15$

Answer: C

3. The negation of the statements p is denoted by -

A. $-p$

B. $\sim p$

C. $\dfrac{1}{p}$

D. $-(\sim p)$

Answer: B

4. Two component statement p and q of the compound statement "p and q " denoted by -

   A. $p \lor q$

   B. $p \land q$

   C. $p \Rightarrow q$

   D. $p \Leftrightarrow q$

Answer: B

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5. Two componet statement p and q of the compound statement "p or q" denoted by -

A. $p \lor q$

B. $p \land q$

C. $p \Rightarrow q$

D. $p \Leftrightarrow q$

Answer: A

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6. Two component statement p and q of the conditional statement "p and q " denoted by -

A. $p \lor q$

B. $p \land q$

C. $p \Rightarrow q$

D. $p \Leftrightarrow q$

Answer: C

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7. Two component statement p and q of the conditional statement "p if and only if q " denoted by -

A. $p \vee q$

B. $p \wedge q$

C. $p \Rightarrow q$

D. $p \Leftrightarrow q$

Answer: D

8. Let p and q be two component statement of the compound statement $p \vee q$. If the truth value of $p \vee q$ be " F" then the truth value of p and q are respectively -

A. T,T

B. T,F

C. F,T

D. F,F

Answer: D

9. Let p and q be two component statement of the compound statement $p \wedge q$. If the truth value of $p \wedge q$ be " T" then the truth value of p and q are respectively -

    A. T,T

    B. T,F

    C. F,T

    D. F,F

Answer: A

10. Let p and q be two component statement of the compound statement $p \Rightarrow q$. If the truth value of $p \Rightarrow q$ be

" F" then the truth value of p and q are respectively -

A. T,T

B. T,F

C. F,T

D. F,F

Answer: B

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11. Let p and q be two component statement of the compound statement $p \Leftrightarrow q$. If the truth value of $p \Leftrightarrow q$ be " T" then the truth value of p and q are respectively -

A. T , F

B. F , T

C. F ,F

D. none of these

Answer: C

12. If p and q are two component statement then the negation of the compound statement $p \Leftrightarrow q$ is -

A. $\sim(p \wedge q) \vee (q \wedge p)$

B. $(p \wedge \sim q) \wedge (q \wedge \sim p)$

C. $(p \wedge q) \vee (q \wedge \sim p)$

D. $(p \wedge \sim q) \vee (q \wedge \sim p)$

Answer: D

13. The phrase "there exist " is known as -

A. disjunction

B. conjunction

C. existential quantifiers

D. universal quantifuers

Answer: C

14. p : The sum of 5 and 7 is 11 . The negation of the given statement is -

    A. the difference of 5 and 7 is 11 .

    B. the sum of 5 and 7 is not 11 .

    C. the sum of 5 and 7 is 12 .

    D. none of these

Answer: B

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15. $p: \left[\forall x \in \mathbb{N}, p^2 + p + 29 \right.$ is a prime number.] the negation of the given quantified statement is -

A. $\forall x \in \mathbb{N}$, $p^2 + p + 29$ is a prime number

B. $\forall x \in \mathbb{N}$, $p^2 + p + 29$ is not a prime

C. $\exists x \in \mathbb{N}$, such that $p^2 + p + 29$ is prime.

D. $\exists x \in \mathbb{N}$, such that $p^2 + p + 29$ is not prime.

Answer: D

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16. the five statements are given below :

p : The sun is a star ltbgt

q : The set of rational numbers is finite .

r : The number 12 has three prime factors .

s : The product of (-4) and (-3) is less than (-12)

t: There are 36 days in a month .

A. {T,T ,F ,F,F}

B. {T,F,F,T,F}

C. {T,T,T,T,F}

D. {T,F,F,F,F}

Answer: D

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17. Given ,

P : Seven plus two is nine

q : Every parallelogam is a rectangel .

r: If x is realnumber then , $7x + 3x = 10x$.

s : $\sqrt{8}$ is a rational number.

t : If x is not a negative number , then $4x > 3x$

Thuth value of the statements are respectively

A. {T,F,T,F,T}

B. {T,T,T,F,F}

C. {T,F,F,T,F}

D. {T,T,T,T,F}

Answer: A

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18. Given sentence if statement then write 's' otherwise `'

A. $\{SS\$\}$

B. $\{S\$S\$\}$

C. $\{\$S\$S\}$

D. $\{\$SS\}$

Answer: A

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p : Three plus six is nine

q : the moon revoles around the Earth .

r : Mathematics is fun .

s: How far is Mumbai from here ?

The sentences are repectively

A. ###OPT1###

B. ###OPT2###

C. ###OPT3###

D. ###OPT4###

Answer: ###ANSWER###

> ▶ ###BUTTON_TEXT###

Exercise Very Short Answer Type Questions

1. Which of the following sentences are statements ? Give reason for your answers The sun rises in the east .

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2. Which of the following sentences are statements ? Give reason for your answers How far is Kolkata from your house ?

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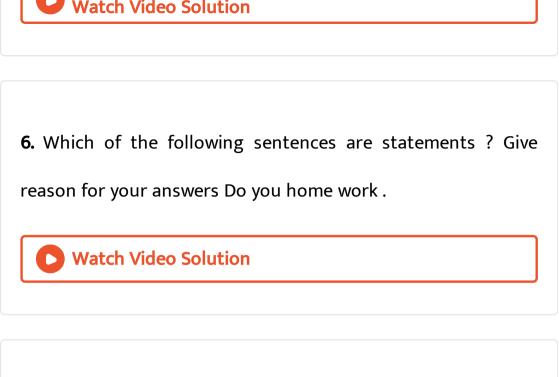**3.** What of the following sentences are statements ? Give reasone for uour answers

She is a beautiful girl .

4. What of the following sentences are statements ? Give reasone for uour answers

The equation $x^2 - 12|x| + 32 = 0$ has four real roots .

5. Which of the following sentences are statements ? Give reason for your answers Every relation is a function .

6. Which of the following sentences are statements ? Give reason for your answers Do you home work .

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7. Which of the following sentences are statements ? Give reasone for your answers The set of prime numbers is finite .

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8. Which of the following sentences are statements ? Give reasone for your answers Every parallelogram is a rectangle .

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9. Which of the following sentences are statements ? Give reason for your answers A prime integer is not divisible by 2 .

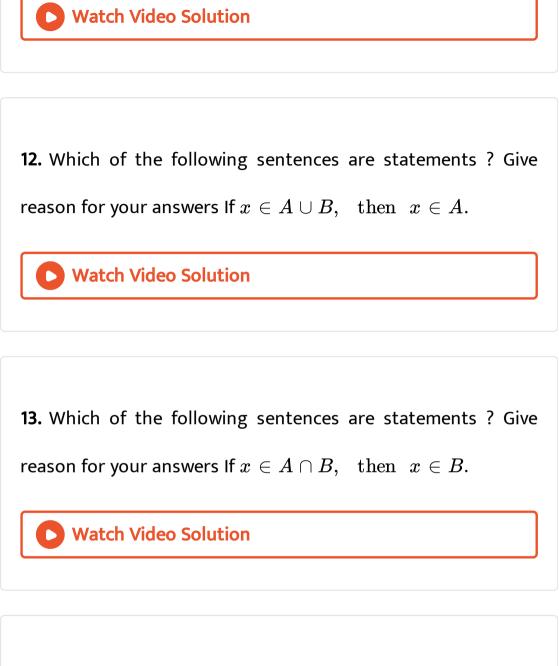**10.** Examine whether the follwing sentences are statements or not . Give reasons for your answers .

There is no rain without clouds .

11. Which of the following sentences are statements ? Give reason for your answers The sun is not a star .

12. Which of the following sentences are statements ? Give reason for your answers If $x \in A \cup B,$ then $x \in A.$

13. Which of the following sentences are statements ? Give reason for your answers If $x \in A \cap B,$ then $x \in B.$

14. Which of the following sentences are statements ? Give reason for your answers All quadrilaterals have four sides .

15. Which of the following sentences are statements ? Give reason for your answers The sum of a real number and a complex number is always a purely complex number .

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16. Which of the following sentences are statements ? Give reason for your answers The sum of two irrational numbers is always a rational number .

  Watch Video Solution

17. Which of the following sentences are statements ? Give reason for your answers Chennai is in pakistan .

18. Which of the following sentences are statements ? Give reason for your answers Is every set infinite ?

19. What of the following sentences are statements ? Give reasone for your answers

The number z is a complex numbers .

20. Which of the following sentences are statements ? Give reason for your answers The sum of two complex numbers is always a complex number .

21. What do you mean by negative of a statement (or , a proposition) ? How is it usually obtained ?

22. Write the negation of each of the following statements and find in each case the truth value of the resulting

statement :

The sum of 4 and 5 is 7

23. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

$5 < 9$

24. Write the negation of each of the following statements and find in each case the truth value of the resulting

statement :

For all $n \in \mathbb{N}$, we have $n - 2 > 3.$

25. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

The roots of the equation $x^2 - 4x + 5 = 0$ are real .

26. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

If A= {1 , 2, 3 ,4 } be a given set , then there exists x in A such that $2x + 1 = 10$

27. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

There does not exist a rectangle which has all its sides equal .

28. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

Both the diagonals of a parallelogram have the same length .

29. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

The earth is round .

30. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

The product of two natural numbers is a natural number .

31. Write the negation of each of the following statements and find in each case the truth value of the resulting statement :

If A and B are two sets such that $A \subseteq B$, then $A \cup B = B$.

32. State with reason whether the statements given below is negation of each other :

(i) The relation $xy = yx$ is true for every real number x and y .

(ii) There exists real numbers x and y for which the relation $xy = yx$ is not true .

33. State with reason whether the statements given below is negation of each other :

(i) The quadratic equation $x^2 - 6x + 25 = 0$ has no real roots .

(ii) The roots of the equation $x^2 - 6x + 25 = 0$ are compleax .

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34. State with reason whether the statements given below is negation of each other :

(i) All complex numbers are real .

(ii)There exists at least one complex number which is not real .

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35. Define examples simple statement and compound statements

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36. What do you mean by 'Connectives ' in mathematical reasoning problems ?

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37. Define with examples 'Conjunction' Disjunction ' ,"If - then implication " , (or ,'Conditional statement ') and 'Biconditional' statement . If p and q are two simple statements then state the symolic presentations of above compound statements .

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38. Find the component statements of the following compound statement: It is raining and it is cold.

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39. Write the component statements of each of the folloing compound statements :

The earth is round and the sky is blue.

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40. Write the component statements of each of the following compound statements : 840 is divisible by 7 , 4 and 15 .

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41. Write the component statements of each of the folloing compound statements :

Two coplanar lines are parallel or they intersect at a point .

42. Write the component statements of each of the folloing compound statements :

$\sqrt{3}$ is a rational number or an irrational number .

43. Write the component statements of each of the folloing compound statements :

315 is a multiple of 7 or 9 .

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44. Write the component statements of each of the folloing compound statements :

If $9 > 11$, then $81 > 121$.

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45. Write the component statements of each of the folloing compound statements :

If the number 73452 is divisible by 3 , then the sum of the digits in 73452 is divisible by 3 .

46. Write the component statements of each of the following compound statements : Sets A and B are equal if and only if $(A \subseteq B \text{ and } B \subseteq A)$

47. Write the component statements of each of the folloing compound statements :

A triangle is equilateral if and only if iit is equiangular .

48. Find the truth value of each of the following compound statements :

A parallelogram is a quadrilateral and its opposite sides are equal .

49. Find the truth value of each of the following compound statements :

The sky is blue and the earth is a star .

50. Find the truth value of each of the following compound statements :
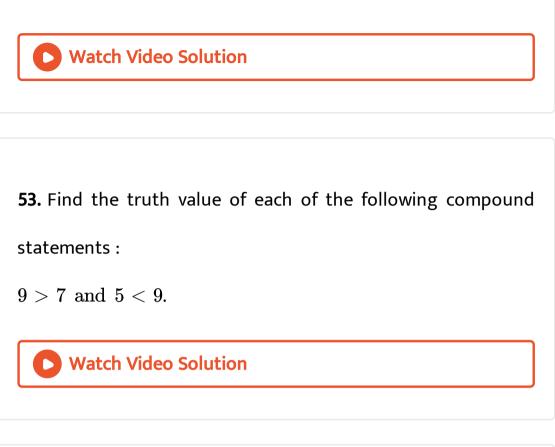
$9 > 7 \text{ and } 6 > 5$.

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51. Find the truth value of each of the following compound statements :

35 is a multiple of 4 and 3 .

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52. Find the truth value of each of the following compound statements :

Number 7 is prime or it is odd.

53. Find the truth value of each of the following compound statements :

$9 > 7$ and $5 < 9$.

54. Find the truth value of each of the following compound statements :

$3 + 4i\left(i = \left(\sqrt{-1}\right)\right.$ is real number or it is a complex number .

55. Find the truth value of each of the following compound statements :

The sun is cold or the sky is red .

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56. Find the truth value of each of the following compound statements :

100 is multiple of 6 or 8 .

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57. Find the truth value of each of the following compound statements :

If the five -digit naturals 54732 is divisible by 3 , then the sum of the digits in 54732 is divisible by 3 .

58. Find the truth value of each of the following compound statements :

If the five -digit naturals 54732 is divisible by 3 , then the sum of the digits in 54732 is divisible by 3 .

59. Find the truth value of each of the following compound statements :

If the five -digit naturals 54732 is divisible by 3 , then the sum of the digits in 54732 is not divisible by 3 .

60. Find the truth value of each of the following compound statements :

If the five -digit naturals 54732 is divisible by 3 , then the sum of the digits in 54732 is not divisible by 3 .

61. Find the truth value of each of the following compound statements :

A quadrilateral is a parallelogram if and only if its opposite sides are equal .

62. Find the truth value of each of the following compound statements :

$6 > 7$ if and only if $4 < 7$

63. Find the truth value of each of the following compound statements :

$15 > 17$ if and only if $11 < 10$

64. Find the truth value of each of the following compound statements :

$17 < 14 + 5$ if and only if $12 > 17.$

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65. Find the component statements of the following two compound statements and in each case show that there is no relation between the component statements.

A prime number is odd and the earth is round .

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66. Find the component statements of the following two compound statements of the following two compound statements and in each case show that there is no relation between the component statements.

the number 6 is less than 4 and the sun is a star .

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67. In each of the following compound statements state with reasons whether an "inclusive or" or an "exclusive or" is used :

the gaovernment office is closed if it is holiday or Sunday .

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68. In each of the following compound statements state with reasons whether an "inclusive or" or an "exclusive or" is used :

Two coplanar straight lines intersect at a point or they are parallel .

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69. In each of the following compound statements state with reasons whether an "inclusive or" or an "exclusive or" is used :

72 is a multiple of 4 or 9 .

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70. In each of the following compound statements state with reasons whether an "inclusive or" or an "exclusive or" is used : Students can take Mathematics or Biology as their additional subject .

71. In each of the following compound statements state with reasons whether an "inclusive or" or an "exclusive or" is used : to visit a county , a man needs a passport or voteridentity card .

72. In each of the following compound statements state with reasons whether an "inclusive or" or an "exclusive or" is used :

$9 > 11$ or, $7 < 10$.

73. Rewrite the follwing statement with the connective phrase "if ...., then ....." in five different ways conveying the same meaning :

If a number is a multiple of 9 , then it is a multiple of 3 .

74. Let A = { 2 , 3 , 4 ,5, 6 , 7 } , be a given set , find the truth value of each of the following statements :

$\exists x \in A, \quad \text{such that} \quad x + 4 \geq 11.$

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75. Let A = { 2 , 3 , 4 ,5, 6 , 7 } , be a given set , find the truth value of each of the following statements :

$\exists x \in A, \quad \text{such that} \quad x - 2 = 6.$

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76. Let A = { 2 , 3 , 4 ,5, 6 , 7 } , be a given set , find the truth value of each of the following statements :

$\forall x \in A,$ such that $x - 1 \leq 6.$

77. Let A = { 2 , 3 , 4 ,5, 6 , 7 } , be a given set , find the truth

value of each of the following statements :

$\forall x \in A,$ such that $x + 2 > 5.$

78. Write the negation of each of the follwing quantified

statements :

{ $\exists x \in \mathbb{R}$ such that x is irrational } , here $\mathbb{R}$ is the set of real

numbers.

79. Write the negation of each of the follwing quantified statements :

{If $\mathbb{Z}$ is the set of all integers , then $\exists x \in \mathbb{Z}$ such that x is a natural number }

80. Write the negation of each of the follwing quantified statements :

$\left\{ \forall x \in \mathbb{N}, x^2 + 41x + 41 \text{ is a prime number} \right\}$

81. Write the negation of each of the follwing quantified statements :

$\{\forall x \in \mathbb{N}, \text{such that } x + 2 > 4\}$

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82. Write the negation of each of the follwing quantified statements :

$\{\exists x \in \mathbb{N} \text{ such that } , 4x = 24\}$

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83. If p and q are two given statements the prove that ,

$\sim(p \wedge q) \equiv (\sim p) \vee (\sim q)$

84. If p and q and q are two statements , prove that

(i) $\sim(p \lor q) \equiv (\sim p) \land$ (q) " " (ii) $\sim($ p $^{\wedge\wedge}$ q) -= $\sim(\sim$q) `

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85. If p and q are two given statements the prove that ,

$\sim(p \Rightarrow q) \equiv (p) \land (\sim q)$

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86. If p and q are two given statements the prove that ,

$\sim(p \Leftrightarrow q) \equiv (p \land \sim q) \lor (q \land \sim p)$

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87. Write down the negation of each of the following compound statements :

$5 + 4 = 9$ and $4 + 6 \leq 11$.

88. Write down the negation of each of the following compound statements :

The sun rises in the east and sets in the west .

89. Write down the negation of each of the following compound statements :

$3 + 8 < 9$ or , $4 + 10 > 13.$

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90. Write down the negation of each of the following compound statements :

The sun shines or it rains .

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91. Write down the negation of each of the following compound statements :

If triangle ABC is right angled at A , then $AB^2 + AC^2 = BC^2$.

92. Write down the negation of each of the following compound statements :

If $12 > 13$, then $16 < 15$.

93. Write down the negation of each of the following compound statements :

A triangle is equilateral if and only if it is equiangular .

94. Write down the negation of each of the following compound statements :

$|x| \leq 5$ if and only if $x \geq -5$ or , $x \leq 5$.

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1. What do you mean by contrapositive and converse of a conditional statement ?

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2. Write down the contrapositive of the following " if ...., then ......" implications :

If $x + 1 = 7,$ then $x = 6$

3. Write down the contrapositive of the following " if ...., then ......" implications :

If a numbers is divisible by 8 , then it is divisible by 4 .

4. Write down the contrapositive of the following " if ...., then ......" implications :

If a is prime number , then a is odd .

5. Write down the contrapositive of the following " if ...., then ......" implications :

If N is an even number , then N is divisible by 4 .

6. Write down the contrapositive of the following " if ...., then ......" implications :

If the diagonals of a quadrilateral bisect each other , then the quadrilateral is a parallelgram.

7. Write down the contrapositive of the following " if ...., then ......" implications :

If n is a positive number , then n is not less than zero .

8. Write down the contrapositive of the following " if ...., then ......" implications :

If x is an integer and x^2 is even then x is even .

9. Write down the contrapositive of the following " if ...., then ......" implications :

If a positive integer N is divisible by 9 , then the sum of the digits in N is divisible by 9 .

10. Write down the contrapositive of the following " if ...., then ......" implications :

If triangle ABC is isosceles , then the base angles B and C are equal .

11. Write down the contrapositive of the following " if ...., then ......" implications : It never rains when it is cold.

12. Write the converse of each of the following conditional statements :

If $x + 5 = 9, \quad \text{then} \quad x = 4$

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13. Write the converse of each of the following conditional statements :

If a number is divisible by 9 , then it is divisible by 3 .

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14. Write the converse of each of the following conditional statements :

statements :

If a number N is odd then N^2 is odd .

15. Write the converse of each of the following conditional statements :

If a traiangle ABC is right - angled at C , then $AC^2 + BC^2 = AB^2$.

16. Write the converse of each of the following conditional statements :

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

17. Write the converse of each of the following conditional statements :

If you feel thirsty , then temperature is high .

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18. Write the converse of each of the following conditional statements :

If you are born in India , then you are a citizen of India

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19. Write the converse of each of the following conditional statements :

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

20. Write the converse of each of the following conditional statements :

If two coplanar striagh lines are parallel , then they do not intersect .

21. Write the converse of each of the following conditional statements :

If it rains , then there is traffic jam .

22. The contrapositives of few conditional statements are given below , find the conditional statements :

If $x \neq 5, \quad \text{then} \quad x + 4 \neq 9.$

23. The contrapositives of few conditional statements are given below , find the conditional statements :

If I go to school , then it does not rain .

24. The contrapositives of few conditional statements are given below , find the conditional statements :

If the sum of digits in a positive integer n is not divisible by 3 , then the integer n is not divisible by 3 .

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25. The contrapositives of few conditional statements are given below , find the conditional statements :

If you do not have winter clothes , then you do not live in simla .

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26. The contrapositives of few conditional statements are given below , find the conditional statements :

If a positive integer has some divisors other than 1 and itself , then it is not prime .

27. Find " If - then implications " of the following converse statements :

If it is a sunny day , then I go to a beach .

28. Find " If - then implications " of the following converse statements : If x = 5 , then x + 3 = 8

29. Find " If - then implications " of the following converse statements : if I stay at home , then it rains .

30. Find " If - then implications " of the following converse statements : Rahul will earn money if he works hard .

31. Find " If - then implications " of the following converse statements : If the diagonals of a quadrilateral bisect each other , then it is a parallelogram .

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32. Two pairs of statements p and q are given below . Combine theses two statements using the biconditional phrase "if and only if " .

p : If a quadrilateral is equiangular then it is a rectangle .

q : If a quadrilateral is a rectangle then it is a equiangular .

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33. Two pairs of statements p and q are given below . Combine theses two statements using the biconditional phrase "if and only if " .

P : If a reatangle is a square then all its four sides are equal .

q : If all the four sides of rectangle are equal , then it is a square .

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34. Two pairs of statements p and q are given below . Combine theses two statements using the biconditional phrase "if and only if " .

p : If the sum of digits in a positive integer n is divisible by 9 , then the number is divisibel by 9

q : If a positive integer n is divisible by 9 , then the sum of the digits in n is divisible by 9 .

35. Two pairs of statements p and q are given below . Combine theses two statements using the biconditional phrase "if and only if " .

p :If ABC is an isosceles triangle , then the base angles are equal .

q : If two base angles of the traingle ABC are equal , then the traingle ABC is isosceles .

36. Two pairs of statements p and q are given below . Combine theses two statements using the biconditional phrase "if and only if " .

p : If a tumbler is half empty , then it is half full .

q : If a tumbler is half full , then it is half empty.

37. Two pairs of statements p and q are given below . Combine theses two statements using the biconditional phrase "if and only if " .

p : If your mind is free , then you watch T .V .

q : If you watch T . V then your mind is free .

38. Two pairs of statements p and q are given below . Combine theses two statements using the biconditional phrase "if and only if " .

p : If sets A and B are equal , then $(A \subseteq B \text{ and } B \subseteq A)$

q : If $(A \subseteq B \text{ and } B \subseteq A)$, then A and B are equal sets .

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39. Rewrite each of the following compound statements with " if ...., then ......" implications :
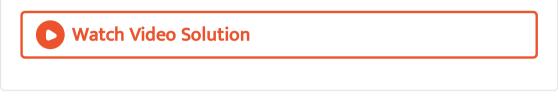
To get grade A in the class , it is necesssary for you to work out all exercises of the book .

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40. Rewrite each of the following compound statements with "
if ...., then ......" implications :

A rectangle is a square if its four sides are equal .

41. Rewrite each of the following compound statements with "
if ...., then ......" implications :

You get a job implies that your credentials are good .

42. Rewrite each of the following compound statements with "
if ...., then ......" implications :

The game is cancelled only if it is raining .

43. Rewrite each of the following compound statements with " if ...., then ......" implications :

The humidity increases whenver it rains .

44. Rewrite each of the following compound statements with " if ...., then ......" implications :

The product of two positive integers x and y is a ratinal number .

45. Rewrite each of the following compound statements with " if ...., then ......" implications :

x is a positive prime number x is odd .

46. Rewrite each of the following compound statements with " if ...., then ......" implications :

n^2 is an even number when the number n is even .

47. Write the component statements of each of the follwing compound statements and state whether the statements are

true or false :

If a triangle ABC is isosceles , then it is equilateral .

48. Write the component statements of each of the follwing compound statements and state whether the statements are true or false :

If you are born in India , then you are citizen of India .

49. Write the component statements of each of the follwing compound statements and state whether the statements are true or false :

x = 3 and x = 4 are the roots of the equation $2x^2 - 5x - 3 = 0$

.

50. Write the component statements of each of the follwing compound statements and state whether the statements are true or false :

If a number is a multiple of 9 , then it is multiple of 3 .

51. Write the component statements of each of the follwing compound statements and state whether the statements are true or false :

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

52. Write the component statements of each of the follwing compound statements and state whether the statements are true or false :

Square of an integer is positive or negative .

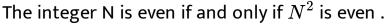**53.** Write the negation of the following statements and check whether the resulting statements are true or false :

Kolkata is the capital of India .

54. Write the negation of the following statements and check whether the resulting statements are true or false :

The sum of 4 and 7 is 13 .

55. Write the negation of the following statements and check whether the resulting statements are true or false :

Every natural number is greater then zero .

56. Write the negation of the following statements and check whether the resulting statements are true or false :

There does not exist a rectangle which has all its sides equal .

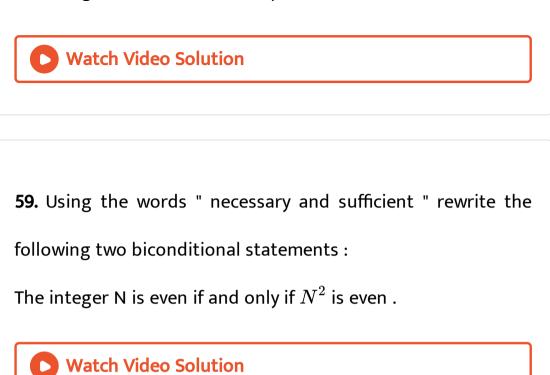**57.** Write the negation of the following statements and check whether the resulting statements are true or false :

All triangles are not isosceles .

58. Using the words " necessary and sufficient " rewrite the following two biconditional statements :

The integer N is even if and only if N^2 is even .

59. Using the words " necessary and sufficient " rewrite the following two biconditional statements :

The integer N is even if and only if N^2 is even .

Exercise Long Answer Type Questions

1. Check the validity of the following compound statements :

264 is a multiple of 11 and 12 .

2. Check the validity of the following compound statements :

195 is a multiple of 13 and 14 .

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3. Examine the validity of the following compound statements
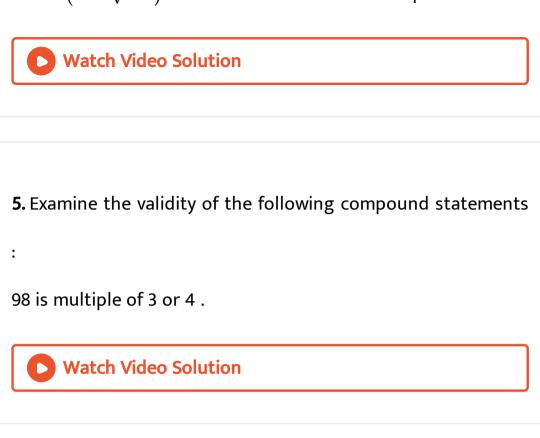
:

180 is a multiple of 4 or 5 .

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4. Examine the validity of the following compound statements

:

$2 - 3i\left(i = \sqrt{-1}\right)$ is a real number or it is a complex number .

5. Examine the validity of the following compound statements

:

98 is multiple of 3 or 4 .

6. Check whether the follwing compound statements is true or

false .

If a and b are odd integers , then (a +b) is an even integer .

7. Check whether the following statement are true or not: p: If x, y are integers such that xy is even then at least one of $x \ and \ y$ is an even integer.
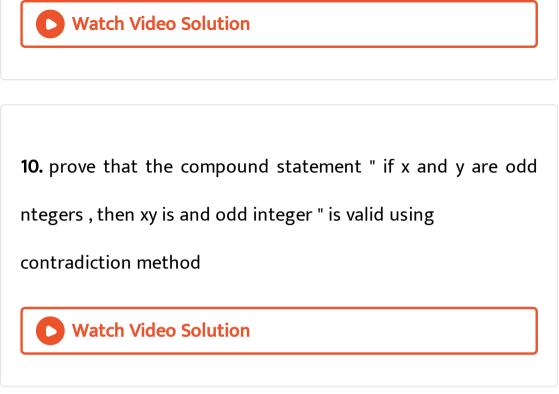
8. prove that the compound statement " if x and y are odd integers , then xy is and odd integer " is valid using direct method

9. prove that the compound statement " if x and y are odd integers , then xy is and odd integer " is valid using contrapositive method

10. prove that the compound statement " if x and y are odd ntegers , then xy is and odd integer " is valid using contradiction method

11. Using contrapositive method show that the following compound statement is true .

If x is an integer and x^2 is even , then x is also even .

12. Check the validity of the following compound statement using

(i) direct method

contrapositive method and

(iii) contradiction method

If x is a real number such that $4x^3 + 3x = 0, \quad \text{then} x = 0$

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13. Prove that the following biconditional compound statement is true :

The integer x is even if and only if x^2 is even .

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14. Check the validity of the following biconditional statement :

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15. Check the validity of the following biconditional statement :

> ▶ **View Text Solution**

16. Prove that $\sqrt{5}$ is irrational (use the method of contradiction)

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17. Use contradiction method to show the validity of the following statement :

If x is real number with $x > 5,$ then $x^2 > 25$.

18. Check the validity of the follwing statement using contradiction method .

"The sum of a real number and a complex number is a complex number" .

19. By giving a counter example show that the following statement is false :

The equation $9x^2 - 16 = 0$ does not have a root lying between (-1) and (-2) .

20. Prove that the statement "If all the the angles of a triangle are equal , then the triangle is a right angled triangle " is false .

21. By giving a counter example show that the following compound statement is not true .

"If x and y are two real numbers , then $x^2 = y^2$ implies x = y " .

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1. Consider the following statements -

p : Mumbai is the capital of Rajasthan or Maharashtra

q : $\sqrt{3}$ is a rational or an irrational number

r : 125 is a multiple of 7 or 8

s : A rectangle is a quadrilateral or a regular hexagon which compound statements are true -

A. p

B. q

C. r

D. s

Answer: A::B::D

2. Consider the following statements -

p : 4 is an even prime number

q : 6 is a faactor of 12

r : H . C .F of 4 and 6 is 12 which compoumd statemnets are

false -

A. $(p \wedge q)$

B. $(p \vee q) \wedge \sim r$

C. $\sim(p \wedge q) \vee p$

D. $\sim p \vee (q \wedge r)$

Answer: A::B::C

3. "If I become a teacher , then I will open a school" . Which of the following statement are not a negation of a quantified statements -
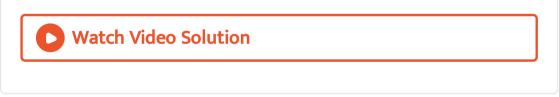
p : I will not becomes a teacher or I will open a school

q : Either I will not become a teacher or I will not open a scholl

r : I will become a teacher and I will not open a school

s : Neither I will become a teacher nor I will open a scholl

A. p

B. q

C. r

D. s

Answer: A::B::D

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4. Which of the following statements are false ?

(i) `3+2=5 (ii) Eat two tablets (iii) what do you understand ? -

A. only (i)

B. only (ii)

C. (ii)

D. (ii) and (iii)

Answer: C::D

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5. Consider the following statements -

p : It is snowing now

q : I am feeling cold

compound statement whose component statements are p and

q is " It is snowing now and it is not that I am feeling cold " .

Which of the following does not represent compound

statements .

A. $p \wedge (\sim q)$

B. $p \wedge q$

C. $(\sim p) \vee (\sim q)$

D. $(\sim p) \wedge (\sim q)$

Answer: B::C::D

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Sample Questions For Competitive Exams Comprehension Type

1. Let 'an integer is prime when it has only two factors 1 and the number itseft .

If an integer has on ohter factors excepting excepting 1 and the number itself,then it is prime ,.this statement will be -

A. converse

B. contrapositive

C. if ... then ....type

D. none of these

Answer: C

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2. Let 'an integer is prime when it has only two factors 1 and the number itseft .'

' If an integer has not other factors excepting 1 and the number itself then it is prime,.this statement will be -

A. converse

B. contrapositive

C. if ... then ....type

D. if and only if type

Answer: A

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3. Consider two statements -

p : Ramesh is tall

q : Ramesh looks good

(i) "Being tall is sufficient to look good ' , the equivalent statement of above statement is -

A. $p \Rightarrow q$

B. $q \Rightarrow p$

C. $p \Leftrightarrow q$

D. $p \wedge q$

Answer: B

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4. Consider two statements -

p : Ramesh is tall

q : Ramesh looks good

" Ramesh is tall looks good ', equivalent statement of this statement is -

A. $(p \vee \sim) \vee q$

B. $p \land q$

C. $p \lor (p \land \sim q)$

D. $\sim(\sim p \land q)$

Answer: B

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1. Statement - I : " Ram is rich or happy " is a statement

statement - II : These two statements are disjunction

A. Statement - I is true , Statement -II is true and Statement

-II is a correct explantion for statement -I .

B. Statement - I is true , Statement -II is true but Statement

-II is not a correct explantion of statement -I .

C. Statement - I is true , Statement -II is false .

D. Statement - I is false , Statement -II is true .

Answer: B

2. Consider the statements p , q and r

Statement - I : Negation of statement

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

Statement - II : Negation of

$p \vee q$ is $(\sim p) \wedge (\sim q)$, and negation of $p \wedge q$ is $(\sim p) \vee (\sim q)$

A. Statement - I is true , Statement -II is true and Statement

   -II is a correct explantion for statement -I .

B. Statement - I is true , Statement -II is true but Statement

   -II is not a correct explantion of statement -I .

C. Statement - I is true , Statement -II is false .

D. Statement - I is false , Statement -II is true .

Answer:

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Wbhs Archive 2014

1. Prove the following by contradiction :

"The sum of a rational and irrational number is an irrational number ."

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2. Show that the following statement is true by the method of contrapositive :

"If x is an integer and x^2 is even , then x is also even."

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Wbhs Archive 2015

1. Let a statement $p: \Delta ABC$ is a right angled triangle and another statement q : In a $\Delta ABC, AB^2 + BC^2 = AC^2$.

Check whether the following statements are true or false .

p implies q

2. Let a statement $p: \Delta ABC$ is a right angled triangle and another statement q : In a $\Delta ABC, AB^2 + BC^2 = AC^2$.

Check whether the following statements are true or false .

q implies p

3. Let a statement $p: \Delta ABC$ is a right angled triangle and another statement q : In a ΔABC, $AB^2 + BC^2 = AC^2$.

Check whether the following statements are true or false .

p is true if and only id q is true

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4. Let a statement $p: \Delta ABC$ is a right angled triangle and another statement q : In a ΔABC, $AB^2 + BC^2 = AC^2$.

Check whether the following statements are true or false .

$\sim p$ implies $\sim q (\sim p$ denotes the negation of the statement p)

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5. prove by contradiction that $\sqrt{5}$ is not rational number .

> ▶ **Watch Video Solution**

1. Check the validity of the following statement by using method of contradiction :

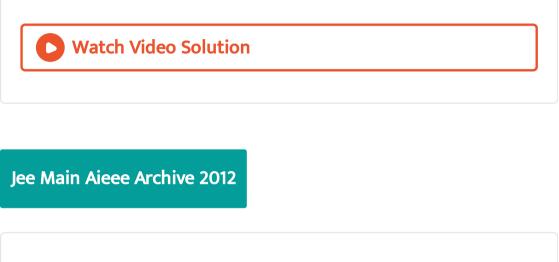The sum of real number and a complex number is a complex number " .

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2. Check the validity of the following compound propositions :

x) "72 is a multiple of bothe 4 and 9 " .

y) "120 is a multiple of both 15 and 9 ".

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Jee Main Aieee Archive 2012

1. the negation of the statements

"If I become a teacher , then I will open a school " , is -

    A. neither I will become a teacher nor I will open a school .

    B. I will not become a teacher or I will open a school .

    C. I will become a teacher and I will not open a school .

D. either I will not become a teacher or I will not open a

school .

Answer: C

Jee Main Aieee Archive 2013

1. consider :

Statement - I : $(p \wedge \sim q) \wedge (\sim p \wedge q)$ is a fallacy .

Statement -II : $(p \to q) \leftrightarrow (\sim q \to \sim p)$ is a tautology .

A. Statement -I is true , Statement -II is true , Statement -II

is a correct explantion for Statement - I .

B. Statement - I is true , Statement - II is true , Statement -II

is not a correct explanation for Statement -I .

C. Statement - I is true , Statement -II is false .

D. Statement - I is false , Statement -II is true .

Answer: B

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1. The statement $\sim(p \leftrightarrow \sim q)$ is -

A. equivalent to $p \leftrightarrow q$

B. equivalent to $\sim p \leftrightarrow rq$

C. a tautology

D. a fallacy

Answer: A

Jee Main Aieee Archive 2015

1. The negation of $\sim s \vee (\sim r \wedge s)$

A. $s \vee (r \vee \sim s)$

B. $s \wedge r$

C. $s \wedge \sim r$

D. $s \wedge (r \wedge \sim s)$

Answer: B

Jee Main Aieee Archive 2016

1. The boolean expression $(p \wedge \sim q) \vee q \vee (\sim p \wedge q)$ is equivalent to