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India's Number 1 Education App

## MATHS

## JEE (MAIN AND ADVANCED

## MATHEMATICS) FOR BOARD AND

## COMPETITIVE EXAMS

## MATHEMATICAL REASONING

Example

1. Check which of the following sentences are statements

The Mars is a planet

Eight plus twelve is fifteen

Noida is captial of U.P

Hockey is the national gane of India

Australia is the most beautiful country of the
world

Football is more intresting than Cricket
2. Check whether the following sentences are statements. Give reasons for answer
(i) P : The product of 8 and 2 ia 16
(ii) P : There are 37 days in a month
(iii) P : Shut up!
(iv) P: She was Hockey player
(v) $P$ : Haridwar is far from here
(vi) P: Day after tomorrow is Monday

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3. Write the negative of the following statements

Guraon is a city

The number 17 is greater than 9
$\sqrt{5}$ is a complex number
2.5 is a natural number

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4. Write the negative of the following statements and chheck whether the resulting
statements are true or false
(i) The product of 4 and 8 is 12
(ii) Number of prime numbers are infinite
(iii) China is a continent
(iv) There does not exits a triangle has all its
sides equal
(v) All the angles of a regular polygon are equal

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5. Find the component statements of the following comound statements , check whether they are true not, and also write connective word
(i) Rectangle is a parellelogram and its diagonals are equal
(ii) 39 is odd and prime number
(iii) 18 is a multiple of 2,3,6 and 9
(iv) It is raining or grass is black
(v) -5 is a negative interger or an irrational number
6. Write the component statements of the following compound statements and check whether the compound statement is true or false
(i) Venus is the smallest and Jupiter is the largest planet of solar system.
(ii) India is a country and Asia is a continent.
(iii) Commutative law holds for addition and subtraction of rational number.
(iv) Additive inverse exists for natural number
and rational number
(v) 32 is a multiple of 2,3 and 4 .

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7. A person who has been taken Maths or Computer can apply for M.Sc computer science

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8. For each of the following statments, determine whether an inclusive "OR" or
exclusive 'OR, is used. Give reasons for your answer.
(i) Students can take Biology or Physical Education as thier, third language.
(ii) The office is closed if it is a holiday or a Sunday.
(iii) MBA or Graduate having experience of three year, can apply for Area Manager Post

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9. Check whether the following statements are
true and false
(i) 101 is a prime number or a composite number
(ii) A hexagon is 6 sided polygon or rectangle
(iii) $\sqrt{157}$ is a rational number or an interger
(iv) Two lines intersect at a point or are parellel

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10. Identify the quantifier in the following statement and write the negation of the statements
(i) p : For every real number $\mathrm{x}, 5 \mathrm{x}$ is greater than 5
(ii) q : There exists a prime number which is

## even

(iii) $r$ : For every positive interger $x, x+2$, is a positive interger
(iv) s : For every planet there is a moon
(v) t : There exists a rhombus whose all angle is $90^{\circ}$
11. Rewrite the given statement with "if then" in five different ways conveying the same meaning: If p is prime number then $\sqrt{p}$ is an irrational number

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12. Write each of the following statements in the form "if then "
(i) Two arcs of a circle are equal in length if they subtend equal angle at the centre
(ii) You can view viruses if you have a microscope
(iii) To get product of two intergers negative it is necessary that both intergers are of different sign

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13. For the given statement identify the necessary and sufficent conditions
$r$ : If $x$ is real number such that
$x>0$ then $x+\frac{1}{x} \geq 2$

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14. Write the contrapositive of the following statement
(i) If a quandrilateral is rectangle then it is a parallelogram
(ii) If a number is even, then it is divisble by 2
(iii) If end digit of a number is 0 , then it is divisble by 10

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15. Write the converse of the following statement
(i) If a number n is odd, then $n^{2}$ is odd

If a number is divisble by 6 , then it is divisble by both 2 and 3
(iii) If $\sqrt[3]{a}$ is an irrational number then a is not a perfect cube
16. Given below are two pairs of statement .

Combine these two statement using " if and only if "
(i) p : If a rhombus is a square, then all its
angles are $90^{\circ}$
$\mathrm{q}:$ If all the angles of a rhombus are $90^{\circ}$, then
it is sqaure
(ii) p : If the sum of digit of a number is divisble by 9 , then the number is divisble by 9
q : If a number is divisble by 9 , then the sum of its digit is divisble by 9

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17. Check validity of following statement
(i) $r$ : Sky is blue and water is colourless
(ii) $\mathrm{s}: 102$ is multiple of 2 and 51
(iii) $\mathrm{t}: 2$ is even and compositive mnumber

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18. Given below are two statements
$p$ : Cube of an even number is even
$q$ : Cube of an odd number is odd

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

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19. $\mathrm{p}: 87$ is a multiple of 3
$\mathrm{q}: 87$ is a multiple of 29

Write the compound statement by using connective "OR" from above statement and check its validity
20. Check the validity of the following statement
(a) $r$ : if $x$ is a real number such that $x^{3}+9 x=0$ then x is 0.
(b) $\mathrm{r}:$ If x is an integer and $x^{3}$ is even, then x is also even
(c) $r$ : If a polygon is regular then it is equiangular and equilateral.

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21. P: Two circles are congruent if and only if
their radii are equal. Check the validity of statement P

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22. Using the word " necessary and sufficient"
rewrite the statement $" \sqrt{n}$ is a rational number if and only if is a pefect square "
23. Verify by the method of contradiction
$p: \sqrt{11}$ is irrational

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24. Verify by the method of contradiction $p$ : If
a, $b \in Z$, then $a^{2}-4 b \neq 2$

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25. By giving a counter example, show that the following statements are false
(i) If $\sqrt{p}$ is an irrational number then p is prime number
(ii) Square of every rational number is greater than the number itself
(iii) If all the angles of a quadrilateral is equal then it is regular

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1. Which of the following sentences are statement ?
(i) Cow is the only animal which gives milk
(ii) Chennai is the capital of Tamilnadu
(iii) Taste of mango is better than orange
(iv) The product of two intergers p and q is greater than zero

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2. Check whether the following sentences are statement or not also provide reason for your answer
(i) There are 9 days in a week
(ii) Infinite number of rational number can be inserted between two rational number
(iii) How far is Sikandrabad from here
(iv) Run fast
(v) She is a post graduate scholar

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3. Write the negation of the following statements
(i) $\sqrt{13}$ is rational number
(ii) Both the diagonals of a rhombus are equal
(iii) All the sides of a regular polygon are equal

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4. Write the negation of the following
statements and check whether the resulting statements are true or false
(i) p : Diagonals of a square are equal
(ii) q : Irrational number are natural numbers
(iii) $r$ : There are infinite even prime number

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5. Find the component statement of the following compound statement , Check whether they true or false and write connecting word
(i) The sun is hot and the moon is cold
(ii) Mahatma Gandhi was born in Gujarat and he is the citizen of London
(iii) $\sqrt{8}$ is an irrational number or $3 \sqrt{8}$ is a rational number

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6. Write the component statement of the following statement and check whether the compound statement is true or false
(i) $r$ : All real numbers are complex and all complex numbers are real
(ii) $s$ : All square are rectangle and all rectangle are not square
(iii) $\mathrm{t}: 2$ is a root of equation $(x-2)^{2}=0$ and 3 is a root of equation $x^{2}-3 x=0$
(iv) Sphere is 3-D solid and square is 2demensional figure

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7. For each of the following statement, determine whether an inclusive "OR" or exclusive "OR" is used. Give reasons for you answer
(i) $r$ : An integer (except zero) $x$ is positive or
negative
(ii) s : To apply for a passport ,You should have a voter I-card or ration card
(iii) t : A bucket of popcorn or two samosa is available with a movie ticket

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8. Identify the type of OR used in following statement and check whether the statement are true or false
(i) p : A number is real or imaginary
(ii) q : To open bank account a person needs
voter I-card or ration card
(iii) $r$ : An integer is even or odd
(iv) s: A function is symmetric about x-axis or $y$-axis

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9. Identify the quantifier in the following statement and write the negation of the statement
(i) p : For every negative number $\mathrm{x}, \mathrm{x}-2$ is

## smaller than x

(ii) $q$ : There exists a rational number whose sqaure is smaller than the number
(iii) $r$ : For every real number, there is a position on number line

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10. Rewrite the following statement with "if then" in five different ways
(1) $r$ : If a point lies $y$-axis then its $x$-coordinate is zero

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11. Write contrapositive of the following statement
(i) If an Indian is working in America then he has a working visa
(ii) If a number is divisible by 10 then it is divisiblw by 5
(iii) If a number $p$ is prime number, then $\sqrt{5}$ is irrational number
12. Write the converse of the following
statement
(a) If H. C. F. of $(\mathrm{a}, \mathrm{b})$ in 1 , then $a \div b$ is not an integer (wher , $b \neq 1$ )
(b) If a parallelogram is square then its angle are $90^{\circ}$

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13. Given below are two pairs of statement, combine these two statement using "if and only if"
(i) p : If a polygon is convex then all its diagonal lies inside the polygon
q : If all the diagonals of a polygon lie inside if then it is convex
(ii) p : If a physical quantity has magnitude only then it is scalar
q : If a physical quantity is scalar, then it has magnitude only

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14. Check the validity of given statement
(a) $r$ : 31 is odd and prime number
(ii) From compound statement with given statement by using connective "and" and check its "validity"
p : Bhopal is in U.P
q : Bhopal is the captial of M.P

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15. Check the validity of the following statement
$p: 77$ is a multiple of 11 or 7

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16. (i) Check the validity of given statement
$r$ : A triangle is isosceles if and only if its two
angles are equal
(ii) Using the word " necessary and sufficient " rewrite the statement : A sequence is in G. P if
and only if each term differs from the succeeding one by a non-zero constant ratio

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17. (i) Verify by method of contradicition
$p$ : There are infinitely many numbers
(ii) Verify by method of contradicition
p : If p and q are rational number $q \neq 0$ and $r$ is an irrational number, then $\mathrm{p}+\mathrm{qr}$ is irrational
18. By giving counter example show that following statement are false
(a) p : Square of a real number is always integer
(b) p : The equation $x^{2}-9=0$ does not have a root lying between 0 and 4

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Assignment Section A Objective Type Questions Only One Answer

1. Which of the following sentences are statements
p: Hockey is the national sport of India
$q$ : Do your homework
$r$ : There are 400 days in a year
A. p only
B. q only
C. P and r only
D. All $p, q$ and $r$

Answer: C
2. Which of the following option is statement
A. He-is post graduate in Commerce
B. Day before yesterday was Sunday
C. Delhi is far from here
D. The product of a positive and a negative
number is negative

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3. $\mathrm{P}: \sqrt{15}$ is a rational number is statement
A. $p$ is true
B. $p$ is false
C. $p$ is both true and false
D. p is ambiguous

Answer: B
4. Which of the following is not a statement
A. Brush your teeth
B. 11 is a prime number
C. $\sqrt{p}$ is an irrational number, if p is prime
D. 15 is composite number

Answer: A
5. Negation of statement "New york is in America and Mumbai is in India" is
A. Newyork is in India and Mumbai is in

America
B. Newyork is not in America anq Mumbai
is .in . India
C. Newyork is not in America and Mumbai
is not in India

# D. Newyork is in America and Mumbai is 

 not in India
## Answer: C

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6. Negation of the statement "There does not exist a parallelogram whose diagonals are of equal length" is
A. It is not the case that there does not exist a parallelogrcJm whose diagonals
are of equal length
B. It is false that there does not exist a
parallelogram whose diagonals are -of
equal length
C. There exists a parallelogram whose
diagonals are of equal length
D. All of these
7. Negation of statement "Everyone in China knows Martial Art": can be interpreted as
A. No person in China knows Martial Art
B. At most one person in China does not
know Martial Art
C. At least one person in China does not know Martial Art
D. None of these

Answer: A

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8. Which of the following is true?
(i) If p is a statement then $\sim \mathrm{p}$ is not a
statement
(ii) If p is a statement then $\sim \mathrm{p}$ is also a statement
(iii) Negation of p : 0 is a positive number is, 0 is a negative number
A. Only (ii)
B. Only (i)
C. (i) \& (iii)
D. (ii) \& (iii)

Answer: A

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9. Which of the following option can be used as basic connectives
A. "far" , "near"
B. "And", "Or"
C. It is false
D. Is

Answer: B

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10. The compound statement with. "And" is
A. All its component statements are true
B. All its component statements are false
C. At least one component statement is
true
D. None of these

Answer: A

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11. The compound statement with "And" is false
A. All its component statements are false
B. Any one of its component are false
C. All its component statements is false
D. Both (1) \& (2)

## Answer: D

(D) Watch Video Solution
12. In which of the following statements • 'And"
is not used as basic connective
$P: 63$ is a multiple of $3,7,9$ and 21
q : Product of 8 and 4 is even number
$r$ : H.C.F. of 2 and 3 is one
3
$\mathrm{s}: \sqrt{8}$ is a rational number and 8 is a perfect
cube
A. $q$ and $r$
B. pand s
C. p, r, s
D. $p, q, r$

Answer: A

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13. In which of the following statement "And" is not used as basic connective •
p: L.C .M. of 5 and 3 is 15
$q: 108$ is a multiple of $2,3,6$ and 36
$r$ : Water is a compound of hydrogen and oxygen
$s$ : Product of an even number and odd number is always odd
A. p only
B. q, r only
C. $p, r$ and $s$
D. $p$ and $s$

## Answer: C

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14. Which of the following compound statements is/are true?
$\mathrm{p}: \sqrt{7}$ is an irrational number and $\sqrt{12}$ is a
rational number
q : Cow gives us milk and ox is used for ploughing $r: 105$ is multiple of $3,5,7$ and 35.
A. p only
B. $q$ and $r$
C. $p$ and $r$
D. All of these

Answer: B
15. Which of the following compound statements are false?
$p: 17$ is odd and prime number
$\mathrm{q}: 23$ is even and prime number
$r$ : Volume of cube is $a^{3}$ and total surface area
is $4 a^{2}$ where a is the length of side of a cube
A. $p$ and $q$
B. $q$ and $r$
C. pand r
D. None of these

Answer: B

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16. A compound statement with "OR" Is true when
A. At least one component statement is
true
B. All the component statements are true
C. All the component statements are false
D. Both (1) \& (2)

## Answer: D

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17. A compound statement with "OR" is false when
A. At least one component statement is
false
B. At most one component statement is

false

C. All the component statements are false
D. Only one component statement is true other are false

## Answer: C

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18. Which of the following compound statements is/are true?
$\mathrm{p}:$ All fraction numbers are rational or all rational numbers are fraction
$\mathrm{q}:$ Number of prime factors of 12 is 3 or number . of total factors is 6
$r$ : Square of an integer is always positive or
cube • of an integer may be negative or positive
A. p only -
B. q only

## C. $q$ and $r$

D. $p, q$ and $r$

## Answer: D

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19. $p: x=5$ or $x=1$ is the root of equation
$(x-5)^{2}=0$, statement p is true since
A. Both the component statements are false
B. Both the component statements are true
C. One of the component statements is
true
D. None of these

Answer: C

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20. Which of the following statements is/are false?
$p: 137$ is an integer or rational number
q : Birds has wings or colour of sky is blue
$r$ : One of every three consecutive integer is
divisible by 3 or product of every two consecutive integer is odd
A. p only
B. q only
C. p and q only

> D. p, q, r

## Answer: D

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21. Which of the following compound statement contains inclusive OR
$\mathrm{p}: \sqrt{35}$ is a rational or an irrational number
$\mathrm{q}: 12$ is an even or irrational number
$r$ : To apply for post paid mobile connection
you should have voter I- card or driving licence
A. p only
B. q only
C. ronly
D. All

## Answer: c

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22. Which of the following compound statement contains exclusive OR'
p : Student can take computer or physical
education as their fourth subject with PCM
q : Sun rises or moon rises
$r$ : An integer greater than 1 is prime or composite
A. p only
B. q only
C. ronly
D. All P,q and r

## Answer: D

23. p : For every integer $\mathrm{x}, x^{2}$ is positive integer, $(x \neq 0)$ statement $p$ can be interpreted as
A. There is at least one integer exists such
that its square is positive integer
B. There is at most one integer exists such
that its square is positive integer
C. In the set of integers square of all
integers are positive integer

## D. All of these

## Answer: C

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24. p -: There exists a natural number which is
prime. Statement p can be interpreted as
A. Every natural number is prime number
B. There is at least one natural number
C. There is at most one natural number

## which is prime

D. Every prime number is a natural
numbers

Answer: B

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25. "If $p$ then $q$ " (where $p$ and $q$ are statements) says
A. If $p$ ts true, then $q$ must be true
B. If $p$ is false, then $q$ must be false
C. Not happening of $p$ has no effect of
happening of $q$
D. Both (1) \& (3)

## Answer: D

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26. "If $p$ then $q$ " is same as (where $p$ and $q$ are
statement)
A. p only if $q$
B. $p$ is a sufficent condition for $q$
C. $\sim q$ implies $\sim p$

D. All of these

## Answer: c

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27. $p$ : If end digit of an integer is 5 then end digit of its square is also 5. Statement p is same as the
A. If end digit of square of an integer is not

5 , then. end of digit of integer is not 5
B. If end digit of a number is not 5 , then we
cannot say anything about the end digit
of that integer
C. The end digit of an integer is 5 only if square of' its end digit is 5.

## D. All of these•

## Answer: D

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28. If a number is multiple of 5 then its end
digit wiil be 5 or 0.

Contrarositive of above statement is
A. If a number is not multiple of 5 , then it $\$$
end digit will not be 5 or 0 .
B. If end digit of a number is not 5 or 0
then it will not be multiple of 5 .
C. If a number is not multiple of 5 , then its
end digit will be 5 or 0
D. If end digit of of number is 5 or 0 , then
the number will be 5 .

Answer: B

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29. Contrapositive of "if $p$ then $q$ " is (where $p$ and q are statement)
A. If $\sim p$ then $\sim q$
B. If $\sim q$ then $\sim p$
C. If $\sim q$ then $p$
D. If $\sim p$ then $q$

Answer: B
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30. $p$ : If an octagon in regular than all its side
and angles are equal

Contrapositive of statement $p$ is .
A. If all sides and angles of an octagon are not equal then octagon is not regular
B. If all sides and angles of an octagon are
not equal then it is regular
C. If all sides and angles of an octagon are not equal then it is regular

# D. If all sides and angles of an octagon are 

 equa then it is not regular
## Answer: A

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31. $p$ : If a cylinder is right circular cylinder then its volume is $\frac{1}{3} \pi r^{2} h$

Contrapositive of statement $p$ is
A. If the volume of a cylinder is $\frac{1}{3} \pi r^{2} h$ then it is right circular cylinde B. If the volume of a cylinder is not $\frac{1}{3} \pi r^{2} h$ then 3 it is nor right circular cylinder
C. If a cylinder is not right circular cylinder
then its volume is not $\frac{1}{3} \pi r^{2} h$
D. Volume can't be $\frac{1}{3} \pi r^{2} h$

## Answer: B

## D Watch Video Solution

32. The converse of a given statement "if $p$, then $q$ " is (where $f$ and $q$ are statements)
A. If $q$, then $p$
B. If $\sim p$, then $q$
C. If $\sim q$, then $p$
D. If $\sim p$ then $\sim q$

Answer: A

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33. p : • If nth term of a sequence _is linear then sequence is in A.P.

Converse of statement $p$ is
A. If a sequence is not in A.P. then its nth
term is linear
B. If a sequence is in A.P. then it's nth term
is not linear
C. If a sequnce is in A.P. then its .11 th term is
linear
D. Both (1) \& (2)

## Answer: C

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34. $p$ : If a triangle is equilateral then its centroid, circumcenter and incentre lies at same point

Converse of statement $p$ is
A. If centroid, circumcentre and incentre of
a triangle lies at.same point then
triangle is equilateral
B. If a triangle is not equilateral then its
centroid, circumcenter and, incentre will
not lie at same point
C. If a triangle is equilaterial then its
centroid circumcenter and incentre will
not lie at same point
D. If centroid, circumcenter .and incentre of
a triangle does not lie at same point
then it is not equilateral-

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35. $r$ : If a finite set has $n$ elements then its total number of substets is $2^{n}$

Converse of statement $r$ is
A. If a finite set has $n$ elements then its number of subset is not equal to $2^{n}$
B. If a finite set has not n elements then its
number of subset is equal to $2^{n}$
C. If number of subset of a finite set in not $2^{n}$ than it is not finite

D. If number of substets of a finite set is $2^{n}$

then it has n elements

## Answer: D

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36. Equivalent form of " if and only if " for the given statements $p$ and $q$ is
A. $p$ if and only if $q$
B. $q$ if and only if $p$
C. $p$ is necessary and sufficent condition for $q$ and vice versa

D. All of these

## Answer: D

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37. Equal chords of a circle are equidistant from the centre.
A. If two polygons are congruent then they are equal in shape and size
B. If two polygons are equal in shape and
size then they' are not congruent
C. Both (1) \& (2)
D. Noen of these

Answer: C
38. $r$ : Two chords of a circle subtend equal angles at centre if and only if they are equal.

Statement $r$ can be interpreted as
A. If two polygons are congruent then they are equal in shape and size
B. If two polygons are equal in shape and
size then they are not congruent
C. If two polygons are equal in shape and size then they are congruent D. Both (1) \& (3)

## Answer: D

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39. To check the validity of a statement $p$ by contradiction method our initial assumption is
A. $\sim p$ is not true

## B. $\sim p$ is true

C. $p$ is true
D. $\sim p$ is false

Answer: B

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40. To check validity of statement we can use which of the following method
A. Using a counter example

## B. Contrapositive method

C. Mehtod of contradiction
D. Any one of these

## Answer: D

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41. $\mathrm{p}: \sqrt{39}$ is irrational

To check the validity of statement $p$, which of the following method we can use
A. Direct method
B. Contrapositive method
C. Contradiction method
D. By giving a counter example

## Answer: C

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42. For the given statement identify the necessary condition
$p$ : If a function is even then it will be
symmetric about y-axis
A. Function is even
B. Symmetric about y-axis.
C. Function is not even
D. Function does not exist

Answer: B

## D Watch Video Solution

43. For the given statements identify the sufficient condition
$p$ : If discriminarit of a quadratic equation is
not a perfect square then its roots are irrational
A. Roots are irrational
B. Discriminant is a perfect square
C. Discriminant is not a perfect square
D. Roots are rational

Answer: C
44. Negation of the given statement $p$ is
$P$ : There exists a rational number $y$ such that $y^{3} \neq 108$
A. There exists an irrational number y such
that $y^{3}=108$
B. There exists an irrational number y such
that $y^{3} \neq 108$
C. There does not exist a rational number

$$
\text { such } y^{3}=108
$$

D. There does not exist a rational number such $y^{3} \neq 108$

## Answer: D

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45. Converse of given statement $p$ is, where

P: If an event is sure event then its probability
A. If probability of occurrence of an event is
not 1 , then it is not same event
B. If probability of occurrence of a $n$ event
is 1 , then it is sure event
C. If is probability of occurrence of an event
is not 1 , then iCis sure event
D. If probability of occurrence of an event is

1 , then it is not sure

## Answer: B

46. Contrapositive of given statement $p$ is, where
p : If slope of a straight line is $45^{\circ}$, then it is equally inclined to both the axes
A. If a straight line is equally inclined to
both the axes then its siope is $45^{\circ}$
B. If a straight line is equally inclined to
both the axes then its slope is not $45^{\circ}$
C. If a straight line is not equally indinlted
to both the axes then its slope is not
$45^{\circ}$
D. If a straight line is is not equally inclined
to both the axes then its slope is $45^{\circ}$

## Answer: C

## D Watch Video Solution

47. $r$ : Two chords of a circle subtend equal angles at centre if and only if they are equal.

Statement r can be interpreted as
A. Two chords of a circle subtend equal
angle at the centre if they are equal
B. Two chords of a circle are equal if they
subtend equal angle at the centre
C. Both (1) \& (2)
D. None of these

## Answer: C

## D Watch Video Solution

48. Which type of OR is used in following pair of statements
(i) Afunction is onto or one - one
(ii) A function is even or odd
A. (i) Inclusive OR (ii) Inclusive OR .
B. (i) Exclusive -OR (ii) Exclusive OR
C. (i) Exciusive OR (ii) Exclusive OR

## D. (i) Inclusive OR (ii) Exclusive OR.

## Answer: D

## D Watch Video Solution

49. $p: x y=y x$, is true for every real number $x$ and $y$
q : There exists real number x and y for which $x y=y x$ is not true. above pair of statement are
A. Negation of each other
B. Not negation of each other
C. Converse of each other
D. Contrapostive of each other

Answer: A

## D Watch Video Solution

50. Which of type of is used in following statements
p : A physical quantity is scalar or vector
q : A number is multiple of 5 or 25
A. (i) Inclusive OR (ii) Exclusive OR
B. (i) Exclusive OR (ii) Inclusive OR
C. (i) Inclusive OR (ii) Inclusive OR
D. (i) Exclusive OR (ii) Exclusive OR

Answer: B

D Watch Video Solution

Assignment Section B Objective Type Questions
Only One Answer

1. Which of the following ia not a logical statement
A. There are finitely many real numbers
B. The product of rational number is
irrrational
C. Every square is a rectangle
D. She is a beautiful girl

Answer: D
2. Which of the following is true about the statement ? " A mixture of alcohol and water can be sepreted by chemical methods
A. It is compound statement
B. Connective is and
C. It is not compound statement
D. Connective is "or"

## Answer: C

3. Which of the following is a logical statement
(i) Are you going to Kolkata?
(ii)Give me a pen
(iii)He will be next chief minister
(iv)Sum of two irrational number is always
irrational
A. Are you going to Kolakata?
B. Give me a pen
C. He will be next chiefminister

# D. Sum of two irrational number is always 

 irrational
## Answer: D

## - Watch Video Solution

4. Which of the following is not equivalent from of "if and only if " for the given statements p and q
A. If $p$ then $q$
B. $q$ if and only if $p$
C. $p$ if and only if $q$
D. p is necesssary and suffient condition for

q and vice-versa

## Answer: A

## D Watch Video Solution

5. p : if a natural is odd, then its sqare also odd. Which of the following does not convey
the same meaning as that by statement $p$
A. A natural number is odd implies that its square is also odd
B. For a natural number to be odd it is
necessary that its square is odd
C. If the square of a natural number is not
even then it is odd
D. If the square of natural number is not
odd then it is odd

## Answer: D

6. $p$ : if you are born in India, then you are a citizen of India.
q : if you are not a citizen of India, .then you were not born in India.

Which of the following is true
A. $p$ is contrapositive of $q$
B. $p$ is converse of $q$
C. - $p$ is contrapositive of $q$
D. - $p$ is converse of $q$

## Answer: A

## - Watch Video Solution

7. $p$ : if two integers $a$ and $b$ are such that
$a>b$ then $\mathrm{a}-\mathrm{b}$ is always a positive integer.
q : If two integers a and b are such that $\mathrm{a}-\mathrm{b}$ is
always a positive integer, then $a>b$

Which of the following is true regarding
statements $p$ and $q$ ?
A. (a) $\sim p$ is converse of $q$
B. (b) $\sim p$ is contrapositive of $p$
C. (c) $p$ is converse of $q$
D. (d) $p$ is contrapositive of $q$

## Answer: C

## D Watch Video Solution

8. Which of the following is not true regarding the statement "p if and only if q"?
A. If $p$ is true, then $q$ is true

## B. If $q$ is true, then $p$ is true

C. $\sim q \Leftrightarrow \sim p$
D. $\sim q \Rightarrow p$

## Answer: D

## D Watch Video Solution

9. In which of the following examples an inclusive or is• used
A. Two lines intersect at a point or are
parallel
B. Students can take French or Spanish as
their third language
C. To apply for a driving licence, you should
have a ration card or a passport.
D. All integers are positive or negative

## Answer: C

10. In which of the following example an exclusive "or" is used
A. To enter a country, you need a passport or a , voter registration card
B. The school is closed if it is a holiday or a

Sunday
C. Then exists a number which is equal to
its square
D. You are wet when it rains or you are in
river

## Answer: C

## (D) Watch Video Solution

## Assignment Section C Linked Comprehension

 Type Questions Comprehension I1. Let $\mathrm{p}: 2$ is a prime number
$\mathrm{q}: \cos 30^{\circ}=\frac{1}{2}$
$\mathrm{r}: \sec ^{2} x+\tan ^{2} x=1$
$s=\sqrt{7}$ is an irrational number
$u: \pi^{2}$ is greater than 10.

The truth values of $p \vee \sim s$ and $\sim q \vee \sim u$ are, respectively, opposite to the values of
A. $p \vee q, q \vee r, r \vee s, s \vee u$
B. $p \vee q, q \wedge r, r \vee s, s \wedge u$
C. $p \vee q, q \vee s, r \vee s, s \vee u$
D. $p \wedge q, q \wedge s, r \wedge s, s \wedge u$

Answer: C

- Watch Video Solution

2. Let $\mathrm{p}: 2$ is a prime number
$\mathrm{q}: \cos 30^{\circ}=\frac{1}{2}$
$\mathrm{r}: \sec ^{2} x+\tan ^{2} x=1$
$\mathrm{s}=\sqrt{7}$ is an irrational number
$u: \pi^{2}$ is greater than 10.
The statements which are all false are
A. $p \vee q, r \vee s, r \vee u$
B. $p \wedge q, q \wedge s, s \wedge u$
C. $p \wedge q, q \vee r, p \vee u$
D. $p \wedge q, q \vee r, r \vee s$

Answer: B

## D Watch Video Solution

3. Let $\mathrm{p}: 2$ is a prime number
$\mathrm{q}: \cos 30^{\circ}=\frac{1}{2}$
$r: \sec ^{2} x+\tan ^{2} x=1$
$s=\sqrt{7}$ is an irrational number
$u: \pi^{2}$ is greater than 10.

The truth values of $p \vee \sim s$ and $\sim q \vee \sim u$ are, respectively, opposite to the values of
A. (a) $p \vee r, q \wedge s$
B. (b) $q \wedge s, \sim p \wedge u$
C. (c) $\sim p \vee r, q \wedge \sim r$
D. (d) $\sim p \vee u, r \wedge s$

Answer: A

- Watch Video Solution

Assignment Section C Linked Comprehension Type Questions Comprehension li

## 1. Consider the truth table

| $p$ | $q$ | $p \Rightarrow \sim(p \wedge \sim q)$ |
| :---: | :---: | :---: |
| $T$ | $T$ | $A$ |
| $T$ | $F$ | $B$ |
| $F$ | $T$ | $C$ |
| $F$ | $F$ | $D$ |

The truth value is False for
A. A
B. B
C. C
D. D

Answer: B

## - Watch Video Solution

2. Consider the truth table

| $p$ | $q$ | $p \Rightarrow \sim(p \wedge \sim q)$ |
| :---: | :---: | :---: |
| $T$ | $T$ | $A$ |
| $T$ | $F$ | $B$ |
| $F$ | $T$ | $C$ |
| $F$ | $F$ | $D$ |

Identify the correct statement'
A. The truth value of $A$ is opposite to that of B
B. The truth value of $A$ in opposite to that of C
C. The truth value of $A$ is opposite to that of D
D. The truth value of $C$ is opposite to that
of D

Answer: A

# Assignment Section D Assertion Reason Type 

 Questions1. Let p be the statement "It rains"! and q be the statement "It is cold".

STATEMENT-1 : If it rains then it is cold, if it does not rain then it is not cold.
and

STATEMENT-2 : $p \Rightarrow q=\sim p \vee q$
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement-1 is False, Statement-2 is True
D. Statement-1 is True, Statement-2 is False

## Answer: C

2. If $p, q$, $r$ be anY three. statements

## STATEMENT-1

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

## STATEMENT-2

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

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

# B. Statement-1 is True, Statement-2 is True, 

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement-1 is True, Statement-2 is False
D. Statement-1 is False, Statement- 2 is True

Answer: A

## D Watch Video Solution

3. STATEMENT-1 : The converse of
$p \Rightarrow q$ is $q \Rightarrow p$
and

$$
\begin{aligned}
& \text { STATEMENT-2 }: \text { The inverse of } \\
& p \Rightarrow q \text { is } \sim p \Rightarrow \sim q
\end{aligned}
$$

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1
B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
C. Statement-1 is True, Statement-2 is False
D. Statement-1 is False, Statement-2 is True

## Answer: B

## D Watch Video Solution

4. STATEMENT-1 : $\sim(p \Rightarrow q)=p \wedge \sim q$
and

STATEMENT-2 : $p \Rightarrow q=\sim p \vee q$
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement- 1 is True, Statement- 2 is False
D. Statement-1 is False, Statement-2 is True

## Answer: A

5. STATEMENT-1 : $(p \Leftrightarrow q)=\sim p \Leftrightarrow q$
and

STATEMENT-2 : $(p \Leftrightarrow q)=\sim p \Leftrightarrow \sim q$
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1
B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
for Statement-1

# C. Statement-1 is True, Statement-2 is False 

D. Statement-1 is False, Statement-2 is True

## Answer: D

## D Watch Video Solution

6. Let p be the statement " x is divisible $\mathrm{b}, 4$ "
and $q$ be the statement " $x$ is divisible by 2 ".

STATEMENT-1 : $p \Leftrightarrow q$
and

STATEMENT-2 : If x is divisible by 4 , it must be divisible by 2 .
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1
B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement- 1 is True, Statement- 2 is False
D. Statement-1 is False, Statement-2 is True

## Answer: D

## D Watch Video Solution

> 7. STATEMENT-1 : The inverse of
> $(p \wedge \sim q) \Rightarrow r$ is $\sim p \vee q \Rightarrow \sim r$
and

STATEMENT-2 : $\sim(p \wedge q)=\sim p \vee \sim q$
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

# B. Statement-1 is True, Statement-2 is True, 

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement- 1 is True, Statement- 2 is False
D. Statement-1 is False, Statement-2 is True

Answer: A

## - Watch Video Solution

8. STATEMENT-1 : If $(p \wedge \sim r) \Rightarrow(q \vee r)$ is false and $q$ and $r$ are false, then $p$ is also false.
and

STATEMENT-2 : $p \Rightarrow q$ is false, when q is false and $p$ is true. .
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1
B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
C. Statement-1 is True, Statement-2 is False
D. Statement-1 is False, Statement-2 is True

## Answer: D

## D Watch Video Solution

9. STATEMENT-1 : $p \Leftrightarrow \sim q$ is true, when pis false and $q$ is true.
and

STATEMENT-2 : $p \Rightarrow \sim q$ is true, when pis true
and $q$ is false, and $-q \Rightarrow p$ is true, when $q$ is false and $p$ is true.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1
B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement-1 is True, Statement-2 is False
D. Statement-1 is False, Statement-2 is True

Answer: B

## D Watch Video Solution

10. STATEMENT-1 : $(p \wedge \sim q) \wedge(\sim p \wedge q)$
and

STATEMENT-2 : $(p \vee \sim q) \vee(\sim p \wedge q)$
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

# B. Statement-1 is True, Statement-2 is True, 

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement- 1 is True, Statement- 2 is False
D. Statement-1 is False, Statement-2 is True

## Answer: B

## - Watch Video Solution

11. STATEMENT-1 : $(p \Rightarrow q) \Leftrightarrow(\sim q \Rightarrow \sim p)$
and

STATEMENT-2 : $p \Rightarrow q$ is logically equivalent to
$\sim q \Rightarrow \sim p$
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
for Statement-1

# C. Statement-1 is True, Statement-2 is False 

## D. Statement-1 is False, Statement-2 is True

## Answer: D

## - Watch Video Solution

12. STATEMENT-1 : $(p \Rightarrow \sim q) \wedge(\sim q \Rightarrow q)$ is a

## contradication

and

$$
\begin{aligned}
& \text { STATEMENT-2 }: \text { The inverse of } \\
& p \Rightarrow \sim p \text { is } \sim p \Rightarrow p
\end{aligned}
$$

A. (a) Statement-1 is True, Statement-2 is
True, Statement-2 is a correct
explanation for Statement-1
B. (b)Statement-1 is True, Statement-2 is

True, Statement-2 is NOT a correct explanation for Statement-1
C. (c)Statement-1 is True, Statement-2 is False
D. (d)Statement-1 is False, Statement-2 is

True

Answer: A

## D Watch Video Solution

13. STATEMENT-1 : The dual statement of "xis a perfect square or xis a prime number" is " $x$ is a perfect square and a prime number and

STATEMENT-2 : If x is a prime number, then it isnot a perfect square.
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement- 1 is True, Statement- 2 is False
D. Statement-1 is False, Statement-2 is True

## Answer: B

14. STATEMENT-1
$[p \wedge(p \vee q)] \vee[q \wedge(q \vee p)]=p \vee q$
and

## STATEMENT-2

$p \wedge(q \vee r)=(p \wedge q) \vee(p \wedge r)$
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

# B. Statement-1 is True, Statement-2 is True, 

Statement-2 is NOT a correct explanation
for Statement-1
C. Statement-1 is True, Statement-2 is False
D. Statement-1 is False, Statement- 2 is True

Answer: A

## - Watch Video Solution

## 15.

 STATEMENT-1$\sim(p \Leftrightarrow q)=\sim p \Leftrightarrow q=p \Leftrightarrow \sim q$
and

STATEMENT-2 : $(p \Leftrightarrow q) \Leftrightarrow r=p \Leftrightarrow(q \Leftrightarrow r)$
A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1
B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation
for Statement-1

# C. Statement- 1 is True, Statement- 2 is False 

D. Statement-1 is False, Statement-2 is True

## Answer: B

- Watch Video Solution

