

India's Number 1 Education App

MATHS

BOOKS - CENGAGE MATHS (HINGLISH)

MATHMETICAL REASONING



1. From the truth table of pvq and $p \lor {\sf \neg} q$

2. Find the truth values of (i) $\sim (P \lor \sim q)$ $(ii) \sim (\sim p \land \sim q)$ Watch Video Solution

3. Find the truth values of the following compound statements :

- (i) $P \wedge (q \wedge r)$ $(ii)(p \lor q) \lor r$
- (iii) $p \wedge (q \vee r)$ $(iv)(p \wedge q) \vee r$

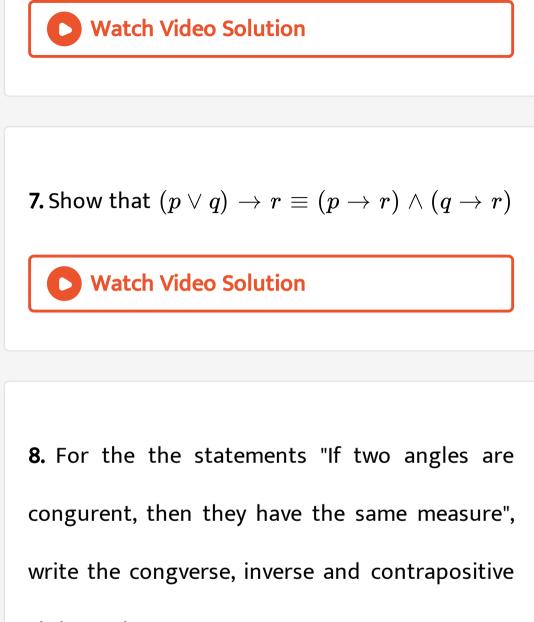
4. Find the truth values of

$$(i)$$
 ~ $p
ightarrow q \qquad (ii)$ ~ $(p
ightarrow q)$

Watch Video Solution



Watch Video Solution



statements.



9. Show that

(i) $p
ightarrow (p \lor q)$ is a tautology

 $(ii)(p \lor q) \land (extsf{-}p \land extsf{-}q)$ is a contradiction

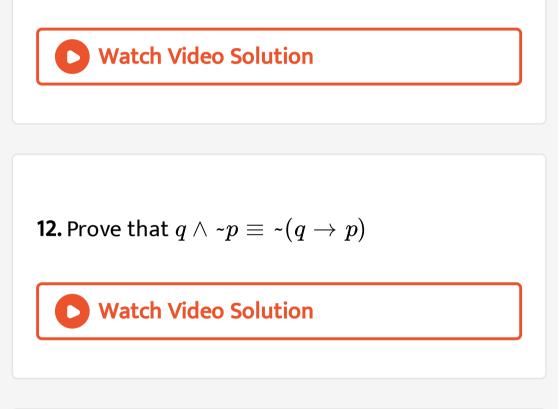
> Watch Video Solution

10. Show that $[(p \lor q) \lor r] \leftrightarrow [p \lor (q \lor r)]$ is a

tautology

11. Write the negation of statements "2+3 =5 and

8< 10"



13. Write the negation of the compound propostion . "If the examination is difficult, then I shall pass if I study hard".

Watch Video Solution

Exercise 101

1. Write down the truth table for the compound statements :

$$(\ \ p \lor q) \land (\ \ p \land \ \ q)$$

Watch Video Solution

2. Find the truth values of the following compound statements :

$$(a)(p \lor \neg r) \land (q \lor \neg r) \qquad (b) \neg (p \lor \neg q) \land (\neg p \lor r)$$

$$\textcircled{O} Watch Video Solution$$
3. Find the truth values of
$$(a) \neg p \rightarrow (q \rightarrow p) \qquad (b)(p \rightarrow q) \rightarrow (p \land q)$$

$$\textcircled{O} Watch Video Solution$$
4. Find the truth values of
$$(a)$$

$$(p \leftrightarrow \neg q) \leftrightarrow (p \rightarrow p) \qquad (b)(p \rightarrow q) \lor \neg (p \leftrightarrow \neg q)$$

5. Construct the truth table for the followings statements :

Watch Video Solution

6. Show that ${}^{\sim}(p \leftrightarrow q) \equiv (p \wedge {}^{\sim}q) \lor ({}^{\sim}p \wedge q).$

7. Are the following statements equivalent : 'If the trades do not reduce the price then the government will take action against them '. 'it is not true that the traders do not reduce the prices and government does not take action against them'.



8. For the statement: "If a quadilateral is a rectangle , then it has two paisrs of parallel

sides", write the converse, inverse and

contrapositive statements.



Exercise 10 2

1. Show that $(p \wedge q) \lor (\ensuremath{\,^{\sim}} p) \lor (p \wedge \ensuremath{\,^{\sim}} q)$ is a

tautology

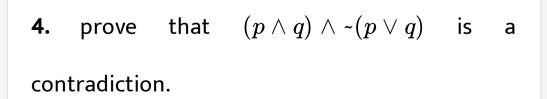
2. Show that
$$[(p
ightarrow q) \land (q
ightarrow r)]
ightarrow (p
ightarrow r)$$
is

a tautology



3. Prove that
$$\ensuremath{\raisebox{1.5pt}{\text{\circle*{1.5}}}}(\ensuremath{\raisebox{1.5pt}{\text{\circle*{1.5}}}}) \land q) \equiv p \lor (\ensuremath{\raisebox{1.5pt}{\text{\circle*{1.5}}}}).$$

Watch Video Solution





5. Prove that $extsf{-}(extsf{-}p o extsf{-}q) \equiv extsf{-}p \wedge q$

Watch Video Solution



1. Which of the following is not a statement.

A. 2 is an odd number

B. 10 is less than 8

C. the number 13 is prime

D. please do me a favour

Answer: D



2. If p: 'Ram is tall' and q: 'Ram is intelligent',

then the statement ~ $p \lor q$ is

A. Ram is not tall or he is intelligent.

B. Ram is tall or he is intelligent

C. Ram is not tall and he is intelligent

D. Ram is not all then he is intelligent

Answer: A



3. Consider the statement p: 'New Delhi is a city'.

Which of the following is not negation of p?

A. New delhi is not a city

B. it is false that new delhi is a city

C. it is not case that New delhi is a city

D. None of these

Answer: D



4. Which of the following is the inverse of the proposition 'If a number is a prime then it is odd' ?

A. IF a number is not odd then it is not a

prime

B. if a number is a prime then it is odd

C. If a number of is not odd then it is a prime

D. IF a number is not a prime then it is not

odd.

Answer: D

Watch Video Solution

5. Consider the following statements :

p: It rains today

q: I go to school

r: I Shall meet any friends

s: I shall go for a movie

Then which of the following proposition represents 'If it does not rain or if I do not go to school, then I shall meet my friend and go for a movie .'?

A.
$$au(p \wedge q) o (r \wedge s)$$

B. $au(p \wedge au q) o (r \wedge s)$
C. $au(p \wedge q) o (r \vee s)$

D. None of these

Answer: A



6. Negation of 'Paris is in France and London is in England' is

A. Paris is in England and London is in France

B. Paris is not in France or london is not in

England

C. Paris Is in england or london is in France

D. None of these

Answer: B



- 7. Which of the following is not a proposition ?
 - A. $\sqrt{3}$ is a prime
 - B. $\sqrt{2}$ is irrational
 - C. Mathematics is interesting
 - D. 5 is an even integer

Answer: C



8. ~
$$((~(~p)) \land q)$$
 is equal to

A. ~
$$p \wedge q$$

B. ~ $p \lor$ ~q

 $\mathsf{C}.\, p \wedge \, {\scriptstyle{\sim}} q$

D. ~ $p \wedge$ ~q

Answer: B



9. ~
$$(p \lor (~p))$$
 is equal to

A. ~ $p \lor q$

 $\mathsf{B.}\left(\mathsf{\scriptstyle{\sim}} p\right) \wedge q$

C. ~ $p \lor$ ~p

D. ~ $p \wedge$ ~q

Answer: B



10. Which of the following is logically equivalent

to ~(~p
ightarrow q)?

A. $p \wedge q$

B. $p \wedge {\scriptstyle{\sim}} q$

C. ~ $p \wedge q$

D. ~ $p \wedge$ ~q

Answer: D



11. If p,q and r are simple propositions with truth values T,F and T , respectively, then the truth value of $(\neg p \lor q) \land \neg r o p$ is

A. T

B. False

C. true if r is false

D. true if q is true

Answer: A

Watch Video Solution

12. If the statements $(p \wedge {\,}^{\sim} r) o (q \lor r)$, q and r

are all false, then p

A. is true

B. is false

C. may be true or false

D. data is insufficient

Answer: A

Watch Video Solution

13. If p,q and r are simple propositions such that

 $(p \wedge q) \wedge (q \wedge r)$ is true, then

A. p,q and r are all false

B. p,q and r are all true

C. p,qare true and r is false

D. p is true and q, r are false

Answer: B

Watch Video Solution

14. ~
$$(p \lor (~p \lor q))$$
 is equal to

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

B.
$$(p \lor {\mathsf{\neg}} q)v{\mathsf{\neg}} p$$

C. none of these

D.

Answer: A

Watch Video Solution

15. $(imes (p \lor q)) \lor (imes p \land q)$ is logically equivalent

to

B. ∼*p*

C. q

D. ~q

Answer: B

Watch Video Solution

16. If the inverse of implication p o q is defined as ${ imes} p o { imes} q$, then the inverse of the proposition $(p \wedge { imes} q) o r$ is

A. ~ $r
ightarrow (~ p \lor q)$

B.
$$r
ightarrow (p \wedge { extsf{-}} q)$$

C. ~
$$q \lor (p \land r)$$

D. none of these

Answer: D

Watch Video Solution

17. The negation of $q \lor (p \land r)$ is

A. ~
$$q \wedge (~-p \wedge ~-r)$$

B. ~ $q \wedge (p \wedge r)$

C. ~
$$q \lor (p \land r)$$

D. none of these

Answer: A



18. The contrapositive of $(p \lor q) o r$ is

A.
$$r
ightarrow (p \lor q)$$

B. ~ $r
ightarrow (p \lor q)$

C. ~ $r
ightarrow (~p \land ~q)$

D.
$$p
ightarrow (q ee r)$$

Answer: C

Watch Video Solution

19. If $p ightarrow (q \lor r)$ is false, then the truth values of p,q, and r are, respectively.

A. T,T,F

B. F,F,F

C. F,T,T

D. T,F,F

Answer: D

Watch Video Solution

20.
$$(p \wedge {\,}^{\hspace{-0.5mm}} q) \wedge (\,{\,}^{\hspace{-0.5mm}} p \wedge q)$$
 is

A. a tautology

B. a contradiction

C. neither a tautology nor a contradiction

D. None of these

Answer: B



21. The properties $(p
ightarrow { extsf{-}q}) \wedge ({ extsf{-}p}
ightarrow p)$ is a

A. tautology and contradiction

B. neither tautology nor contradiction

C. contradiction

D. tautology





22. The false statement among the following is

A. $p \land (\ensuremath{\,^{\sim}} p)$ is a contradiction

B. $(p
ightarrow q) \leftrightarrow (imes q
ightarrow imes p)$ is a contradiction

C. $p \lor (\ensuremath{\,^{\sim}} p)$ is a tautology

D.

Answer: B

23. Which of the following is logically equivalent

to ~(~p
ightarrow q)?

A. $p \wedge q$

B. $p \wedge {\mathsf{-}} q$

C. ~ $p \wedge q$

D. ~ $p \wedge$ ~q

Answer: D

24. If $p
ightarrow (\ensuremath{\,^{\sim}} p \lor q)$ is false, the truth values of p

and q are , respectively

A. F,T

B. F,F

C. T,T

D. T,F

Answer: D

25. The conditional statement $(p \land q)
ightarrow p$ is

A. a tautology

B. a fallacy

C. neither tautology nor fallacy

D. None of these

Answer: A



26. $(p \land \neg q) \land (\neg p \land q)$ is

A. a contradiction

B. a tautology

C. either (1) or (2)

D. neither (1) nor (2)

Answer: A

Watch Video Solution

27. The proposition $p o extsf{-}(p \wedge extsf{-}q)$ is

A. a contradiction

B. a tautology

C. either (1) or (2)

D. neither (1) nor (2)

Answer: D

Watch Video Solution

28.
$$(p \land {\mathsf{\neg}} q) \land ({\mathsf{\neg}} p \lor q)$$
 is

A. a contradiction

B. a tautology

C. either (1) or (2)

D. neither (1) nor (2)

Answer: A



29. In the truth table for the statements $(p ightarrow q) \leftrightarrow (\mathcap V q)$, the last column has the

truth value in the following order

A. TTTT

B. FTFT

C. TTFF

D. FFFF

Answer: A



30. If each of the statements $p \rightarrow \neg q$, $\neg r \rightarrow q$ and p are true then which of the following is NOT true ?

A. q is false

B. r is true

C. r
ightarrow q is false

D. $r \wedge \mathsf{\sim} q$ is false

Answer: D



31. Which of the following is true?

A.
$$p \wedge extsf{-}p \equiv t$$

B.
$$p \lor extsf{-}p \equiv f$$

$$\mathsf{C}.\,p o q\equiv q o p$$

D.
$$p
ightarrow q \equiv extsf{-}q
ightarrow extsf{-}p$$

Answer: D



32. If p is true and q is false, then which of the following statements is NOT true ?

A. $p \lor q$

 $\mathsf{B.}\,p\wedge(\,{\scriptstyle{\thicksim}} q)$

 $\mathsf{C}.\,p\to p$

$\mathsf{D}.\,p o q$

Answer: D

Watch Video Solution

33. If $(p \wedge {\earline { imes} r}) o ({\earline { imes} p} \lor q)$ is false, then truth

values of p,q and r are respectively.

A. T,T,T

B. T,F,T

C. T,F,F

D. F,T,T

Answer: C



34. Statements
$$(p
ightarrow q) \leftrightarrow (\ensuremath{\,{}^{\sim}} q \ensuremath{\,{}^{\sim}} p)$$

A. is contradiction

B. is tautology

C. is neither contradiction not tautology

D. None of these



35. The contrapositive of inverse of $p ightarrow \, extsf{~} q$ is

A. p
ightarrow q

- $\mathsf{B.}\,\mathsf{\textbf{-}}q\to p$
- $\mathsf{C}.\,q\to p$

D. ~
$$q
ightarrow$$
 ~ p

Answer: B



36. Consider the following statements :

p: He is intelligent

q: He is strong

Then symbolic form of statements 'it is wrong

that he is intelligent or strong's

A. ~
$$p \lor$$
 ~ q

- B. ~ $p \lor q$
- C. ~ $p \wedge$ ~q
- D. $p \wedge {\scriptstyle{\sim}} q$





37. ~ $(p \lor q) \lor (~p \land q)$ is equivalent to

A. q

B.p

C. ~p

D. ~q

Answer: C



38. If p
ightarrow (q ee r) is false, then the truth values

of p,q, and r are, respectively.

A. F,T,T

B. T,T,F

C. T,F,F

D. F,F,F

Answer: C



Jee Previous Year

1. Statements -1 : $\circle(p\leftrightarrow\circlever)$ is equivalent to $p\leftrightarrow q$

Statement-2: (~ $p \leftrightarrow$ ~q) is a tautology.

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: C

Watch Video Solution

2. Let S be a non-empty subset of R. consider the

following statement :

P: There is a rational number ξnS such that

xgtO. which of the following statements is the negation of the statement P?

A. $x \in S$ and $x \leq 0 \Rightarrow x$ is not rational

B. There is rational number $x \in S$ such that

 $x \leq 0.$

C. There is no rational number $x \in S$ such

that $x \leq 0$.

D. Every rational number $x \in S$ satisfies

$$x\,\leq 0$$

Answer: D





- 3. Consider the following statements
- P: Suman is brilliant
- Q: Suman is rich
- R: Suman is honest

The negation of the statement "Suman is brilliant and dishonest if and only if Suman is rich" can be expressed as

A. ~
$$(p \wedge R) \leftrightarrow Q$$

B. ~ $p \land (Q \leftrightarrow ~R)$

 $\mathsf{C}.\, \mathsf{\scriptstyle{\sim}}(Q \leftrightarrow (P \wedge \mathsf{\scriptstyle{\sim}} R))$

D. ~ $Q \leftrightarrow$ ~ $P \wedge R$

Answer: C



4. The negation of the statement

"If I becomes a teacher, then I will open a school",

is

A. I will become a teacher and I will not open

a school.

B. Either I will not becomes a teacher or I will

not open a school.

C. Neither I will becomes a teacher nor I will

open a school

D. I will not becomes a teacher or I will open

a school.

Answer: A



5. Consider :

Statement I:

 $(p \wedge {\scriptscriptstyle{ extsf{-}}} q) \wedge ({\scriptscriptstyle{ extsf{-}}} p \wedge q)$ is a fallacy

Statement II: $(p
ightarrow q) \leftrightarrow (\ensuremath{\sc q}
ightarrow \ensuremath{\sc r} p)$ is a tautology

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

6. The statement ${}^{\hspace*{-0.5pt}}{}(p \leftrightarrow {}^{\hspace*{-0.5pt}}{}q)$ is

A. equivalent to $p \leftrightarrow q$

B. equivalent to $\ensuremath{\ } p \leftrightarrow q$

C. a tautology

D. a fallacy

Answer: A



7. The negation of ~ $s \lor (~r \land s)$ is equivalent to

A.
$$s \wedge extsf{-}r$$

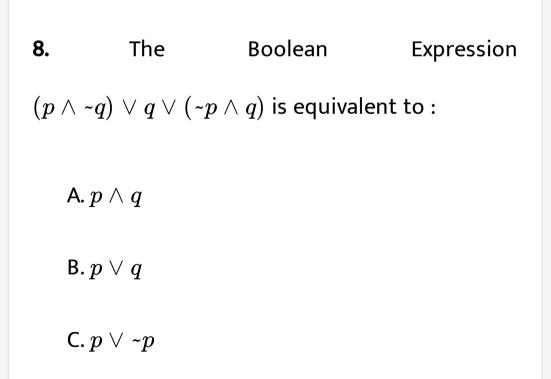
B. $s \land (r \land { circles})$

C. $s \lor (r \lor {\mathsf{~~s}})$

D. $s \wedge r$

Answer: D

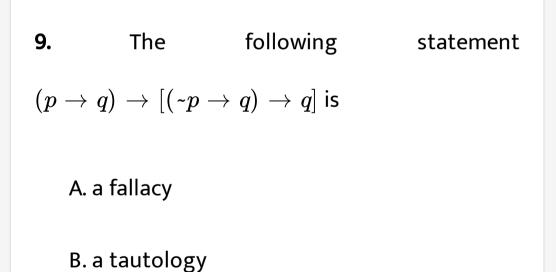




D. ~ $p \wedge q$

Answer: B





C. equivalent to $\ensuremath{\ \sim} p
ightarrow q$

D. equivalent to $p
ightarrow \,$ ~q

Answer: B



A. ~p

B. ~q

С. р

D. q

Answer: B

Watch Video Solution