

India's Number 1 Education App

MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

MATHMETICAL REASONING

Illustration

1. Form the truth table of $p \lor q$ and $p \lor \mathsf{\neg} q$

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

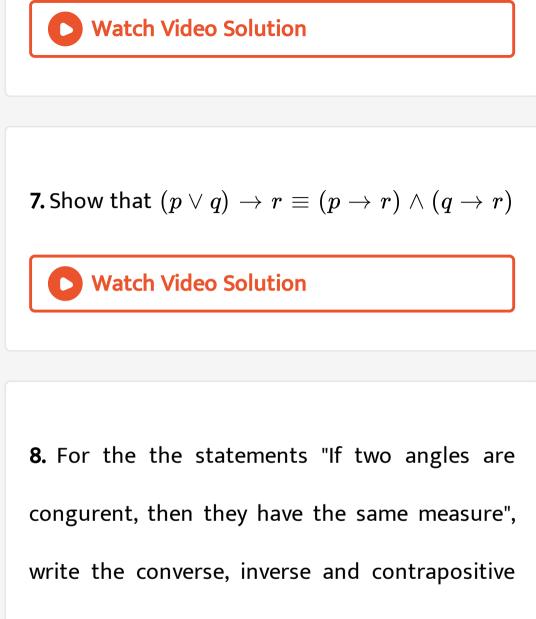
4. Find the truth values of

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

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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

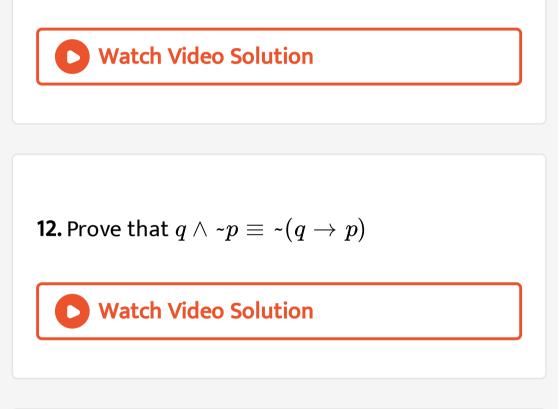
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10. Show that $[(p \lor q) \lor r] \leftrightarrow [p \lor (q \lor r)]$ is a

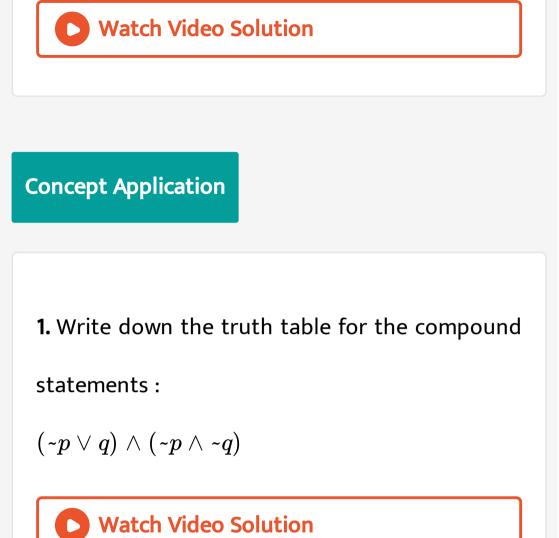
tautology

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".



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

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

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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 :

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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



contrapositive statements.



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

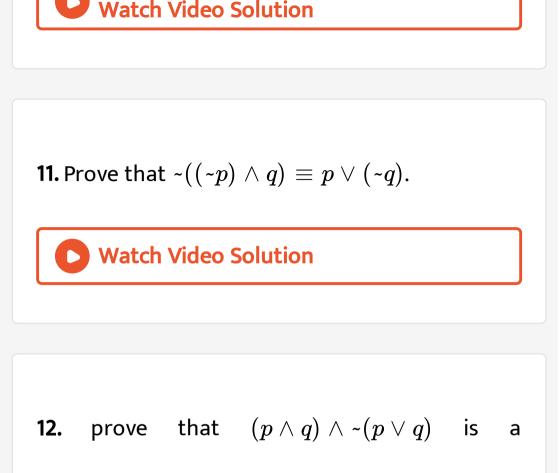
tautology

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

is a tautology





contradiction.

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13. Prove that ~(~p
ightarrow ~ $q) \equiv$ ~ $p \wedge q$



Single Correct Answer Type

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



- 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. ~
$$(p \wedge q) o (r \wedge s)$$

B. –
$$(p \wedge –q)
ightarrow (r \wedge s)$$

C. ~
$$(p \wedge q)
ightarrow (r \lor s)$$

D. None of these

Answer: A

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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

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7. Which of the following is not a proposition ?

A. 3 is a prime

B. $\sqrt{2}$ is irrational

C. Mathematics is interesting

D. 5 is an even integer

Answer: C

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

A. ~ $p \wedge q$

B. ~ $p \lor$ ~q

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

D. ~ $p \wedge$ ~q

Answer: B



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

A. ~
$$p \lor q$$

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

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. $p \wedge {\mathsf{\neg}} q$

C. ~ $p \wedge q$

D. ~ $p \wedge$ ~q

Answer: D

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

A. True

B. False

C. true if r is false

D. true if q is true

Answer: A

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



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



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.





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

A. p

B. ~p

C. q

D. ~q

Answer: B



16. If the inverse of implication p o q is defined as $\ p o \ q$, then the inverse of the proposition $(p \land \ q) \to r$ is A. $\ r \to (\ p \lor q)$ B. $r \to (p \land \ q)$ C. $\ q \lor (p \land r)$

D. none of these

Answer: C



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

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

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

A. a tautology

B. a contradiction

C. neither a tautology nor a contradiction

D. None of these

Answer: B



21. The properties $(p
ightarrow {}^{\hspace*{-0.5mm} \hspace*{-0.5mm} } {}^{\hspace*{-0.5mm} } {}^{\hspace*{$

A. tautology and contradiction

B. neither tautology nor contradiction

C. contradiction

D. tautology

Answer: C



22. The false statement among the following is

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

B. $(p
ightarrow q) \leftrightarrow (\ensuremath{\,^{\sim}} q
ightarrow \ensuremath{\,^{\sim}} p)$ is a contradiction

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

D. none of these

Answer: B

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23. 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

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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

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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



A. a contradiction

B. a tautology

C. either (1) or (2)

D. neither (1) nor (2)

Answer: A

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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



28.
$$(p \wedge {\scriptstyle{\sim}} q) \wedge ({\scriptstyle{\sim}} p \lor q)$$
 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 $(p o q) \leftrightarrow (\neg p \lor q)$, the last column has the truth value in the following order

A. (a) TTTT

B. (b) FTFT

C. (c) TTFF

D. (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

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31. Which of the following is true?

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

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

C.
$$p
ightarrow q \equiv q
ightarrow p$$

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



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

A. $p \lor q$

- $\mathsf{B}.\,p\wedge(\,{\scriptstyle{\thicksim}} q)$
- $\mathsf{C}.\,p\to p$
- $\mathsf{D}.\, p \to q$



33. If $(p \wedge {\ensuremath{{\scriptstyle\sim}}} r) o ({\ensuremath{\scriptstyle\sim}} p \lor q)$ 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

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34. Statements (p
ightarrow q)
ightarrow (q
ightarrow p)

A. is contradiction

B. is tautology

C. is neither contradiction not tautology

D. None of these

Answer: B



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

A. p ightarrow q

 $\mathsf{B.}\,\mathsf{\scriptstyle{\sim}}q \to p$

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

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

Answer: C



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

A. q

B.p

C. ~p

D. ~q

Answer: C



38. If $p
ightarrow (q \lor r)$ 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

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Archives

1. Statements -1 : $\sim (p \leftrightarrow \sim q)$ is equivalent to $p \leftrightarrow q$ Statement-2: ~ $(p \leftrightarrow \ au q)$ 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,

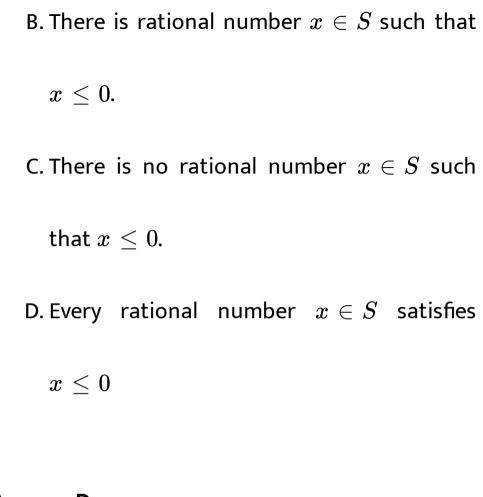
D. statement 1 is false, statement 2 is true

Answer: C



2. If S be a non - empty subset of R. Consider the following statement p . There is a rational number $x \in S$ such that x > 0.Write the negation of the statement p.

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





3. Consider the following statements

P: Suman is brilliant

Q: Suman is rich

R: Suman is honest

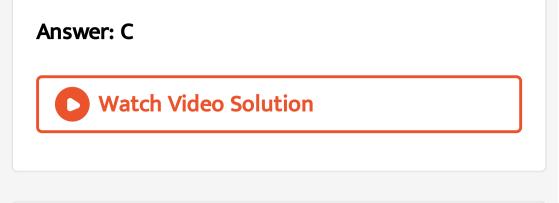
The negation of the statement "Suman is brilliant and dishonest if and only if Suman is rich" can be expressed as

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



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

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5. Consider :

Statement I:

 $(p \wedge {\scriptscriptstyle{\,{\sim}}} q) \wedge ({\scriptscriptstyle{\,{\sim}}} p \wedge q)$ is a fallacy

Statement II: $(p
ightarrow q) \leftrightarrow (\ensuremath{\,^{\sim}} q
ightarrow \ensuremath{\,^{\sim}} p)$ 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



6. The statement $au(p \leftrightarrow au q)$ 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. $s \wedge extsf{-}r$

- $\mathsf{B.}\, s \wedge (r \wedge {\,{\scriptstyle{\sim}}} s)$
- C. $s \lor (r \lor {\mathsf{~~s}})$

D. $s \wedge r$



Expression 8. The Boolean $(p \land \neg q) \lor q \lor (\neg p \land q)$ is equivalent to : A. $p \wedge q$ $\mathsf{B}.\, p \lor q$ $\mathsf{C}.\, p \lor \mathsf{~}p$ D. ~ $p \wedge q$

Answer: B

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9. The following

 $(p
ightarrow q)
ightarrow [(\ensuremath{\,^{\sim}} p
ightarrow q)
ightarrow q]$ is

A. a fallacy

B. a tautology

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

D. equivalent to p
ightarrow ~q

Answer: B

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10. The Boolean expression $(p \wedge r) o (p \lor r)$ is

equivalent to

A. ~p

B. ~q

С. р

D. q

Answer: B

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