



# MATHS

## BOOKS - OMEGA PUBLICATION

### MATHEMATICAL REASONING

#### Questions

1. Which of the following sentences are statement? Give reason for your answer.

Mathematics is difficult



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2. Which of the following sentences are statement? Give reason for your answer.

The sum of 5 and 7 is greater than 10



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3. Which of the following sentences are statement? Give reason for your answer.

The square of a number is an even number





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4. Which of the following sentences are statement? Give reason for your answer.

The sides of a quadrilateral have equal length



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5. Which of the following sentences are statement? Give reason for your answer.

Answer this question



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6. Which of the following sentences are statement? Give reason for your answer.

The product of  $(-1)$  and  $(8)$  is  $8$



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7. Which of the following sentences are statement? Give reason for your answer.

The sum of all interior angles of a triangles is  $180^\circ$



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8. Which of the following sentences are statement? Give reason for your answer.

Today is a windy day



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9. Which of the following sentences are statement? Give reason for your answer.

All real numbers are complex numbers



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10. Which of the following sentences are statement? Give reason for your answer.

How far is chennai from here.



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11. Write the negation of the following statements

$\sqrt{2}$  is not a complex number



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**12.** Write the negation of the following statements

All triangles are not equilateral triangle



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**13.** Write the negation of the following statements

The number 2 is greater than 7



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**14.** Write the negation of the following statements

Every natural number is an integer.



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**15.** Are the following pairs of the statement negation of each other

The number  $x$  is not a rational number

The number  $x$  is not an irrational number



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**16.** Find the component of the following compound statements

All integers are positive or negative



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**17.** Find the component of the following compound statements

100 is divisible by 3,11 and 5



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**18.** Find the component of the following compound statements

Number 3 is prime or it is odd.



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**19.** For each of the following compound statements first identify the connecting words and then break it into components statements  
Square of an integer is positive or negative.



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**20.** For each of the following compound statements first identify the connecting words and then break it into components statements

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

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**21.** For each of the following compound statements first identify the connecting words

and then break it into components statements

$x=2$  and  $x=3$  are the roots of the equation

$$3x^2 - x - 10 = 0$$



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22. Identify the quantifier in the following statements and write the negation of the statements

There exists a number which is equal to its square.



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**23.** Identify the quantifier in the following statements and write the negation of the statements

For every real number  $x$ ,  $x$  is less than  $x+1$



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**24.** Identify the quantifier in the following statements and write the negation of the statements

There exists a capital for every state in india.



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25. Check whether the following pairs of statements are negation of each other. Give reasons for your answer.

$x + y = y + x$  is true for every real number  $x$  and  $y$ .

There exists real number  $x$  and  $y$  for which  $x + y$   
 $= y + x$



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**26.** Check whether the following pairs of statements are negation of each other. Give reasons for your answer.

There exists real number  $x$  and  $y$  for which

$$x + y = y + x$$

There exists Real number  $x$  and  $y$  for which

$$x+y=xy$$



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**27.** State whether the OR used in the following statements is exclusive or inclusive

sun rises or moon sets



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**28.** State whether the OR used in the following statements is exclusive or inclusive

to apply for a driving license you should have a ration card or a passport.



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**29.** State whether the OR used in the following statements is exclusive or inclusive

All integers are positive or negative.



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**30.** Rewrite the following statement if then in five different ways conveying the same meaning

If a natural number is odd, then its square is also odd.





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**31.** Write the contrapositive and converse of the following statements

If the two lines are parallel, then they do not intersect in the same plane.



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**32.** Write the contrapositive and converse of the following statements

Something is cold implies that it has low temperature.



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**33.** Write the contrapositive and converse of the following statements

$x$  is an even number implies that  $x$  is divisible by 4



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**34.** Write each of the statements in the form if then

A quadrilateral is a parallelogram if its diagonals bisect each other.



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**35.** Write each of the statements in the form if then

To get an  $A^+$  in the class it is necessary that you do all the exercises of all the book.





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**36.** Show that the statement

IF  $x$  is a real number such that  $x^3 + 4x = 0$

then  $x$  is 0 is true by

direct method



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**37.** Show that the statement

IF  $x$  is a real number such that  $x^3 + 4x = 0$

then  $x = 0$  is true by

method of contradiction



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**38.** Show that the statement

IF  $x$  is a real number such that  $x^3 + 4x = 0$

then  $x = 0$  is true by

method of contrapositive



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**39.** Show that the following statement is true by the method of contrapositive

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



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**40.** By giving a counter example , show that the following statement is not true.

r: The equation  $x^2 - 1 = 0$  does not have a root lying between 0 and 2.





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## Important Question From Miscellaneous Exercise

1. Write the negation of the following statements

$p$ : all cats scratch.



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2. Write the negation of the following statements



q: For every real number  $x$ . either  $x > 1$  or  $x < 1$



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**3.** State the converse and contrapositive of the following statements

p: A positive integer is prime only if it has no divisors other than 1 and itself.



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4. State the converse and contrapositive of the following statements

q: if it is hot outside then you feel thirsty.



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5. Write each of the statement in the form if p and then q

p: It is necessary to have a password to log on to the server.



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6. Write each of the statement in the form if  $p$  and then  $q$

$q$ : you can access the website only if you pay a subscription fee.



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7. Rewrite each of the following statements in the form  $p$  if and only if  $q$

$p$ : if you watch television then your mind is

free and if your mind is free then you watch television.



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8. Rewrite each of the following statements in the form  $p$  if and only if  $q$

$q$ : for you to get an A grade is necessary and sufficient that you do all the homework regularly.



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**9.** Give below are two statements

$p$ :25 is a multiple of 5  $q$ :25 is a multiple of 8.

Write the compound statement connecting these two statements with And and Or in both cases check the validity of the compound statement.



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**10.** Using the words necessary and sufficient rewrite the statement. The integer  $n$  is odd if

and only if  $n^2$  is odd Also choice whether the statement is true.



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## Multiple Choice Questions

1. Denial of a statement is called as

A. Contrapositive

B. Quantifiers

C. Negation

D. Component

**Answer: C**



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2. The words And and Or are called as

A. Connectives

B. Quantifiers

C. Components

D. Counter examples

**Answer: A**



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**3. The words There exists and For all are called as**

- A. Connectives
- B. Quantifiers
- C. Components
- D. Counter examples



**Answer: B**



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4. In a statement if you drive over 100 km per hour then you will get a fine. Sufficient condition is

A. you drive over 100km per hour

B. you will get a fine

C. 100km per hour speed

D. there is no sufficient conditions

**Answer: A**



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5.  $p$ : If a tumbler is half empty then it is half full  
 $q$ : if a tumbler is half full then it is half empty

Combination of these two statements is

A. A tumbler is half empty if it is half full

B. A tumbler is half empty if and only if it is half full

C. A tumbler is half empty then it is half full

D. If a tumbler is half empty then it is half full

**Answer: B**



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**6.** Which of the following is not a negation of the statement  $p$ : Every natural number is greater than 0.

A.  $p$ : It is false that every natural number is greater than 9

B.  $p$ : every natural number is not a greater than 0

C.  $p$ : It is not the case that every natural number is greater than 0

D. none of these

**Answer: D**



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7. Contrapositive of the statement If a number is divisible by 9. then it is divisible by 3 is

A. If a number is divisible by 3 then it is divisible by 0

B. If a number is not divisible by 3 it is not divisible by 9

C. Every number is divisible by 3 then 9

D. none of these

**Answer: B**





8. Let  $p$ : if a natural number is odd then its square is also odd. Which of the following statements conveying different meaning from above statement

A. For the natural number to be odd, it is sufficient that the number is odd

B. For the natural number to be odd it is necessary that its square is odd

C. A natural number is odd only if its square may be even

D. A natural number is odd implies that its square is odd.

**Answer: C**



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9. Which of the following sentences are not statements

A. assertive

B. unambiguous

C. declarative

D. instructive

**Answer: D**



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**10.** Which of the following is not the negation of statement The sum of 3 and 4 is 9



A. It is false that the sum of 3 and 4 is 9

B. Number 9 is the sum of 3 and 4.

C. The sum of 3 and 4 is not equal to 9

D. none of these

**Answer: B**



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