EXERCISE.14.3

Question-1

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

(i) All rational numbers are real and all real numbers are not complex.

(ii) Square of an integer is positive or negative.

(iii) The sand heats up quickly in the Sun and does not cool down fast at night.

(iv) $x = 2$ and $x = 3$ are the roots of the equation $3x^2 - x - 10 = 0$.

Ans.

i) Here, the connecting word is 'and'.

The component statements are as follows.

p: All rational numbers are real.

q: All real numbers are not complex.

(ii) Here, the connecting word is 'or'.

The component statements are as follows.

p: Square of an integer is positive.

q: Square of an integer is negative.

(iii) Here, the connecting word is 'and'.

The component statements are as follows.

p: The sand heats up quickly in the sun.

q: The sand does not cool down fast at night.

(iv) Here, the connecting word is 'and'.

The component statements are as follows.

p: $x = 2$ is a root of the equation $3x^2 - x - 10 = 0$

q: $x = 3$ is a root of the equation $3x^2 - x - 10 = 0$

Question-2

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

(i) There exists a number which is equal to its square.

(ii) For every real number x, x is less than $x + 1$.

(iii) There exists a capital for every state in India.

Ans.

(i) The quantifier is "There exists".

The negation of this statement is as follows.

There does not exist a number which is equal to its square.

(ii) The quantifier is "For every".

The negation of this statement is as follows.

There exist a real number x such that x is not less than $x + 1$.

(iii) The quantifier is "There exists".

The negation of this statement is as follows.

There exists a state in India which does not have a capital.

Question-3

Check whether the following pair of statements is negation of each other. Give reasons for the answer.

(i) $x + y = y + x$ is true for every real numbers x and y.

(ii) There exists real number x and y for which $x + y = y + x$.

Ans.

The negation of statement (i) is as follows.

There exists real number x and y for which $x + y \neq y + x$. This is not the same as statement (ii).

Thus, the given statements are not the negation of each other.

Question-4

State whether the "Or" used in the following statements is "exclusive "or" inclusive. Give reasons for your answer.

(i) Sun rises or Moon sets.

(ii) To apply for a driving licence, you should have a ration card or a passport.

(iii) All integers are positive or negative.

Ans.

(i) Here, "or" is exclusive because it is not possible for the Sun to rise and the moon to set together.

(ii) Here, "or" is inclusive since a person can have both a ration card and a passport to apply for a driving licence.

(iii) Here, "or" is exclusive because all integers cannot be both positive and negative.

EXERCISE.14.4

Question-1

Rewrite the following statement with "if-then" in five different ways conveying the same meaning.

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

Ans.

The given statement can be written in five different ways as follows.

(i) A natural number is odd implies that its square is odd.

(ii) A natural number is odd only if its square is odd.

(iii) For a natural number to be odd, it is necessary that its square is odd.

(iv) For the square of a natural number to be odd, it is sufficient that the number is odd.

(v) If the square of a natural number is not odd, then the natural number is not odd.

Question-2

Write the contrapositive and converse of the following statements.

(i) If x is a prime number, then x is odd.

(ii) It the two lines are parallel, then they do not intersect in the same plane.

(iii) Something is cold implies that it has low temperature.

(iv) You cannot comprehend geometry if you do not know how to reason deductively.

(v) x is an even number implies that x is divisible by 4

Ans.

(i) The contrapositive is as follows.

If a number x is not odd, then x is not a prime number.

The converse is as follows.

If a number x is odd, then it is a prime number.

(ii) The contrapositive is as follows.

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

The converse is as follows.

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

(iii) The contrapositive is as follows.

If something does not have low temperature, then it is not cold.

The converse is as follows.

If something is at low temperature, then it is cold.

(iv) The contrapositive is as follows.

If you know how to reason deductively, then you can comprehend geometry.

The converse is as follows.

If you do not know how to reason deductively, then you cannot comprehend geometry.

(v) The given statement can be written as follows.

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

The contrapositive is as follows.

If x is not divisible by 4, then x is not an even number.

The converse is as follows.

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

Question-3

Write each of the following statement in the form "if-then".

(i) You get a job implies that your credentials are good.

(ii) The Banana trees will bloom if it stays warm for a month.

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

(iv) To get A^+ in the class, it is necessary that you do the exercises of the book.

Ans.

(i) If you get a job, then your credentials are good.

(ii) If the Banana tree stays warm for a month, then it will bloom.

(iii) If the diagonals of a quadrilateral bisect each other, then it is a parallelogram.

(iv) If you want to get an A^+ in the class, then you do all the exercises of the book.

Question-4

Given statements in (a) and (b). Identify the statements given below as contrapositive or converse of each other.

(a) If you live in Delhi, then you have winter clothes.

(i) If you do not have winter clothes, then you do not live in Delhi.

(ii) If you have winter clothes, then you live in Delhi.

(b) If a quadrilateral is a parallelogram, then its diagonals bisect each other.

(i) If the diagonals of a quadrilateral do not bisect each other, then the quadrilateral is not a parallelogram.

(ii) If the diagonals of a quadrilateral bisect each other, then it is a parallelogram.

Ans.

(a) (i) This is the contrapositive of the given statement (a).

(ii) This is the converse of the given statement (a).

(b) (i) This is the contrapositive of the given statement (b).

(ii) This is the converse of the given statement (b).

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