

EXERCISE 31.3**PAGE NO: 31.14****1. Find the component statements of the following compound statements:****(i) The sky is blue, and the grass is green.****(ii) The earth is round, or the sun is cold.****(iii) All rational numbers are real, and all real numbers are complex.****(iv) 25 is a multiple of 5 and 8.****Solution:****(i)** The components of the compound statement are:

P: The sky is blue.

Q: The grass is green.

(ii) The components of the compound statement are:

P: The earth is round.

Q: The sun is cold.

(iii) The components of the compound statement are:

P: All rational number is real.

Q: All real number are complex.

(iv) The components of the compound statement are:

P: 25 is multiple of 5.

Q: 25 is multiple of 8.

2. For each of the following statements, determine whether an inclusive “OR” or exclusive “OR” is used. Give reasons for your answer.**(i) Students can take Hindi or Sanskrit as their third language.****(ii) To entry a country, you need a passport or a voter registration card.****(iii) A lady gives birth to a baby boy or a baby girl.****(iv) To apply for a driving license, you should have a ration card or a passport.****Solution:****(i)** In the given statement “Students can take Hindi or Sanskrit as their third language.”

An exclusive “OR” is used because a student cannot take both Hindi and Sanskrit as the third language.

(ii) In the given statement “To entry a country, you need a passport or a voter registration card.”

An inclusive “OR” is used because a person can have both a passport and a voter registration card to enter a country.

(iii) In the given statement “A lady gives birth to a baby boy or a baby girl.”

An exclusive “OR” is used because a lady cannot give birth to a baby who is both a boy and a girl.

(iv) In the given statement “To apply for a driving license, you should have a ration card or a passport.”

An inclusive “OR” is used because a person can have both a ration card and passport to apply for a driving license.

3. Write the component statements of the following compound statements and check whether the compound statement is true or false:

(i) To enter into a public library children need an identification card from the school or a letter from the school authorities.

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

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

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

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

Solution:

(i) The components of the compound statement are:

P: To get into a public library children need an identity card.

Q: To get into a public library children need a letter from the school authorities.

Both P and Q are true.

Hence, the compound statement is true.

(ii) The components of the compound statement are:

P: All rational number is real.

Q: All real numbers are not complex.

P is true and Q is false then P and Q both are False.

Hence, the compound statement is False

(iii) The components of the compound statement are:

P: Square of an integer is positive.

Q: Square of an integer is negative.

Both P and Q are true.

Hence, the compound statement is True.

(iv) The components of the compound statement are:

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

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

P is true, but Q is false then P and Q both are False.

Hence, the compound statement is False.

(v) The components of the compound statement are:

P: The sand heats up quickly in the sun.

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

P is false and Q is also false then P and Q both are False.

Hence, the compound statement is False.

4. Determine whether the following compound statements are true or false:

(i) Delhi is in India and $2 + 2 = 4$

(ii) Delhi is in England and $2 + 2 = 4$

(iii) Delhi is in India and $2 + 2 = 5$

(iv) Delhi is in England and $2 + 2 = 5$

Solution:

(i) The components of the compound statement are:

P: Delhi is in India.

Q: $2 + 2 = 4$

Both P and Q are true.

Hence, the compound statement is True.

(ii) The components of the compound statement are:

P: Delhi is in England.

Q: $2 + 2 = 4$

P is false, and q is true. So, both P and Q are false.

Hence, the compound statement is False.

(iii) The components of the compound statement are:

P: Delhi is in India.

Q: $2 + 2 = 5$

P is true, and q is false. So, both P and Q are false.

Hence, the compound statement is False.

(iv) The components of the compound statement are:

P: Delhi is in England.

Q: $2 + 2 = 5$

Both P and Q are false.

Hence, the compound statement is False.