# ASSERTION REASONING QUESTIONS

**DIRECTION :** In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

**1. Assertion :** The linear equations $x - 2y - 3 = 0$ and $3x + 4y - 20 = 0$ have exactly one solution.

**Reason :** The linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ have a unique solution.

**Ans:** For linear equations $x - 2y - 3 = 0$ and $3x + 4y - 20 = 0$

We have, $a_1 = 1$, $b_1 = -2$, $a_2 = 3$ and $b_2 = 4$

Now, $\frac{a_1}{a_2} = \frac{1}{-2}$ and $\frac{b_1}{b_2} = \frac{3}{4} \Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

So, the pair of linear equations has unique solution

So, Assertion is correct

For linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$

We have, $a_1 = 2$, $b_1 = 3$, $c_1 = -9$, $a_2 = 3$, $b_2 = 4$ and $c_2 = -18$

Now, $\frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{3}{6} = \frac{1}{2}$ and $\frac{c_1}{c_2} = \frac{-9}{-18} = \frac{1}{2} \Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

So, the pair of linear equations has infinitely many solution.

So. Reason is not correct.

Correct option is (c) Assertion (A) is true but reason (R) is false.

**2. Assertion :** If the pair of lines are coincident, then we say that pair of lines is consistent and it has a unique solution.
**Reason :** If the pair of lines are parallel, then the pair has no solution and is called inconsistent pair of equations.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

**Ans :** We know that if the lines are coincident, then it has infinite number of solutions
So, Assertion Reason is false
We know that if the lines are parallel, then it has no solution.
So, reason is true.
Correct option is (d) Assertion (A) is false but reason (R) is true.

**3. Assertion :** The graph of the linear equations 3x + 2y = 12 and 5x – 2y = 4 gives a pair of intersecting lines.

**Reason :** The graph of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ gives a pair of intersecting lines if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

**Ans :** We know that the system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ and gives a pair of intersecting lines.

So, Reason is correct

For Assertion, we have, $a_1 = 3$, $b_1 = 2$, $a_2 = 5$ and $b_2 = -2$

Now, $\frac{a_1}{a_2} = \frac{3}{5}$ and $\frac{b_1}{b_2} = \frac{2}{-2} = -1 \Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

So, the pair of linear equations has unique solution and gives a pair of intersecting lines. Hence Assertion is also correct based of Reason given.

Correct option is (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

**4. Assertion :** The graphic representation of the equations x + 2y = 3 and 2x + 4y + 7 = 0 gives a pair of coincident lines.

**Reason :** The graph of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ gives a pair of coincident lines if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

**Ans :** We know that the system of linear equations

$a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has infinitely many solutions if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ and gives a pair of coincident lines.

So, Reason is correct

For Assertion, we have, $a_1 = 1$, $b_1 = 2$, $c_1 = -3$, $a_2 = 2$, $b_2 = 4$ and $c_2 = 7$

Now, $\frac{a_1}{a_2} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{2}{4} = \frac{1}{2}$ and $\frac{c_1}{c_2} = \frac{-3}{7} \Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

So, the pair of linear equations has no solution and gives a pair of parallel lines.

So, Assertion is not correct.

Correct option is (d) Assertion (A) is false but reason (R) is true.

**5. Assertion :** The value of k for which the system of equations 3x + ky = 0, 2x – y = 0 has a unique solution is $k \neq -\frac{3}{2}$.

**Reason :** The system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

**Ans :** We know that the system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$.

So, Reason is correct

For Assertion, we have, $a_1 = 3$, $b_1 = k$, $a_2 = 2$ and $b_2 = -1$

Now, $\frac{a_1}{a_2} = \frac{3}{k}$ and $\frac{b_1}{b_2} = \frac{2}{-1} = -1$

$\Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{3}{k} \neq \frac{2}{-1} \Rightarrow k \neq -\frac{3}{2}$

Hence Assertion is also correct based of Reason given.

Correct option is (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

**6. Assertion :** The value of k for which the system of linear equations $3x - 4y = 7$ and $6x - 8y = k$ have infinite number of solution is 14.

**Reason :** The system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

**Ans :** We know that the system of linear equations

$a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has infinitely many solutions if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.

So, Reason is not correct

For Assertion, we have, $a_1 = 3$, $b_1 = -4$, $c_1 = -7$, $a_2 = 6$, $b_2 = -8$ and $c_2 = -k$

Now, $\frac{a_1}{a_2} = \frac{3}{6} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{-4}{-8} = \frac{1}{2}$ and $\frac{c_1}{c_2} = \frac{-7}{-k}$

$\Rightarrow \frac{-7}{-k} = \frac{1}{2} \Rightarrow k = 14$

So, Assertion is correct.

Correct option is (c) Assertion (A) is true but reason (R) is false.

**7. Assertion :** The number of common solutions for the system of linear equations $5x + 4y + 6 = 0$ and $10x + 8y = 12$ is zero

**Reason :** The system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

**Ans :** We know that the system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

So, Reason is correct

For Assertion, we have, $a_1 = 5$, $b_1 = 4$, $c_1 = 6$, $a_2 = 10$, $b_2 = 8$ and $c_2 = -12$

Now, $\frac{a_1}{a_2} = \frac{5}{10} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{4}{8} = \frac{1}{2}$ and $\frac{c_1}{c_2} = \frac{6}{-12} = \frac{1}{-2}$

$\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

So, the pair of linear equations has no solution and hence Assertion is correct.

But reason (R) is not the correct explanation of assertion (A).

Correct option is (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

**8. Assertion :** A pair of linear equations has no solution (s) if it is represented by intersecting lines graphically.
**Reason:** If the pair of lines are intersecting, then the pair has unique solution and is called consistent pair of equations.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

**Ans :** We know that if the lines are parallel, then it has no solution.
So, Assertion is false.
We know that if the lines are intersecting, then it has unique solution.
So, Reason is true.
Correct option is (d)

**9. Assertion :** The value of $q = \pm 2$, if $x = 3$, $y = 1$ is the solution of the line $2x + y - q^2 - 3 = 0$.

**Reason :** The solution of the line will satisfy the equation of the line.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

**Ans :** As $x = 3$, $y = 1$ is the solution of $2x + y - q^2 - 3 = 0$

$\therefore 2 \times 3 + 1 - q^2 - 3 = 0$

$\Rightarrow 4 - q^2 = 0$

$\Rightarrow q^2 = 4 \Rightarrow q = \pm 2$

So, both A and R are correct and R explains A.

Correct option is (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

**10. Assertion :** The value of k for which the system of linear equations kx – y = 2 and 6x – 2y = 3 has a unique solution is 3.

**Reason :** The system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

**Ans :** We know that the system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

So, Reason is correct

For Assertion, we have, $a_1 = k$, $b_1 = -1$, $c_1 = -2$, $a_2 = 6$, $b_2 = -2$ and $c_2 = -3$

Now, $\frac{a_1}{a_2} = \frac{k}{6}$, $\frac{b_1}{b_2} = \frac{-1}{-2} = \frac{1}{2}$

$\Rightarrow \frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{k}{6} \neq \frac{1}{2} \Rightarrow k \neq 3$

So, Assertion is not correct.

Correct option is (d) Assertion (A) is false but reason (R) is true.