

ASSERTION AND REASONING QUESTIONS
CLASS X MATHEMATICS

UNIT : NUMBER SYSTEM

CHAPTER 1: REAL NUMBERS

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.

Q1: Assertion: The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162.

Reason: If a and b are two positive integers, then $H.C.F. \times L.C.M. = a \times b$.

Q2: Assertion: 12^n ends with the digit zero, where n is any natural number.

Reason: Any number ends with digit zero, if its prime factor is of the form $2^m \times 5^n$, where m and n are natural numbers.

Q3: Assertion: A number N when divided by 15 gives the remainder 2. Then the remainder is same when N is divided by 5.

Reason: $\sqrt{3}$ is an irrational number.

Q4: Assertion: For any two positive integers p and q, $HCF(p, q) \times LCM(p, q) = p \times q$

Reason: If the HCF of two numbers is 5 and their product is 150, then their LCM is 40.

Q5: Assertion: 8^n ends with digit 0 for some positive integer n.

Reason: Prime factorization of a number ending with digit 0 is of the form $2^a \times 5^b$, where a and b are positive integers.

Q6. Assertion: If $HCF(26, 169) = 13$ then $LCM(26, 169) = 676$.

Reason: $HCF(a \times b) \times LCM(a \times b) = a \times b$.

Q7. Assertion: The largest number that divide 70 and 125 which leaves remainder 5 and 8 is 13.

Reason: $HCF(65, 117) = 13$.

Q8. Assertion: The given pair of numbers 231 and 396 are co-prime.

Reason: 231 and 396 have only 1 as a common factor

ANSWERS: 1) d 2) d 3) b 4) c
 5) d 6) d 7) a 8) d

UNIT : ALGEBRA

CHAPTER 2: POLYNOMIALS

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.

Q1: Assertion: A quadratic polynomial can have at the most two zeroes.

Reason: $x^2 + 7x + 12$ has no real zeroes.

Q2: Assertion: If the sum of the zeroes of the quadratic polynomial $x^2 - 2kx + 8$ is 2 then value of k is 1.

Reason: Sum of zeroes of a quadratic polynomial ax^2+bx+c is $-b/a$

Q3: Assertion: If the product of the zeroes of the quadratic polynomial $ax^2 + 3x + 5k$ is -10 then value of k is -2 .

Reason: Sum of zeroes of a quadratic polynomial $ax^2 + bx + c$ is $-b/a$.

Q4: Assertion: $x + 1$ is a Linear Polynomial

Reason (R): The polynomials of degree 1 are called linear polynomials.

Q5: Assertion: -1 & -4 are the zeroes of polynomial $x^2 - 3x - 4$

Reason: a real number k is said to be a zero of polynomial P(x) if $P(k) = 0$

Q6. Assertion: $x = 2$ is a zero of the polynomial $x^2 + 2x - 8$.

Reason: A real number 'a' is zero of a polynomial p(x) if $p(a) = 0$.

Q7. Assertion: $p(x) = 14x^3 - 2x^2 + 8x^4 + 7x - 8$ is a polynomial of degree 3.

Reason: The highest power of x in the polynomial $p(x)$ is the degree of the polynomial.

ANSWERS:

- 1) c 2) a 3) b 4) a 5) d 6) a 7) a

UNIT : ALGEBRA

CHAPTER – 3 -PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Directions:

- (a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
(c) If Assertion is correct but Reason is incorrect.
(d) If Assertion is incorrect but Reason is correct.

1. **ASSERTION:** There are infinite number of lines which passes through (1, 13)

REASON: A linear equation in two variables has infinitely many solutions

ANS b)

2. **ASSERTION:** The graph of linear equations $3x + 2y = 12$ and $5x - 2y = 4$ gives a pair of intersecting lines

REASON: The graph of linear equation $a_1x + b_1y + c_1 = 0$ 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 a)

3. **ASSERTION:** If the pair of lines are coincident, then we say that pair of lines is inconsistent and it has a unique solution.

REASON: If the pair of lines are parallel then the pairs has no solution and is called consistent pair of equations.

ANS d)

4. **ASSERTION:** If one equation of a pair of dependent linear equations is $-3x + 5y - 2 = 0$ The second equation will be $-6x + 10y - 4 = 0$

REASON: The condition for dependent linear equation is $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

ANS c)

UNIT : ALGEBRA CHAPTER- 4 QUADRATIC EQUATION

1 Assertion: If one root of the quadratic equation $6x^2 - x - k = 0$ is $2/3$, then the value of k is 2.

Reason: The quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has at most two roots.

2..Assertion: $(2x - 1)^2 - 4x^2 + 5 = 0$ is not a quadratic equation.

Reason: An equation of the form $ax^2 + bx + c = 0$, $a \neq 0$, where $a, b, c \in \mathbb{R}$ is called a quadratic equation.

3. Assertion: The roots of the quadratic equation $x^2 + 2x + 2 = 0$ are imaginary

Reason: If discriminant $D = b^2 - 4ac < 0$ then the roots of quadratic equation $ax^2 + bx + c = 0$ are imaginary.

4. Assertion: $3x^2 - 6x + 3 = 0$ has repeated roots.

Reason: The quadratic equation $ax^2 + bx + c = 0$ have repeated roots if discriminant $D > 0$

ANS1.b

ANS 2. a

ANS 3. a

ANS4. C

UNIT: ALGEBRA CHAPTER 5 - ARITHMETIC PROGRESSION

- a) Both assertion and reason are correct and Reason is the correct explanation for Assertion
- b) Both assertion and reason are correct and Reason is not the correct explanation for Assertion
- c) Assertion is true but the Reason is false
- d) Both Assertion and Reason are false

1. **ASSERTION:** Sum of natural number from 1 to 100 is 5050

REASON: The formula of general term a_n is $a_n = a + (n - 1)d$

ANS: b)

2. **ASSERTION:** If numbers a, b, c are in AP then $b - a = c - b$

REASON: Given three numbers are in AP then the common difference will be same

ANS a)

3. **ASSERTION:** The value of n , if $a = 10$, $d = 5$, $a_n = 95$ is 18.

REASON: The formula of general term a_n is $a_n = \frac{n}{2} [2a + (n - 1)d]$

ANS c)

4. **ASSERTION:** The sum of the series with the n^{th} term $t_n = 9 - 5n$ is 220 when number of terms $n = 6$

REASON: Sum of first n terms in an AP is given by the formula

$$S_n = \frac{n}{2} [2a + (n - 1)d]$$

ANS d)

UNIT : GEOMETRY

CHAPTER 6: TRIANGLES

Directions:

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.

Q.1. Assertion (A): If two sides of a right angle are 7 cm and 8 cm, then its third side will be 9 cm.

Reason (R): In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Answer: (d)

Q.2. Assertion (A): If $\triangle ABC$ and $\triangle PQR$ are congruent triangles, then they are also similar triangles.

Reason (R): All congruent triangles are similar but the similar triangles need not be congruent.

Answer: (a)

Q.3. Assertion (A): In the given figures, $\triangle ABC \sim \triangle GHI$.

Reason (R): If the corresponding sides of two triangles are proportional, then they are similar.

Answer: (a)

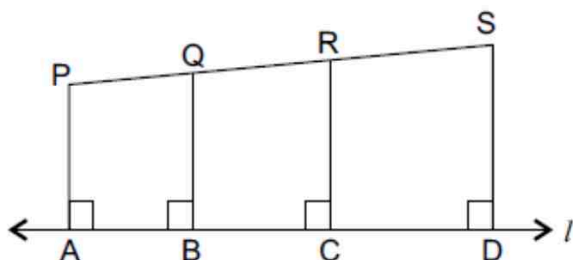
Q.4. Assertion (A): In the $\triangle ABC$, $AB = 24$ cm, $BC = 10$ cm and $AC = 26$ cm, then $\triangle ABC$ is a right angle triangle.

Reason (R): If in two triangles, their corresponding angles are equal, then the triangles are similar.

Answer: (b)

Q.5. Assertion (A): In the given figure, PA || QB || RC || SD.

Reason (R): If three or more line segments are perpendiculars to one line, then they are parallel to each other.



Answer: (a)

UNIT : CO-ORDINATE GEOMETRY CHAPTER-7 COORDINATE GEOMETRY

Directions:

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 point which divides the line joining the points A(1, 2) and B(-1, 1) internally in the ratio 1: 2 is $(\frac{-1}{2}, \frac{5}{3})$

Reason: The coordinates of the point P(x, y) which divides the line segment joining the points A (x_1, y_1) and B(x_2, y_2) in the ratio $m_1 : m_2$ is

$$\left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2} \right)$$

2. **Assertion :** Ratio in which the line $3x + 4y = 7$ divides the line segment joining the points (1, 2) and (-2, 1) is 4 : 9

Reason : The coordinates of the point P(x, y) which divides the line segment joining the points A(x_1, y_1) and B(x_2, y_2) in the ratio $m_1 : m_2$ is

$$\left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2} \right)$$

3. **Assertion :** C is the mid-point of PQ, if P is (4, x), C is (y, -1) and Q is (-2, 4), then x and y respectively are -6 and 1.

Reason : The mid-point of the line segment joining the points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

4. **Assertion :** The point (0, 4) lies on y -axis.

Reason : The X co-ordinate on the point on y -axis is zero

5. **Assertion :** The point (-1, 6) divides the line segment joining the points (-3, 10) and (6, -8) in the ratio 2 : 7 internally.

Reason : Three points A,B and C are collinear if $AB + BC = AC$

ANS1. d

ANS2. a

ANS3. a

ANS4. a

ANS5.b

UNIT – 5 CHAPTER – 8 –INTRODUCTION TO TRIGONOMETRY

Directions:

(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 value of $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$ is 1

Reason: $\sin 90^\circ=1$ and $\cos 90^\circ=0$

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

2. **Assertion:** $\sin A$ is the product of \sin and A .

Reason: The value of $\sin \theta$ increases as θ increases.

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

3. **Assertion:** In ΔABC , right-angled at B, $AB = 24$ cm, $BC = 7$ cm. The value of

$$\tan C \text{ is } \frac{24}{7}$$

Reason: $\tan C = \text{Opposite side/Adjacent side}$.

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

4. **Assertion :** The value of $\sin \theta = \frac{4}{3}$ is possible.

Reason : Hypotenuse is the largest side in any right angled triangle.

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

UNIT – 5 CHAPTER – 9 –SOME APPLICATION OF TRIGONOMETRY

In the following questions ,a statement of assertion (A) is followed by a statement of reason (R) .Mark the correct choices 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 angle of elevation of an object viewed, is the angle formed by the line of sight with the horizontal when it is above the horizontal level.

Reason: The angle of depression of an object viewed, is the angle formed by the line of sight with the horizontal when it is below the horizontal level.

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

2.Assertion: If the length of shadow of a vertical pole is equal to its height, then the angle of elevation of the sun is 45°

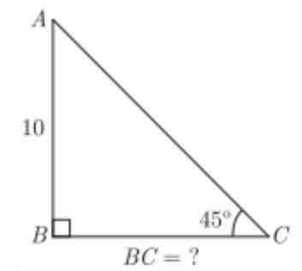
Reason : According to Pythagoras theorem $h^2 = l^2 + b^2$, where h = hypotenuse, l = length and b = base

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

3.Assertion : In the figure if $AB = 10$ m, then height $BC = 10$ m

Reason : $\tan 45 = \frac{AB}{BC} = \frac{10}{BC}$

$$1 = \frac{10}{BC} \text{ OR } BC = 10$$



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

4. Assertion: The line of sight is the line drawn from the eye of an observer to the point in the object viewed by the observer.

Reason: Trigonometric ratios are used to find height or length of an object or distance between two buildings

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

UNIT – GEOMETRY

CHAPTER 10 - CIRCLES

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: If in a circle, the radius of the circle is 3 cm and distance of a point from the center of a circle is 5 cm, then length of the tangent will be 4 cm.

Reason: $(\text{hypotenuse})^2 = (\text{base})^2 + (\text{height})^2$

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

2. Assertion: If length of a tangent from an external point to a circle is 8 cm, then length of the other tangent from the same point is 8 cm.

Reason: Length of the tangents drawn from an external point to a circle are equal.

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

3. Assertion: If in a cyclic quadrilateral, one angle is 40° , then the opposite angle is 140° .

Reason: Sum of opposite angles in a cyclic quadrilateral is equal to 360° .

Ans: (c) Assertion (A) is true but reason (R) is false

4. Assertion: In the following diagram, $\angle POQ = 2 \angle PRQ$

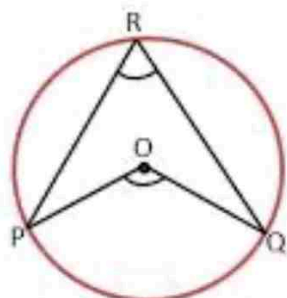


FIGURE (1)

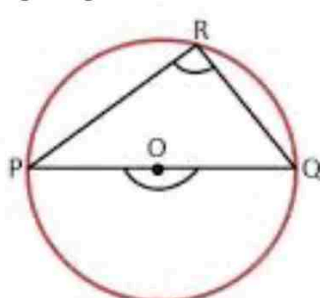


FIGURE (2)

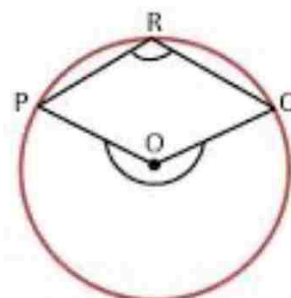


FIGURE (3)

Reason: Angle subtended by the arc at the centre is double the angle subtended by it on the remaining part of the circle

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

UNIT : MENSURATION Chapter 12 : AREA RELATED TO CIRCLES

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.

Q.1. **Assertion (A):** In a circle of radius 6 cm, the angle of a sector is 60° . Then the area of the sector is $132/7 \text{ cm}^2$.

Reason (R): Area of the circle with radius r is πr^2

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

Q. 2. **Assertion:** The length of the minute hand of a clock is 7 cm. Then the area swept by the minute hand in 5 minute is $77/6 \text{ cm}^2$.

Reason (R): The length of an arc of a sector of angle q and radius r is given by

$$l = \frac{\theta}{360^\circ} \times 2\pi r$$

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

Q. 3. **Assertion:** Area of a segment of a circle is less than the area of its corresponding sector.

Reason: The area of the circle inscribed in a square of side a cm, $\pi a^2/4$.

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

Q. 4.Assertion: If outer and inner diameter of a circular path is 10m and 6m then area of path is $16\pi \text{ m}^2$.

Reason: if R and r be the radius of outer and inner circular path = $\pi(R^2 - r^2)$

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

UNIT : MENSURATION

CHAPTER 13 : SURFACE AREAS & VOLUMES

Directions:

a) Both Assertion(A) and Reason (R) are true and Reason (R) is the correct explanation for Assertion (A)

b) Both Assertion(A) and Reason(R) are true but Reason(R) is not correct explanation for Assertion.

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

d) Both Assertion(A) is false and Reason(R) is true.

1.Assertion(A): If we join two hemispheres of same radius along their bases, then we get a sphere.

Reason(R): A tank is made of the shape of a cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and radius is 30 cm. The total surface area of the tank is 3.5 m^2

Ans: b) both Assertion(A) and Reason (R) are true but Reason(R) is not correct explanation for Assertion(A)

2. Assertion(A): The volume of two sphere are in the ratio 27: 8 then the surface area is in the ratio 3:2 .

Reason(R): Volume of sphere = $\frac{4}{3} \pi r^3$ and it's surface area = $4\pi r^2$

Ans: c) both Assertion(A) is true and Reason(R) is false.

3. .Assertion(A): Savita had to make a model of a cylindrical kaleidoscope for her science project. She wanted to use chart paper to make the curved surface of the kaleidoscope. 550cm^2 would be the area of chart paper required by her, if she wanted to make a kaleidoscope of length 25 cm with a 3.5 cm radius.

Reason(R): Area of chart paper required = curved surface area of the kaleidoscope = $2\pi rh$

Ans: a) both Assertion(A) and Reason(R) are true and Reason(R) is correct explanation for Assertion(A).

4. Assertion(A): The lateral surface area of a right circular cone of height 28 cm and base radius 21 cm is 2310 cm^2

Reason(R): Lateral surface area = $\pi r l^2$

Ans: c) Assertion(A) is true but Reason(R) is false.

UNIT - STATISTICS AND PROBABILITY

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.

Q1) **Assertion:** Two dice are thrown simultaneously. There are 11 possible outcomes and each of them has a probability $\frac{1}{11}$.

Reason: Probability of an event (E) is defined as

$$P(E) = \frac{\text{Number of favourable outcomes}}{\text{Total number of possible out come}}$$

Q2) **Assertion:** The probability of an event that cannot happen or which is impossible, is equal to zero.

Reason: The probability lies between 0 and 1. Hence, it cannot be negative.

Q3) **Assertion:** If $P(E) = 0.07$, then its probability of 'not E' is 0.93

Reason: $P(E) + P(\text{not } E) = 1$

Q4) **Assertion:** The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is 14.

Reason: If the probability of an event is p, the probability of its complementary event will be $1 - p$

Q5) **Assertion:** If the value of mode and mean is 60 and 66 respectively, then the value of median is 64.

Reason: $3 \text{ Median} = (\text{Mode} + 2 \text{ Mean})$

Q6)

Assertion : Consider the following frequency distribution:

Class Interval	3-6	6-9	9-12	12-15	15-18	18-21
Frequency	2	5	21	23	10	12

The mode of the above data is 12.4.

Reason : The value of the variable which occurs most often is the mode.

Q7)

Assertion : Consider the following frequency distribution:

Class Interval	10-15	15-20	20-25	25-30	30-35
Frequency	5	9	12	6	8

The modal class is 10-15.

Reason : The class having maximum frequency is called the modal class.

ANS.1) d

ANS2) b

ANS3) a

ANS4) b

ANS5) a

ANS6) b

ANS7) d

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