ASSERTION REASON TYPE QUESTIONS

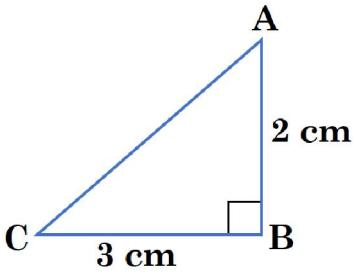
For CBSE 2025 Exams - Mathematics - Class 10

In the following questions, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct answer out of the following choices.

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

◈ Chapter-01 Real Numbers

Q01. **Assertion (A) :** The perimeter of ΔABC is a rational number.
Reason (R) : The sum of the squares of two rational numbers is always rational.



Q02. **Assertion (A) :** The number 5^n cannot end with the digit 0, where n is a natural number.
Reason (R) : Prime factorisation of 5 has only two factors, 1 and 5.

Q03. **Assertion (A) :** $\sqrt{2}(5-\sqrt{2})$ is an irrational number.
Reason (R) : Product of two irrational numbers is always irrational.

Q04. **Assertion (A) :** The HCF of two numbers is 5 and their product is 150. Then their LCM is 40.
Reason (R) : For any two positive integers a and b, $HCF(a, b) \times LCM(a, b) = a \times b$.

◈ Chapter-02 Polynomials

Q01. **Assertion (A) :** The polynomial $p(x) = x^2 + 3x + 3$ has two real zeroes.
Reason (R) : A quadratic polynomial can have at most two real zeroes.

Q02. **Assertion (A) :** Polynomial $x^2 + 4x$ has two real zeroes.
Reason (R) : Zeroes of the polynomial $x^2 + ax$ $(a \neq 0)$ are 0 and a.

Q03. **Assertion (A) :** If one zero of the quadratic polynomial $4x^2 - 10x + (k-4)$ is reciprocal of the other, then value of k is 8.
Reason (R) : Zeroes of the quadratic polynomial $x^2 - 2x + 1$ are real and equal.

Q04. **Assertion (A) :** If $5+\sqrt{7}$ and $5-\sqrt{7}$ are zeroes of a quadratic polynomial, then the polynomial is given by $x^2 - 10x + 18$.
Reason (R) : If α and β are the zeroes of a quadratic polynomial, then the polynomial is given by $x^2 - (\alpha+\beta)x + \alpha\beta$.

◈ Chapter-03 Pair of Linear Equations in Two Variables

Q01. **Assertion (A) :** The system of linear equations $3x + 5y - 4 = 0$ and $15x + 25y - 25 = 0$ is inconsistent.

Reason (R) : The pair of linear equations given by $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ is inconsistent if $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$.

Q02. **Assertion (A) :** Point P(0, 2) is the point of intersection of y-axis with the line $3x+2y=4$.
Reason (R) : The distance of point P(0, 2) from x-axis is 2 units.

Q03. **Assertion (A) :** The pair of linear equations $5x+2y+6=0$ and $7x+6y+18=0$ have infinitely many solutions.
Reason (R) : The pair of linear equations given by $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ have infinitely many solutions, if $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$.

Q04. **Assertion (A) :** The two lines given by $2x+3y=7$ and $4x+6y=14$ intersect at infinite points.
Reason (R) : When $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$, then the system of linear equations $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ has infinite no. of solutions.

◈ Chapter-04 Quadratic Equations

Q01. **Assertion (A) :** Equation $2x^2+3x+4=0$ has no real roots.
Reason (R) : When discriminant of a quadratic equation is zero, then the equation has real and distinct roots.

Q02. **Assertion (A) :** If one root of the quadratic equation $4x^2-10x+(k-4)=0$ is reciprocal of the other, then value of k is 8.
Reason (R) : Roots of the quadratic equation $x^2-x+1=0$ are real.

Q03. **Assertion (A) :** If $5+\sqrt{7}$ is a root of a quadratic equation with rational coefficients, then its other root is $5-\sqrt{7}$.
Reason (R) : Surd roots of a quadratic equation with rational coefficients occur in conjugate pairs.

Q04. **Assertion (A) :** The equation $x^2+6x+9=0$ has real and equal roots.
Reason (R) : When discriminant b^2-4ac of a quadratic equation $ax^2+bx+c=0;\ a\neq0$ is zero, then the equation has real and equal roots.

◈ Chapter-05 Arithmetic Progression

Q01. **Assertion (A) :** a, b, c are in A.P. if and only if $2b=a+c$.
Reason (R) : The sum of first n odd natural numbers is n^2.

Q02. **Assertion (A) :** Common difference of the A.P. 5, 1, –3, –7, … is 4.
Reason (R) : Common difference of the A.P. $a_1, a_2, a_3, ..., a_n$ is obtained by $d=a_n-a_{n-1}$.

Q03. **Assertion (A) :** $-5, -\frac{5}{2}, 0, \frac{5}{2}, ...$ is in arithmetic progression.
Reason (R) : The terms of an Arithmetic Progression cannot have both positive and negative rational numbers.

Q04. **Assertion (A) :** Sum of n terms of an AP is always a quadratic polynomial.
Reason (R) : General term of an AP is always a quadratic polynomial.

◈ Chapter-06 Triangles

Q01. **Assertion (A) :** If two triangles are similar, their corresponding angles are equal.

Reason (R) : Any two equilateral triangles are always similar.

Q02. **Assertion (A) :** If $\Delta_1 \sim \Delta_2$ and $\Delta_2 \sim \Delta_3$, then $\Delta_1 \sim \Delta_3$.

Reason (R) : If one polygon is similar to another polygon and this second polygon is similar to a third polygon, then the first polygon is similar to the third polygon.

Q03. **Assertion (A) :** If two triangles are similar, their corresponding medians are in the same ratio as their corresponding sides.

Reason (R) : Similar triangles have corresponding sides that are proportional.

Q04. **Assertion (A) :** All circles are similar.

Reason (R) : All squares are congruent.

◈ Chapter-07 Coordinate Geometry

Q01. **Assertion (A) :** The point (0, 4) lies on y-axis.

Reason (R) : The x-coordinate of a point, lying on y-axis, is zero.

Q02. **Assertion (A) :** If the points A(4, 3) and B(x, 5) lie on a circle with centre O(2, 3), then the value of x is 2.

Reason (R) : Centre of a circle is the mid-point of each chord of the circle.

Q03. **Assertion (A) :** Mid-point of a line segment divides the line segment in the ratio 1:1.

Reason (R) : The ratio in which the point (–3, k) divides the line segment joining the points (–5, 4) and (–2, 3) is 1:2.

Q04. **Assertion (A) :** The point which divides the line segment joining the points A(1, 2) and B(–1, 1) internally in the ratio 1:2 is $\left(-\frac{1}{3}, \frac{5}{3}\right)$.

Reason (R) : The coordinates of the point which divides the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ in the ratio $m_1 : m_2$ are $\left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$.

◈ Chapter-08 Introduction to Trigonometry

Q01. **Assertion (A) :** For $0^\circ < \theta \le 90^\circ$, $\operatorname{cosec}\theta - \cot\theta$ and $\operatorname{cosec}\theta + \cot\theta$ are the reciprocal of each other.

Reason (R) : $\cot^2\theta - \operatorname{cosec}^2\theta = 1$.

Q02. **Assertion (A) :** If $\sin A = \frac{1}{3}$, $(0^\circ < A < 90^\circ)$, then the value of $\cos A$ is $\frac{2\sqrt{2}}{3}$.

Reason (R) : For every angle θ, $\sin^2\theta + \cos^2\theta = 1$.

Q03. **Assertion (A) :** Maximum value of $\frac{1}{\sec\theta} + \frac{1}{\operatorname{cosec}\theta}$ is 1.

Reason (R) : Maximum value of both $\sin\theta$ and $\cos\theta$ is 1.

Q04. **Assertion (A) :** Value of $\sin\theta$ can never be $\frac{21}{22}$.

Reason (R) : Maximum value of $\sin\theta$ is 1.

Q05. **Assertion (A) :** Value of $\cos\theta$ can never be $\frac{22}{21}$.

Reason (R) : Maximum value of $\cos\theta$ is 1.

Q06. **Assertion (A) :** Value of $\tan 60^\circ$ is less than the value of $\tan 45^\circ$.

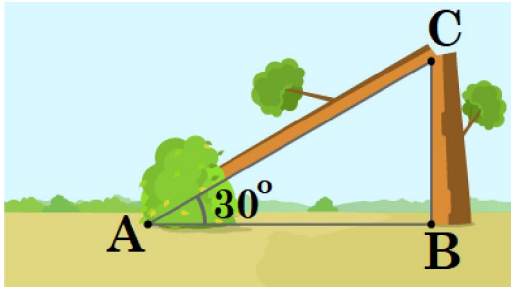
Reason (R) : When $0^\circ < \theta < 90^\circ$, the value of $\tan\theta$ increases as θ increases.

Q07. **Assertion (A) :** If $\sin x = \frac{1}{2}$, then the value of $\cos 2x$ is also $\frac{1}{2}$.

Reason (R) : If $\tan y = 1$, then $y = 45^\circ$.

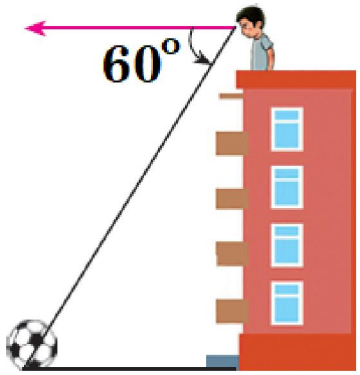
◈ Chapter-09 Applications of Trigonometry

Q01. Refer the diagram shown below.



Assertion (A) : Angle of elevation is 30°.
Reason (R) : An angle of elevation is the angle formed between the line of sight and the horizontal line when looking upward from a point.

Q02. Refer the diagram shown below.



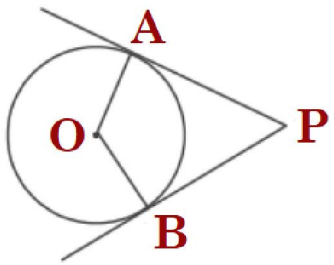
Assertion (A) : Angle of depression is 60°.
Reason (R) : The angle of depression is the angle formed between the line of sight and the horizontal line when looking downward from a point.

◈ Chapter-10 Circles

Q01. **Assertion (A) :** A tangent to a circle is perpendicular to the radius through the point of contact.
Reason (R) : The lengths of tangents drawn from the external point to a circle are equal.

Q02. **Assertion (A) :** The tangents drawn at the end points of a diameter of a circle, are parallel.
Reason (R) : Diameter of a circle is the longest chord.

Q03.



Assertion (A) : If the PA and PB are tangents drawn to a circle with centre O from an external point P, then the quadrilateral OAPB is a cyclic quadrilateral.
Reason (R) : In a cyclic quadrilateral, opposite angles are equal.

◈ Chapter-11 Areas Related to Circles

Q01. **Assertion (A) :** The area of the sector of a circle of radius 14 cm and central angle 90° is $154\ \text{cm}^2$.

Reason (R) : The area of the sector of a circle of radius r and central angle θ is $\pi r^2 \times \frac{\theta}{360}$.

Q02. **Assertion (A) :** If the circumference of a circle is 176 cm, then its radius is 28 cm.
Reason (R) : Circumference $= 2\pi \times$ radius of a circle.

Q03. **Assertion (A) :** The length of the minute hand of a clock is 7 cm. Then the area swept by minute hand in 5 minute is $\frac{53}{6}$ cm^2.

Reason (R) : The length of an arc of a sector of angle and radius r is given by $l = \frac{\theta}{360^o} \times 2\pi r$.

Q04. **Assertion (A) :** In a circle of radius 6 cm, the angle of a sector 60^o. Then the area of the sector is $18\frac{6}{7}$ cm^2.

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

◈ Chapter-12 Surface Areas and Volumes

Q01. **Assertion (A) :** The surface area of largest sphere that can be inscribed in a hollow cube of side 'a' cm is πa^2 cm^2.

Reason (R) : The surface area of a sphere of radius 'r' is $\frac{4}{3}\pi r^3$.

Q02. **Assertion (A) :** The diameter of a sphere, whose surface area is 616 cm^2, is 7 cm.

Reason (R) : The surface area of a sphere of radius r is $4\pi r^2$.

Q03. **Assertion (A) :** Two cubes each of edge length 10 cm are joined together. The total surface area of newly formed cuboid is 1200 cm^2.

Reason (R) : Area of each surface of a cube of side 10 cm is 100 cm^2.

Q04. **Assertion (A) :** Total surface area of the top is the sum of curved surface area of the hemisphere and the curved surface area of the cone.

Reason (R) : Top is obtained by fixing the plane surface of the hemisphere and cone together.

◈ Chapter-13 Statistics

Q01. **Assertion (A) :** If the Mean and the Median of a distribution are 169 and 170 respectively, then its Mode is 172.

Reason (R) : The relation between Mean, Median and Mode is Mode = 3 Median – 2 Mean.

Q02. **Assertion (A) :** Mean is the average of all the observations.

Reason (R) : If each observation is increased by 10, mean will also be increased by 10.

◈ Chapter-14 Probability

Q01. **Assertion (A) :** Two players, Sania and Ashnam play a tennis match. The probability of Sania winning the match is 0.79 and that of Ashnam winning the match is 0.21.

Reason (R) : The sum of probabilities of two complementary events is 1.

Q02. **Assertion (A) :** A fair die is thrown once. The probability of getting a prime number is $\frac{1}{2}$.

Reason (R) : A natural number is a prime number if it has only two factors.

Q03. **Assertion (A) :** The probability of getting a prime number, when a die is thrown once, is $\frac{2}{3}$.

Reason (R) : On the faces of a die, prime numbers are 2, 3, and 5.

Q04. **Assertion (A) :** When two coins are tossed together, the probability of getting no tail is $\frac{1}{4}$.

Reason (R) : The probability P(E) of an event E satisfies $0 \le P(E) \le 1$.

Q05. **Assertion (A) :** The probability that a leap year has 53 Sundays is $\frac{2}{7}$.

Reason (R) : The probability that a non-leap year has 53 Sundays is $\frac{1}{7}$.

Q06. **Assertion (A) :** The probability of randomly drawing a card with an even number from a box containing cards numbered 1 to 100 is $\frac{1}{2}$.

Reason (R) : $P(\text{event}) = \frac{\text{Number of favourable outcomes}}{\text{Total number of possible outcomes}}$.

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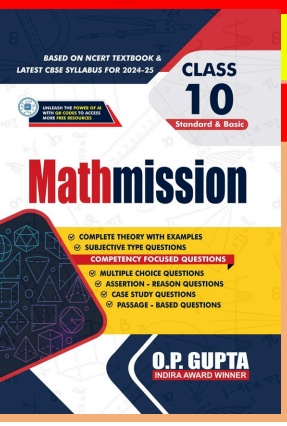

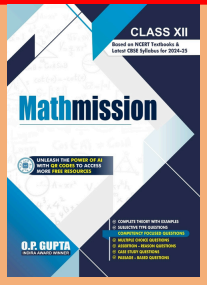

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