Sunrise Academy

Half Yearly · 40 Questions

Date: 20 Sep 2026

Class IX · Mathematics

Duration: 120 Minutes

Max. Marks: 80

Section A — 1 Mark Questions

Q1. Angle sum of an octagon

(A) 1080°
(B) 1440°
(C) 900°
(D) 720°

Q2. If $p(x) = 2x^2 - 3x + 1$, then $p(2)$ is

(A) 5
(B) -3
(C) 3
(D) 15

Q3. The perpendicular from the centre of a circle bisects the:

(A) circle
(B) circumference
(C) chord
(D) radius.

Q4. The area of the quadrant of a circle whose radius is 7 cm is

(A) $38.5\ \text{cm}^2$
(B) $38\ \text{cm}^2$
(C) $37.5\ \text{cm}^2$
(D) $42\ \text{cm}^2$

Q5. A sequence is given by $s_1 = 2$, $s_n = s_{n-1}(s_{n-1} - 1)$ for $n \geq 2$. The value of s_4 is

(A) 6
(B) 42
(C) 2
(D) 0

Q6. If $x + \frac{1}{x} = 3$, then the value of $x^3 + \frac{1}{x^3}$ is

(A) 18
(B) 27
(C) 24
(D) 36

Q7. The area of an equilateral triangle is $16\sqrt{3}\ \text{cm}^2$. Its perimeter is

(A) 12 cm
(B) 16 cm
(C) 24 cm
(D) 48 cm

Q8. Using Heron's formula, the area of a triangle with sides 5 cm, 12 cm, and 13 cm is:

(A) $30\ \text{cm}^2$
(B) $60\ \text{cm}^2$
(C) $78\ \text{cm}^2$
(D) $90\ \text{cm}^2$

Q9. The perimeter of a sector of a circle of radius 7 cm is 25 cm. The angle of the sector is ($\pi = \frac{22}{7}$)

(A) $60°$
(B) $120°$
(C) $90°$
(D) $45°$

Q10. A pit is dug to depth 6 hastas for a length of 3 hastas, depth 4 hastas for the next 5 hastas and depth 2 hastas for the last 2 hastas. Using Brahmagupta's formula, its mean depth is

(A) 4 hastas **(B)** 3.6 hastas

(C) 4.8 hastas **(D)** 4.2 hastas

Q11. 300 mL of kadha with 12% spice mix is to be mixed with kadha that has 4% spice mix so that the mixture has 10% spice mix. The quantity of the 4% kadha needed is

(A) 300 mL **(B)** 150 mL

(C) 200 mL **(D)** 100 mL

Q12. When $9 - 2y = 5x$ is written in the form $ax + by + c = 0$ with $a = 5$, the values of b and c are

(A) $b = -2, c = 9$ **(B)** $b = 2, c = -9$

(C) $b = 2, c = 9$ **(D)** $b = -2, c = -9$

Q13. How many factor-partner pairs does 144 have, and how many factors?

(A) 7 pairs, 14 factors **(B)** 8 pairs, 16 factors

(C) 8 pairs, 15 factors **(D)** 15 pairs, 15 factors

Q14. The steps below find 1 + 2 + … + 10 by the reversal method, but they are jumbled.

(a) Add the two equations: 2S = 11 + 11 + … + 11 (10 times).

(b) Write S = 1 + 2 + 3 + … + 10.

(c) So 2S = 110, giving S = 55.

(d) Write the same sum in reverse: S = 10 + 9 + 8 + … + 1.

The correct order is

(A) b, a, d, c **(B)** b, d, a, c

(C) d, b, c, a **(D)** b, d, c, a

Q15. In parallelogram PQRS, ∠P = 65°. Then ∠R is

(A) 115° **(B)** 25°

(C) 65° **(D)** 130°

Q16. The distance of the point $(4, 10)$ from the y-axis is

(A) 4 units **(B)** 14 units

(C) 6 units **(D)** 10 units

Q17. Assertion (A): An algorithm must always produce an output.

Reason (R): An algorithm has a finite number of well-defined steps.

(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.

Q18. Assertion (A): The centroid M of $\triangle ABC$ divides the median AR so that AM : MR = 1 : 2.
Reason (R): The point where the medians meet divides each median in the ratio 2 : 1, with the longer part connecting to the vertex.

(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.

Q19. Assertion (A): Euclid's subtraction algorithm finds gcd(99, 2) after only 2 reductions.
Reason (R): m mod n stands for the remainder when m is divided by n.

(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.

Q20. Assertion (A): The graph of $y = 2x + 1$ is a straight line.
Reason (R): The graph of every linear polynomial is a straight 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.

Section B — 2 Marks Questions

Q1. For the question 'Will it rain tomorrow?' the sample space {Rain, No Rain} is used. If we also want to know how much it rains, what sample space should we use? Why?

Q2. Show that $(1, 2)$, $(5, 2)$, $(5, 6)$ and $(1, 6)$ are the corners of a square, and find its area.

Q3. The radius of a sphere is increased by 10%. Show that the volume increases by approximately 33.1%.

Q4. The graphs of $y = \frac{1}{2}x$, $y = x$ and $y = 2x$ are drawn on the same axes (you may also plot $y = 3x$ and $y = \frac{1}{3}x$). What can you conclude about the line $y = ax$, $a > 0$, as a varies? What happens when $a > 1$ and when $a < 1$?

Q5. An isosceles triangle has equal sides 10 cm each and base 12 cm. Find its area using the result area $= b\sqrt{a^2 - b^2}$ (equal sides a, base $2b$), and check it by Heron's formula.

Q6. Does a pair of linear equations always have either a unique solution or infinitely many solutions? Examine $x - y = 10$ and $10x - 10y = 101$, give one more pair with no solution, and state the rule.

Q7. Metal spheres, each of radius 2 cm, are packed into a rectangular box of internal dimensions 16 cm × 8 cm × 8 cm. When 16 spheres are packed, the box is filled with preservative liquid. Find the volume of this liquid. Round your answer to the nearest integer.

Q8. Can a quadrilateral have angles 110°, 80°, 70° and 95°? Justify.

Section C — 3 Marks Questions

Q1. Find the value of the quadratic polynomial $7s^2 - 4s + 6$ if:
(i) s = 0
(ii) s = −3
(iii) s = 4

Q2. A pump fills a tank in which the water is 2 m high at the start. The height rises by 0.25 m every hour. (i) Write the height h after t hours. (ii) Make a table for $t = 0$ to 4. (iii) After how many hours will the height be 3.5 m?

Q3. A cylindrical glass of radius 3 cm has water up to a height of 10 cm. A crow drops marbles of radius 1 cm into it. How many marbles are needed to raise the water level to 14 cm?

Q4. For the GP 1250, 250, 50, …
(i) find the common ratio and write the explicit formula;
(ii) write the recursive formula;
(iii) find which term is $\frac{2}{5}$.

Q5. A square ABCD is inscribed in a circle of radius 8 cm. Find the side of the square and the distance of each side from the centre.

Q6. Using $(px + a)(qx + b) = pq\,x^2 + (pb + qa)x + ab$, find $(3x + 2)(4x - 5)$. Verify by the distributive property and check for $x = 1$.

Q7. A mobile plan charges ₹99 per month plus ₹2 per minute of calls. Let x be the number of minutes and y the monthly bill.

(a) The bill is given by

(A) $y = 99x + 2$ **(B)** $y = 101x$
(C) $y = 2x - 99$ **(D)** $y = 2x + 99$

(b) The bill for 50 minutes is

(A) ₹199 **(B)** ₹149
(C) ₹101 **(D)** ₹249

(c) The slope of the graph represents the

(A) fixed monthly charge **(B)** cost per minute
(C) total bill **(D)** number of minutes

Q8. A spherical ball of radius 7 cm is placed inside a cubical box that just fits it. Take $\pi = \frac{22}{7}$.

(a) The edge of the box is

(A) 7 cm **(B)** 21 cm

(C) 14 cm **(D)** 28 cm

(b) The volume of the box is

(A) 1,437 cm³ **(B)** 343 cm³

(C) 196 cm³ **(D)** 2,744 cm³

(c) The empty space in the box is about

(A) 1,306.7 cm³ **(B)** 1,437.3 cm³

(C) 2,744 cm³ **(D)** 616 cm³

Section D — 5 Marks Questions

Q1. In $\triangle ABC$, $\angle A = 90°$. Prove that the circle with BC as diameter passes through A. (Hint: suppose A is not on the circle; consider the cases A outside and A inside the circle, and use an exterior angle of a triangle.)

Q2. Two parallel chords of lengths 10 cm and 24 cm are on the same side of the centre of a circle. The distance between the chords is 7 cm. Find the radius of the circle.

Q3. Find gcd(1575, 1155) in three ways: (i) by comparing prime factorisations, (ii) by Euclid's subtraction algorithm, (iii) by Āryabhaṭa's division algorithm. Count the reductions in (ii) and (iii) and comment.

Q4. Let $a = \frac{2}{9}$ and $b = \frac{1}{3}$.

(i) Write a and b with denominator 18. How many rational numbers with denominator 18 and an integer numerator lie strictly between them?

(ii) Find the smallest common denominator m (a multiple of 18) for which at least five such numbers lie between a and b, and write five of them in lowest terms.

(iii) In general, if $a = \frac{k_1}{m}$ and $b = \frac{k_2}{m}$, how many numbers $\frac{k}{m}$ with integer k lie strictly between a and b?