CBSE 2023 Maths Standard — Set 1

English Medium

Time Allowed: 3 Hours | Maximum Marks: 80

General Instructions:

1. This question paper contains 38 questions. All questions are compulsory.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 6 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case-study based questions carrying 4 marks each.
7. Draw neat figures wherever required.

Section A

Multiple Choice Questions (1 mark each)

Q.1 [1 mark]

The graph of y = p(x) is given, for a polynomial p(x). The number of zeroes of p(x) from the graph is

(a) 3

(b) 1

(c) 2

(d) 0

Q.2 [1 mark]

The value of k for which the pair of equations kx = y + 2 and 6x = 2y + 3 has infinitely many solutions,

(a) is k = 3

(b) does not exist

(c) is k = -3

(d) is k = 4

Q.3 [1 mark]

If p - 1, p + 1 and 2p + 3 are in A.P., then the value of p is

(a) -2

(b) 4

(c) 0

(d) 2

Q.4 [1 mark]

In what ratio does the x-axis divide the line segment joining the points A(3, 6) and B(-12, -3)?

(a) 1 : 2

(b) 1 : 4

(c) 4 : 1

(d) 2 : 1

Q.5 [1 mark]

In the given figure, PQ is tangent to the circle centred at O. If angle AOB = 95 degrees, then the measure of angle ABQ will be

(a) 47.5 degrees

(b) 42.5 degrees

(c) 85 degrees

(d) 95 degrees

Q.6 [1 mark]

If 2 tan A = 3, then the value of (4 sin A + 3 cos A)/(4 sin A - 3 cos A) is

(a) 7/sqrt(13)

(b) 1/sqrt(13)

(c) 3

(d) does not exist

Q.7 [1 mark]

If alpha and beta are the zeroes of a polynomial p(x) = x^2 + x - 1, then 1/alpha + 1/beta equals

(a) 1

(b) 2

(c) -1

(d) -1/2

Q.8 [1 mark]

The least positive value of k, for which the quadratic equation 2x^2 + kx - 4 = 0 has rational roots, is

(a) +/- 2*sqrt(2)

(b) 2

(c) +/- 2

(d) sqrt(2)

Q.9 [1 mark]

(3/4)*tan^2(30) - sec^2(45) + sin^2(60) is equal to

(a) -1

(b) 5/6

(c) -3/2

(d) 1/6

Q.10 [1 mark]

Curved surface area of a cylinder of height 5 cm is 94.2 cm^2. Radius of the cylinder is (Take pi = 3.14)

(a) 2 cm

(b) 3 cm

(c) 2.9 cm

(d) 6 cm

Q.11 [1 mark]

The distribution below gives the marks obtained by 80 students on a test:

Marks: Less than 10 | Less than 20 | Less than 30 | Less than 40 | Less than 50 | Less than 60
Number of Students: 3 | 12 | 27 | 57 | 75 | 80

The modal class of this distribution is:

(a) 10-20

(b) 20-30

(c) 30-40

(d) 50-60

Q.12 [1 mark]

The curved surface area of a cone having height 24 cm and radius 7 cm, is

(a) 528 cm^2
(b) 1056 cm^2
(c) 550 cm^2
(d) 500 cm^2

Q.13 [1 mark]

The distance between the points (0, 2*sqrt(5)) and (-2*sqrt(5), 0) is

(a) 2*sqrt(10) units
(b) 4*sqrt(10) units
(c) 2*sqrt(20) units
(d) 0

Q.14 [1 mark]

Which of the following is a quadratic polynomial having zeroes -2/3 and 2/3?

(a) 4x^2 - 9
(b) (4/9)*(9x^2 + 4)
(c) x^2 + 9/4
(d) 5(9x^2 - 4)

Q.15 [1 mark]

If the value of each observation of a statistical data is increased by 3, then the mean of the data

(a) remains unchanged
(b) increases by 3
(c) increases by 6
(d) increases by 3n

Q.16 [1 mark]

Probability of happening of an event is denoted by p and probability of

non-happening of the event is denoted by q. Relation between p and q is

(a) $p + q = 1$
(b) $p = 1, q = 1$
(c) $p = q - 1$
(d) $p + q + 1 = 0$

Q.17 [1 mark]

A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought?

(a) 40
(b) 240
(c) 480
(d) 750

Q.18 [1 mark]

In a group of 20 people, 5 can't swim. If one person is selected at random, then the probability that he/she can swim, is

(a) 3/4
(b) 1/3
(c) 1
(d) 1/4

Q.19 [1 mark]

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.

Select the correct option:

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

(d) A is false but R is true

Q.20 [1 mark]

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

Triangle ABC has: AB = 2 cm (vertical side), BC = 3 cm (horizontal side), and angle B = 90 degrees.

Select the correct option:

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

Section B

Very Short Answer Questions (2 marks each)

Q.21 [2 marks]

(a) Solve the pair of equations x = 3 and y = -4 graphically.

OR

(b) Using graphical method, find whether the following system of linear equations is consistent or not: x = 0 and y = -7.

Q.23 [2 marks]

(a) If sin theta + cos theta = sqrt(3), then find the value of sin theta * cos theta.

OR

(b) If sin alpha = 1/sqrt(2) and cot beta = sqrt(3), then find the value of cosec alpha + cosec beta.

Q.24 [2 marks]

Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively.

Q.25 [2 marks]

A bag contains 4 red, 3 blue and 2 yellow balls. One ball is drawn at random from the bag. Find the probability that the drawn ball is (i) red (ii) yellow.

Q.26 [2 marks]

Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers.

Section C

Short Answer Questions (3 marks each)

Q.28 [3 marks]

If (-5, 3) and (5, 3) are two vertices of an equilateral triangle, then find the coordinates of the third vertex, given that the origin lies inside the triangle. (Take sqrt(3) = 1.7)

Q.29 [3 marks]

(b) A circle is inscribed in a quadrilateral ABCD in which angle B = 90 degrees. If AD = 17 cm, AB = 20 cm and DS = 3 cm, then find the radius of the circle.

Q.31 [3 marks]

(a) A room is in the form of a cylinder surmounted by a hemispherical dome. The base radius of hemisphere is one-half the height of the cylindrical part. Find the total height of the room if it contains (1408/21) m^3 of air. (Take pi = 22/7)

OR

(b) An empty cone is of radius 3 cm and height 12 cm. Ice-cream is filled in it so that the lower part of the cone which is (1/6)th of the volume of the cone is unfilled but hemisphere is formed on the top. Find the volume of the ice-cream. (Take pi = 3.14)

Section D

Long Answer Questions (5 marks each)

Q.33 [5 marks]

(a) The angle of elevation of the top of a tower 24 m high from the foot of another tower in the same plane is 60 degrees. The angle of elevation of the top of the second tower from the foot of the first tower is 30 degrees. Find the distance between two towers and the height of the other tower. Also, find the length of the wire attached to the tops of both the towers.

OR

(b) A spherical balloon of radius r subtends an angle of 60 degrees at the eye of an observer. If the angle of elevation of its centre is 45 degrees from the same point, then prove that the height of the centre of the balloon is sqrt(2) times its radius.

Q.34 [5 marks]

A chord of a circle of radius 14 cm subtends an angle of 60 degrees at the centre. Find the area of the corresponding minor segment of the circle. Also find the area of the major segment of the circle.

Q.35 [5 marks]

(a) The ratio of the 11th term to the 17th term of an A.P. is 3 : 4. Find the ratio of the 5th term to the 21st term of the same A.P. Also, find the ratio of the sum of first 5 terms to that of first 21 terms.

OR

(b) 250 logs are stacked in the following manner: 22 logs in the bottom row, 21 in the next row, 20 in the row next to it and so on (as shown by an example). In how many rows are the 250 logs placed and how many logs are there in the top row?

Q.36(a) [5 marks]

Case Study: While designing the school year book, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide.

(I) Write an algebraic equation depicting the above information.

Q.36(b) [5 marks]

Case Study (continued): The original photo is 18 cm long and 12 cm wide. Length and width are each increased by x units to double the area.

(II) Write the corresponding quadratic equation in standard form.

Q.36(c) [5 marks]

Case Study (continued): The original photo is 18 cm long and 12 cm wide. $x^2 + 30x - 216 = 0$.

(III) What should be the new dimensions of the enlarged photo?

OR

Q.36(c) [5 marks]

Case Study (continued): The original photo is 18 cm long and 12 cm wide. $x^2 + 30x - 216 = 0$.

(III) OR: Can any rational value of x make the new area equal to 220 cm^2?

Q.37(a) [4 marks]

Case Study: India Meteorological Department observes seasonal and annual rainfall every year in different sub-divisions of our country. The table given below shows sub-division wise seasonal (monsoon) rainfall (mm) in 2018:

Rainfall (mm)	Number of Sub-divisions
200-400	2
400-600	4
600-800	7
800-1000	4
1000-1200	2
1200-1400	3
1400-1600	1
1600-1800	1

(I) Write the modal class.

Q.37(b) [4 marks]

Case Study (continued): Rainfall data:
200-400: 2 | 400-600: 4 | 600-800: 7 | 800-1000: 4 | 1000-1200: 2 | 1200-1400: 3 | 1400-1600: 1 | 1600-1800: 1

(II) Find the median of the given data.

OR

Q.37(b) [4 marks]

Case Study (continued): Rainfall data:
200-400: 2 | 400-600: 4 | 600-800: 7 | 800-1000: 4 | 1000-1200: 2 | 1200-1400: 3 | 1400-1600: 1 | 1600-1800: 1

OR: Find the mean rainfall in this season.

Q.37(c) [4 marks]

Case Study (continued): Rainfall data:
200-400: 2 | 400-600: 4 | 600-800: 7 | 800-1000: 4 | 1000-1200: 2 | 1200-1400: 3 | 1400-1600: 1 | 1600-1800: 1

(III) If sub-division having at least 1000 mm rainfall during monsoon season is considered good rainfall sub-division, then how many sub-divisions had good rainfall?

Q.38(a) [4 marks]

Case Study: The discus throw is an event in which an athlete attempts to throw a discus. The athlete spins anti-clockwise around one and a half times through a circle, then releases the throw. When released, the discus travels along tangent to the circular spin orbit.

In the given figure, AB is one such tangent to a circle of radius 75 cm. Point

O is the centre of the circle and angle ABO = 30 degrees. PQ is parallel to OA.

(a) Find the length of AB.

Q.38(b) [4 marks]

Case Study (continued): Circle with centre O, radius 75 cm. AB is tangent at A, angle ABO = 30 degrees, PQ parallel to OA.

(b) Find the length of OB.

Q.38(c) [4 marks]

Case Study (continued): Circle with centre O, radius 75 cm. AB is tangent at A, angle ABO = 30 degrees. PQ is parallel to OA, where P is the point where OB intersects the circle and Q is on OB.

(c) Find the length of AP.

OR

Find the length of PQ.