Series WX1YZ/2

SET~1

रोल नं.
Roll No.

| 1 | 5 | 1 | 2 | 6 | 2 | 3 | 9 |
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प्रश्न-पत्र कोड
Q.P. Code **30/2/1**

परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।
Candidates must write the Q.P. Code on the title page of the answer-book.

# गणित (मानक)
# MATHEMATICS (STANDARD)

*

निर्धारित समय : 3 घण्टे
Time allowed : 3 hours

अधिकतम अंक : 80
Maximum Marks : 80

नोट / NOTE :

(i) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **23** हैं ।
Please check that this question paper contains **23** printed pages.

(ii) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

(iii) कृपया जाँच कर लें कि इस प्रश्न-पत्र में **38** प्रश्न हैं ।
Please check that this question paper contains **38** questions.

(iv) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें ।
**Please write down the serial number of the question in the answer-book before attempting it.**

(v) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा । 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।
15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

***General Instructions :***

*Read the following instructions very carefully and strictly follow them :*

*(i)* *This question paper contains **38** questions. **All** questions are **compulsory**.*

*(ii)* *This question paper is divided into **five** Sections – **A**, **B**, **C**, **D** and **E**.*

*(iii)* *In **Section A**, Questions no. **1** to **18** are multiple choice questions (MCQs) and questions number **19** and **20** are Assertion-Reason based questions of **1** mark each.*

*(iv)* *In **Section B**, Questions no. **21** to **25** are very short answer (VSA) type questions, carrying **2** marks each.*

*(v)* *In **Section C**, Questions no. **26** to **31** are short answer (SA) type questions, carrying **3** marks each.*

*(vi)* *In **Section D**, Questions no. **32** to **35** are long answer (LA) type questions carrying **5** marks each.*

*(vii)* *In **Section E**, Questions no. **36** to **38** are case study based questions carrying **4** marks each. Internal choice is provided in **2** marks questions in each case-study.*

*(viii)* *There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.*

*(ix)* *Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.*

*(x)* *Use of calculators is **not** allowed.*

## SECTION A

*This section comprises multiple choice questions (MCQs) of 1 mark each.*

**1.** Which of the following quadratic equations has sum of its roots as 4 ?

(a) $2x^2 - 4x + 8 = 0$ (b) $-x^2 + 4x + 4 = 0$

(c) $\sqrt{2}x^2 - \frac{4}{\sqrt{2}}x + 1 = 0$ (d) $4x^2 - 4x + 4 = 0$

**2.** What is the length of the arc of the sector of a circle with radius 14 cm and of central angle 90° ?

(a) 22 cm (b) 44 cm

(c) 88 cm (d) 11 cm

3. If $\Delta ABC \sim \Delta PQR$ with $\angle A = 32°$ and $\angle R = 65°$, then the measure of $\angle B$ is :

(a) $32°$ (b) $65°$

(c) $83°$ (d) $97°$

4. If 'p' and 'q' are natural numbers and 'p' is the multiple of 'q', then what is the HCF of 'p' and 'q' ?

(a) pq (b) p

(c) q (d) p + q

5. The coordinates of the vertex A of a rectangle ABCD whose three vertices are given as B(0, 0), C(3, 0) and D(0, 4) are :

(a) (4, 0) (b) (0, 3)

(c) (3, 4) (d) (4, 3)

6. If the pair of equations $3x - y + 8 = 0$ and $6x - ry + 16 = 0$ represent coincident lines, then the value of 'r' is :

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$

(c) $-2$ (d) 2

7. A bag contains 100 cards numbered 1 to 100. A card is drawn at random from the bag. What is the probability that the number on the card is a perfect cube ?

(a) $\frac{1}{20}$ (b) $\frac{3}{50}$

(c) $\frac{1}{25}$ (d) $\frac{7}{100}$

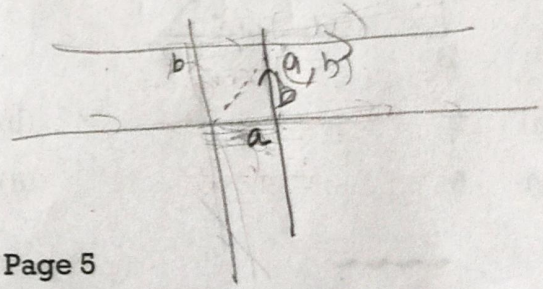
8. The pair of equations $x = a$ and $y = b$ graphically represents lines which are :

(a) parallel

(b) intersecting at (b, a)

(c) coincident

(d) intersecting at (a, b)



9. If one zero of the polynomial $6x^2 + 37x - (k - 2)$ is reciprocal of the other, then what is the value of k ?

(a) $-4$ (b) $-6$

(c) 6 (d) 4

10. What is the total surface area of a solid hemisphere of diameter 'd' ?

(a) $3\pi d^2$ (b) $2\pi d^2$

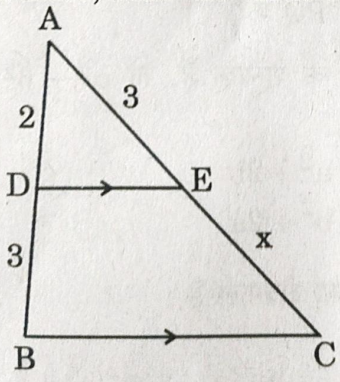
(c) $\frac{1}{2}\pi d^2$ (d) $\frac{3}{4}\pi d^2$

11. If three coins are tossed simultaneously, what is the probability of getting at most one tail ?

(a) $\frac{3}{8}$ (b) $\frac{4}{8}$

(c) $\frac{5}{8}$ (d) $\frac{7}{8}$

12. In the given figure, DE $\parallel$ BC. If AD = 2 units, DB = AE = 3 units and EC = x units, then the value of x is :




(a) 2 (b) 3

(c) 5 (d) $\frac{9}{2}$

13. The hour-hand of a clock is 6 cm long. The angle swept by it between 7:20 a.m. and 7:55 a.m. is :

(a) $\left(\frac{35}{4}\right)^\circ$ (b) $\left(\frac{35}{2}\right)^\circ$

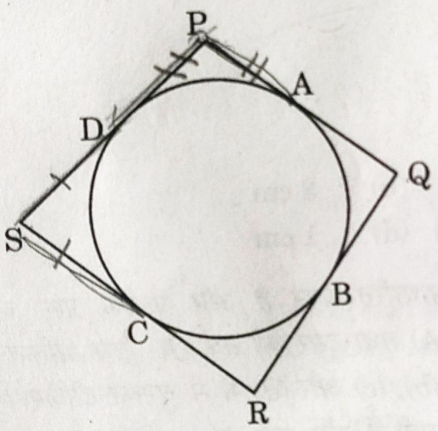
(c) $35^\circ$ (d) $70^\circ$

14. The zeroes of the polynomial $p(x) = x^2 + 4x + 3$ are given by :

(a) 1, 3 (b) −1, 3

(c) 1, −3 (d) −1, −3

15. In the given figure, the quadrilateral PQRS circumscribes a circle. Here PA + CS is equal to :




(a) QR (b) PR

(c) PS (d) PQ

16. If $\alpha$ and $\beta$ are the zeroes of the quadratic polynomial $p(x) = x^2 - ax - b$, then the value of $\alpha^2 + \beta^2$ is :

(a) $a^2 - 2b$ (b) $a^2 + 2b$

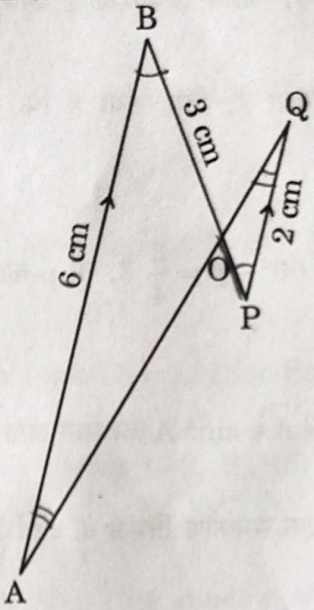
(c) $b^2 - 2a$ (d) $b^2 + 2a$

17. The area of the triangle formed by the line $\frac{x}{a} + \frac{y}{b} = 1$ with the coordinate axes is :

(a) ab (b) $\frac{1}{2}ab$

(c) $\frac{1}{4}ab$ (d) 2ab

18. In the given figure, AB ∥ PQ. If AB = 6 cm, PQ = 2 cm and OB = 3 cm, then the length of OP is :




△ AOB ~ △ QOP

(a) 9 cm (b) 3 cm

(c) 4 cm (d) 1 cm

*Questions number **19** and **20** are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.*

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

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of the Assertion (A).

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

(d) Assertion (A) is false, but Reason (R) is true.

19. *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 an external point to a circle are equal. → (B)

20. *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. → (D)



D = 9 − 12 = −3

## SECTION B

*This section comprises very short answer (VSA) type questions of 2 marks each.*

**21.** Prove that $2 + \sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

**22.** (a) If $4\cot^2 45° - \sec^2 60° + \sin^2 60° + p = \frac{3}{4}$, then find the value of p.

**OR**

(b) If $\cos A + \cos^2 A = 1$, then find the value of $\sin^2 A + \sin^4 A$.

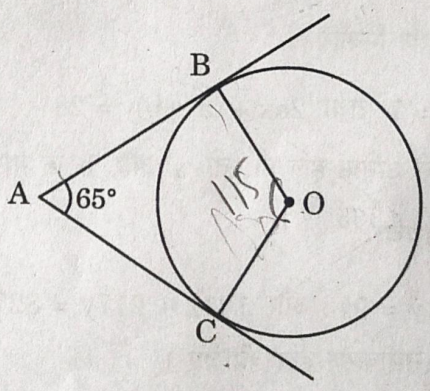
**23.** Show that the points $(-2, 3)$, $(8, 3)$ and $(6, 7)$ are the vertices of a right-angled triangle.

**24.** (a) The length of the shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. Find the angle of elevation of the sun.

**OR**

(b) The angle of elevation of the top of a tower from a point on the ground which is 30 m away from the foot of the tower, is 30°. Find the height of the tower.

**25.** In the given figure, O is the centre of the circle. AB and AC are tangents drawn to the circle from point A. If $\angle BAC = 65°$, then find the measure of $\angle BOC$.



## SECTION C

*This section comprises of short answer (SA) type questions of 3 marks each.*

**26.** (a) Find by prime factorisation the LCM of the numbers 18180 and 7575. Also, find the HCF of the two numbers.

**OR**

(b) Three bells ring at intervals of 6, 12 and 18 minutes. If all the three bells rang at 6 a.m., when will they ring together again ?

**27.** Prove that :

$$\left(\frac{1}{\cos\theta} - \cos\theta\right)\left(\frac{1}{\sin\theta} - \sin\theta\right) = \frac{1}{\tan\theta + \cot\theta}.$$

**28.** If Q(0, 1) is equidistant from P(5, – 3) and R(x, 6), find the values of x.

**29.** A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120°. Find the total area cleaned at each sweep of the two blades.

**30.** (a) If the system of linear equations

$2x + 3y = 7$ and $2ax + (a + b)y = 28$

have infinite number of solutions, then find the values of 'a' and 'b'.

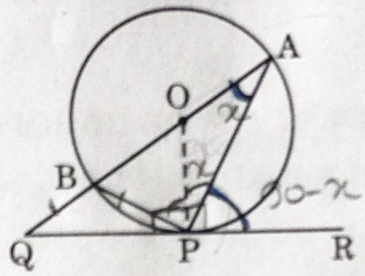
**OR**

(b) If $217x + 131y = 913$ and

$131x + 217y = 827$,

then solve the equations for the values of x and y.

31. In the given figure, O is the centre of the circle and QPR is a tangent to it at P. Prove that $\angle QAP + \angle APR = 90°$.




## SECTION D

*This section comprises long answer (LA) type questions of 5 marks each.*

32. How many terms of the arithmetic progression 45, 39, 33, ..... must be taken so that their sum is 180 ? Explain the double answer.

33. (a) As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 60°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.
(Use $\sqrt{3} = 1{\cdot}73$)

**OR**

(b) From a point on the ground, the angle of elevation of the bottom and top of a transmission tower fixed at the top of 30 m high building are 30° and 60°, respectively. Find the height of the transmission tower. (Use $\sqrt{3} = 1{\cdot}73$)

34. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarised it in the table given below. Find the mean and median of the following data.

| Number of cars | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 | 60 – 70 | 70 – 80 |
|---|---|---|---|---|---|---|---|---|
| Frequency (periods) | 7 | 14 | 13 | 12 | 20 | 11 | 15 | 8 |

35. (a) Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of Δ PQR. Show that Δ ABC ~ Δ PQR.

**OR**

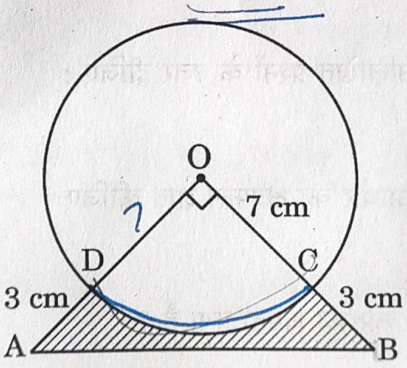
(b) Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC in L and AD (produced) in E. Prove that EL = 2BL.

## SECTION E

*This section comprises 3 case study based questions of 4 marks each.*

### Case Study – 1

36. In an annual day function of a school, the organizers wanted to give a cash prize along with a memento to their best students. Each memento is made as shown in the figure and its base ABCD is shown from the front side. The rate of silver plating is ₹ 20 per $cm^2$.




Based on the above, answer the following questions :

(i) What is the area of the quadrant ODCO ? 1

(ii) Find the area of Δ AOB. 1

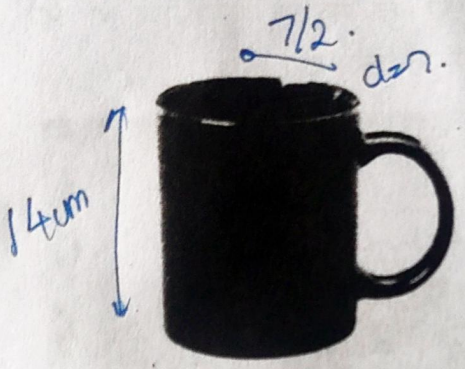
(iii) (a) What is the total cost of silver plating the shaded part ABCD ? 2

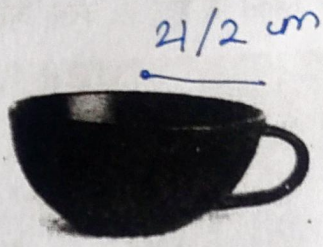
**OR**

(iii) (b) What is the length of arc CD ? 2

## Case Study – 2

37. In a coffee shop, coffee is served in two types of cups. One is cylindrical in shape with diameter 7 cm and height 14 cm and the other is hemispherical with diameter 21 cm.




Based on the above, answer the following questions :

(i) Find the area of the base of the cylindrical cup. 1

(ii) (a) What is the capacity of the hemispherical cup ? 2

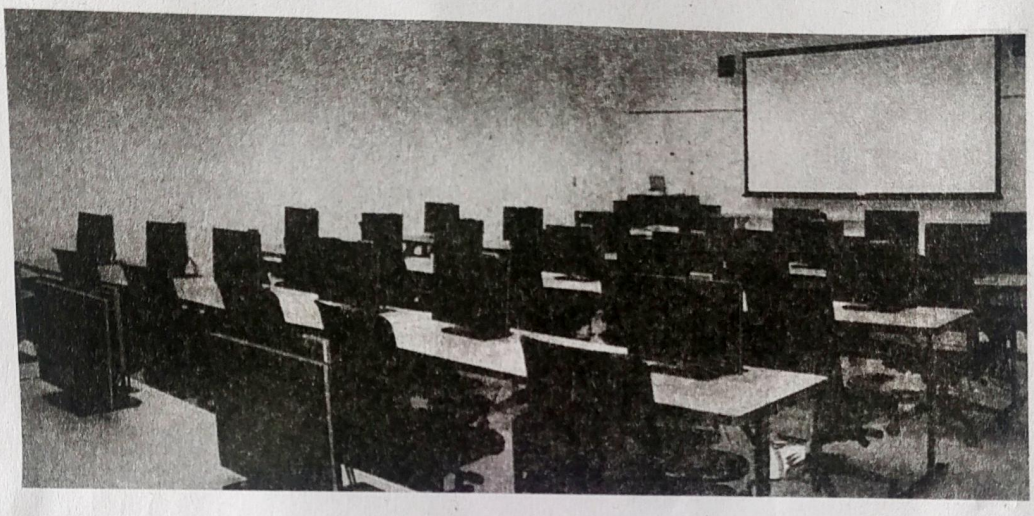
**OR**

(ii) (b) Find the capacity of the cylindrical cup. 2

(iii) What is the curved surface area of the cylindrical cup ? 1

## Case Study – 3

38. Computer-based learning (CBL) refers to any teaching methodology that makes use of computers for information transmission. At an elementary school level, computer applications can be used to display multimedia lesson plans. A survey was done on 1000 elementary and secondary schools of Assam and they were classified by the number of computers they had.



| Number of Computers | 1 – 10 | 11 – 20 | 21 – 50 | 51 – 100 | 101 and more |
|---|---|---|---|---|---|
| Number of Schools | 250 | 200 | 290 | 180 | 80 |

One school is chosen at random. Then :

(i) Find the probability that the school chosen at random has more than 100 computers. 0.08 *1*

(ii) (a) Find the probability that the school chosen at random has 50 or fewer computers. *2*

**OR**

(ii) (b) Find the probability that the school chosen at random has no more than 20 computers. 0.45 *2*

(iii) Find the probability that the school chosen at random has 10 or less than 10 computers. 0.25 *1*