Series WX1YZ/1

SET~2

प्रश्न-पत्र कोड
Q.P. Code **30/1/2**

रोल नं.
Roll No.

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) – सैद्धान्तिक

MATHEMATICS (Standard) – Theory

निर्धारित समय : 3 घण्टे | *अधिकतम अंक : 80*

Time allowed : 3 hours | *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 परीक्षार्थी 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 candidates will read the question paper only and will not write any answer on the answer-book during this period.

SECTION – A

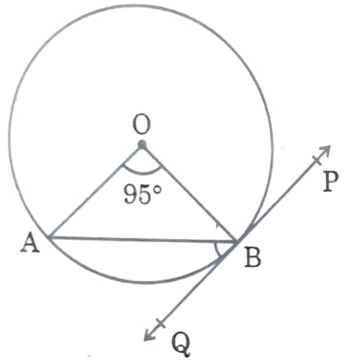
(Multiple Choice Questions)

Each question is of **1** mark.

1. In what ratio, does 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

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



   (A) 47.5°
   (B) 42.5°
   (C) 85°
   (D) 95°

3. If 2 tan A = 3, then the value of $\frac{4 \sin A + 3 \cos A}{4 \sin A - 3 \cos A}$ is

   (A) $\frac{7}{\sqrt{13}}$
   (B) $\frac{1}{\sqrt{13}}$
   (C) 3
   (D) does not exist

4. 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) $\frac{3}{4}$
   (B) $\frac{1}{3}$
   (C) 1
   (D) $\frac{1}{4}$

5. 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

6. 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

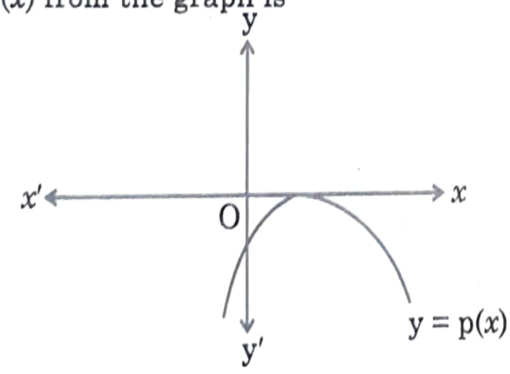
7. The end-points of a diameter of a circle are (2, 4) and (–3, –1). The radius of the circle is

(A) $2\sqrt{5}$
(B) $\frac{5}{2}\sqrt{5}$
(C) $\frac{5}{2}\sqrt{2}$
(D) $5\sqrt{2}$

8. Which of the following is a quadratic polynomial with zeroes $\frac{5}{3}$ and 0 ?

(A) $3x(3x - 5)$
(B) $3x(x - 5)$
(C) $x^2 - \frac{5}{3}$
(D) $\frac{5}{3}x^2$

9. 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

10. 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

11. If a, b, c form an A.P. with common difference d, then the value of $a - 2b - c$ is equal to

(A) $2a + 4d$
(B) 0
(C) $-2a - 4d$
(D) $-2a - 3d$

12. 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

13. 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) $p + q + 1 = 0$

14. 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

15. If α, β are the zeroes of a polynomial $p(x) = x^2 + x - 1$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ equals to

(A) 1
(B) 2
(C) -1
(D) $\frac{-1}{2}$

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

(A) $\pm 2\sqrt{2}$
(B) 2
(C) ± 2
(D) $\sqrt{2}$

17. $\left[\frac{5}{8}\sec^2 60^\circ - \tan^2 60^\circ + \cos^2 45^\circ\right]$ is equal to

(A) $\frac{-5}{3}$
(B) $\frac{-1}{2}$
(C) 0
(D) $\frac{-1}{4}$

18. 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

Assertion-Reason Type Questions

In Question **19** and **20**, an **Assertion (A)** statement is followed by a statement of **Reason (R)**. Select the correct option out of the following :

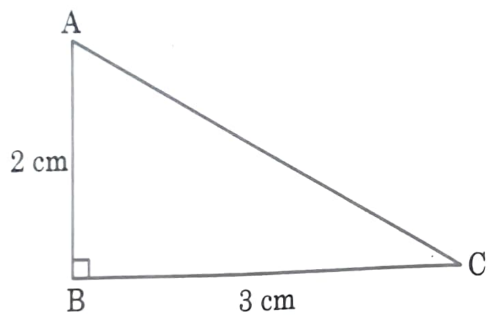
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(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.

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



20. **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.

SECTION – B

(This section comprises of Very Short Answer (SA-I) type questions. Every question is of 2 marks.)

21. Find the least number which when divided by 12, 16 and 24 leaves remainder 7 in each case.

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

23. (a) Solve the pair of equations $x = 5$ and $y = 7$ graphically.

OR

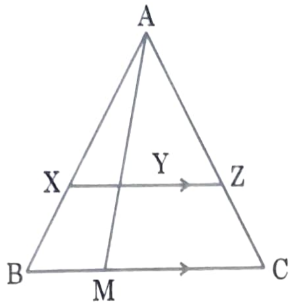
(b) Using graphical method, find whether pair of equations $x = 0$ and $y = -3$, is consistent or not.

24. (a) If $\sin\theta + \cos\theta = \sqrt{3}$, then find the value of $\sin\theta \cdot \cos\theta$.

OR

(b) If $\sin\alpha = \frac{1}{\sqrt{2}}$ and $\cot\beta = \sqrt{3}$, then find the value of $\operatorname{cosec}\alpha + \operatorname{cosec}\beta$.

25. In the given figure, XZ is parallel to BC. AZ = 3 cm, ZC = 2 cm, BM = 3 cm and MC = 5 cm. Find the length of XY.

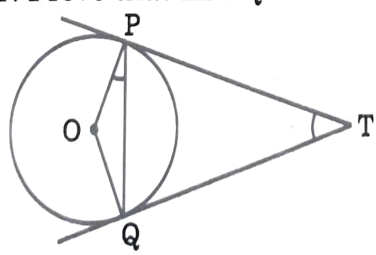


SECTION – C

(This section comprises of Short Answer (SA-II) type questions of 3 marks each.)

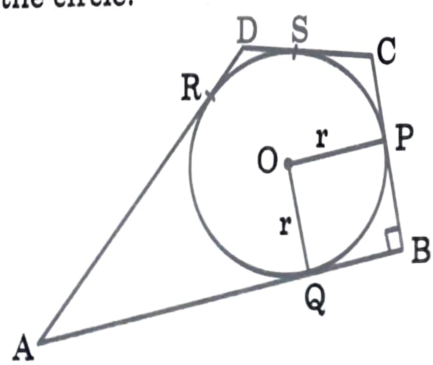
26. The centre of a circle is (2a, a – 7). Find the values of 'a' if the circle passes through the point (11, –9). Radius of the circle is $5\sqrt{2}$ cm.

27. (a) Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.



OR

(b) In the given figure, a circle is inscribed in a quadrilateral ABCD in which $\angle B = 90°$. If AD = 17 cm, AB = 20 cm and DS = 3 cm, then find the radius of the circle.

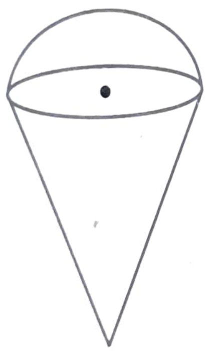


28. Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers.

29. (a) A room is in the form of cylinder surmounted by a hemi-spherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find total height of the room if it contains $\left(\frac{1408}{21}\right) m^3$ of air. $\left(\text{Take } \pi = \frac{22}{7}\right)$

OR

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



30. Prove that $\sqrt{5}$ is an irrational number.

31. Prove that $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\cot A + \tan A}$.

SECTION – D

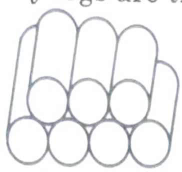
(This section comprises of Long Answer (LA) type questions of 5 marks each.)

32. A ladder set against a wall at an angle 45° to the ground. If the foot of the ladder is pulled away from the wall through a distance of 4 m, its top slides a distance of 3 m down the wall making an angle 30° with the ground. Find the final height of the top of the ladder from the ground and length of the ladder.

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

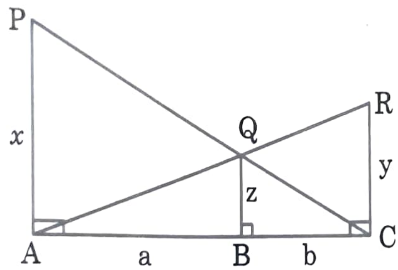
OR

(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 ?



(Example)

34. (a) PA, QB and RC are each perpendicular to AC. If AP = x, QB = z, RC = y, AB = a and BC = b, then prove that $\frac{1}{x}+\frac{1}{y}=\frac{1}{z}$.

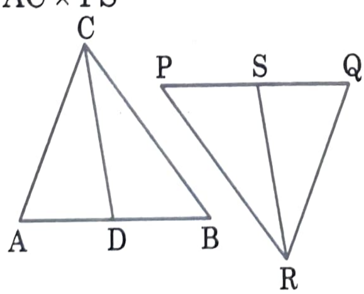


OR

(b) In the given figure, CD and RS are respectively the medians of ΔABC and ΔPQR. If $\Delta ABC \sim \Delta PQR$ then prove that :

(i) $\Delta ADC \sim \Delta PSR$

(ii) $AD \times PR = AC \times PS$



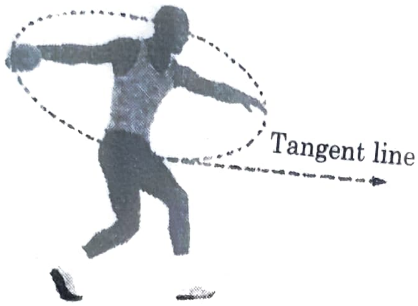
35. A chord of a circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle. Also find the area of the major segment of the circle.

SECTION – E

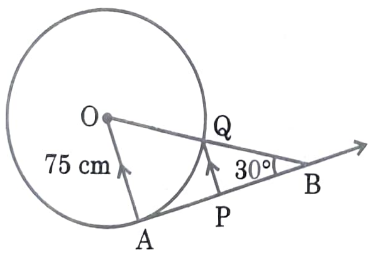
(In this section, there are 3 case study/passage based questions. Each question is of 4 marks.)

Case Study

36. 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 centre of the circle and $\angle ABO = 30^\circ$. PQ is parallel to OA.



Based on above information :

(a) find the length of AB. **1**

(b) find the length of OB. **1**

(c) find the length of AP. **2**

OR

find the length of PQ.

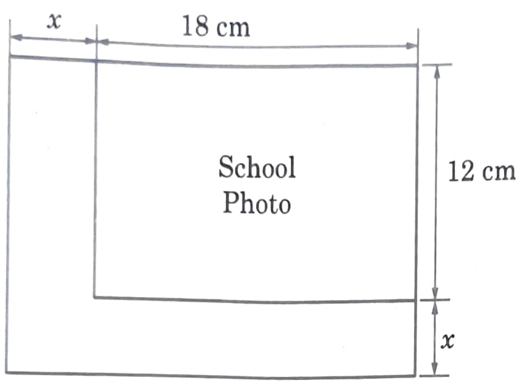
37. While designing the school year book, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide.

Based on the above information, answer the following questions :

(I) Write an algebraic equation depicting the above information. 1

(II) Write the corresponding quadratic equation in standard form. 1

(III) What should be the new dimensions of the enlarged photo ? 2



OR

Can any rational value of x make the new area equal to 220 cm^2 ?

38. India meteorological department observes seasonal and annual rainfall every year in different sub-divisions of our country.

It helps them to compare and analyse the results. 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

Based on the above information, answer the following questions :

(I) Write the modal class. 1

(II) Find the median of the given data. 2

OR

Find the mean rainfall in this season.

(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 ? 1