



Series CD1BA/3

SET~1

रोल नं. Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **430/3/1**

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.

नोट / NOTE :

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।
Please check that this question paper contains 23 printed pages.
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।
Please check that this question paper contains 38 questions.
- 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.
- 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.
- 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.



गणित (बुनियादी)

MATHEMATICS (BASIC)



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

430/3/1/CD1BA/22

109 A

Page 1

अधिकतम अंक : 80

Maximum Marks : 80

P.T.O.



General Instructions :

Read the following instructions very carefully and follow them :

- (i) *This question paper contains 38 questions. All questions are compulsory.*
- (ii) *Question Paper is divided into 5 Sections – Section A, B, C, D and E.*
- (iii) *In Section–A question number 1 to 18 are Multiple Choice Questions (MCQs) and question number 19 & 20 are Assertion-Reason based questions of 1 mark each.*
- (iv) *In Section–B question number 21 to 25 are Very Short Answer (VSA) type questions of 2 marks each.*
- (v) *In Section–C question number 26 to 31 are Short Answer (SA) type questions carrying 3 marks each.*
- (vi) *In Section–D question number 32 to 35 are Long Answer (LA) type questions carrying 5 marks each.*
- (vii) *In Section–E question number 36 to 38 are Case Study based questions carrying 4 marks each. Internal choice is provided in 2 marks question 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 figures wherever required. Take $\pi = 22/7$ wherever required if not stated.*
- (x) *Use of calculators is NOT allowed.*



खण्ड – क

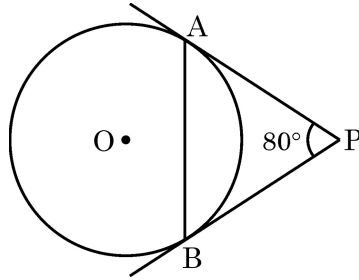
20 × 1 = 20

(बहुविकल्पीय प्रश्न)

प्रश्न संख्या 1 से 20 तक बहुविकल्पीय प्रश्न हैं जिनमें प्रत्येक प्रश्न 1 अंक का है।

1. दी गई आकृति में, एक वृत्त पर बाह्य बिंदु P से खींची गई स्पर्श-रेखाएँ PA तथा PB परस्पर 80° के कोण पर झुकी हुई हैं। $\angle PAB$ का माप है :

1



- (A) 80° (B) 60°
(C) 50° (D) 40°

2. k का/के वे मान जिनके लिए द्विघात समीकरण $5x^2 - 9kx + 5 = 0$ के मूल वास्तविक और समान हैं, हैं :

1

- (A) $-\frac{10}{9}$ (B) $\pm \frac{9}{10}$
(C) $\frac{10}{9}$ (D) $\pm \frac{10}{9}$

3. बिंदुओं A(-1, 5) तथा B(6, -2) के बीच की दूरी है :

1

- (A) $2\sqrt{7}$ (B) $7\sqrt{2}$
(C) 49 (D) 14

4. द्विघातीय बहुपद जिसके शून्यक 3 तथा -2 हैं, है :

1

- (A) $x^2 - x - 6$ (B) $x^2 + x - 6$
(C) $2x^2 - x - 12$ (D) $x^2 + x + 6$

5. रैखिक समीकरणों $x = a$ तथा $y = b$ ($a \neq b$) द्वारा निरूपित रेखाएँ

1

- (A) (a, b) पर प्रतिच्छेदी हैं। (B) (b, a) पर प्रतिच्छेदी हैं।
(C) समांतर हैं। (D) संपाती हैं।



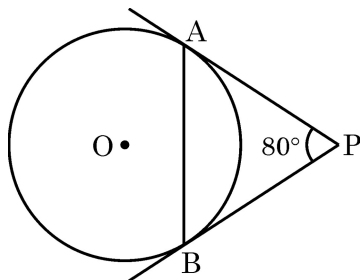
Section – A

20 × 1 = 20

(Multiple Choice Questions)

Q. No. 1 to 20 are Multiple Choice Questions of 1 mark each.

1. In the given figure, tangents PA and PB drawn from P to circle are inclined to each other at an angle of 80° . The measure of $\angle PAB$ is 1

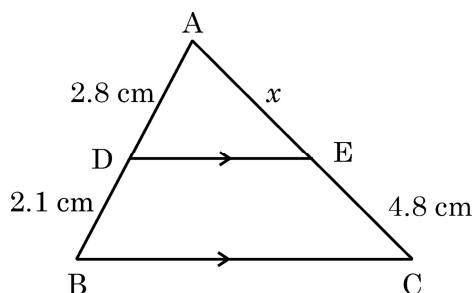


- (A) 80° (B) 60°
(C) 50° (D) 40°
2. The value(s) of k for which the quadratic equation $5x^2 - 9kx + 5 = 0$ has real and equal roots, is/are : 1
(A) $-\frac{10}{9}$ (B) $\pm \frac{9}{10}$
(C) $\frac{10}{9}$ (D) $\pm \frac{10}{9}$
3. The distance between the points A(-1, 5) and B(6, -2) is : 1
(A) $2\sqrt{7}$ (B) $7\sqrt{2}$
(C) 49 (D) 14
4. A quadratic polynomial whose zeroes are 3 and -2, is : 1
(A) $x^2 - x - 6$ (B) $x^2 + x - 6$
(C) $2x^2 - x - 12$ (D) $x^2 + x + 6$
5. The lines represented by linear equations $x = a$ and $y = b$ ($a \neq b$) are 1
(A) intersecting at (a, b). (B) intersecting at (b, a).
(C) parallel. (D) coincident.



6. यदि दी गई आकृति में, $DE \parallel BC$ है। यदि $AD = 2.8$ cm, $DB = 2.1$ cm तथा $EC = 4.8$ cm है, तो x का मान है :

1



- (A) 3.6 cm (B) 2.4 cm
(C) 6.4 cm (D) 4.8 cm

7. एक समकोण त्रिभुज ABC, जिसमें $\angle A = 90^\circ$ तथा $AB = AC$ है, में $\sin C$ का मान है :

1

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

8. एक पासा एक बार उछाला गया। इस पर 6 से कम संख्या के आने की प्रायिकता है :

1

- (A) 0 (B) $\frac{5}{6}$
(C) $\frac{1}{6}$ (D) 1

9. एक बाह्य बिंदु P से वृत्त पर एक स्पर्श-रेखा PA खींची गई। P से स्पर्श-रेखा PA के समांतर खींची जा सकने वाली स्पर्श-रेखाओं की संख्या है :

1

- (A) 2 (B) 2 से अधिक
(C) 1 (D) 0

10. यदि एक गोले का आयतन $\frac{11}{21} \text{ cm}^3$ है, तो इसकी त्रिज्या है :

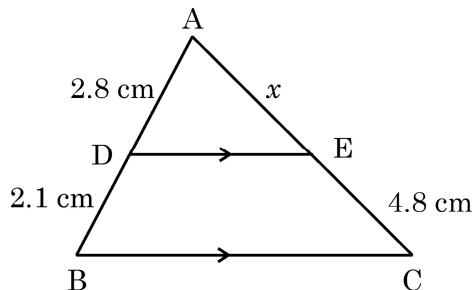
1

- (A) 2 cm (B) 4 cm
(C) $\frac{1}{2}$ cm (D) $\frac{1}{4}$ cm



6. If in the given figure, $DE \parallel BC$. If $AD = 2.8$ cm, $DB = 2.1$ cm and $EC = 4.8$ cm, then the value of x is :

1



- (A) 3.6 cm (B) 2.4 cm
(C) 6.4 cm (D) 4.8 cm

7. In a right-angled triangle ABC, $\angle A = 90^\circ$ and $AB = AC$. The value of $\sin C$ is :

1

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

8. A die is thrown once. The probability of getting a number less than 6, is :

1

- (A) 0 (B) $\frac{5}{6}$
(C) $\frac{1}{6}$ (D) 1

9. From an external point P, a tangent PA is drawn to a circle. The number of tangents through P parallel to PA is :

1

- (A) 2 (B) more than 2
(C) 1 (D) 0

10. If the volume of a sphere is $\frac{11}{21} \text{ cm}^3$, then the radius of the sphere is :

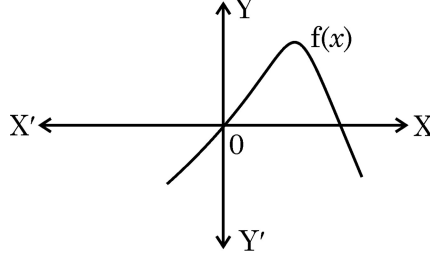
1

- (A) 2 cm (B) 4 cm
(C) $\frac{1}{2}$ cm (D) $\frac{1}{4}$ cm



11. दी गई आकृति में, बहुपद $f(x)$ का आलेख दर्शाया गया है। बहुपद $f(x)$ के शून्यकों की संख्या है :

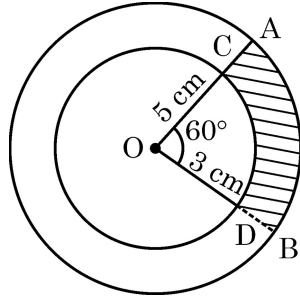
1



- (A) 3 (B) 1
(C) 0 (D) 2

12. दी गई आकृति में, केंद्र O वाले दो संकेन्द्रीय वृत्त दर्शाए गए हैं जिनकी त्रिज्याएँ 5 cm तथा 3 cm हैं। OAB बड़े वृत्त का त्रिज्य खण्ड है जिसका केंद्रीय कोण 60° है तथा OCD छोटे वृत्त का त्रिज्य खण्ड है। छायांकित क्षेत्र का क्षेत्रफल है :

1



- (A) $\frac{7\pi}{2} \text{ cm}^2$ (B) $\frac{8\pi}{3} \text{ cm}^2$
(C) $\frac{25\pi}{6} \text{ cm}^2$ (D) $\frac{3\pi}{2} \text{ cm}^2$

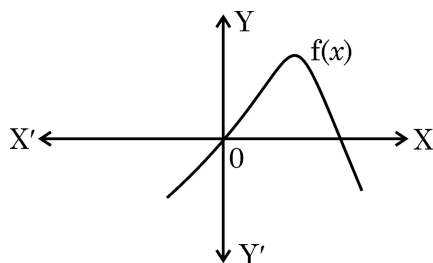
13. यदि किन्हीं आँकड़ों का माध्य तथा माध्यक क्रमशः 10 तथा 11 हैं, तो इन आँकड़ों का बहुलक है :

1

- (A) 12 (B) 8
(C) 20 (D) 13

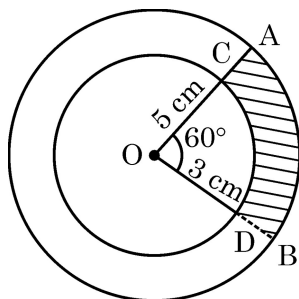


11. In the given figure, graph of a polynomial $f(x)$ is shown. The number of zeroes of polynomial $f(x)$ is : 1



- (A) 3 (B) 1
(C) 0 (D) 2

12. In the given figure, two concentric circles of radii 5 cm and 3 cm have their centre O. OAB is a sector of outer circle making an angle of 60° at the centre while OCD is the sector of smaller circle. The area of the shaded region is : 1



- (A) $\frac{7\pi}{2} \text{ cm}^2$ (B) $\frac{8\pi}{3} \text{ cm}^2$
(C) $\frac{25\pi}{6} \text{ cm}^2$ (D) $\frac{3\pi}{2} \text{ cm}^2$

13. If the mean and median of a data are 10 and 11 respectively, then mode of the data is : 1

- (A) 12 (B) 8
(C) 20 (D) 13



14. दो निष्पक्ष सिक्कों को एक साथ उछाला गया। 2 चित आने की प्रायिकता है :

1

(A) $\frac{1}{2}$

(B) $\frac{3}{4}$

(C) $\frac{1}{4}$

(D) $\frac{3}{8}$

15. यदि $\cos A = \frac{1}{2}$ है, तो $\tan A$ का मान है :

1

(A) $\frac{1}{\sqrt{3}}$

(B) $\sqrt{3}$

(C) 3

(D) $\frac{3}{2}$

16. भुजा 14 cm वाले एक ठोस घन में से अधिकतम व्यास का एक गोला काटकर निकाला गया। गोले की त्रिज्या है :

1

(A) 7 cm

(B) 14 cm

(C) $\frac{7}{2}$ cm

(D) $\sqrt{14}$ cm

17. एक समांतर श्रेढ़ी जिसका n वाँ पद $a_n = 5n - 1$ द्वारा दिया गया है, का सार्व अंतर है :

1

(A) 1

(B) 6

(C) 5

(D) 4

18. यदि किसी बंटन के लिए $\sum_{i=1}^n f_i x_i = 132 + 5p$ तथा $\sum_{i=1}^n f_i = 20$ है तथा बंटन का माध्य 8.1 है, तो

p का मान है :

1

(A) 3

(B) 6

(C) 4

(D) 5



14. Two fair coins are tossed together. The probability of getting 2 heads, is : 1

(A) $\frac{1}{2}$

(B) $\frac{3}{4}$

(C) $\frac{1}{4}$

(D) $\frac{3}{8}$

15. If $\cos A = \frac{1}{2}$, then $\tan A$ is equal to 1

(A) $\frac{1}{\sqrt{3}}$

(B) $\sqrt{3}$

(C) 3

(D) $\frac{3}{2}$

16. From a solid cube of side 14 cm, a sphere of maximum diameter is carved out. The radius of sphere is : 1

(A) 7 cm

(B) 14 cm

(C) $\frac{7}{2}$ cm

(D) $\sqrt{14}$ cm

17. The common difference of an A.P. whose n^{th} term is given by $a_n = 5n - 1$, is : 1

(A) 1

(B) 6

(C) 5

(D) 4

18. If for a distribution, $\sum_1^n f_i x_i = 132 + 5p$, $\sum_1^n f_i = 20$ and the mean of the distribution is 8.1, then the value of p is : 1

(A) 3

(B) 6

(C) 4

(D) 5



(Assertion – Reason based questions)

Directions : In question numbers **19** and **20**, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option from the following :

- (A) Both Assertion (A) and Reason (R) are true. Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true. 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 distance of P(a, b) from origin is $a^2 + b^2$. **1**

Reason (R) : The distance between two points $A(x_1, y_1)$ and $B(x_2, y_2)$ is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

20. **Assertion (A) :** $\sqrt{2}(5 - \sqrt{2})$ is an irrational number. **1**

Reason (R) : Product of two irrational numbers is always irrational.

Section – B

(Very Short Answer Type Questions)

Q. No. **21** to **25** are Very Short Answer type questions of **2** marks each.

21. (a) If Q(0, 2) is equidistant from P(5, -3) and R(x, 7), find the value(s) of x. **2**

OR

(b) If A(1, 1) and B(7, 9) are the end points of a diameter of a circle, then find the co-ordinates of the centre of the circle. **2**

22. Evaluate : $4 \sin^2 60^\circ \tan^2 45^\circ - 2 \sec^2 30^\circ \tan^2 60^\circ$ **2**



23. (a) Prove that $-7 - 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number. 2

OR

- (b) Explain why $(7 \times 11 \times 13 + 2 \times 11)$ is not a prime number. 2
24. Find the ratio in which the Y-axis divides the line segment joining the points A(5, -6) and B(-1, -4). Also, find the point of intersection. 2
25. There are 80 cards numbered from 1 to 80. One card is drawn at random from them. Find the probability that the number on the selected card is not divisible by 8. 2

Section – C

(Short Answer Type Questions)

Q. No. 26 to 31 are Short Answer type questions of 3 marks each.

26. Find LCM and HCF of two numbers 336 and 54, using prime-factorisation method. 3
27. The altitude of a right-angled triangle is 7 cm less than its base. If its hypotenuse is 17 cm long, then 3
- (a) represent the above information in the form of a quadratic equation;
- (b) find the length of the sides of the triangle.
28. (a) A vessel is in the form of a hollow hemisphere surmounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel. 3

OR

- (b) A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. 3

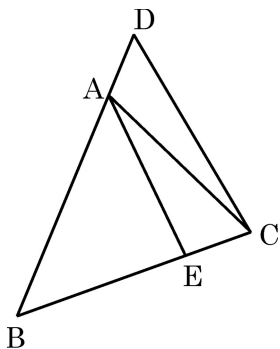


29. द्विघात बहुपद $5x^2 + 3x - 2$ के शून्यक ज्ञात कीजिए। शून्यकों तथा गुणांक के बीच के संबंध का सत्यापन कीजिए।

3

30. दी गई आकृति में, $\angle ABC = \angle ACB$ हैं, तथा $\frac{BC}{BE} = \frac{BD}{AC}$ है।

3



दर्शाए कि $\triangle ABE \sim \triangle DBC$ तथा $AE \parallel DC$.

31. (a) सिद्ध कीजिए : $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$.

3

अथवा

- (b) यदि $\cos A = \frac{5}{13}$ है, तो सत्यापित कीजिए कि :

3

$$\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \cos A + \sin A.$$

खण्ड - घ

(दीर्घ-उत्तरीय प्रश्न)

प्रश्न संख्या 32 से 35 तक दीर्घ-उत्तरीय वाले प्रश्न हैं जिनमें प्रत्येक के 5 अंक हैं।

32. 50 कर्मचारियों के प्रति घंटा वेतन, नीचे दिए गए बंटन में दर्शाए गए हैं :

5

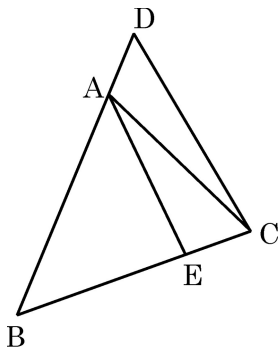
प्रति घंटा वेतन (₹ में)	100-120	120-140	140-160	160-180	180-200
कर्मचारियों की संख्या	12	14	8	6	10

उपरोक्त आँकड़ों का माध्य तथा माध्यक ज्ञात कीजिए।



29. Find the zeroes of the quadratic polynomial $5x^2 + 3x - 2$ and verify the relationship between the zeroes and the co-efficients. 3

30. In the given figure, $\angle ABC = \angle ACB$ and $\frac{BC}{BE} = \frac{BD}{AC}$. 3



Show that $\triangle ABE \sim \triangle DBC$ and $AE \parallel DC$.

31. (a) Prove that $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$. 3

OR

- (b) If $\cos A = \frac{5}{13}$, then verify that $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \cos A + \sin A$. 3

Section – D

(Long Answer Type Questions)

Q. No. 32 to 35 are Long Answer type questions of 5 marks each.

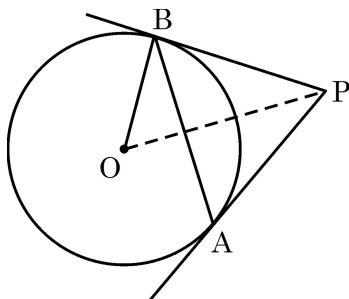
32. Consider the following distribution of hourly wages of 50 workers of a factory : 5

Hourly wages (in ₹)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

Find the mean and the median of the above data.



33. (a) In the given figure, AB is chord of length 6 cm of a circle of radius 5 cm. The tangents at A and B intersect at a point P. Find the length of PB. 5



OR

- (b) Prove that the parallelogram circumscribing a circle is a rhombus. Also, find area of the rhombus, if radius of circle is 3 cm and length of one side of the rhombus is 10 cm. 5

34. Two poles of equal height are standing opposite each other on either side of a road, which is 100 m wide. From a point somewhere between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distances of the point from the poles. 5

35. (a) Using graphical method, solve the following pair of equations : 5

$$x + 2y = 8 \text{ and } 3x - 2y = 12$$

OR

- (b) The sum of the digits of a 2-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number. 5



Section – E

(Case Study based Questions)

Q. No. 36 to 38 are Case Study based questions of 4 marks each.

36. While preparing for a competitive examination, Akbar came across a match-stick pattern based question. The pattern is given below :

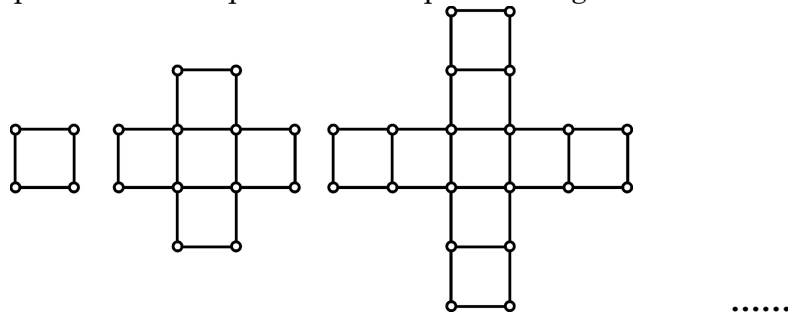


Fig. (1)

Fig. (2)

Fig. (3)

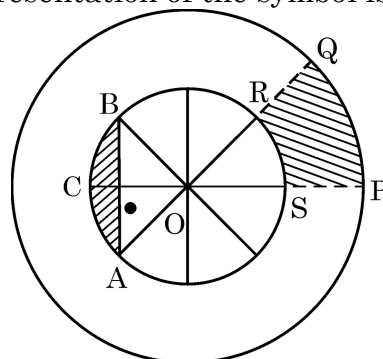
Based on the above information, answer the following questions :

- Write first term and common difference of the A.P. formed by number of squares in each figure. 1
- Write first term and common difference of the A.P. formed by number of sticks used in each figure. 1
- (a) How many squares are there in Fig. (10) ? Also, write the number of sticks used in Fig. (10). 2

OR

- (b) If 88 sticks are used to make m^{th} figure (Fig. (m)), find the value of m . How many squares are formed in this figure ? 2

37. NSS (National Service Scheme) aims to connect the students to the community and to involve them in problem solving process. NSS symbol is based on the 'Rath' wheel of the Konark Sun Temple situated in Odisha. The wheel signifies the progress cycle of life. The diagrammatic representation of the symbol is given below :





ऊपर दी गई आकृति का अवलोकन कीजिए। अन्तः वृत्त के व्यास समान रूप से रखे गए हैं। दिया है कि $OP = 21$ cm तथा $OS = 10$ cm है, तो

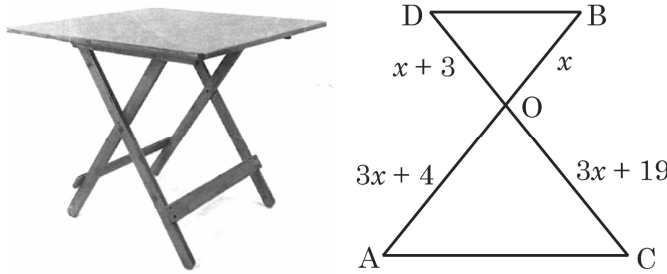
ऊपर दी गई जानकारी के आधार पर निम्नलिखित प्रश्नों के उत्तर दीजिये :

- (i) $m\angle ROS$ ज्ञात कीजिए। 1
- (ii) त्रिज्य खण्ड OPQ का परिमाप ज्ञात कीजिए। 1
- (iii) (a) छायांकित क्षेत्र $PQRS$ का क्षेत्रफल ज्ञात कीजिए। 2

अथवा

- (iii) (b) छायांकित क्षेत्र ACB (वृत्त खण्ड ACB) का क्षेत्रफल ज्ञात कीजिए। 2

38. दी गई आकृति में, एक बंद किया जा सकने वाला मेज दर्शाया गया है :



मेज के पैर रेखा खण्ड AB तथा CD द्वारा निरूपित हैं जो O पर मिलते हैं। AC तथा BD को मिलाएँ। यह मानते हुए कि मेज का ऊपरी भाग भूमि के समांतर है तथा $OB = x$, $OD = x + 3$, $OC = 3x + 19$ तथा $OA = 3x + 4$ है, तो निम्न के उत्तर दीजिए :

- (i) सिद्ध कीजिए कि $\triangle OAC \sim \triangle OBD$. 1
- (ii) सिद्ध कीजिए कि $\frac{OA}{AC} = \frac{OB}{BD}$. 1
- (iii) (a) आकृति के अवलोकन से, x का मान ज्ञात कीजिए। अतः OC की लंबाई ज्ञात कीजिए। 2

अथवा

- (iii) (b) आकृति के अवलोकन से, $\frac{BD}{AC}$ ज्ञात कीजिए। 2



Observe the figure given above. The diameters of inner circle are equally placed. Given that $OP = 21$ cm, $OS = 10$ cm.

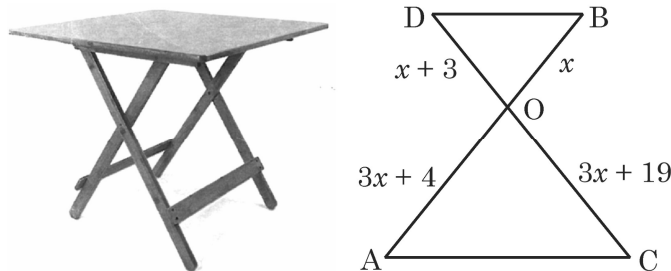
Based on the above information, answer the following questions :

- (i) Find $m\angle ROS$. 1
- (ii) Find the perimeter of sector OPQ . 1
- (iii) (a) Find the area of shaded region $PQRS$. 2

OR

- (iii) (b) Find the area of shaded region ACB i.e. the segment ACB . 2

38. In the figure given below, a folding table is shown :



The legs of the table are represented by line segments AB and CD intersecting at O . Join AC and BD .

Considering table top is parallel to the ground, and $OB = x$, $OD = x + 3$, $OC = 3x + 19$ and $OA = 3x + 4$, answer the following questions :

- (i) Prove that $\triangle OAC$ is similar to $\triangle OBD$. 1
- (ii) Prove that $\frac{OA}{AC} = \frac{OB}{BD}$. 1
- (iii) (a) Observe the figure and find the value of x . Hence, find the length of OC . 2

OR

- (iii) (b) Observe the figure and find $\frac{BD}{AC}$. 2

