

Series : EH5GF



SET ~ 1



रोल नं.

Roll No.



प्रश्न-पत्र कोड
Q.P. Code **430/5/1**

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

- (I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।
- (II) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।
- (III) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
- (IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें।
- (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।

NOTE

- (I) Please check that this question paper contains 23 printed pages.
- (II) Please check that this question paper contains 38 questions.
- (III) 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.
- (IV) Please write down the Serial Number of the question in the answer-book at the given place before attempting it.
- (V) 15 minutes 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

अधिकतम अंक : 80

Maximum Marks : 80



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General Instructions :

Read the following instructions carefully and follow them :

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

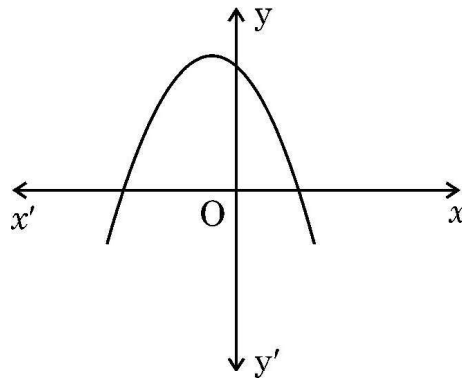


खण्ड – क
(बहुविकल्पीय प्रश्न)

$20 \times 1 = 20$

इस खण्ड में 20 बहुविकल्पीय प्रश्न हैं, जिनमें प्रत्येक का 1 अंक है।

1. $(2 - 5\sqrt{3})^2$
 (A) एक ऋणात्मक पूर्णांक है। (B) एक अपरिमेय संख्या है।
 (C) एक परिमेय संख्या है। (D) एक धनात्मक पूर्णांक है।
2. k का वह मान जिसके लिये द्विघात समीकरण $6x^2 + 4kx + k = 0$ के मूल वास्तविक तथा समान हैं, है
 (A) 0 (B) $\frac{3}{4}$
 (C) $-\frac{3}{2}$ (D) $\frac{2}{3}$
3. बिंदुओं $(2, 3)$ तथा $(-2, -3)$ के बीच की दूरी है
 (A) $4\sqrt{13}$ (B) $\sqrt{40}$
 (C) $2\sqrt{13}$ (D) 5
4. बहुपद $p(x)$ के दिए गए ग्राफ को ध्यानपूर्वक देखिये। बहुपद $p(x)$ के शून्यकों की संख्या है



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



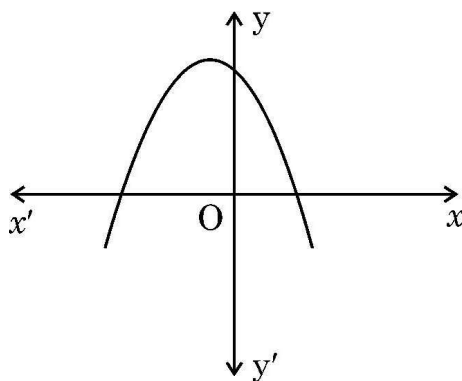
Section – A

 $20 \times 1 = 20$

(Multiple Choice Questions)

Section-A consists of **20** Multiple Choice Questions of **1** mark each.

- $(2 - 5\sqrt{3})^2$ is
 (A) a negative integer (B) an irrational number
 (C) a rational number (D) a positive integer
- The value of k for which the roots of the quadratic equation $6x^2 + 4kx + k = 0$ are real and equal, is
 (A) 0 (B) $\frac{3}{4}$
 (C) $-\frac{3}{2}$ (D) $\frac{2}{3}$
- The distance between the points $(2, 3)$ and $(-2, -3)$ is
 (A) $4\sqrt{13}$ (B) $\sqrt{40}$
 (C) $2\sqrt{13}$ (D) 5
- Observe the given graph of polynomial $p(x)$. The number of zeroes of $p(x)$ is

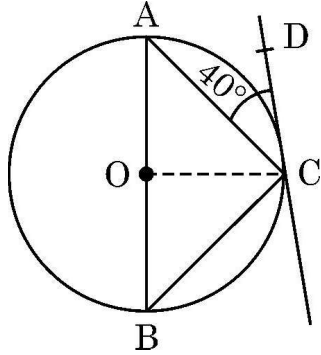


- (A) 0 (B) 1
 (C) 3 (D) 2



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5. दी गयी आकृति में, AB बिन्दु O पर केन्द्रित वृत्त का व्यास है। CD वृत्त की स्पर्श-रेखा है ताकि $\angle ACD = 40^\circ$ है। $\angle CBA$ का मान है

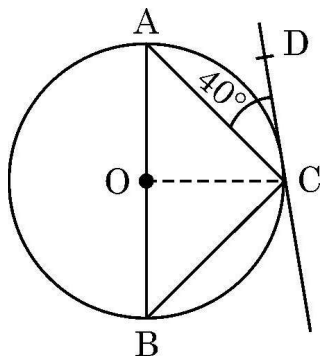


- (A) 50° (B) 40°
 (C) 80° (D) 45°
6. A.P. : $-12, -19, -26, \dots$ का 10वाँ पद है
 (A) -75 (B) -65
 (C) 51 (D) -82
7. समीकरण $x^2 - 8 = 0$ के मूल हैं
 (A) परिमेय तथा भिन्न (B) अपरिमेय तथा भिन्न
 (C) वास्तविक तथा समान (D) वास्तविक नहीं
8. बिंदुओं $(-4, 5)$ तथा $(0, -10)$ को जोड़ने वाले रेखाखंड को बिन्दु $(x, 0)$ निम्न अनुपात में विभाजित करता है :
 (A) $1 : 3$ (B) $2 : 1$
 (C) $1 : 1$ (D) $1 : 2$
9. 52 पत्तों वाली ताश की गड्डी में से एक काला पत्ता खो गया है। बाकी बचे हुए पत्तों को अच्छी प्रकार से फेंटकर उनमें से यादृच्छया एक पत्ता निकाला गया। इसकी प्रायिकता कि निकाला गया पत्ता पान का बादशाह है, है
 (A) $\frac{1}{52}$ (B) $\frac{1}{4}$
 (C) $\frac{1}{51}$ (D) $\frac{1}{26}$



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5. In the given figure, AB is diameter of the circle with centre O. CD is tangent to the circle so that $\angle ACD = 40^\circ$. The value of $\angle CBA$ is



- (A) 50° (B) 40°
 (C) 80° (D) 45°
6. 10th term of the A.P. : $-12, -19, -26, \dots$ is
 (A) -75 (B) -65
 (C) 51 (D) -82
7. The roots of the equation $x^2 - 8 = 0$ are
 (A) rational and distinct (B) irrational and distinct
 (C) real and equal (D) not real
8. The point $(x, 0)$ divides the line segment joining the points $(-4, 5)$ and $(0, -10)$ in the ratio
 (A) $1 : 3$ (B) $2 : 1$
 (C) $1 : 1$ (D) $1 : 2$
9. A black card is lost from a deck of 52 playing cards. Rest of the cards are shuffled and one card is drawn at random from the available cards. The probability that drawn card is 'king of hearts', is
 (A) $\frac{1}{52}$ (B) $\frac{1}{4}$
 (C) $\frac{1}{51}$ (D) $\frac{1}{26}$



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10. 25 cm भुजा वाले एक खोखले घन में, जितना बड़ा संभव हो सके, शंकु रखा गया है। शंकु के आधार की त्रिज्या है

- (A) 5 cm (B) 12.5 cm
(C) 25 cm (D) 10 cm

11. यदि किसी घटना E के होने की प्रायिकता $P(E) = 0.1$ है, तो $P(\bar{E})$ का मान है

- (A) 0.9 (B) $\frac{1}{2}$
(C) 0.99 (D) -1

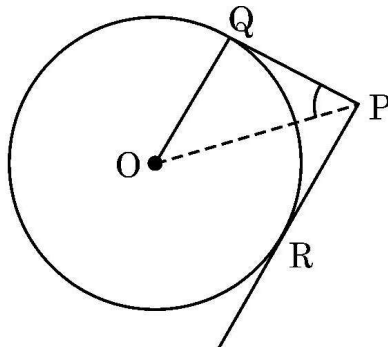
12. यदि $\tan A = 1$ है, तो $3 \sin A + \cos A$ का मान है

- (A) $4\sqrt{2}$ (B) 4
(C) $2\sqrt{2}$ (D) $4 \times 45^\circ$

13. ऐसा द्विघाती बहुपद जिसका सिर्फ एक शून्यक (-2) है, है

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

14. केन्द्र O वाले वृत्त पर बिन्दु P से दो स्पर्श-रेखायें PQ तथा PR इस प्रकार खींची गई हैं कि $OQ = QP$ है। $\angle OPQ$ का मान है



- (A) 45° (B) 30°
(C) 60° (D) 90°



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10. The largest possible cone is just fitted inside a hollow cube of edge 25 cm. The radius of the base of the cone is

- (A) 5 cm (B) 12.5 cm
(C) 25 cm (D) 10 cm

11. If E is an event such that $P(E) = 0.1$, then $P(\bar{E})$ is equal to

- (A) 0.9 (B) $\frac{1}{2}$
(C) 0.99 (D) -1

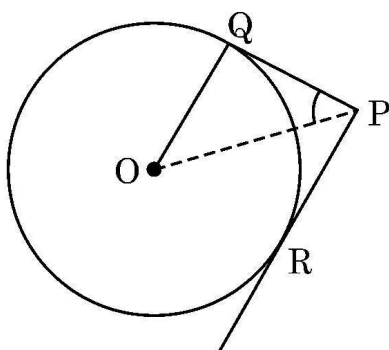
12. If $\tan A = 1$, then $3 \sin A + \cos A$ is equal to

- (A) $4\sqrt{2}$ (B) 4
(C) $2\sqrt{2}$ (D) $4 \times 45^\circ$

13. A quadratic polynomial having only zero (-2) is

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

14. PQ and PR are tangents to a circle with centre O such that $OQ = QP$. The value of $\angle OPQ$ is equal to



- (A) 45° (B) 30°
(C) 60° (D) 90°



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15. निम्न में से क्या, आँकड़ों के सभी प्रेक्षणों पर निर्भर करता है ?

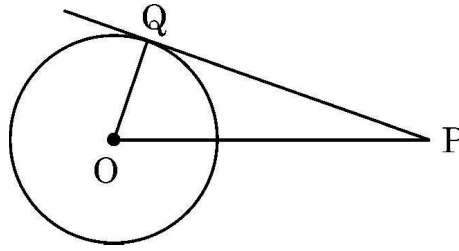
(A) माध्यक

(B) माध्य

(C) सीमा

(D) बहुलक

16. केन्द्र O वाले वृत्त पर स्पर्श-रेखा PQ खींची गयी है। यदि $OQ = 3 \text{ cm}$, $PQ = 5 \text{ cm}$ है, तो OP बराबर है



(A) 5 cm

(B) 4 cm

(C) $\sqrt{15} \text{ cm}$

(D) $\sqrt{34} \text{ cm}$

17. दो पासों को एक साथ फेंका जाता है। सिर्फ एक पासे पर संख्या 4 आने की प्रायिकता है

(A) $\frac{11}{36}$

(B) $\frac{1}{3}$

(C) $\frac{5}{18}$

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

18. 22 cm लम्बी चाप वृत्त के केन्द्र पर x° का कोण अंतरित करती है। यदि वृत्त की त्रिज्या 36 cm है तो x का मान है

(A) 35

(B) 40

(C) 60

(D) 30



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15. Which of the following depends on all observations of a given data ?

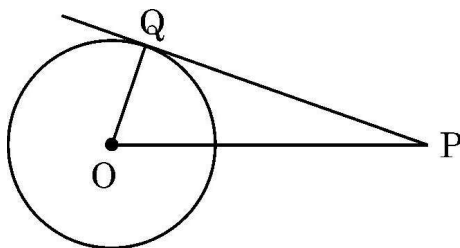
(A) Median

(B) Mean

(C) Range

(D) Mode

16. PQ is tangent to the circle centred at O. If $OQ = 3$ cm, $PQ = 5$ cm, then OP is equal to



(A) 5 cm

(B) 4 cm

(C) $\sqrt{15}$ cm

(D) $\sqrt{34}$ cm

17. Two dice are rolled together. The probability that only one die shows number 4, is

(A) $\frac{11}{36}$

(B) $\frac{1}{3}$

(C) $\frac{5}{18}$

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

18. An arc of length 22 cm subtends an angle of x° at the centre of the circle. If radius of circle is 36 cm, the value of x is

(A) 35

(B) 40

(C) 60

(D) 30



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(Assertion – Reason based questions)

Directions : Question numbers **19** and **20** are Assertion and Reason based questions. 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) :** When a hemisphere of same radius (r) is carved out from one side of a solid wooden cylinder, the total surface area of remaining solid is increased by $2\pi r^2$.

Reason (R) : Curved surface area of hemisphere is $2\pi r^2$.

20. **Assertion (A) :** In a right angle triangle ABC, $\angle B = 90^\circ$. Therefore the value of $\cos (A + C)$ is equal to 0.

Reason (R) : $A + B + C = 180^\circ$ and $\cos 90^\circ = 0$.

Section – B

(Very Short Answer Type Questions)

$5 \times 2 = 10$

Q. Nos. **21** to **25** are Very Short Answer type questions of **2** marks each.

21. Check whether $15^n \times 2^n$, n being a natural number, ends with the digit zero.

22. (a) Evaluate : $2 \tan^2 45^\circ + \cos^2 30^\circ - \sin^2 90^\circ$.

OR

- (b) Verify that $\cos 2A = \frac{1 - \tan^2 A}{1 + \tan^2 A}$ for $A = 30^\circ$.



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23. Find the coordinates of the points of trisection of line segment joining the points $(-4, 1)$ and $(6, 5)$.
24. (a) A bag contains 40 marbles out of which some are white and others are black. If the probability of drawing a black marble is $\frac{3}{5}$, then find the number of white marbles.

OR

- (b) In a pre-primary class, a teacher put cards numbered 20 to 59 in a bowl. A student picked up a card at random and read the number. Find the probability that the number read was (i) a prime number (ii) a perfect square.
25. Using distance formula, prove that the points $(1, 5)$, $(2, 3)$ and $(3, 1)$ are collinear.

Section – C

(Short Answer Type Questions)

$6 \times 3 = 18$

Q. Nos. **26** to **31** are Short Answer type questions of **3** marks each.

26. (a) If α, β are zeroes of the polynomial $3x^2 - 8x + 4$, then form a quadratic polynomial in x whose zeroes are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$.

OR

- (b) Find zeroes of the polynomial $6x^2 - 7x - 3$ and verify the relationship between zeroes and its coefficients.
27. The sum of the squares of two consecutive even numbers is 452. Find the numbers.
28. Prove that $(\operatorname{cosec} A + \sin A)^2 + (\sec A + \cos A)^2 = 7 + \tan^2 A + \cot^2 A$.



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29. The traffic lights at three different road crossings change after every 45 seconds, 75 seconds and 60 seconds respectively. If they change together at 5.00 a.m., then at what time they will change together next ?
30. (a) A spherical glass vessel has a cylindrical neck 7 cm long and 8 cm in diameter. The radius of spherical part is 10 cm. Find the volume of the vessel.

OR

- (b) From each end of a solid cylinder of height 20 cm and base radius 7 cm, a cone of base radius 2.1 cm and height 5 cm is scooped out. Find the volume of the remaining solid.
31. Point E lies on the extended side AD of parallelogram ABCD. BE intersects CD at F. Show that (i) $\triangle DFE \sim \triangle CFB$ (ii) $\triangle AEB \sim \triangle CBF$.

Section – D

(Long Answer Type Questions)

$4 \times 5 = 20$

Q. Nos. **32** to **35** are Long Answer type questions of **5** marks each.

32. Determine graphically whether the following pair of linear equations

$$2x + 3y = 12 \text{ and } x - y = 1$$

has unique solution or infinitely many solutions.

33. (a) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

OR

- (b) It is given that sides AB and AC and median AD of $\triangle ABC$ are respectively proportional to sides PQ and PR and median PM of another $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$.



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34. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60° . If the tower is 30 m high, find the height of the building and distance between the building and the tower. (Use $\sqrt{3} = 1.73$)

35. (a) Find 'mean' and 'mode' of the following data :

Class	10-25	25-40	40-55	55-70	70-85	85-100
Number of Students	12	10	15	13	8	12

OR

- (b) The following table shows the ages of patients admitted in a hospital during a year :

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
Number of Patients	7	10	21	22	15	5

Find 'mode' and 'median' of the above data.

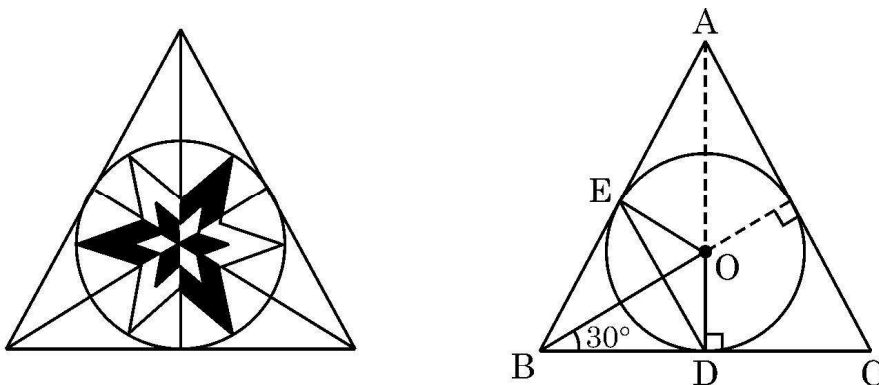
Section – E

(Case-study based Questions)

$3 \times 4 = 12$

Q. Nos. 36 to 38 are Case-study based Questions of 4 marks each.

36.



In a Fine Arts class, students were asked to design triangular tiles in geometric pattern.



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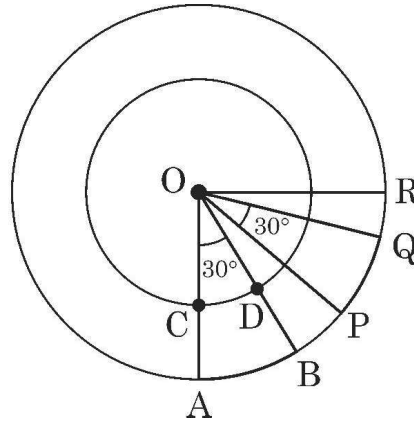
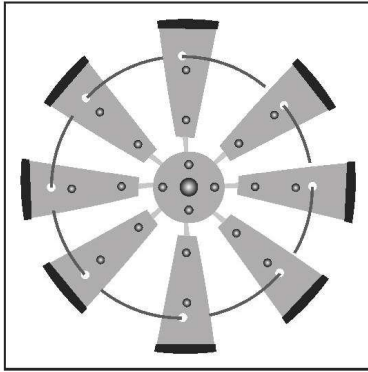
नीलिमा ने समबाहु त्रिभुज ABC के अन्तर्गत एक वृत्ताकार डिजाइन बनाया। वृत्त की त्रिज्या 4 cm है। दिये गये चित्र की सहायता से निम्न प्रश्नों के उत्तर दीजिये :

- (i) OB की लम्बाई ज्ञात कीजिये। 1
- (ii) क्या $DE \parallel CA$ है? तर्कसंगत उत्तर दीजिये। 1
- (iii) (a) चतुर्भुज OEBD के सभी कोणों की माप लिखिये। दर्शाइये कि OEBD एक चक्रीय चतुर्भुज है। 2

अथवा

- (iii) (b) ΔABC का परिमाण ज्ञात कीजिए। ($\sqrt{3} = 1.73$ लीजिये)

37.



एक किसान ने अपने खेत में सजावट के लिये एक पवनचक्की (windmill) लगायी। इसके समान चौड़ाई के आठ ब्लेड हैं जो कि एक वृत्त में समान रूप से व्यवस्थित हैं। एक वृत्ताकार तार इन सबको बाँधे रखता है।

दिया गया आरेख दो ब्लेड OAB तथा OPQ को एक चौथाई वृत्त में दर्शाता है। दोनों वृत्त बिंदु O पर संकेन्द्रित हैं। $\angle AOB = \angle POQ = 30^\circ$, $OA = 28$ cm तथा $OC = 21$ cm है।

- (i) $\angle BOP$ का मान ज्ञात कीजिए। 1
- (ii) चाप CD की लम्बाई ज्ञात कीजिए। 1
- (iii) (a) क्षेत्र CABD का क्षेत्रफल ज्ञात कीजिए। 2

अथवा

- (iii) (b) क्षेत्र CABD का परिमाण ज्ञात कीजिए।



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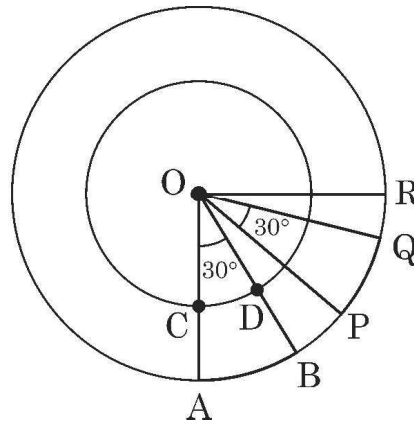
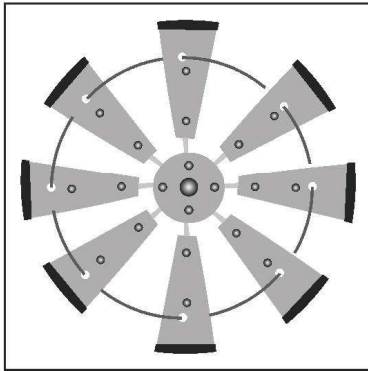
Neelima made a circular design inside an equilateral triangle ABC. The radius of the circle is 4 cm. Observe the diagram and answer the following questions :

- (i) Determine the length OB. 1
- (ii) Is $DE \parallel CA$? Give reason for your answer. 1
- (iii) (a) Write all angles of quadrilateral OEBC and show that it is a cyclic quadrilateral. 2

OR

- (iii) (b) Find the perimeter of $\triangle ABC$. (Use $\sqrt{3} = 1.73$)

37.



A farmer has put up a decorative windmill in his farm in which there are eight blades of equal width and equally placed in a circular arrangement. A circular wire goes through them.

The diagram shows two blades OAB and OPQ in a quarter circle with centre O. $\angle AOB = \angle POQ = 30^\circ$, $OA = 28$ cm, $OC = 21$ cm.

O is the centre of both the circles.

- (i) Determine the measure of $\angle BOP$. 1
- (ii) Find length of arc CD. 1
- (iii) (a) Find the area of region CABD. 2

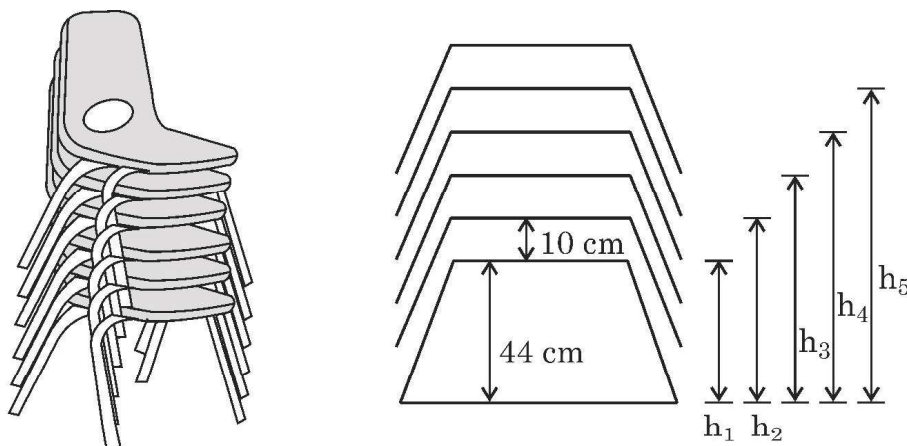
OR

- (iii) (b) Find perimeter of region CABD.



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38. A tent house owner provides furniture on rent. He stacks chairs in his shop to save space.



In the diagram, the height of seat of chair from ground is represented by $h_1, h_2, h_3, \dots$. The height of first seat is 44 cm from ground level and gap between every two seats is 10 cm.

- (i) Write the values of h_1, h_2, h_3, h_4 and h_5 in this order only. 1
- (ii) Show that the above values form an A.P. Write its first term and common difference. 1
- (iii) (a) If chairs can be stacked up to the maximum height of 160 cm, then find the maximum number of chairs in a stack. 2

OR

- (iii) (b) Is it possible to stack 15 chairs if maximum height of the stack can not be more than 180 cm ? Justify your answer.



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