

Series : **4MNKL**



SET ~ 2



रोल नं.



प्रश्न-पत्र कोड **30/4/2**
Q.P. Code

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.

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 यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें।
Please write down the Serial Number of the question in the answer-book at the given place 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. **{ }**

गणित (मानक)

MATHEMATICS (Standard)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80



General Instructions :

Read the following instructions very carefully and strictly follow them :

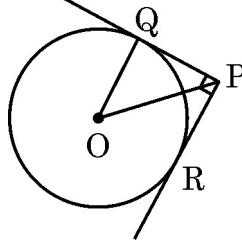
- (i) *This question paper contains **38** questions. **All** questions are **compulsory**.*
- (ii) *This question paper is divided into **FIVE** Sections – **A, B, C, D** and **E**.*
- (iii) *In Section–**A**, questions number **1** to **18** are Multiple Choice Questions (MCQs) and questions number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



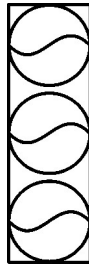
खण्ड – क

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

1. 4 cm त्रिज्या तथा केन्द्र O वाले वृत्त पर दो स्पर्श-रेखाएँ PQ तथा PR खींची गयी हैं। यदि $\angle QPR = 90^\circ$ है, तो OP की लम्बाई है



- (A) 4 cm (B) $4\sqrt{2}$ cm
(C) 8 cm (D) $2\sqrt{2}$ cm
2. त्रिज्या r तथा ऊँचाई h वाला आइसक्रीम का शंकु आइसक्रीम के दो गोलों से पूरा-पूरा भरा जा सकता है। यदि प्रत्येक गोले की त्रिज्या $\frac{r}{2}$ हो, तो $h : 2r$ बराबर है
- (A) 1 : 8 (B) 1 : 2
(C) 1 : 1 (D) 2 : 1
3. त्रिज्या 6.3 cm वाले वृत्त की चाप PQ केन्द्र पर θ कोण अंतरित करती है। यदि $\widehat{PQ} = 11$ cm है, तो θ का मान है
- (A) 10° (B) 60°
(C) 45° (D) 100°
4. $\frac{1 + \tan^2 A}{1 + \cot^2 A}$ बराबर है
- (A) $\tan^2 A$ (B) -1
(C) $-\tan^2 A$ (D) $\cot^2 A$
5. तीन टेनिस की गेंदें एक बेलनाकार जार में पूरी तरह से फिट हो गयी हैं। यदि प्रत्येक गेंद की त्रिज्या r है, तो जार में मौजूद हवा का आयतन है



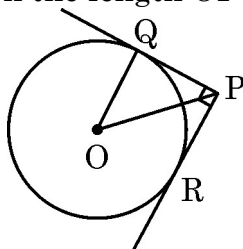
- (A) $2\pi r^3$ (B) $3\pi r^3$
(C) $5\pi r^3$ (D) $4\pi r^3$



SECTION – A

Q. Number 1 to 20 are multiple choice questions of 1 mark each.

1. If PQ and PR are tangents to the circle with centre O and radius 4 cm such that $\angle QPR = 90^\circ$, then the length OP is



- (A) 4 cm
(B) $4\sqrt{2}$ cm
(C) 8 cm
(D) $2\sqrt{2}$ cm
2. An ice-cream cone of radius r and height h is completely filled by two spherical scoops of ice-cream. If radius of each spherical scoop is $\frac{r}{2}$, then

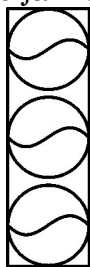
$h : 2r$ equals

- (A) 1 : 8
(B) 1 : 2
(C) 1 : 1
(D) 2 : 1
3. Arc PQ subtends an angle θ at the centre of the circle with radius 6.3 cm.

If $\widehat{PQ} = 11$ cm, then the value of θ is

- (A) 10°
(B) 60°
(C) 45°
(D) 100°
4. $\frac{1 + \tan^2 A}{1 + \cot^2 A}$ equals to :

- (A) $\tan^2 A$
(B) -1
(C) $-\tan^2 A$
(D) $\cot^2 A$
5. Three tennis balls are just packed in a cylindrical jar. If radius of each ball is r , volume of air inside the jar is



- (A) $2\pi r^3$
(B) $3\pi r^3$
(C) $5\pi r^3$
(D) $4\pi r^3$



6. दो भिन्न पासे एक साथ फेंके गये। इसकी प्रायिकता कि दोनों प्राप्त संख्याएँ 4 से छोटी हैं, है :

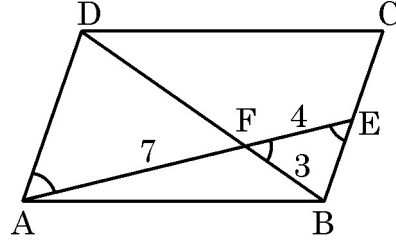
(A) $\frac{2}{9}$

(B) $\frac{7}{36}$

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

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

7. ABCD एक समान्तर-चतुर्भुज है जिसमें $AF = 7$ cm, $FB = 3$ cm तथा $EF = 4$ cm है। FD की लम्बाई है :



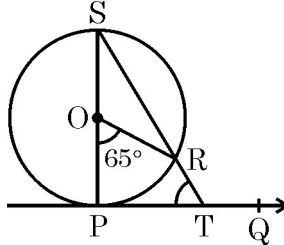
(A) $\frac{21}{4}$ cm

(B) $\frac{28}{3}$ cm

(C) $\frac{12}{7}$ cm

(D) 5.5 cm

8. O केन्द्र वाले वृत्त पर खींची गयी स्पर्श-रेखा PQ है। यदि $\angle POR = 65^\circ$ है, तो $\angle PTR$ का मान है



(A) 65°

(B) 58.5°

(C) 57.5°

(D) 45°

9. $(-1, 2)$ पर केन्द्रित वृत्त बिन्दु $(0, 3)$ से होकर गुजरता है। वृत्त की त्रिज्या है

(A) $2\sqrt{2}$

(B) $\sqrt{2}$

(C) $\sqrt{26}$

(D) 1

10. दिया गया है कि $\triangle ABC \sim \triangle EDF$ है। निम्न में से कौन सा विकल्प सही नहीं है ?

(A) $\frac{\triangle ABC \text{ का परिमाप}}{\triangle EDF \text{ का परिमाप}} = \frac{AB}{ED}$

(B) $\frac{AB}{ED} = \frac{AC}{EF}$

(C) $\angle A = \angle D, \angle C = \angle F$

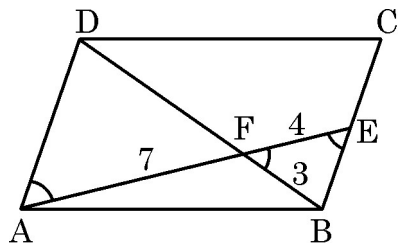
(D) $\frac{AB + BC}{AC} = \frac{DE + DF}{EF}$



6. Two different dice are rolled together. The probability that both the obtained numbers are less than 4, is

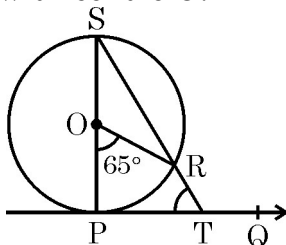
- (A) $\frac{2}{9}$ (B) $\frac{7}{36}$
(C) $\frac{1}{4}$ (D) $\frac{2}{3}$

7. ABCD is a parallelogram such that AF = 7 cm, FB = 3 cm and EF = 4 cm, length FD = equals



- (A) $\frac{21}{4}$ cm (B) $\frac{28}{3}$ cm
(C) $\frac{12}{7}$ cm (D) 5.5 cm

8. PQ is tangent to a circle with centre O. If $\angle POR = 65^\circ$, then $m\angle PTR$ is



- (A) 65° (B) 58.5°
(C) 57.5° (D) 45°

9. A circle centred at $(-1, 2)$ passes through the point $(0, 3)$. Radius of the circle is

- (A) $2\sqrt{2}$ (B) $\sqrt{2}$
(C) $\sqrt{26}$ (D) 1

10. It is given that $\triangle ABC \sim \triangle EDF$. Which of the following is not true ?

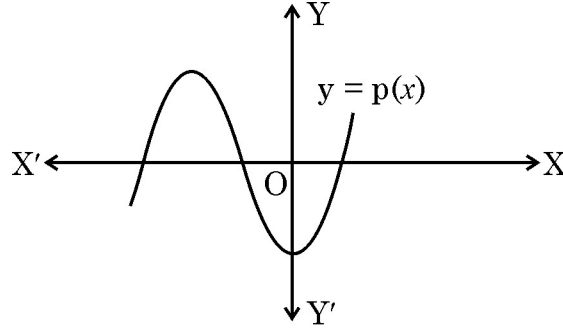
- (A) $\frac{\text{Perimeter of } \triangle ABC}{\text{Perimeter of } \triangle EDF} = \frac{AB}{ED}$ (B) $\frac{AB}{ED} = \frac{AC}{EF}$
(C) $\angle A = \angle D, \angle C = \angle F$ (D) $\frac{AB + BC}{AC} = \frac{DE + DF}{EF}$



11. यदि द्विघात समीकरण $x^2 - k\sqrt{3}x + 2 = 0$ के मूल वास्तविक तथा समान हैं, तो k का मान है

- (A) -2 (B) $\sqrt{\frac{8}{3}}$
(C) 1 (D) 2

12. बहुपद $p(x)$ के ग्राफ को ध्यानपूर्वक देखिये। बहुपद $p(x)$ के शून्यकों की संख्या है :



- (A) 5 (B) 4
(C) 6 (D) 3

13. एक बारम्बारता बंटन का माध्य तथा माध्यक क्रमशः 43 तथा 40 हैं। इसके बहुलक का मान है

- (A) 34 (B) 43
(C) 38.5 (D) 41.5

14. त्रिज्या 18 cm वाले वृत्त के एक त्रिज्यखंड का क्षेत्रफल 198 cm^2 है। इसके केन्द्रीय कोण की माप है

- (A) 70° (B) 14°
(C) 140° (D) 210°

15. यदि $2 \tan A = 3$ है, तो $\sec A$ का मान बराबर है

- (A) $\sqrt{\frac{13}{2}}$ (B) $\frac{\sqrt{13}}{4}$
(C) $\frac{2}{\sqrt{13}}$ (D) $\frac{\sqrt{13}}{2}$

16. k का वह मान जिसके लिये रैखिक समीकरण युग्म $\frac{x}{2} + \frac{y}{3} = 5$ तथा $2x + ky = 7$ असंगत है, है :

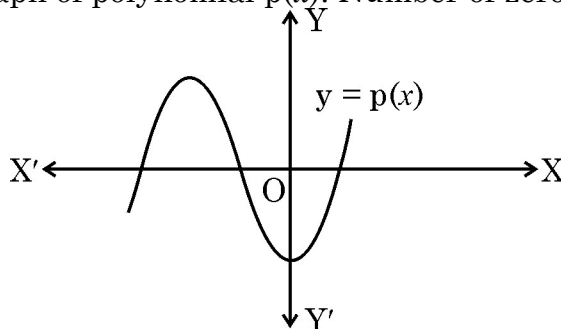
- (A) $\frac{3}{4}$ (B) $\frac{4}{3}$
(C) $\frac{1}{3}$ (D) 3



11. If roots of the quadratic equation $x^2 - k\sqrt{3}x + 2 = 0$ are real and equal, then value of k is

(A) -2 (B) $\sqrt{\frac{8}{3}}$
(C) 1 (D) 2

12. Observe the graph of polynomial $p(x)$. Number of zeroes of $p(x)$ is



- (A) 5 (B) 4
(C) 6 (D) 3
13. Mean and Median of a frequency distribution are 43 and 40 respectively. The value of mode is

(A) 34 (B) 43
(C) 38.5 (D) 41.5

14. Area of sector of a circle with radius 18 cm is 198 cm^2 . The measure of central angle is

(A) 70° (B) 14°
(C) 140° (D) 210°

15. If $2 \tan A = 3$, then value of $\sec A$ equals

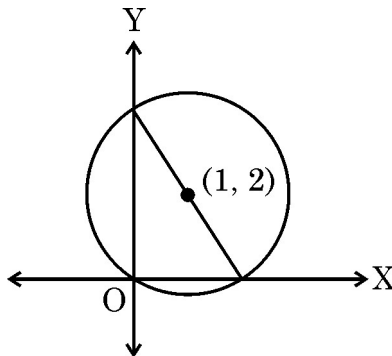
(A) $\sqrt{\frac{13}{2}}$ (B) $\frac{\sqrt{13}}{4}$
(C) $\frac{2}{\sqrt{13}}$ (D) $\frac{\sqrt{13}}{2}$

16. The value of k for which the system of linear equations $\frac{x}{2} + \frac{y}{3} = 5$ and $2x + ky = 7$ is inconsistent, is

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



17. In an A.P., $a = -3$ and $S_{17} = 357$. The value of a_{17} is
(A) 47 (B) 39
(C) 45 (D) 42
18. In the given figure, a circle is centred at $(1, 2)$. The diameter of the circle is



- (A) 4 (B) $2\sqrt{2}$
(C) $\sqrt{5}$ (D) $2\sqrt{5}$

(Assertion and Reason based Questions)

Direction : Question Numbers 19 and 20 are Assertion (A) and Reason (R) based questions. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (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 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) :** $(\sqrt{3} + \sqrt{5})$ is an irrational number.
Reason (R) : Sum of the any two irrational numbers is always irrational.
20. **Assertion (A) :** If probability of happening of an event is $0.2p$, $p > 0$, then p can't be more than 5.
Reason (R) : $P(\bar{E}) = 1 - P(E)$ for an event E .



खण्ड – ख

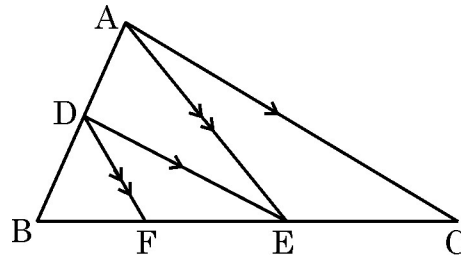
प्रश्न संख्या 21 से 25 तक अति लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न के 2 अंक हैं।

21. (a) सिद्ध कीजिए कि $2 + 3\sqrt{5}$ एक अपरिमेय संख्या है। दिया है कि $\sqrt{5}$ एक अपरिमेय संख्या है।

अथवा

- (b) यदि 210 और 55 के HCF को $210 \times 5 + 55 \times m$ के द्वारा व्यक्त किया जाये, तो m का मान ज्ञात कीजिए।

22. दी गयी आकृति में, $DE \parallel AC$ है तथा $DF \parallel AE$ है। सिद्ध कीजिये : $\frac{BF}{FE} = \frac{BE}{EC}$.



23. सत्यापित कीजिये कि द्विघात समीकरण $(p - q)x^2 + (q - r)x + (r - p) = 0$ के मूल बराबर हैं जब $q + r = 2p$ है।

24. बहुपद $p(x) = 3x^2 - 6x - 5$ के शून्यक α तथा β हैं। $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ का मान ज्ञात कीजिये।

25. (a) सिद्ध कीजिये : $\sqrt{\frac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$

अथवा

- (b) मान ज्ञात कीजिए : $\frac{3 \cos^2 30^\circ - 6 \operatorname{cosec}^2 30^\circ}{\tan^2 60^\circ}$

खण्ड – ग

प्रश्न संख्या 26 से 31 तक लघु-उत्तरीय प्रकार के प्रश्न हैं। प्रत्येक प्रश्न के 3 अंक हैं।

26. एक व्यापारी के पास 870 l, 812 l तथा 638 l आयतन के तीन प्रकार के तेल हैं। इन सभी प्रकार के तेलों को बिना मिलाये संग्रहित करने के लिये समान आकार के कम से कम कितने बर्तन लगेंगे ?



SECTION – B

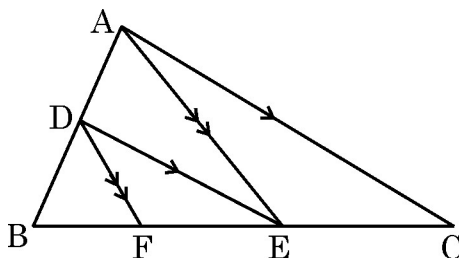
Q. Numbers 21 to 25 are very short answer type questions of 2 marks each.

21. (a) Prove that $2 + 3\sqrt{5}$ is an irrational number given that $\sqrt{5}$ is irrational number.

OR

- (b) If the HCF of 210 and 55 is expressed as $210 \times 5 + 55m$, then find the value of m .

22. In the given figure, $DE \parallel AC$ and $DF \parallel AE$. Prove that : $\frac{BF}{FE} = \frac{BE}{EC}$.



23. Verify that roots of the quadratic equation $(p - q)x^2 + (q - r)x + (r - p) = 0$ are equal when $q + r = 2p$.

24. α, β are zeroes of the polynomial $p(x) = 3x^2 - 6x - 5$. Find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$.

25. (a) Prove that : $\sqrt{\frac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$

OR

- (b) Evaluate : $\frac{3 \cos^2 30^\circ - 6 \operatorname{cosec}^2 30^\circ}{\tan^2 60^\circ}$

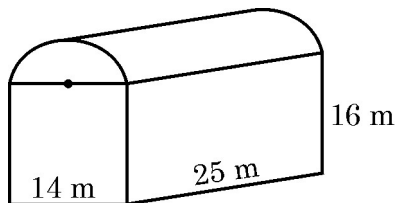
SECTION – C

Q. Numbers 26 to 31 are short answer type questions of 3 marks each.

26. A trader has three different types of oils of volume 870 l, 812 l and 638 l. Find the least number of containers of equal size required to store all the oil without getting mixed.

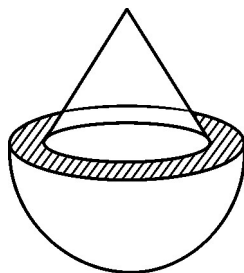


27. (a) To protect plants from heat, a shed of iron rods covered with green cloth is made. The lower part of the shed is a cuboid mounted by semi-cylinder as shown in the figure. Find the area of the cloth required to make this shed, if dimensions of the cuboid are $14 \text{ m} \times 25 \text{ m} \times 16 \text{ m}$



OR

- (b) The internal and external radii of a hollow hemisphere are $5\sqrt{2} \text{ cm}$ and 10 cm respectively. A cone of height $5\sqrt{7} \text{ cm}$ and radius $5\sqrt{2} \text{ cm}$ is surmounted on the hemisphere as shown in the figure. Find the total surface area of the object in terms of π . (Use $\sqrt{2} = 1.4$)



28. (a) In a class test, Veer scored 6 more than twice as many marks as Kevin scored. If one of them had scored 4 more marks, their total score would have been 40. Find the marks obtained by Veer and Kevin.

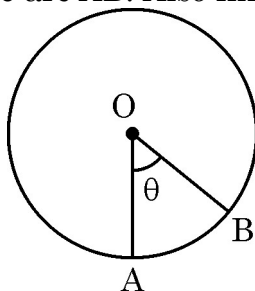
OR

- (b) Solve the linear equations $3x + y = 14$ and $y = 2$ graphically.
29. A bag contains 30 balls out of which 'm' number of balls are blue in colour.
- Find the probability that a ball drawn at random from the bag is not blue.
 - If 6 more blue balls are added in the bag, then the probability of drawing a blue ball will be $\frac{5}{4}$ times the probability of drawing a blue ball in the first case. Find the value of m.



30. Prove that : $\frac{1}{\sec x - \tan x} - \frac{1}{\cos x} = \frac{1}{\cos x} - \frac{1}{\sec x + \tan x}$

31. The perimeter of sector OAB of a circle with centre O and radius 5.6 cm, is 15.6 cm. Find length of the arc AB. Also find the value of θ .



SECTION – D

Q. Numbers 32 to 35 are long answer type questions of 5 marks each.

32. A kite is flying at a height of 60 m above the ground level. Ravi, standing at the roof of the house is holding the string straight and observes the angle of elevation of kite as 30° . From the bottom of the same building, the angle of elevation of kite is 45° . Find the length of the string and height of roof from the ground. (Use $\sqrt{3} = 1.73$)

33. (a) Find mean and mode of the following frequency distribution :

Class :	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65
Frequency :	11	20	25	22	12	10

OR

- (b) The median of the following data is 32.5, find the missing frequencies x and y :

Class :	0–10	10–20	20–30	30–40	40–50	50–60	60–70	Total
Frequency :	x	5	9	12	y	3	2	40

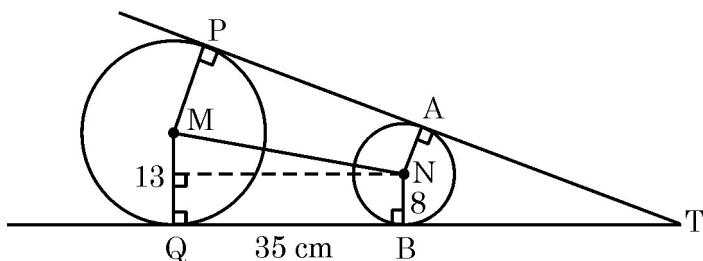
34. (a) A person on tour has ₹ 5,400 for his expenses. If he extends his tour by 5 days, he has to cut down his daily expenses by ₹ 180. Find the original duration of the tour and daily expense.

OR

- (b) The total cost of certain piece of cloth was ₹ 2,100. During special sale time, the shopkeeper offered 2 m extra cloth for free thus reducing the price of cloth per metre by ₹ 120. What was the original per metre price of cloth and its length ?



35.



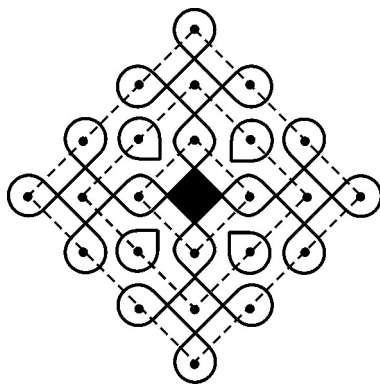
In the given figure, TP and TQ are tangents to a circle with centre M, touching another circle with centre N at A and B respectively. It is given that $MQ = 13$ cm, $NB = 8$ cm, $BQ = 35$ cm and $TP = 80$ cm.

- | | |
|--|---|
| (i) Name the quadrilateral MQBN. | 1 |
| (ii) Is MN parallel to PA ? Justify your answer. | 1 |
| (iii) Find length TB. | 1 |
| (iv) Find length MN. | 2 |

SECTION – E

Q. Numbers 36 to 38 are case based questions of 4 marks each.

36. 'Kolam' is a decorative art which is made with rice flour in South Indian States. It is drawn on grid pattern of dots. One such art work is shown below.



Observe the given figure carefully. There are 4 dots in first square, 8 dots in second square, 12 dots in third square and so on.

Based on the above, answer the following questions :

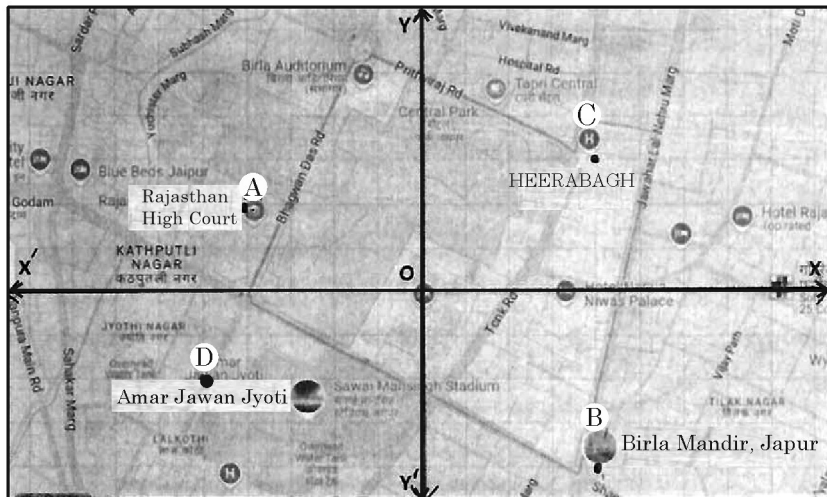
- | | |
|--|---|
| (i) Show that number of dots given above form an A.P. Write the first term and common difference. | 1 |
| (ii) Write n^{th} term of the A.P. formed. | 1 |
| (iii) (a) The pattern is expanded on a large ground. If total 220 dots are used, then find the number of squares formed. | 2 |

OR



- (b) Is it possible to complete n number of squares using 100 dots ?
If yes, then find the value of n .

37.



Observe the map of Jaipur city placed on a Cartesian plane. Taking Rambhagh Palace as origin, the location of some places are given below :

Point A : $(-4, 2)$ Rajasthan High Court

Point B : $(4, -4)$ Birla Mandir

Point C : $(4, 3)$ Heera Bagh

Point D : $(-5, -2)$ Amar Jawan Jyoti

Based on the above, answer the following questions :

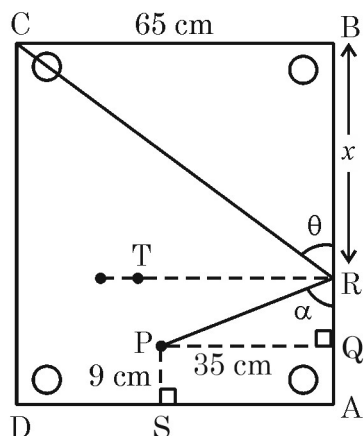
- (i) Advocate Rehana stays at Heera Bagh. How much distance she has to cover daily to go to the court and coming back home ? 1
- (ii) There is a crossing on X-axis which divides AD in a certain ratio. Find the ratio. 1
- (iii) (a) Is Birla Mandir equidistant from Heera Bagh and Amar Jawan Jyoti ? Justify your answer. 2

OR

- (b) Using section formula, show that points A, O and B are not collinear.



38.



Carom board is a very popular game. The board is a square of side length 65 cm. It has circular pockets in each corner.

Ansh strikes a disc, kept at position P with a striker. The disc, hits the boundary of the board at R and goes straight to pocket at corner C. It is given that $PS = 9$ cm, $PQ = 35$ cm, $BR = x$, $\angle PRQ = \alpha$ and $\angle CRB = \theta$.

Based on the above information, answer the following questions :

- (i) Using law of reflection i.e. $\angle PRT = \angle CRT$, prove that $\theta = \alpha$. 1
- (ii) Prove that $\triangle PQR \sim \triangle CBR$ given that PQ is perpendicular to AB . 1
- (iii) (a) Find the value of x using similarity of triangles. 2

OR

- (b) If $\frac{\text{Area } \triangle PQR}{\text{Area } \triangle CBR} = \frac{PQ^2}{CB^2}$, then find the value of x .

