

Series : **5LMKN**



SET ~ 2



रोल नं.



प्रश्न-पत्र कोड
Q.P. Code **430/5/2**

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 (बुनियादी)

MATHEMATICS (BASIC)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

430/5/2

1159-2

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P.T.O.



General Instructions :

Read the following instructions very carefully and follow them strictly :

- (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**, 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 carrying **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 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 $\pi = 22/7$ wherever required, if not stated.
- (x) Use of calculator is **NOT** allowed.



खण्ड – क

(बहुविकल्पीय प्रश्न)

20 × 1 = 20

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

1. एक थैले में कुछ लाल तथा कुछ सफेद गेंदें हैं। थैले में से यादृच्छया एक गेंद निकाली गयी। यदि एक लाल गेंद निकालने की प्रायिकता $\frac{2}{7}$ है, तो एक सफेद गेंद निकालने की प्रायिकता है :
(A) $\frac{1}{14}$ (B) $\frac{5}{7}$
(C) $\frac{1}{7}$ (D) $\frac{2}{7}$
2. यदि बहुपद $p(x) = 2x^2 - 7x + 6$ के शून्यक α तथा β हैं, तो $\frac{1}{\alpha} + \frac{1}{\beta}$ का मान है :
(A) $\frac{7}{2}$ (B) $\frac{6}{7}$
(C) $-\frac{7}{6}$ (D) $\frac{7}{6}$
3. दो पासों को एक साथ फेंका जाता है। प्राप्त संख्याओं के योग के 10 से बड़ा होने की प्रायिकता है :
(A) $\frac{1}{9}$ (B) $\frac{1}{18}$
(C) $\frac{1}{12}$ (D) 1
4. एक ठोस शंकु जिसकी त्रिज्या 7 cm तथा तिर्यक ऊँचाई 25 cm है, का संपूर्ण पृष्ठीय क्षेत्रफल है :
(A) 724 cm^2 (B) 704 cm^2
(C) 550 cm^2 (D) 616 cm^2
5. एक पेंडुलम की लम्बाई 70 cm है। घूमने पर यह पेंडुलम 88 cm लम्बाई की चाप बनाता है। चाप द्वारा केन्द्र पर अंतरित कोण की माप है :
(A) 36° (B) 70°
(C) 72° (D) 80°



Section – A
(Multiple Choice Questions)

20 × 1 = 20

Q. Nos. 1 to 20 are Multiple Choice Questions of 1 mark each.

1. A bag contains some red and some white balls. A ball is drawn at random from the bag. If the probability of getting a red ball is $\frac{2}{7}$, then the probability of getting a white ball is
(A) $\frac{1}{14}$ (B) $\frac{5}{7}$
(C) $\frac{1}{7}$ (D) $\frac{2}{7}$
2. If the zeroes of the polynomial $p(x) = 2x^2 - 7x + 6$ are α and β , then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is
(A) $\frac{7}{2}$ (B) $\frac{6}{7}$
(C) $\frac{-7}{6}$ (D) $\frac{7}{6}$
3. The probability of getting sum greater than 10, when two dice are rolled together, is
(A) $\frac{1}{9}$ (B) $\frac{1}{18}$
(C) $\frac{1}{12}$ (D) 1
4. The total surface area of a solid cone of radius 7 cm and slant height 25 cm, is
(A) 724 cm^2 (B) 704 cm^2
(C) 550 cm^2 (D) 616 cm^2
5. The length of a pendulum is 70 cm and it describes an arc of length 88 cm when swings. The angle subtended by the arc at the centre is
(A) 36° (B) 70°
(C) 72° (D) 80°



6. बिंदुओं $(-4, 5)$ तथा $(-1, 2)$ के बीच की दूरी है :

(A) 5

(B) $3\sqrt{2}$

(C) 6

(D) $2\sqrt{3}$

7. समांतर श्रेढ़ी (A.P.) $\frac{-1}{3}, \frac{4}{3}, 3, \dots$ का n वाँ पद है :

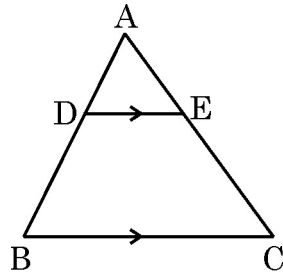
(A) $\frac{5n-9}{3}$

(B) $\frac{5n-6}{3}$

(C) $\frac{3n-4}{3}$

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

8. दी गई आकृति में, त्रिभुज ABC में $DE \parallel BC$ है। यदि $AD : AB = 1 : 3$ तथा $AE = 2.5$ cm है, तो AC बराबर है :



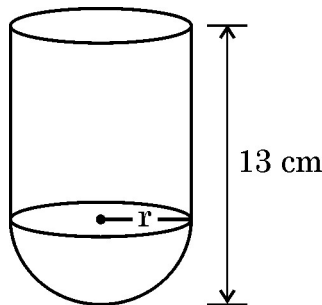
(A) 7.5 cm

(B) 5 cm

(C) 10 cm

(D) 2.5 cm

9. त्रिज्या r वाला एक बेलन समान त्रिज्या वाले अर्धगोले पर अध्यारोपित है। यदि वस्तु की कुल ऊँचाई 13 cm है तो इसका आंतरिक पृष्ठीय क्षेत्रफल है :



(A) $2\pi r(r + 13)$

(B) $13\pi r$

(C) $2\pi(13 + r)^2$

(D) $26\pi r$



6. The distance between the points $(-4, 5)$ and $(-1, 2)$ is

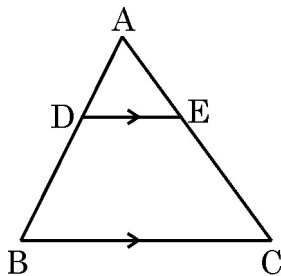
(A) 5 (B) $3\sqrt{2}$
(C) 6 (D) $2\sqrt{3}$

7. n^{th} term of the A.P. : $\frac{-1}{3}, \frac{4}{3}, 3, \dots$ is

(A) $\frac{5n-9}{3}$ (B) $\frac{5n-6}{3}$
(C) $\frac{3n-4}{3}$ (D) $\frac{3n+2}{3}$

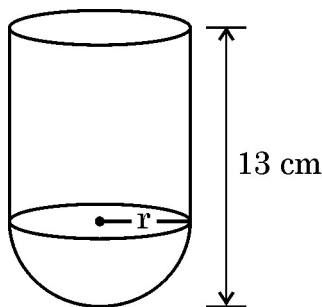
8. In the given figure, $DE \parallel BC$.

If $AD : AB = 1 : 3$ and $AE = 2.5$ cm, then AC equals



(A) 7.5 cm (B) 5 cm
(C) 10 cm (D) 2.5 cm

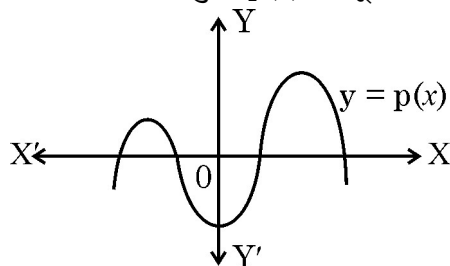
9. A cylinder of radius r is surmounted on a hemisphere of same radius. If total height of the object is 13 cm, then its inner surface area is



(A) $2\pi r(r + 13)$ (B) $13\pi r$
(C) $2\pi(13 + r)^2$ (D) $26\pi r$



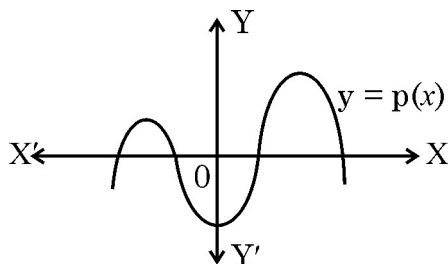
10. निम्न में से कौन सा कथन हमेशा सत्य नहीं है ?
 (A) दो वृत्त समरूप होते हैं ।
 (B) दो समद्विबाहु समकोण त्रिभुज समरूप होते हैं ।
 (C) दो आयत समरूप होते हैं ।
 (D) दो समबाहु त्रिभुज समरूप होते हैं ।
11. $7 \times 11 \times 13 + 5$
 (A) एक अभाज्य संख्या है । (B) एक विषम संख्या है ।
 (C) एक भाज्य संख्या है । (D) संख्या 5 का गुणज है ।
12. द्विघात समीकरण $x^2 + 9 = 0$ के मूल
 (A) वास्तविक एवं बराबर हैं । (B) वास्तविक नहीं हैं ।
 (C) वास्तविक तथा एक दूसरे के ऋणात्मक हैं । (D) परिमेय संख्याएँ हैं ।
13. 52 पत्तों की अच्छी प्रकार से फेंटी गयी गड्डी में से एक पत्ता निकाला जाता है । हुकुम (spade) की बेगम निकलने की प्रायिकता है :
 (A) $\frac{1}{26}$ (B) $\frac{1}{52}$
 (C) 0 (D) $\frac{1}{4}$
14. यदि $\sin \theta = \frac{1}{\sqrt{11}}$ है, तो $\cot \theta$ का मान है :
 (A) $\frac{\sqrt{11}}{\sqrt{10}}$ (B) $\frac{\sqrt{10}}{\sqrt{11}}$
 (C) $\sqrt{10}$ (D) $\sqrt{11}$
15. बहुपद $p(x)$ का ग्राफ यहाँ दर्शाया गया है । बहुपद $p(x)$ के शून्यकों की संख्या है :



- (A) 5 (B) 1
 (C) 0 (D) 4



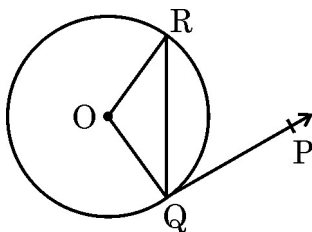
10. Which of the following statements is not always true ?
(A) Two circles are similar.
(B) Two isosceles right triangles are similar.
(C) Two rectangles are similar.
(D) Two equilateral triangles are similar.
11. $7 \times 11 \times 13 + 5$ is
(A) a prime number. (B) an odd number.
(C) a composite number. (D) a multiple of 5.
12. The roots of the quadratic equation $x^2 + 9 = 0$ are
(A) real and equal (B) not real
(C) real and negative of each other (D) rational numbers
13. A card is drawn from a well-shuffled deck of 52 playing cards. The probability of getting a queen of spade is
(A) $\frac{1}{26}$ (B) $\frac{1}{52}$
(C) 0 (D) $\frac{1}{4}$
14. If $\sin \theta = \frac{1}{\sqrt{11}}$, then $\cot \theta$ equals
(A) $\frac{\sqrt{11}}{\sqrt{10}}$ (B) $\frac{\sqrt{10}}{\sqrt{11}}$
(C) $\sqrt{10}$ (D) $\sqrt{11}$
15. The graph of a polynomial $p(x)$ is shown here. The number of zeroes of the polynomial $p(x)$ is



- (A) 5 (B) 1
(C) 0 (D) 4



16. A chord QR subtends an angle of 105° at the centre O of the circle. The measure of $\angle RQP$ is



- (A) $\frac{75^\circ}{2}$ (B) $\frac{105^\circ}{2}$
(C) 75° (D) 15°
17. If $\frac{-20}{9}, \frac{-2}{9}, \frac{16}{9}, \dots$ are in A.P., then next term of the sequence is
- (A) $\frac{32}{9}$ (B) $\frac{46}{9}$
(C) $\frac{2}{9}$ (D) $\frac{34}{9}$
18. PQ is tangent to a circle at a point P on the circle. The number of tangents which can be drawn to the circle parallel to PQ, is
- (A) 2 (B) 1
(C) many (D) zero

(Assertion – Reason based questions)

Directions : In Q. No. 19 and 20 a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option .

- (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. अभिकथन (A) : दिये गये आँकड़ों में माध्यक $\frac{N}{2}$ का मान होता है, जहाँ N सभी आवृत्तियों का योग है।

तर्क (R) : माध्यक का मान समस्त वितरण को दो बराबर भागों में बाँटता है।

20. अभिकथन (A) : न्यून कोण θ के लिये $\cos \theta$ का मान हमेशा 1 से कम होता है।

तर्क (R) : एक समकोण त्रिभुज में कर्ण सबसे लम्बी भुजा होती है तथा $\cos \theta = \frac{\text{आधार}}{\text{कर्ण}}$ ।

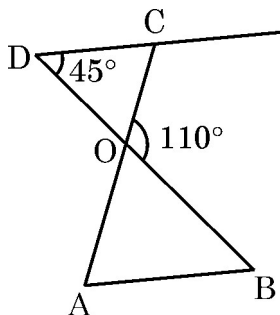
खण्ड – ख

(अति लघु-उत्तरीय प्रश्न)

5 × 2 = 10

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

21. यदि बिंदु A(a, 0), B(1, 1) तथा C(0, b) मिलाने पर बिंदु B पर समकोण वाला त्रिभुज बनाते हैं, तो a तथा b के बीच के संबंध को स्थापित कीजिए।
22. दी गयी आकृति में $\triangle ODC \sim \triangle OBA$ है। यदि $\angle BOC = 110^\circ$, $\angle ODC = 45^\circ$ तथा $AB = 2 CD$ है, तो ज्ञात कीजिए (i) $m\angle OAB$ (ii) $OB : OD$



23. (a) मान ज्ञात कीजिए : $\frac{5 \sin^2 45^\circ - 3 \tan^2 30^\circ}{2 \sec^2 30^\circ}$

अथवा

- (b) यदि $A = 60^\circ$ तथा $B = 30^\circ$ है, तो सत्यापित कीजिए कि $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$

24. यदि संख्याओं $135x^2$ तथा $189x^3$ का H.C.F. 108 है, तो x का मान ज्ञात कीजिए।



19. **Assertion (A) :** Median of a data is the value of $\frac{N}{2}$, where N represents sum of all frequencies.

Reason (R) : Median divides the whole distribution in two equal parts.

20. **Assertion (A) :** For an acute angle θ , $\cos \theta$ is always less than 1.

Reason (R) : In a right-angled triangle, hypotenuse is the longest side and $\cos \theta = \frac{\text{Base}}{\text{Hypotenuse}}$.

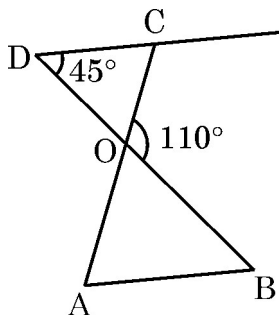
Section – B

(Very Short Answer Type Questions)

5 × 2 = 10

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

21. If A(a, 0), B(1, 1) and C(0, b) form a triangle, right angled at B when joined, then establish a relation between a and b.
22. In the given figure, $\triangle ODC \sim \triangle OBA$. If $\angle BOC = 110^\circ$, $\angle ODC = 45^\circ$ and $AB = 2 CD$, then find (i) $m\angle OAB$ (ii) $OB : OD$.



23. (a) Evaluate : $\frac{5 \sin^2 45^\circ - 3 \tan^2 30^\circ}{2 \sec^2 30^\circ}$

OR

- (b) For $A = 60^\circ$ and $B = 30^\circ$, verify that $\tan (A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$.

24. If H.C.F. of $135x^2$ and $189x^3$ is 108, then find the value of x .



25. (a) Find the probability that a number selected at random from the numbers 30, 31, 32, 33,, 60 is (i) a prime number (ii) a multiple of 6.

OR

- (b) Slips of letters of the word 'BACKGROUND' are put in a bowl and thoroughly mixed. One slip is picked up at random. Find the probability that picked up slip's letter is (i) a vowel (ii) present in the word 'BALL'.

Section – C

(Short Answer Type Questions)

6 × 3 = 18

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

26. (a) Find the zeroes of the polynomial $p(x) = 4x^2 - 8x + 3$ and verify the relationship between its zeroes and co-efficients.

OR

- (b) Form a polynomial whose zeroes are α^2 and β^2 , where α and β are zeroes of the polynomial $p(x) = x^2 - 3\sqrt{2}x + 4$.

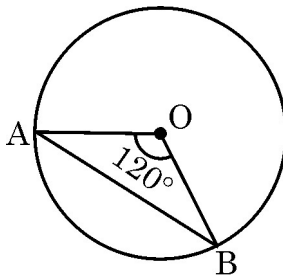
27. Prove that $\sqrt{2}$ is an irrational number.

28. (a) How many terms of the A.P. 3, 5, 7, 9, ... must be added to get the sum 80 ?

OR

- (b) Find three consecutive terms in A.P. whose sum is 21 and their product is 231.

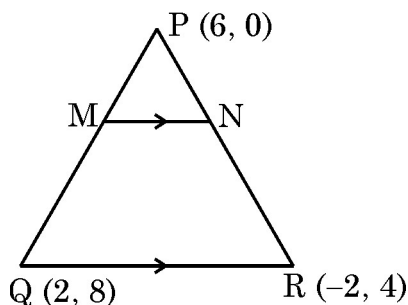
29. Chord AB of a circle subtends an angle of 120° at the centre O of the circle. Find the length of arc AB, if radius of the circle is 21 cm.



30. Prove that : $\tan^2 \theta + \cot^2 \theta + 2 = \sec^2 \theta \operatorname{cosec}^2 \theta$.



31. Points P(6, 0), Q(2, 8) and R(-2, 4) are vertices of ΔPQR . It is given that $MN \parallel QR$ such that $\frac{PM}{MQ} = \frac{1}{3}$. Using distance formula and ratio formula, show that $\frac{MN}{QR} = \frac{1}{4}$.



Section – D

(Long Answer Type Questions)

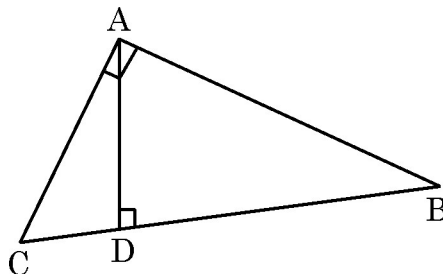
4 × 5 = 20

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

32. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point 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 distance of the point from the poles.
33. Find mean and mode of the following data :

Class	0-15	15-30	30-45	45-60	60-75	75-90	90-105
Frequency	4	6	8	10	12	7	3

34. (a) In the given figure, ΔABC is right angled triangle with $\angle A = 90^\circ$. AD is perpendicular to BC. Prove that :
- $\Delta DBA \sim \Delta DAC$
 - $DA^2 = DB \times DC$
 - Find the area of ΔABC when $DB = 9$ cm and $DC = 16$ cm.



OR



- (b) 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.
35. (a) ABCD is a rectangle of dimensions $80 \text{ cm} \times 60 \text{ cm}$. Another rectangle PQRS is drawn inside ABCD leaving space of equal width $x \text{ cm}$ along the edges of ABCD. If area PQRS is half of the area ABCD, then find the value of x .

OR

- (b) A train covers a distance of 90 km at a uniform speed. Had the speed been 15 km/h more, it would have taken 30 minutes less for the same journey. Find the original speed of the train.

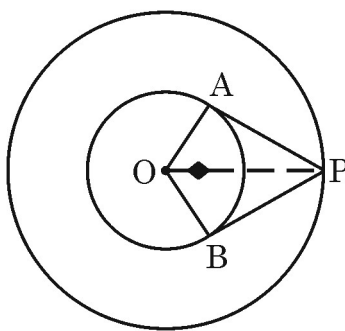
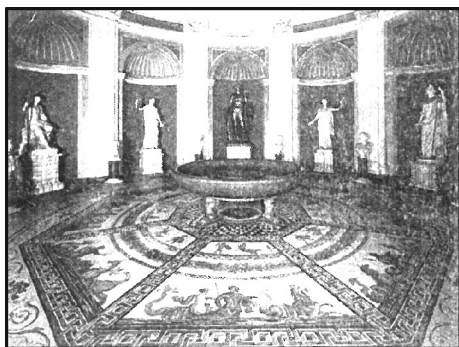
Section – E

(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 circular museum hall of radius 14 m , some statues are displayed. Statues are kept inside the inner concentric circle of radius 7 m . One such statue lying in sector OAB, is fenced along line segments OA, AP, PB and BO where P is a point on outer circle.

Based on above information, answer the following questions :

- (i) Find $m\angle AOP$.

1

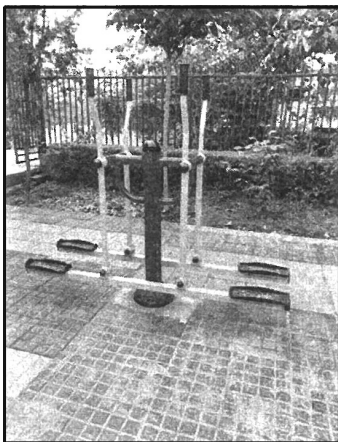


- (ii) Prove that $\triangle OAP \cong \triangle OBP$. 1
- (iii) (a) Find the length of fencing required to protect the statue.
(Take $\sqrt{3} = 1.73$) 2

OR

- (b) Find area of quadrilateral OAPB. (Take $\sqrt{3} = 1.73$)

37.



Seema daily goes to a park to exercise on machines available there. When Seema spent 15 minutes on exercise bicycle and 30 minutes on double cross walker, she received a message of burning 435 calories on her fitness watch. When she spent 30 minutes on exercise bicycle and 40 minutes on double cross walker, she received a message of burning 690 calories. To find the number of calories burned per minute on each machine, answer the following :

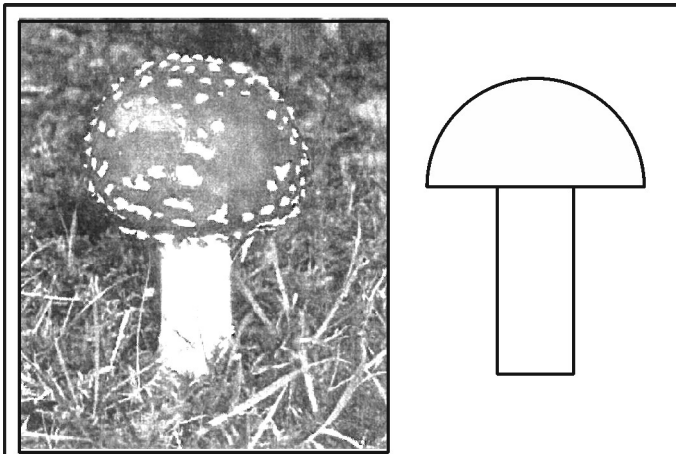
- (i) Represent the above situation in terms of a pair of linear equations in two variables.
- (ii) Show that the equations have unique solution.
- (iii) (a) Solve both equations to find the values of the variables using elimination method.

OR

- (b) Solve both equations to find the values of the variables using substitution method.



38.



There are many varieties of mushrooms available in the world. One such mushroom ‘Amanita muscaria’ has a upper part which is like red cap (hemispherical) and lower part is like white stem (cylindrical).

The hemispherical cap’s radius = 3 cm and cylindrical stem is 2 cm high with diameter 1.4 cm. Considering mushroom a solid object, answer the following questions :

- (i) What is the total height of a mushroom ?
- (ii) Find the volume of the stem.
- (iii) (a) Determine the volume of 7 such mushrooms.

OR

- (b) Find the total surface area of 7 such mushrooms.

