

Series : **4MNKL**



SET ~ 2



रोल नं.



प्रश्न-पत्र कोड
Q.P. Code **430/4/2**

Roll No.

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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

430/4/2

1158-2

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P.T.O.



General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) *This question paper contains total **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** & **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 of **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 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 $\pi = \frac{22}{7}$ wherever required, if not stated.*
- (x) *Use of calculator is **NOT** allowed.*



(बहुविकल्पीय प्रश्न)

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

1. 52 पत्तों की अच्छी प्रकार से फेंटी गयी एक गड्डी में से एक पत्ता निकाला जाता है। इस पत्ते के इक्का या दस होने की प्रायिकता है :

- (A) $\frac{1}{13}$ (B) $\frac{2}{13}$
(C) $\frac{1}{26}$ (D) $\frac{4}{13}$

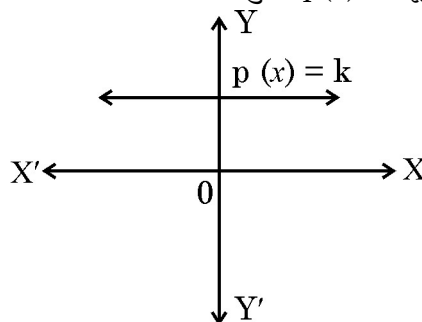
2. बिंदुओं $(-5, 1)$ तथा $(2, 2)$ के बीच की दूरी है :

- (A) $2\sqrt{5}$ इकाइयाँ (B) $\sqrt{10}$ इकाइयाँ
(C) $5\sqrt{2}$ इकाइयाँ (D) $3\sqrt{2}$ इकाइयाँ

3. संख्याओं $\sqrt{3}, \sqrt{4}, 3\sqrt{9}, 3\sqrt{8}, \sqrt{5}, 0, 4^{\frac{3}{2}}$ में से यादृच्छया एक अपरिमेय संख्या चुने जाने की प्रायिकता है :

- (A) 0 (B) $\frac{4}{7}$
(C) $\frac{3}{7}$ (D) 1

4. यहाँ बहुपद $p(x) = k$ का ग्राफ दिखाया गया है। बहुपद $p(x)$ के शून्यकों की संख्या है :



- (A) 0 (B) 1
(C) 2 (D) अनंत रूप से अनेक
5. 9 cm त्रिज्या वाले वृत्त की एक जीवा AB केन्द्र पर 40° का कोण अंतरित करती है। चाप AB की लंबाई है :

- (A) $\frac{22}{7}$ cm (B) $\frac{198}{7}$ cm
(C) $\frac{44}{7}$ cm (D) $\frac{54}{7}$ cm



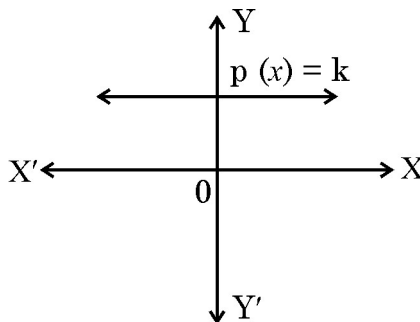
Section – A

20 × 1 = 20

(Multiple Choice Questions)

Q. No. 1 to 20 are multiple choice questions of 1 mark each.

1. A card is drawn from a well shuffled deck of 52 cards. The probability of getting an ace or a ten is :
(A) $\frac{1}{13}$ (B) $\frac{2}{13}$
(C) $\frac{1}{26}$ (D) $\frac{4}{13}$
2. The distance between the points $(-5, 1)$ and $(2, 2)$ is :
(A) $2\sqrt{5}$ units (B) $\sqrt{10}$ units
(C) $5\sqrt{2}$ units (D) $3\sqrt{2}$ units
3. Probability of getting an irrational number at random from the numbers $\sqrt{3}, \sqrt{4}, 3\sqrt{9}, 3\sqrt{8}, \sqrt{5}, 0, 4^{\frac{3}{2}}$ is :
(A) 0 (B) $\frac{4}{7}$
(C) $\frac{3}{7}$ (D) 1
4. The graph of polynomial $p(x) = k$ is shown here. Number of zeroes of polynomial $p(x)$ is :



- (A) 0 (B) 1
(C) 2 (D) infinitely many
5. Chord AB subtends an angle of 40° at the centre of the circle of radius 9 cm. The length of arc AB is :
(A) $\frac{22}{7}$ cm (B) $\frac{198}{7}$ cm
(C) $\frac{44}{7}$ cm (D) $\frac{54}{7}$ cm



6. $7 \times 29 \times 23 + 1$

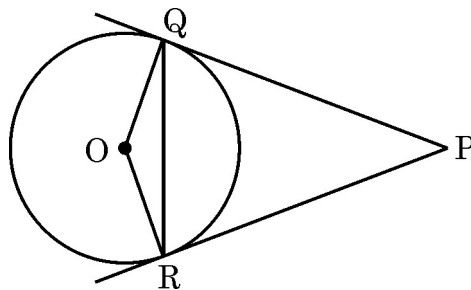
(A) एक अभाज्य संख्या है।

(B) 23 से विभाजित होती है।

(C) एक विषम संख्या है।

(D) एक भाज्य संख्या है।

7. दी गयी आकृति में, PQ तथा PR केन्द्र O वाले वृत्त पर खींची गयी दो स्पर्श-रेखाएँ हैं। यदि $\angle ORQ = 25^\circ$ हो, तो $\angle PQR$ का माप है :



(A) 65°

(B) 25°

(C) 50°

(D) 75°

8. $\tan 30^\circ \tan 60^\circ - \sin 90^\circ \cos 90^\circ$ का मान है :

(A) 1

(B) 0

(C) 2

(D) परिभाषित नहीं

9. दो क्रमागत प्राकृत संख्याओं का HCF है :

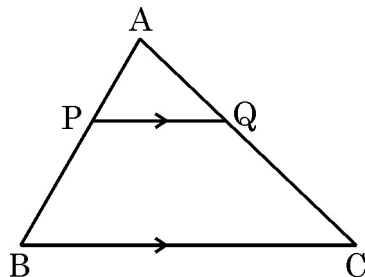
(A) 2

(B) 1

(C) 0

(D) छोटी वाली संख्या

10. दी गयी आकृति में, $PQ \parallel BC$ है। यदि $AP : AB = 3 : 7$ है, तो $AQ : QC$ बराबर है :



(A) 3 : 7

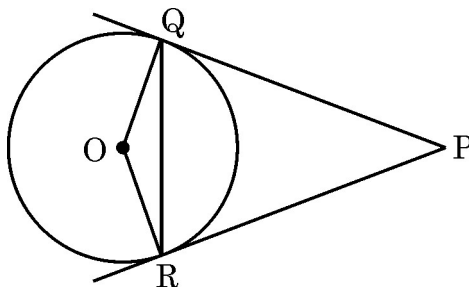
(B) 3 : 10

(C) 7 : 3

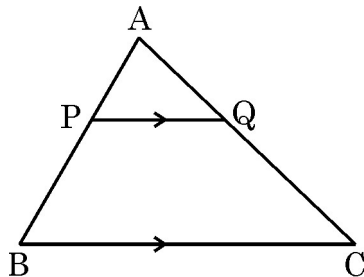
(D) 3 : 4



6. $7 \times 29 \times 23 + 1$ is :
(A) a prime number. (B) divisible by 23.
(C) an odd number. (D) a composite number.
7. In the given figure, PQ and PR are two tangents drawn to a circle with centre O. If $\angle ORQ = 25^\circ$, then the measure of $\angle PQR$ is :



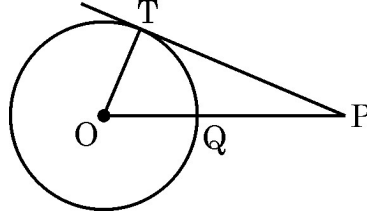
- (A) 65° (B) 25°
(C) 50° (D) 75°
8. The value of $\tan 30^\circ \tan 60^\circ - \sin 90^\circ \cos 90^\circ$ is :
(A) 1 (B) 0
(C) 2 (D) not defined
9. HCF of two consecutive natural numbers is :
(A) 2 (B) 1
(C) 0 (D) smaller number
10. In the given figure, $PQ \parallel BC$. If $AP : AB = 3 : 7$ then, $AQ : QC$ equals :



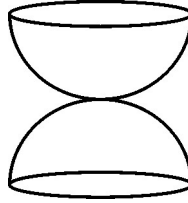
- (A) 3 : 7 (B) 3 : 10
(C) 7 : 3 (D) 3 : 4



11. PT एक वृत्त जिसका केन्द्र O तथा त्रिज्या 5 cm है, पर खींची गयी एक स्पर्शरिखा है। OP वृत्त को बिंदु Q पर काटती है। यदि $PQ = x$ है, तो PT^2 बराबर है :



- (A) $x^2 + 5x$ (B) $x^2 + 10x + 50$
(C) $x^2 + 10x$ (D) $x^2 - 25$
12. समान त्रिज्या r वाले लकड़ी के दो ठोस अर्धगोले चित्र में दर्शाये अनुसार एक बिंदु से जोड़े गये हैं। इस वस्तु का कुल पृष्ठीय क्षेत्रफल है :



- (A) $4\pi r^2$ (B) $6\pi r^2$
(C) $3\pi r^2$ (D) $5\pi r^2$
13. एक वर्गीकृत बारंबारता बंटन का माध्य ज्ञात करने के लिये पद विचलन विधि $\left(u = \frac{x - a}{h}\right)$ का उपयोग

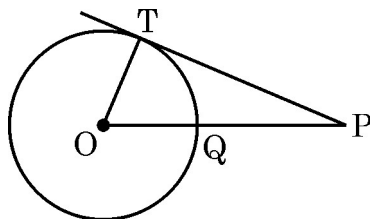
करते हुये पाया गया कि $\bar{x} = 62$, $a = 47.5$ तथा $h = 5$ है। $\bar{u}$ का मान है :

- (A) 3 (B) 14.5
(C) 2.9 (D) 3.1
14. एक A.P. का n वाँ पद $5n - 15$ है। इस A.P. का सार्व अन्तर है :

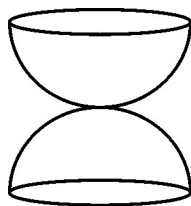
- (A) $5n$ (B) 5
(C) -5 (D) 10



11. PT is tangent to the circle with centre O and radius 5 cm. OP intersects the circle at Q. If $PQ = x$, then PT^2 equals :



- (A) $x^2 + 5x$ (B) $x^2 + 10x + 50$
(C) $x^2 + 10x$ (D) $x^2 - 25$
12. Two wooden solid hemispheres of same radii r , are joined at a point, as shown in the figure. The total surface area of the object is :



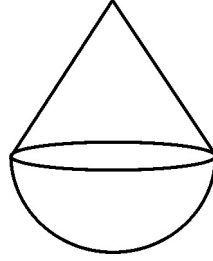
- (A) $4\pi r^2$ (B) $6\pi r^2$
(C) $3\pi r^2$ (D) $5\pi r^2$
13. While calculating mean of a grouped frequency distribution using step deviation method $\left(u = \frac{x - a}{h}\right)$ it was found that $\bar{x} = 62$, $a = 47.5$, $h = 5$. The

value of $\bar{u}$ is :

- (A) 3 (B) 14.5
(C) 2.9 (D) 3.1
14. n^{th} term of an A.P. is $5n - 15$. The common difference of the A.P. is :
- (A) $5n$ (B) 5
(C) -5 (D) 10



15. त्रिज्या 6 cm तथा तिर्यक ऊँचाई 10 cm वाला शंकु, समान त्रिज्या वाले अर्धगोले पर अध्यारोपित है। खिलौने की ऊँचाई है :



- (A) 12 cm (B) 16 cm
(C) 14 cm (D) 10 cm
16. समांतर श्रेणी $\frac{-3}{2}, \frac{3}{2}, \frac{9}{2}, \dots$ का n वाँ पद है :
- (A) $\frac{3n}{2} - 3$ (B) $3n - \frac{9}{2}$
(C) $\frac{3n - 9}{2}$ (D) $3n + \frac{3}{2}$
17. यदि $\sec \theta = \sqrt{3}$ है, तो $\tan \theta$ का मान है :
- (A) $\sqrt{3} - 1$ (B) 60°
(C) 2 (D) $\sqrt{2}$
18. समीकरण $5x^2 - 2x + k = 0$ के मूल वास्तविक और बराबर हैं। k का मान है :
- (A) 5 (B) $-\frac{1}{5}$
(C) $\frac{1}{5}$ (D) 0

(अभिकथन – तर्क आधारित प्रश्न)

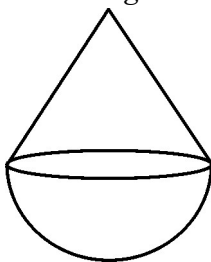
निर्देश : प्रश्न संख्या 19 तथा 20 में एक अभिकथन (A) के बाद एक तर्क (R), कथन दिया गया है।

सही विकल्प चुनिये :

- (A) दोनों, अभिकथन (A) तथा तर्क (R) सही हैं। तर्क (R), अभिकथन (A) की सही व्याख्या करता है।
(B) दोनों, अभिकथन (A) तथा तर्क (R) सही हैं, परन्तु तर्क (R), अभिकथन (A) की सही व्याख्या नहीं करता है।
(C) अभिकथन (A) सही है, परन्तु तर्क (R) गलत है।
(D) अभिकथन (A) गलत है, परन्तु तर्क (R) सही है।



15. A cone with slant height 10 cm and radius 6 cm is surmounted on a hemisphere of same radius. The height of the toy is :



- (A) 12 cm (B) 16 cm
(C) 14 cm (D) 10 cm
16. n^{th} term of the A.P. $-\frac{3}{2}, \frac{3}{2}, \frac{9}{2}, \dots$ is :
- (A) $\frac{3n}{2} - 3$ (B) $3n - \frac{9}{2}$
(C) $\frac{3n - 9}{2}$ (D) $3n + \frac{3}{2}$
17. If $\sec \theta = \sqrt{3}$, then the value of $\tan \theta$ is :
- (A) $\sqrt{3} - 1$ (B) 60°
(C) 2 (D) $\sqrt{2}$
18. The value of k for which the equation $5x^2 - 2x + k = 0$ has equal real roots, is :
- (A) 5 (B) $-\frac{1}{5}$
(C) $\frac{1}{5}$ (D) 0

(Assertion – Reason based questions)

Directions : In questions number 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 correct explanation of Assertion (A).
(B) Both, Assertion (A) and Reason (R) are true, but Reason (R) is not correct explanation for 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) :** 4^n can not end with the digit zero.

Reason (R) : Prime factorisation of 4^n is unique.

20. **Assertion (A) :** The probability of an event can not be $\frac{1}{0.9}$.

Reason (R) : $0 \leq P(E) \leq 1$ for an event E.

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.

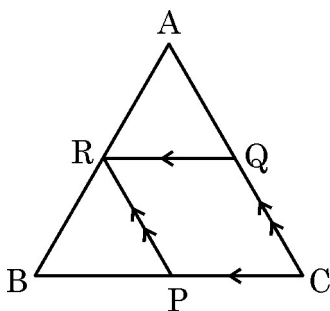
21. If $\sin 2A = \frac{\sqrt{3}}{2}$ and $2 \tan B + 1 = 3$, then find the value of $(A + B)$.

22. (a) If α, β are the zeroes of polynomial $p(x) = -9x^2 - 6x + 1$. Find the value of $\alpha^2 + \beta^2$.

OR

(b) Form a quadratic polynomial whose zeroes are twice the zeroes of polynomial $p(x) = x^2 - 3x - 5$.

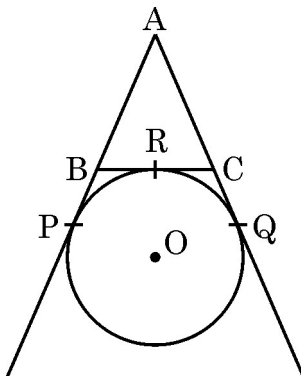
23. In the given figure, $QR \parallel CB$ and $RP \parallel AC$. If $BR = 10$ cm, $QA = 12$ cm, $BP = 12$ cm and $PC = 18$ cm, then find the lengths of AR and QC .



24. A $(-2, 3)$ and B $(4, 1)$ are end points of the diameter of a semi-circle. The semi-circle intersects y-axis at point P. Find the co-ordinates of the point P.

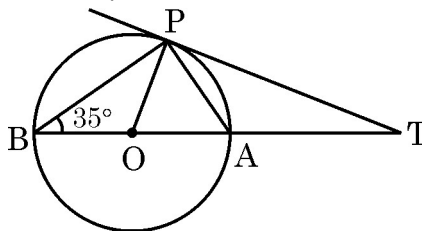


25. (a) In the given figure, AP, AQ and BC are tangents to the circle with centre O. If AB = 6 cm, AC = 7 cm and BC = 5 cm, then what is the length of AP ?



OR

- (b) In the given figure, TP is tangent to a circle with centre O. Diameter BA when produced meets the tangent at T. If $\angle ABP = 35^\circ$, then find the measure of $\angle PTA$.



Section – C

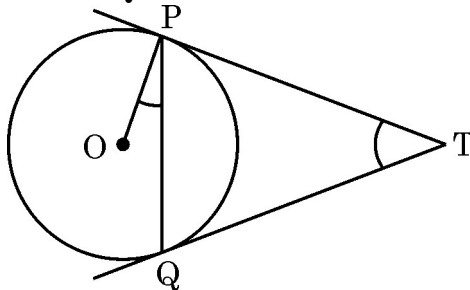
(Short Answer Type Questions)

$6 \times 3 = 18$

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

26. Two tangents TP and TQ are drawn to a circle with centre O, from an external point T.

Prove that $\angle PTQ = 2\angle OPQ$.



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



28. (a) The vertices of a rhombus ABCD are A(− 3, − 4), B(5, − 3), C(1, 4) and D(− 7, 3). Find the length of both the diagonals. Hence, find area of the rhombus ABCD.

OR

- (b) The line segment joining the points A (− 5, 1) and B (7, 6) is trisected at the points P and Q such that P is nearer to A. If P lies on the line $x + y = k$, then find the value of k.
29. (a) Prove that $\frac{(\sec \theta + \tan \theta)^2 - 1}{(\sec \theta + \tan \theta)^2 + 1} = \sin \theta$.

OR

- (b) Prove that $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \sec A \operatorname{cosec} A$.
30. A chord of a circle of radius 14 cm subtends a right angle at the centre. Find the area of the corresponding (i) minor segment (ii) major segment.
31. Two dice are rolled together. Find the probability that at least one of the numbers obtained is a multiple of 3.

Section – D

(Long Answer Type Questions)

4 × 5 = 20

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

32. (a) The difference between two numbers is 12. The greater number is 6 less than twice the smaller one.
- (i) Representing the above situation, frame two linear equations in two variables.
- (ii) Show that the equations have unique solution.
- (iii) Solve the equations and hence find the numbers.

OR

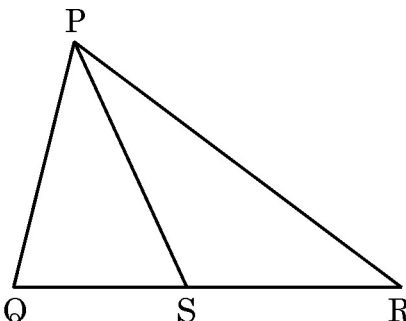
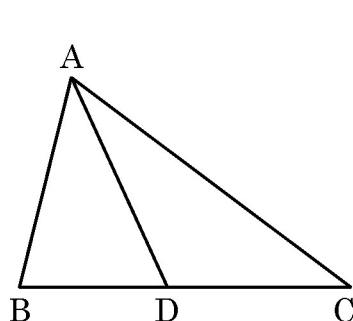
- (b) Solve the following equations graphically :
- $$x + y = 7 \text{ and } 2x - 5y = 7$$
33. The third and ninth term of an A.P. are 4 and − 8 respectively.
- (i) Which term of the A.P. is zero ?
- (ii) Find the value of n if $S_n = -36$.



34. (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)



AD and PS are respectively, the medians of $\triangle ABC$ and $\triangle PQR$. If $\triangle ABC \sim \triangle PQR$, then prove that

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

(ii) $\frac{AD}{PS} = \frac{BC}{QR}$

35. A statue, 2 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the bottom of the statue is 45° . Find the height of the pedestal and its distance from the point of observation on the ground. (use $\sqrt{3} = 1.73$)

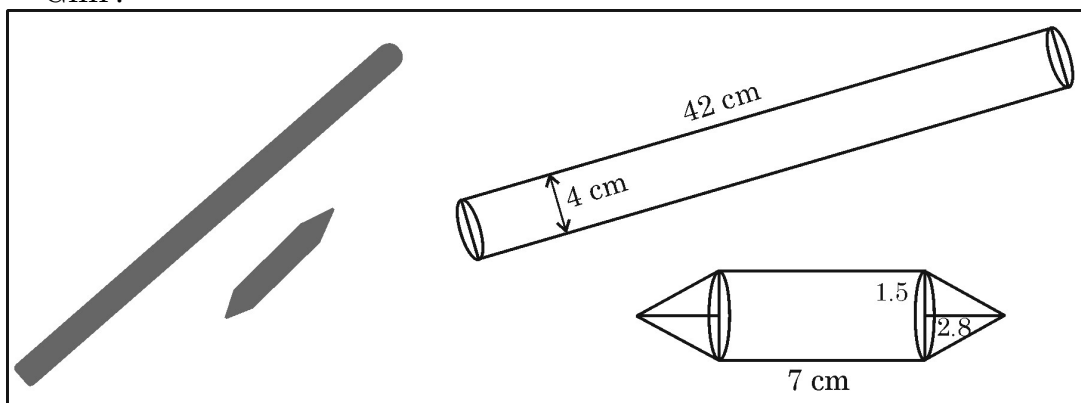
Section – E

(Case-study based Questions)

$3 \times 4 = 12$

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

36. 'Gilli Danda' is a very popular traditional game of India which is played with two wooden sticks – the larger one is called 'Danda' and smaller one 'Gilli'.





'Danda' – It is cylindrical in shape with diameter 4 cm and length 42 cm.

Gilli – It is cylindrical in middle with identical conical ends of same radius 1.5 cm and length 2.8 cm. The length of cylindrical part is 7 cm.

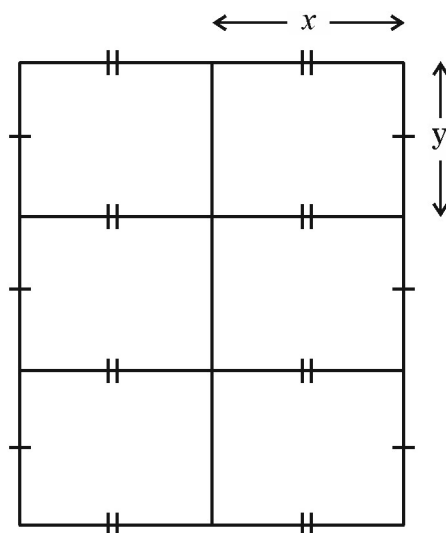
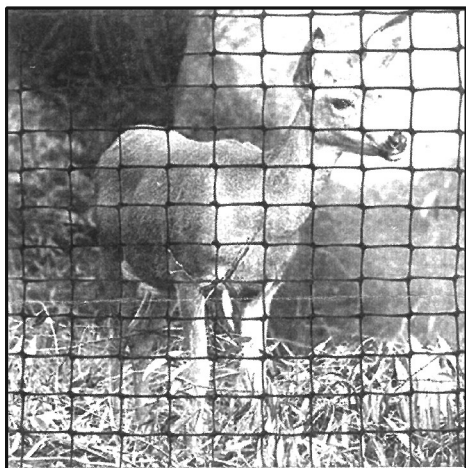
Based on the above, answer the following questions :

- (i) Find the volume of wood used in making both the conical parts of Gilli. 1
- (ii) Find the volume of wood used in making cylindrical part of Gilli. 1
- (iii) (a) A cylindrical log of wood of radius 1.5 cm and length 14 cm is used to make Gilli. Find the volume of the wood scrapped. 2

OR

- (b) Find the total surface area of 'Danda'. 2

37.



Observe the figure given above. It shows six identical rectangular enclosures made by using fencing wire mesh. These enclosures are used to protect baby animals in a zoo. Dimensions of each enclosure is x feet $\times$ y feet. The total length of fencing required is 152 feet and area of each enclosure is 80 square feet.

Based on the above, answer the following questions :

- (i) Write an expression for length of fencing required in terms of x and y . 1
- (ii) Write the area of each enclosure in terms of x . 1
- (iii) (a) Write the above equation in quadratic equation form and thus find the dimensions of each enclosure using factorisation method. 2

OR



- (b) Using above equation in quadratic form, solve the equation and find the dimensions of each enclosure using quadratic formula. 2

38.

CENTRAL POLLUTION CONTROL BOARD'S AIR QUALITY STANDARDS	
AIR QUALITY INDEX (AQI)	CATEGORY
0-50	Good
51-100	Satisfactory
101-200	Moderate
201-300	Poor
301-400	Very Poor
401-500	Severe

The Air Quality Index (AQI) is a scale from 0 to 500 that indicates air quality, with higher numbers signifying more pollution and greater health concerns.

Mansi collected the daily data of AQI of her city for a month and presented it as given below :

AQI Range :	1 – 100	101 – 200	201 – 300	301 – 400	401 – 500
Number of Days :	3	9	12	4	2

- (i) Convert the data to continuous frequency distribution. 1
- (ii) What is the quality of air in most of the days of the month ? 1
- (iii) (a) Using table formed in part (i), find mode of the data. 2

OR

- (b) Using table formed in part (i), find median of the data. 2

