



Series **WX1YZ/5**



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.

गणित (बुनियादी)

MATHEMATICS (BASIC)

*

निर्धारित समय : 3 घण्टे

अधिकतम अंक : 80

Time allowed : 3 hours

Maximum Marks : 80

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 प्रश्न का क्रमांक अवश्य लिखें।
Please write down the serial number of the question in the answer-book 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 छात्र 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 students will read the question paper only and will not write any answer on the answer-book during this period.





General Instructions :

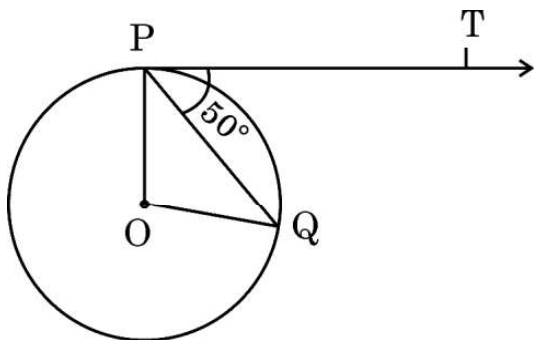
Read the following instructions very carefully and strictly follow them :

- (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 no. **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 no. **21** to **25** are very short answer (VSA) type questions, carrying **2** marks each.
- (v) In **Section C**, Questions no. **26** to **31** are short answer (SA) type questions, carrying **3** marks each.
- (vi) In **Section D**, Questions no. **32** to **35** are long answer (LA) type questions carrying **5** marks each.
- (vii) In **Section E**, Questions no. **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 calculators is **not** allowed.

SECTION A

This section comprises multiple choice questions (MCQs) of 1 mark each.

1. The 8th term of an A.P. is 17 and its 14th term is 29. The common difference of this A.P. is :
- (a) 3 (b) 2
(c) 5 (d) -2
2. In the given figure, O is the centre of a circle, PQ is a chord and the tangent PT at P makes an angle of 50° with PQ. The measure of $\angle POQ$ is :



- (a) 130° (b) 100°
(c) 90° (d) 75°



3. 52 ताश के पत्तों की अच्छी प्रकार फेंटी हुई गड्डी में से एक पत्ता यादृच्छया निकाला जाता है। इस पत्ते की 'पान का 4' होने की प्रायिकता क्या है ?
- (a) $\frac{1}{52}$ (b) $\frac{1}{13}$
(c) $\frac{1}{26}$ (d) $\frac{1}{6}$
4. बिन्दुओं A(0, 6) और B(-6, 2) के बीच की दूरी है :
- (a) 6 इकाई (b) $2\sqrt{6}$ इकाई
(c) $2\sqrt{13}$ इकाई (d) $13\sqrt{2}$ इकाई
5. k के मान, जिनके लिए द्विघात समीकरण $x^2 + 4x + k = 0$ के वास्तविक मूल हैं, हैं :
- (a) $k \geq 4$ (b) $k \leq 4$
(c) $k \geq -4$ (d) $k \leq -4$
6. $(2^3 \times 3 \times 5)$ और $(2^4 \times 5 \times 7)$ का LCM है :
- (a) 40 (b) 560
(c) 1680 (d) 1120
7. यदि द्विघात बहुपद $kx^2 + 3x + k$ का एक शून्यक 2 है, तो k का मान होगा :
- (a) $-\frac{6}{5}$ (b) $\frac{6}{5}$
(c) $\frac{5}{6}$ (d) $-\frac{5}{6}$
8. यदि समीकरणों $3x + 2my = 2$ और $2x + 5y + 1 = 0$ द्वारा निरूपित रेखाएँ समांतर हैं, तो m का मान है :
- (a) $\frac{2}{5}$ (b) $-\frac{5}{4}$
(c) $\frac{3}{2}$ (d) $\frac{15}{4}$



3. One card is drawn at random from a well shuffled deck of 52 playing cards. What is the probability of getting '4 of hearts' ?
- (a) $\frac{1}{52}$ (b) $\frac{1}{13}$
(c) $\frac{1}{26}$ (d) $\frac{1}{6}$
4. The distance between the points A(0, 6) and B(- 6, 2) is :
- (a) 6 units (b) $2\sqrt{6}$ units
(c) $2\sqrt{13}$ units (d) $13\sqrt{2}$ units
5. The value(s) of k for which the roots of quadratic equation $x^2 + 4x + k = 0$ are real, is :
- (a) $k \geq 4$ (b) $k \leq 4$
(c) $k \geq -4$ (d) $k \leq -4$
6. LCM of $(2^3 \times 3 \times 5)$ and $(2^4 \times 5 \times 7)$ is :
- (a) 40 (b) 560
(c) 1680 (d) 1120
7. If one zero of the quadratic polynomial $kx^2 + 3x + k$ is 2, then the value of k is :
- (a) $-\frac{6}{5}$ (b) $\frac{6}{5}$
(c) $\frac{5}{6}$ (d) $-\frac{5}{6}$
8. If the lines represented by equations $3x + 2my = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of m is :
- (a) $\frac{2}{5}$ (b) $-\frac{5}{4}$
(c) $\frac{3}{2}$ (d) $\frac{15}{4}$



9. $\triangle ABC \sim \triangle DEF$ और इनके परिमाण क्रमशः 32 cm और 24 cm हैं । यदि $AB = 10$ cm है, तो DE बराबर है :

- (a) 8 cm (b) 7.5 cm
(c) 15 cm (d) $5\sqrt{3}$ cm

10. समीकरण $3x^2 - 2\sqrt{6}x + 2 = 0$ के दो मूल :

- (a) वास्तविक और भिन्न हैं
(b) वास्तविक नहीं हैं
(c) वास्तविक और बराबर हैं
(d) परिमेय हैं

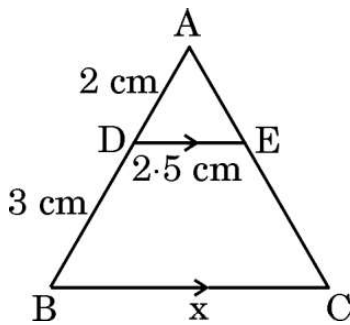
11. यदि $\sin \theta = \frac{a}{b}$ है, तो $\sec \theta$ बराबर है ($0 \leq \theta \leq 90^\circ$) :

- (a) $\frac{a}{\sqrt{b^2 - a^2}}$ (b) $\frac{b}{\sqrt{b^2 - a^2}}$
(c) $\frac{\sqrt{b^2 - a^2}}{b}$ (d) $\frac{\sqrt{b^2 - a^2}}{a}$

12. प्रथम 100 सम प्राकृत संख्याओं का योगफल है :

- (a) 10100 (b) 2550
(c) 5050 (d) 10010

13. दी गई आकृति में, $AD = 2$ cm, $DB = 3$ cm, $DE = 2.5$ cm और $DE \parallel BC$. x का मान है :



- (a) 6 cm (b) 3.75 cm
(c) 6.25 cm (d) 7.5 cm



9. $\Delta ABC \sim \Delta DEF$ and their perimeters are 32 cm and 24 cm respectively.
If $AB = 10$ cm, then DE equals :

(a) 8 cm (b) 7.5 cm
(c) 15 cm (d) $5\sqrt{3}$ cm

10. The two roots of the equation $3x^2 - 2\sqrt{6}x + 2 = 0$ are :

(a) real and distinct
(b) not real
(c) real and equal
(d) rational

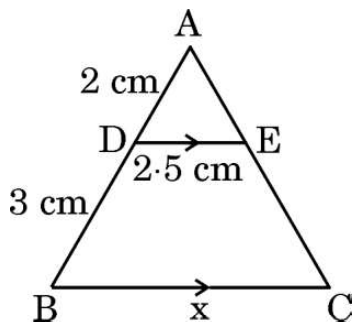
11. If $\sin \theta = \frac{a}{b}$, then $\sec \theta$ is equal to ($0 \leq \theta \leq 90^\circ$) :

(a) $\frac{a}{\sqrt{b^2 - a^2}}$ (b) $\frac{b}{\sqrt{b^2 - a^2}}$
(c) $\frac{\sqrt{b^2 - a^2}}{b}$ (d) $\frac{\sqrt{b^2 - a^2}}{a}$

12. The sum of the first 100 even natural numbers is :

(a) 10100 (b) 2550
(c) 5050 (d) 10010

13. In the given figure, $AD = 2$ cm, $DB = 3$ cm, $DE = 2.5$ cm and $DE \parallel BC$.
The value of x is :



(a) 6 cm (b) 3.75 cm
(c) 6.25 cm (d) 7.5 cm



14. एक वृत्त की त्रिज्या 3 cm है। इसकी दो समांतर स्पर्शरेखाओं के बीच की दूरी है :

- (a) 12 cm (b) 6 cm
(c) 3 cm (d) 4.5 cm

15. नीचे दिए गए आँकड़ों का माध्यक वर्ग है :

वर्ग	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
बारंबारता	10	12	14	13	17

- (a) 80 – 100 (b) 20 – 40
(c) 40 – 60 (d) 60 – 80

16. यदि $\sin \theta = \frac{3}{4}$ है, तो $\frac{(\sec^2 \theta - 1) \cos^2 \theta}{\sin \theta}$ बराबर है :

- (a) $\frac{3}{5}$ (b) $\frac{3}{4}$
(c) $\frac{4}{3}$ (d) $\frac{9}{16}$

17. दो त्रिभुजों ΔPQR और ΔABC के लिए दिया गया है कि $\frac{AB}{BC} = \frac{PQ}{PR}$. ये दोनों त्रिभुजों के समरूप होने के लिए, निम्न में से कौन-सा सत्य होना चाहिए ?

- (a) $\angle A = \angle P$ (b) $\angle B = \angle Q$
(c) $\angle B = \angle P$ (d) $CA = QR$

18. किन्हीं आँकड़ों का माध्य और माध्यक क्रमशः 32 और 30 हैं। आनुभविक सम्बन्ध से इन आँकड़ों का बहुलक है :

- (a) 36 (b) 26
(c) 30 (d) 20



14. A circle is of radius 3 cm. The distance between two of its parallel tangents is :

- (a) 12 cm (b) 6 cm
(c) 3 cm (d) 4.5 cm

15. The median class for the data given below is :

Class	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
Frequency	10	12	14	13	17

- (a) 80 – 100 (b) 20 – 40
(c) 40 – 60 (d) 60 – 80

16. If $\sin \theta = \frac{3}{4}$, then $\frac{(\sec^2 \theta - 1) \cos^2 \theta}{\sin \theta}$ equals :

- (a) $\frac{3}{5}$ (b) $\frac{3}{4}$
(c) $\frac{4}{3}$ (d) $\frac{9}{16}$

17. In two triangles ΔPQR and ΔABC , it is given that $\frac{AB}{BC} = \frac{PQ}{PR}$. For these two triangles to be similar, which of the following should be true ?

- (a) $\angle A = \angle P$ (b) $\angle B = \angle Q$
(c) $\angle B = \angle P$ (d) $CA = QR$

18. Mean and median of some data are 32 and 30 respectively. Using empirical relation, mode of the data is :

- (a) 36 (b) 26
(c) 30 (d) 20





Questions number **19** and **20** are Assertion and Reason based questions carrying 1 mark each. 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 two coins are tossed together, the probability of getting no tail is $\frac{1}{4}$.

Reason (R) : The probability P(E) of an event E satisfies $0 \leq P(E) \leq 1$.

20. Assertion (A) : The surface area of largest sphere that can be inscribed in a hollow cube of side 'a' cm is $\pi a^2 \text{ cm}^2$.

Reason (R) : The surface area of a sphere of radius 'r' is $\frac{4}{3} \pi r^3$.

SECTION B

This section comprises very short answer (VSA) type questions of 2 marks each.

21. Find LCM of 576 and 512 by prime factorization.

22. (a) Evaluate :

$$\frac{\sin 30^\circ + \tan 45^\circ}{\sec 30^\circ + \cot 45^\circ}$$

OR

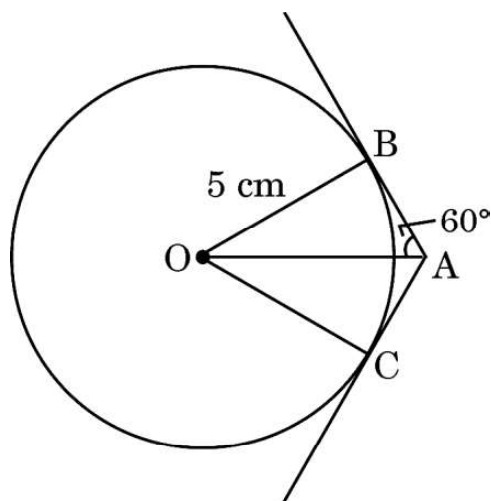
(b) For $A = 30^\circ$ and $B = 60^\circ$, verify that :

$$\sin (A + B) = \sin A \cos B + \cos A \sin B.$$





23. In the given figure, tangents AB and AC are drawn to a circle centred at O. If $\angle OAB = 60^\circ$ and $OB = 5$ cm, find lengths OA and AC.



24. (a) Show that A(1, 2), B(5, 4), C(3, 8) and D(-1, 6) are vertices of a parallelogram ABCD.
- OR**
- (b) Show that the points A(3, 0), B(6, 4) and C(-1, 3) are vertices of a right-angled triangle.
25. Find the sum of the first 15 terms of the A.P. : $\frac{1}{15}, \frac{1}{12}, \frac{1}{10}, \dots$

SECTION C

This section comprises short answer (SA) type questions of 3 marks each.

26. (a) Sabina went to a bank ATM to withdraw ₹ 2,000. She received ₹ 50 and ₹ 100 notes only. If Sabina got 25 notes in all, how many notes of ₹ 50 and ₹ 100 did she receive ?
- OR**
- (b) Five years ago, Amit was thrice as old as Baljeet. Ten years hence, Amit shall be twice as old as Baljeet. What are their present ages ?
27. Prove that $(7 - 2\sqrt{3})$ is an irrational number, given that $\sqrt{3}$ is an irrational number.
28. Find mean of the following data :

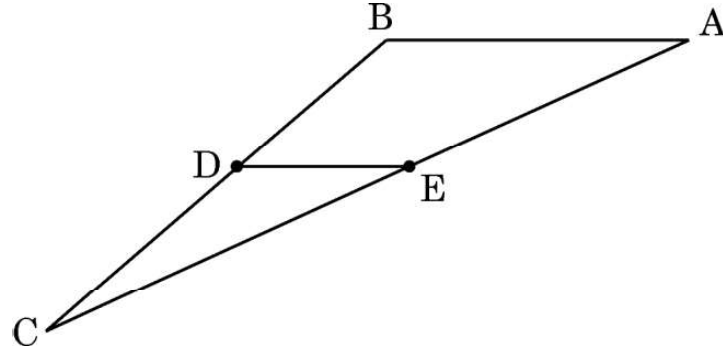
Class	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90
Frequency	12	15	11	20	16	6



29. (क) अनुपात ज्ञात कीजिए जिसमें बिन्दु $P(a, -2)$, बिन्दुओं $A(-4, 3)$ और $B(2, -4)$ को जोड़ने वाले रेखाखंड को बाँटता है। 'a' का मान भी ज्ञात कीजिए।

अथवा

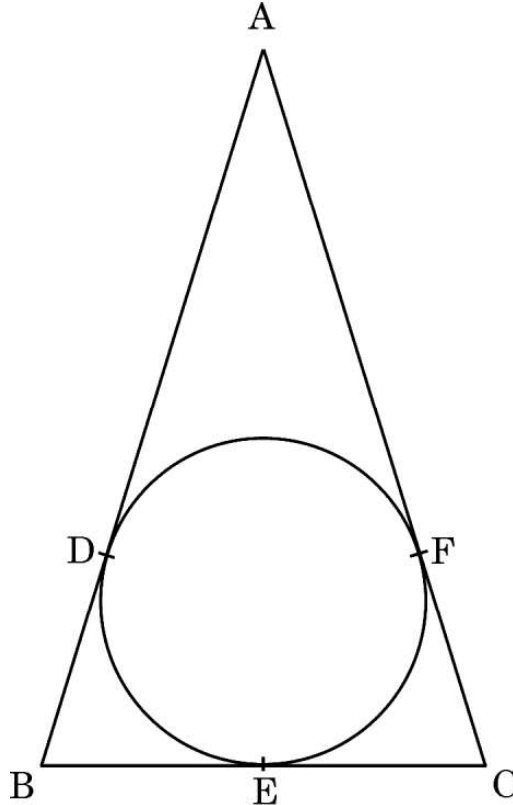
- (ख) दी गई आकृति में, बिन्दु D तथा E क्रमशः $\triangle ABC$ की भुजाओं BC तथा AC के मध्य-बिंदु हैं। यदि शीर्ष $A(4, -2)$, $B(2, -2)$ तथा $C(-6, -7)$ हैं, तो सत्यापित कीजिए कि $DE = \frac{1}{2} AB$.



30. सिद्ध कीजिए कि :

$$(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$$

31. एक वृत्त के परिगत ABC एक समद्विबाहु त्रिभुज है, जिसमें $AB = AC$ है। सिद्ध कीजिए कि स्पर्श बिंदु E द्वारा BC समद्विभाजित होती है।

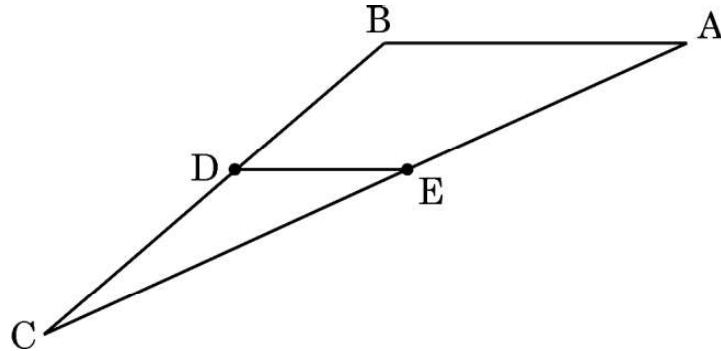




29. (a) Determine the ratio in which the point $P(a, -2)$ divides the line segment joining the points $A(-4, 3)$ and $B(2, -4)$. Also, find the value of 'a'.

OR

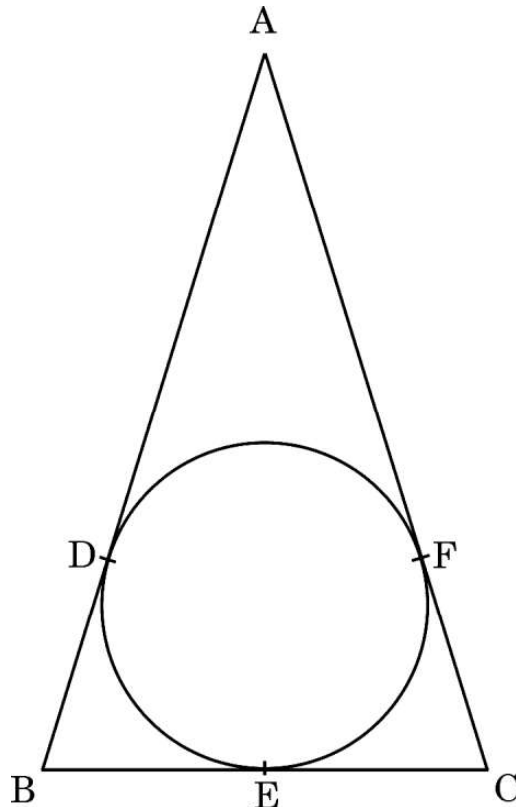
- (b) In the given figure, in ΔABC points D and E are mid-points of sides BC and AC respectively. If given vertices are $A(4, -2)$, $B(2, -2)$ and $C(-6, -7)$, then verify the result $DE = \frac{1}{2} AB$.



30. Prove that :

$$(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$$

31. ABC is an isosceles triangle with $AB = AC$, circumscribed about a circle. Prove that BC is bisected at E .

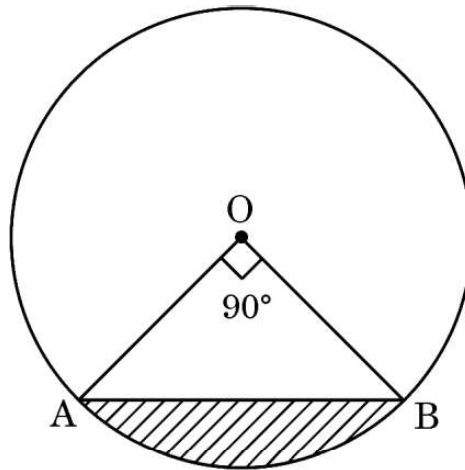




SECTION D

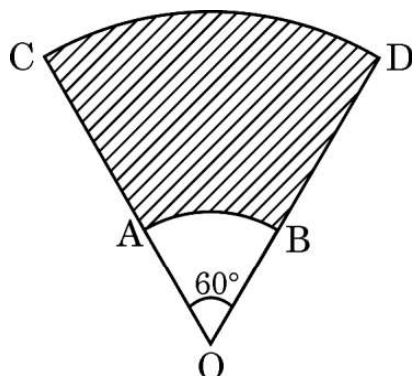
This section comprises long answer (LA) type questions of 5 marks each.

- 32.** A person walking 48 m towards a tower in a horizontal line through its base observes that angle of elevation of the top of the tower changes from 45° to 60° . Find the height of the tower and distance of the person, now, from the tower. (Use $\sqrt{3} = 1.732$)
- 33.** (a) In the given figure, AB is a chord of a circle of radius 7 cm and centred at O. Find the area of the shaded region if $\angle AOB = 90^\circ$. Also, find length of minor arc AB.



OR

- (b) AB and CD are arcs of two concentric circles of radii 3.5 cm and 10.5 cm respectively and centred at O. Find the area of the shaded region if $\angle AOB = 60^\circ$. Also, find the length of arc CD.





34. If a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, then prove that the other two sides are divided in the same ratio.
35. (a) The difference of two numbers is 5 and the difference of their reciprocals is $\frac{1}{10}$. Find the numbers.

OR

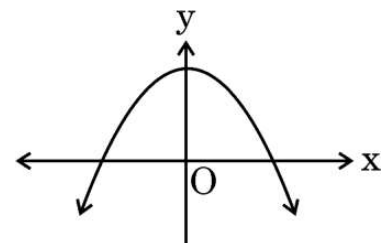
- (b) Find all the values of k for which the quadratic equation $2x^2 + kx + 8 = 0$ has equal roots. Also, find the roots.

SECTION E

This section comprises 3 case study based questions of 4 marks each.

Case Study – 1

36. Rainbow is an arch of colours that is visible in the sky after rain or when water droplets are present in the atmosphere. The colours of the rainbow are generally, red, orange, yellow, green, blue, indigo and violet. Each colour of the rainbow makes a parabola. We know that any quadratic polynomial $p(x) = ax^2 + bx + c$ ($a \neq 0$) represents a parabola on the graph paper.





Based on the above, answer the following questions :

- (i) The graph of a rainbow $y = f(x)$ is shown in the figure. Write the number of zeroes of the curve. 1
- (ii) If the graph of a rainbow does not intersect the x-axis but intersects y-axis at one point, then how many zeroes will it have ? 1
- (iii) (a) If a rainbow is represented by the quadratic polynomial $p(x) = x^2 + (a + 1)x + b$, whose zeroes are 2 and -3 , find the value of a and b . 2

OR

- (iii) (b) The polynomial $x^2 - 2x - (7p + 3)$ represents a rainbow. If -4 is a zero of it, find the value of p . 2

Case Study – 2

- 37.** Singing bowls (hemispherical in shape) are commonly used in sound healing practices. Mallet (cylindrical in shape) is used to strike the bowl in a sequence to produce sound and vibration.



One such bowl is shown here whose dimensions are :

Hemispherical bowl has outer radius 6 cm and inner radius 5 cm.

Mallet has height of 10 cm and radius 2 cm.

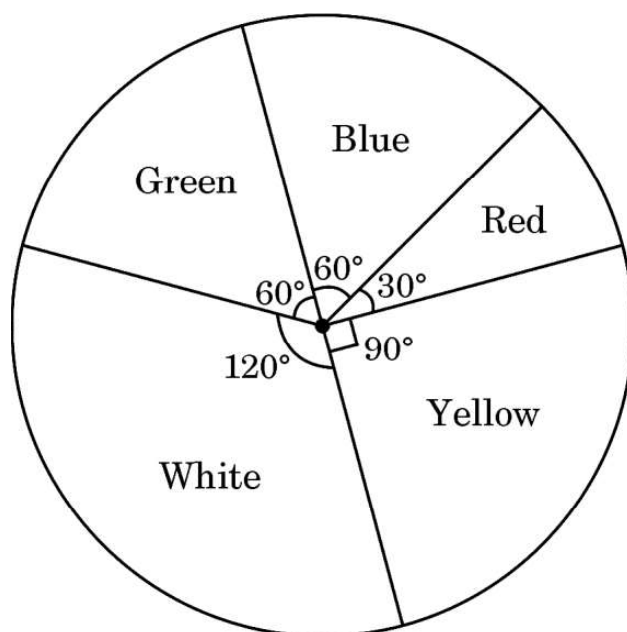


Based on the above, answer the following questions :

- (i) What is the volume of the material used in making the mallet ? 1
 - (ii) The bowl is to be polished from inside. Find the inner surface area of the bowl. 1
 - (iii) (a) Find the volume of metal used to make the bowl. 2
- OR**
- (iii) (b) Find total surface area of the mallet. (Use $\pi = 3.14$) 2

Case Study – 3

38. Some students were asked to list their favourite colour. The measure of each colour is shown by the central angle of a pie chart given below :



Study the pie chart and answer the following questions :

- (i) If a student is chosen at random, then find the probability of his/her favourite colour being white ? 1
 - (ii) What is the probability of his/her favourite colour being blue or green ? 1
 - (iii) (a) If 15 students liked the colour yellow, how many students participated in the survey ? 2
- OR**
- (iii) (b) What is the probability of the favourite colour being red or blue ? 2