



Series WX1YZ/5



SET~2

रोल नं.							
Roll No.							

प्रश्न-पत्र कोड
Q.P. Code 30/5/2

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 (मानक)

MATHEMATICS (STANDARD)

*

निर्धारित समय : 3 घण्टे

अधिकतम अंक : 80

Time allowed : 3 hours

Maximum Marks : 80

नोट / NOTE :

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 27 हैं।
Please check that this question paper contains 27 printed pages.
- 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.
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।
Please check that this question paper contains 38 questions.
- 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.
- 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 carefully and 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. $\left(\frac{1 - \tan^2 30^\circ}{1 + \tan^2 30^\circ} \right)$ is equal to :
- (a) $\sin 60^\circ$
 - (b) $\cos 60^\circ$
 - (c) $\tan 60^\circ$
 - (d) $\cos 30^\circ$
2. In ΔABC and ΔDEF , $\frac{AB}{DE} = \frac{BC}{FD}$. Which of the following makes the two triangles similar ?
- (a) $\angle A = \angle D$
 - (b) $\angle B = \angle D$
 - (c) $\angle B = \angle E$
 - (d) $\angle A = \angle F$





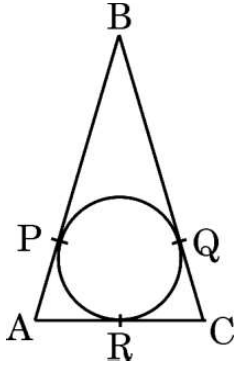
3. A.P. : 20, 13, 6, -1,, -148 में अंतिम पद से 13वाँ पद है :

- (a) 57 (b) -57
(c) 64 (d) -64

4. दो पासे एक साथ फेंके गए । योगफल 10 से अधिक प्राप्त होने की प्रायिकता क्या है ?

- (a) $\frac{1}{9}$ (b) $\frac{1}{6}$
(c) $\frac{1}{12}$ (d) $\frac{5}{18}$

5. दी गई आकृति में, $AB = BC = 10$ cm । यदि $AC = 7$ cm है, तो BP की लम्बाई होगी :



- (a) 3.5 cm (b) 7 cm
(c) 6.5 cm (d) 5 cm

6. 3 m गहरी और 40 m चौड़ी नदी में पानी 2 km/h की दर से बह रहा है । 2 मिनट में समुद्र में कितना पानी गिर जाएगा ?

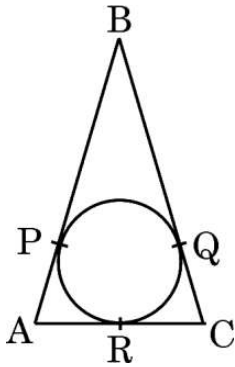
- (a) 800 m^3 (b) 4000 m^3
(c) 8000 m^3 (d) 2000 m^3

7. यदि किन्हीं आँकड़ों के लिए, माध्य और माध्यक क्रमशः 12 और 15 हैं, तो बहुलक होगा :

- (a) 13.5 (b) 21
(c) 6 (d) 14



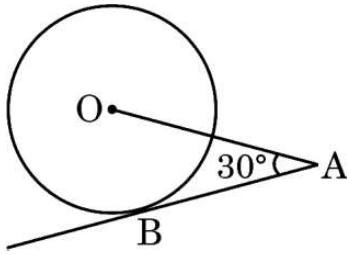
3. The 13th term from the end of the A.P. : 20, 13, 6, -1,, -148 is :
- (a) 57 (b) -57
(c) 64 (d) -64
4. Two dice are rolled together. What is the probability of getting a sum greater than 10 ?
- (a) $\frac{1}{9}$ (b) $\frac{1}{6}$
(c) $\frac{1}{12}$ (d) $\frac{5}{18}$
5. In the given figure, AB = BC = 10 cm. If AC = 7 cm, then the length of BP is :



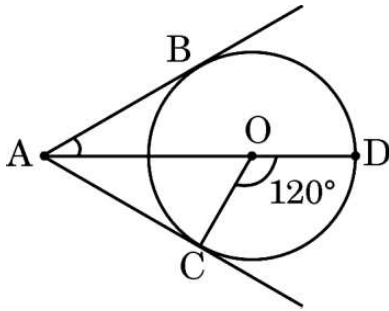
- (a) 3.5 cm (b) 7 cm
(c) 6.5 cm (d) 5 cm
6. Water in a river which is 3 m deep and 40 m wide is flowing at the rate of 2 km/h. How much water will fall into the sea in 2 minutes ?
- (a) 800 m³ (b) 4000 m³
(c) 8000 m³ (d) 2000 m³
7. If the mean and the median of a data are 12 and 15 respectively, then its mode is :
- (a) 13.5 (b) 21
(c) 6 (d) 14



8. In the given figure, AB is a tangent to the circle centered at O. If $OA = 6$ cm and $\angle OAB = 30^\circ$, then the radius of the circle is :



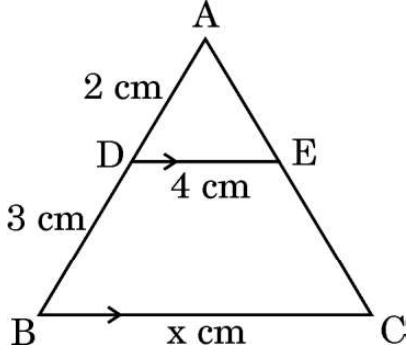
- (a) 3 cm (b) $3\sqrt{3}$ cm
(c) 2 cm (d) $\sqrt{3}$ cm
9. In the given figure, AC and AB are tangents to a circle centered at O. If $\angle COD = 120^\circ$, then $\angle BAO$ is equal to :



- (a) 30° (b) 60°
(c) 45° (d) 90°
10. Which of the following numbers **cannot** be the probability of happening of an event ?
- (a) 0 (b) $\frac{7}{0.01}$
(c) 0.07 (d) $\frac{0.07}{3}$
11. If every term of the statistical data consisting of n terms is decreased by 2, then the mean of the data :
- (a) decreases by 2
(b) remains unchanged
(c) decreases by $2n$
(d) decreases by 1



12. दी गई आकृति में, $DE \parallel BC$. x का मान है :



- (a) 6 (b) 12.5
(c) 8 (d) 10

13. मूल $(2 + \sqrt{3})$ और $(2 - \sqrt{3})$ वाला एक द्विघात समीकरण है :

- (a) $x^2 - 4x + 1 = 0$ (b) $x^2 + 4x + 1 = 0$
(c) $4x^2 - 3 = 0$ (d) $x^2 - 1 = 0$

14. यदि $\tan \theta = \frac{5}{12}$ है, तो $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta}$ का मान है :

- (a) $-\frac{17}{7}$ (b) $\frac{17}{7}$
(c) $\frac{17}{13}$ (d) $-\frac{7}{13}$

15. यदि एक वृत्त के एक व्यास के अंतिम बिन्दु $(-5, 4)$ और $(1, 0)$ हैं, तो वृत्त की त्रिज्या है :

- (a) $2\sqrt{13}$ इकाई (b) $\sqrt{13}$ इकाई
(c) $4\sqrt{2}$ इकाई (d) $2\sqrt{2}$ इकाई

16. शून्यक -1 और 2 वाले बहुपदों की संख्या है :

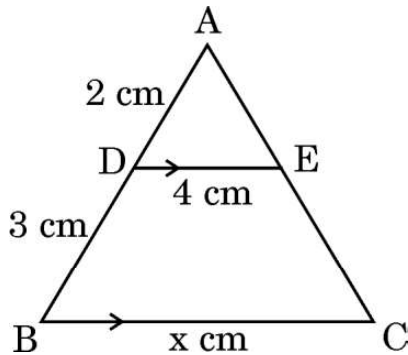
- (a) ठीक 2 (b) केवल 1
(c) अधिक-से-अधिक 2 (d) अनन्त

17. समीकरण युग्म $ax + 2y = 9$ और $3x + by = 18$ समांतर रेखाएँ निरूपित करेगा, जहाँ a, b पूर्णांक हैं, यदि :

- (a) $a = b$ (b) $3a = 2b$
(c) $2a = 3b$ (d) $ab = 6$



12. In the given figure, $DE \parallel BC$. The value of x is :



- (a) 6 (b) 12.5
(c) 8 (d) 10
13. A quadratic equation whose roots are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$ is :
(a) $x^2 - 4x + 1 = 0$ (b) $x^2 + 4x + 1 = 0$
(c) $4x^2 - 3 = 0$ (d) $x^2 - 1 = 0$
14. If $\tan \theta = \frac{5}{12}$, then the value of $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta}$ is :
(a) $-\frac{17}{7}$ (b) $\frac{17}{7}$
(c) $\frac{17}{13}$ (d) $-\frac{7}{13}$
15. If end points of a diameter of a circle are $(-5, 4)$ and $(1, 0)$, then the radius of the circle is :
(a) $2\sqrt{13}$ units (b) $\sqrt{13}$ units
(c) $4\sqrt{2}$ units (d) $2\sqrt{2}$ units
16. The number of polynomials having zeroes -1 and 2 is :
(a) exactly 2 (b) only 1
(c) at most 2 (d) infinite
17. The pair of equations $ax + 2y = 9$ and $3x + by = 18$ represent parallel lines, where a, b are integers, if :
(a) $a = b$ (b) $3a = 2b$
(c) $2a = 3b$ (d) $ab = 6$



18. The common difference of the A.P. whose n^{th} term is given by $a_n = 5n - 7$ is :

- (a) -7 (b) 7
(c) 5 (d) -2

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) : The number 5^n cannot end with the digit 0, where n is a natural number.

Reason (R): Prime factorisation of 5 has only two factors, 1 and 5.

20. Assertion (A) : If the points A(4, 3) and B(x, 5) lie on a circle with centre O(2, 3), then the value of x is 2.

Reason (R) : Centre of a circle is the mid-point of each chord of the circle.

SECTION B

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

21. Using prime factorisation, find HCF and LCM of 96 and 120.

22. Find the ratio in which line $y = x$ divides the line segment joining the points (6, -3) and (1, 6).

23. (a) If $a \cos \theta + b \sin \theta = m$ and $a \sin \theta - b \cos \theta = n$, then prove that $a^2 + b^2 = m^2 + n^2$.

OR



(ख) सिद्ध कीजिए :

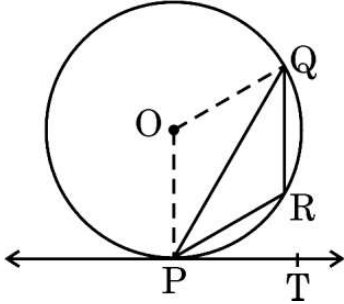
$$\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$$

24. (क) बिन्दु $A(4, -5)$ और $B(4, 5)$ को मिलाने वाले रेखाखंड को बिन्दु P से इस प्रकार विभाजित किया जाता है कि $AP : AB = 2 : 5$ है। बिन्दु P के निर्देशांक ज्ञात कीजिए।

अथवा

- (ख) बिन्दु $P(x, y)$, बिन्दुओं $A(5, 1)$ तथा $B(1, 5)$ से समदूरस्थ है। सिद्ध कीजिए कि $x = y$.

25. दी गई आकृति में, केन्द्र O वाले एक वृत्त की जीवा PQ है। वृत्त के बिन्दु P पर, PT एक स्पर्श-रेखा है। यदि $\angle QPT = 55^\circ$ है, तो $\angle PRQ$ ज्ञात कीजिए।



खण्ड ग

इस खण्ड में लघु-उत्तरीय (SA) प्रकार के प्रश्न हैं, जिनमें प्रत्येक के 3 अंक हैं।

26. निम्न बंटन का माध्य ज्ञात कीजिए :

वर्ग	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90
बारंबारता	17	20	18	21	15	9

27. एक 2-अंकीय संख्या, अपने अंकों के योगफल के सात गुना है। अंकों के स्थान बदलने पर प्राप्त संख्या, पहली संख्या से 18 कम है। पहली संख्या ज्ञात कीजिए।



(b) Prove that :

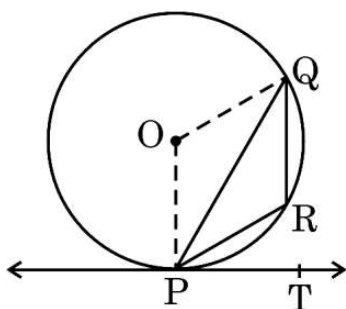
$$\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$$

24. (a) The line segment joining the points A(4, -5) and B(4, 5) is divided by the point P such that AP : AB = 2 : 5. Find the coordinates of P.

OR

(b) Point P(x, y) is equidistant from points A(5, 1) and B(1, 5). Prove that $x = y$.

25. In the given figure, PQ is a chord of the circle centered at O. PT is a tangent to the circle at P. If $\angle QPT = 55^\circ$, then find $\angle PRQ$.



SECTION C

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

26. Find the mean of the following distribution :

Classes	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90
Frequency	17	20	18	21	15	9

27. A 2-digit number is seven times the sum of its digits. The number formed by reversing the digits is 18 less than the given number. Find the given number.





28. सिद्ध कीजिए :

$$\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$$

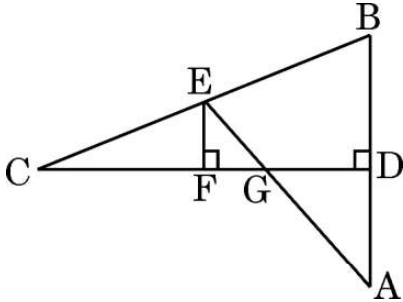
29. (क) सिद्ध कीजिए कि $\sqrt{3}$ एक अपरिमेय संख्या है ।

अथवा

(ख) तीन अलग-अलग रोड क्रॉसिंग पर ट्रैफिक लाइट क्रमशः प्रत्येक 48 सेकण्ड, 72 सेकण्ड और 108 सेकण्ड के बाद बदल जाती हैं । यदि वे एक साथ सुबह 7 बजे बदलती हैं, तो वे आगे किस समय एक साथ बदलेंगी ?

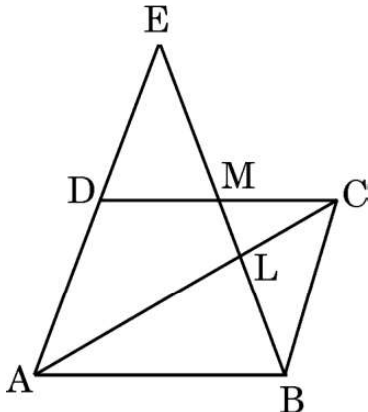
30. एक A.P. में पहले n पदों का योगफल $S_n = 6n - n^2$ द्वारा दिया गया है । इस A.P. का 30वाँ पद ज्ञात कीजिए ।

31. (क) दी गई आकृति में, CD , AB का लंब समद्विभाजक है । EF , CD के लंबवत है । AE , CD को G पर काटती है । सिद्ध कीजिए कि $\frac{CF}{CD} = \frac{FG}{DG}$.



अथवा

(ख) दी गई आकृति में, $ABCD$ एक समांतर चतुर्भुज है । BE , CD को M पर समद्विभाजित करती है और AC को L पर काटती है । सिद्ध कीजिए कि $EL = 2BL$.





28. Prove that :

$$\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$$

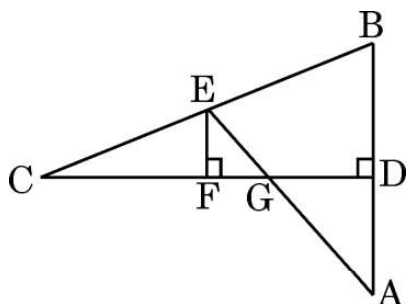
29. (a) Prove that $\sqrt{3}$ is an irrational number.

OR

(b) The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m., at what time will they change together next ?

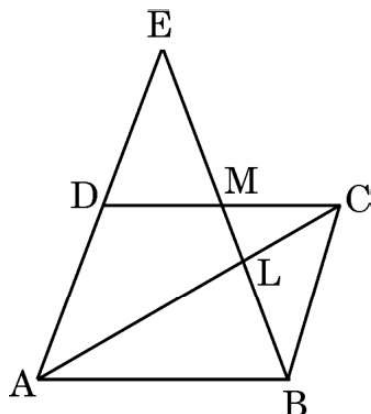
30. In an A.P., the sum of the first n terms is given by $S_n = 6n - n^2$. Find its 30th term.

31. (a) In the given figure, CD is the perpendicular bisector of AB . EF is perpendicular to CD . AE intersects CD at G . Prove that $\frac{CF}{CD} = \frac{FG}{DG}$.



OR

(b) In the given figure, $ABCD$ is a parallelogram. BE bisects CD at M and intersects AC at L . Prove that $EL = 2BL$.

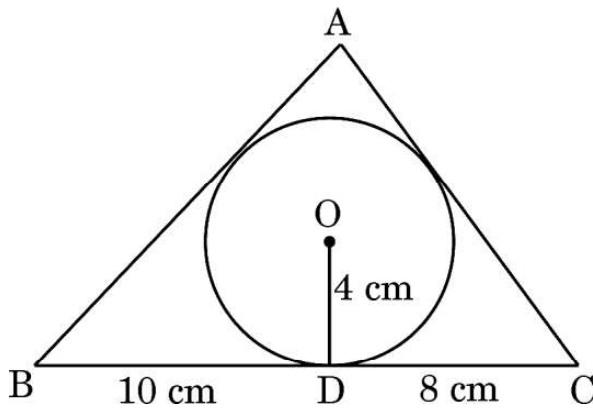




SECTION D

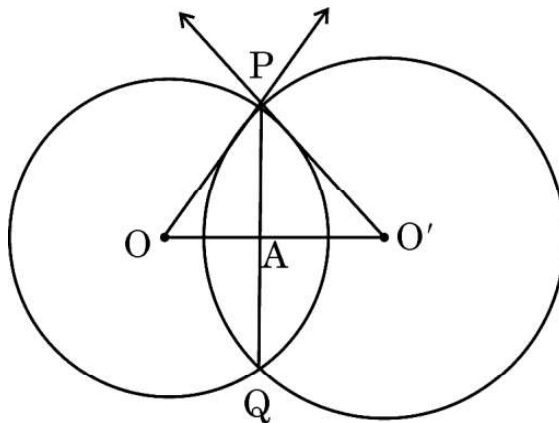
This section comprises long answer (LA) type questions of 5 marks each.

32. (a) A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC are of lengths 10 cm and 8 cm respectively. Find the lengths of the sides AB and AC, if it is given that $\text{area } \Delta ABC = 90 \text{ cm}^2$.



OR

- (b) Two circles with centres O and O' of radii 6 cm and 8 cm, respectively intersect at two points P and Q such that OP and O'P are tangents to the two circles. Find the length of the common chord PQ.





- 33.** A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find the area of that part of the field in which the horse can graze. Also, find the increase in grazing area if length of rope is increased to 10 m. (Use $\pi = 3.14$)
- 34.** The angle of elevation of the top of a vertical tower from a point P on the ground is 60° . From another point Q, 10 m vertically above the first point P, its angle of elevation is 30° . Find :
- (a) The height of the tower.
 - (b) The distance of the point P from the foot of the tower.
 - (c) The distance of the point P from the top of the tower.
- 35.** (a) A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/h more than the first speed. If it takes 3 hours to complete the journey, what was its first average speed ?

OR

- (b) Two pipes together can fill a tank in $\frac{15}{8}$ hours. The pipe with larger diameter takes 2 hours less than the pipe with smaller diameter to fill the tank separately. Find the time in which each pipe can fill the tank separately.

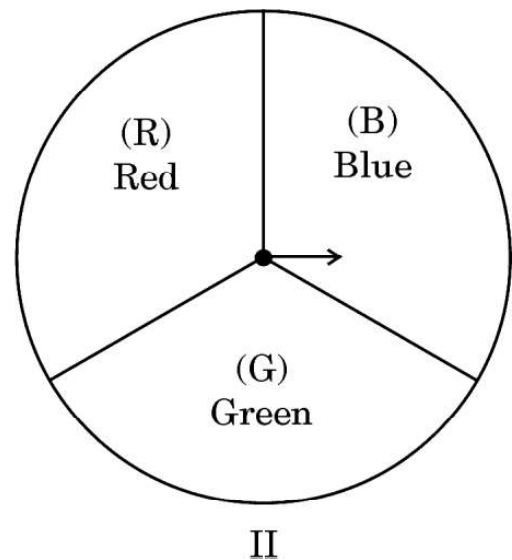
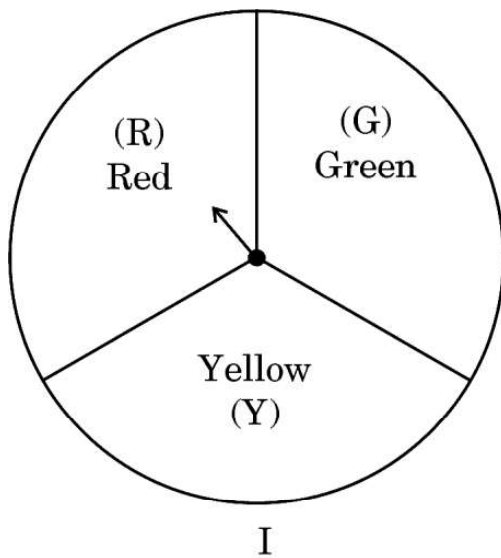


SECTION E

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

Case Study – 1

36. A middle school decided to run the following spinner game as a fund-raiser on Christmas Carnival.



Making Purple : Spin each spinner once. Blue and red make purple. So, if one spinner shows Red (R) and another Blue (B), then you 'win'. One such outcome is written as 'RB'.

Based on the above, answer the following questions :

- (i) List all possible outcomes of the game. 1
- (ii) Find the probability of 'Making Purple'. 1
- (iii) (a) For each win, a participant gets ₹ 10, but if he/she loses, he/she has to pay ₹ 5 to the school.
If 99 participants played, calculate how much fund could the school have collected. 2

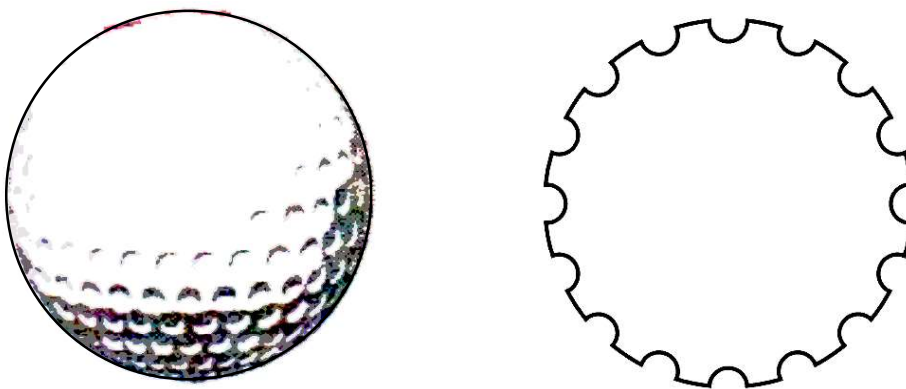
OR

- (iii) (b) If the same amount of ₹ 5 has been decided for winning or losing the game, then how much fund had been collected by school ? (Number of participants = 99) 2



Case Study – 2

37. A golf ball is spherical with about 300 – 500 dimples that help increase its velocity while in play. Golf balls are traditionally white but available in colours also. In the given figure, a golf ball has diameter 4.2 cm and the surface has 315 dimples (hemi-spherical) of radius 2 mm.



Based on the above, answer the following questions :

- | | | |
|-------|--|---|
| (i) | Find the surface area of one such dimple. | 1 |
| (ii) | Find the volume of the material dug out to make one dimple. | 1 |
| (iii) | (a) Find the total surface area exposed to the surroundings. | 2 |

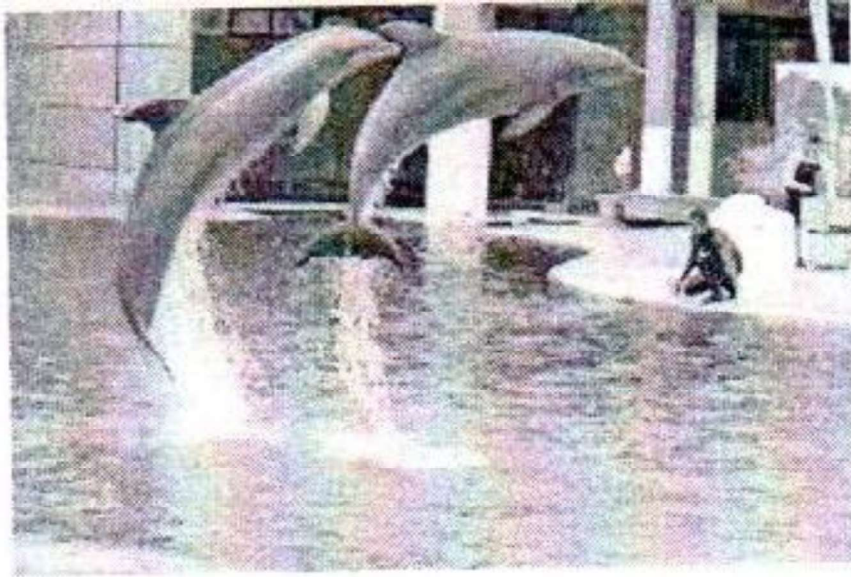
OR

- | | | |
|-------|---------------------------------------|---|
| (iii) | (b) Find the volume of the golf ball. | 2 |
|-------|---------------------------------------|---|



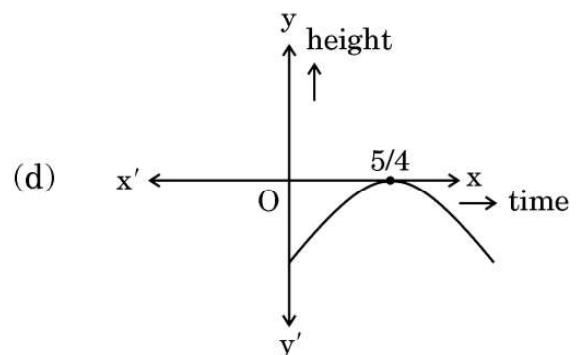
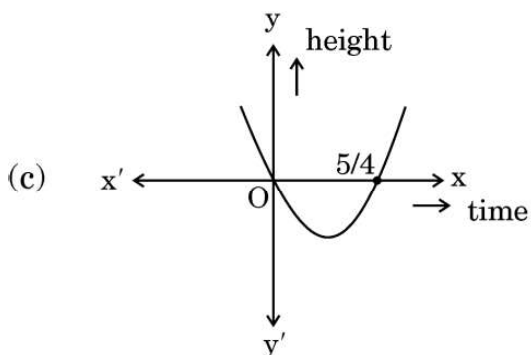
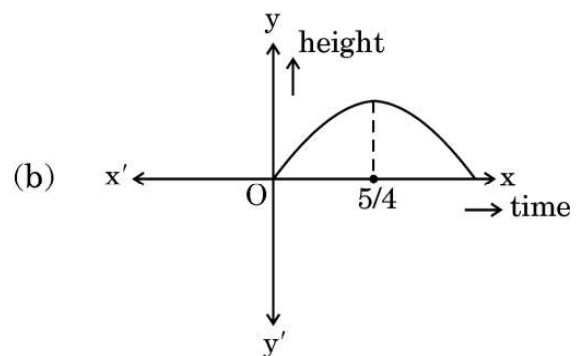
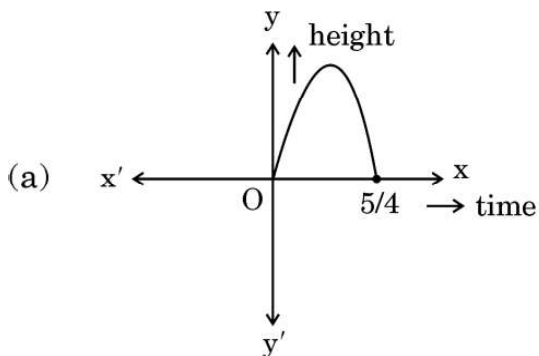
Case Study – 3

38. In a pool at an aquarium, a dolphin jumps out of the water travelling at 20 cm per second. Its height above water level after t seconds is given by $h = 20t - 16t^2$.



Based on the above, answer the following questions :

- (i) Find zeroes of polynomial $p(t) = 20t - 16t^2$. 1
- (ii) Which of the following types of graph represents $p(t)$? 1





- (iii) (क) $t = \frac{3}{2}$ पर h का मान क्या होगा ? परिणाम की व्याख्या कीजिए । 2

अथवा

- (iii) (ख) दोबारा जल स्तर से टकराने से पहले डॉल्फिन ने कितनी दूरी तय की है ? 2



- (iii) (a) What would be the value of h at $t = \frac{3}{2}$? Interpret the result. 2

OR

- (iii) (b) How much distance has the dolphin covered before hitting the water level again ? 2

