



Series WX1YZ/5



SET~3

रोल नं.							
Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **30/5/3**

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 :

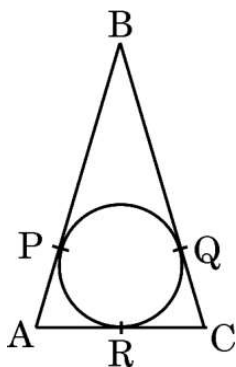
Read the following instructions carefully and follow them :

- (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. The distance between the points $P\left(-\frac{11}{3}, 5\right)$ and $Q\left(-\frac{2}{3}, 5\right)$ is :
- (a) 6 units (b) 4 units
(c) 2 units (d) 3 units
2. In the given figure, $AB = BC = 10$ cm. If $AC = 7$ cm, then the length of BP is :

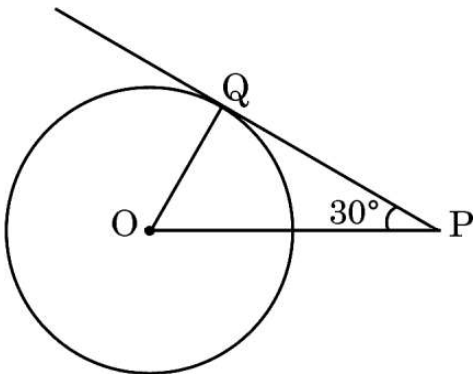


- (a) 3.5 cm (b) 7 cm
(c) 6.5 cm (d) 5 cm





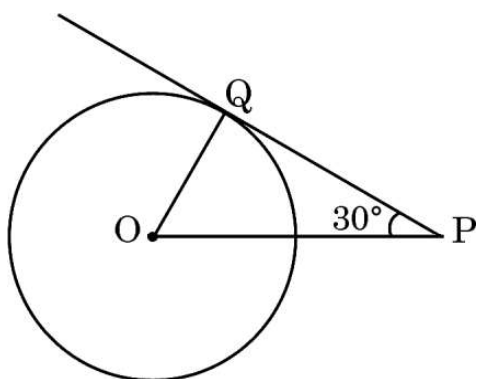
3. 3 m गहरी और 40 m चौड़ी नदी में पानी 2 km/h की दर से बह रहा है । 2 मिनट में समुद्र में कितना पानी गिर जाएगा ?
- (a) 800 m^3 (b) 4000 m^3
(c) 8000 m^3 (d) 2000 m^3
4. यदि किसी बंटन का माध्य और बहुलक क्रमशः 15 और 18 हों, तो इस बंटन का माध्यक होगा :
- (a) 17 (b) 15
(c) 16 (d) 18
5. A.P. : 10, 7, 4,, - 62 में अंतिम पद से 11वाँ पद है :
- (a) 25 (b) 16
(c) - 32 (d) 0
6. 52 ताश के पत्तों की अच्छी तरह से फेंटी गई एक गड्डी से एक पत्ता यादृच्छया निकाला जाता है । इस निकाले गए पत्ते के बेगम होने की प्रायिकता है :
- (a) $\frac{4}{13}$ (b) $\frac{4}{52}$
(c) $\frac{2}{13}$ (d) $\frac{1}{26}$
7. केन्द्र O वाले एक वृत्त पर PQ एक स्पर्श-रेखा है । यदि वृत्त की त्रिज्या 5 cm है, तो स्पर्श-रेखा PQ की लंबाई होगी :



- (a) $5\sqrt{3} \text{ cm}$ (b) $\frac{10}{\sqrt{3}} \text{ cm}$
(c) 10 cm (d) $\frac{5}{\sqrt{3}} \text{ cm}$



3. 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 m^3 (b) 4000 m^3
(c) 8000 m^3 (d) 2000 m^3
4. If the mean and the mode of a distribution are 15 and 18 respectively, then the median of the distribution is :
- (a) 17 (b) 15
(c) 16 (d) 18
5. The 11th term from the end of the A.P. : 10, 7, 4,, -62 is :
- (a) 25 (b) 16
(c) -32 (d) 0
6. One card is drawn at random from a well shuffled pack of 52 playing cards. The probability that the drawn card is a queen, is :
- (a) $\frac{4}{13}$ (b) $\frac{4}{52}$
(c) $\frac{2}{13}$ (d) $\frac{1}{26}$
7. PQ is tangent to a circle centered at O. If the radius of the circle is 5 cm, then the length of the tangent PQ is :



- (a) $5\sqrt{3} \text{ cm}$ (b) $\frac{10}{\sqrt{3}} \text{ cm}$
(c) 10 cm (d) $\frac{5}{\sqrt{3}} \text{ cm}$



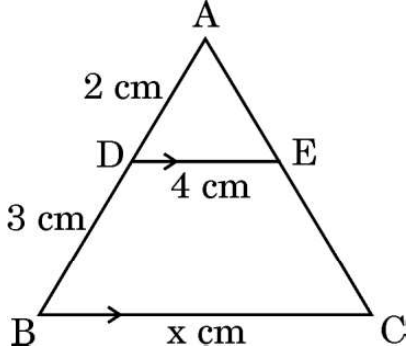
8. निम्नलिखित में से कौन-सी संख्या, किसी घटना के घटने की प्रायिकता **नहीं** हो सकती है ?
- (a) 0 (b) $\frac{7}{0.01}$
- (c) 0.07 (d) $\frac{0.07}{3}$
9. यदि $\sec \theta - \tan \theta = \frac{1}{3}$, तो $(\sec \theta + \tan \theta)$ का मान होगा :
- (a) $\frac{4}{3}$ (b) $\frac{2}{3}$
- (c) $\frac{1}{3}$ (d) 3
10. एक द्विघात समीकरण, जिसके मूल $(3 - \sqrt{2})$ तथा $(3 + \sqrt{2})$ हैं, है :
- (a) $x^2 - 6x + 7 = 0$ (b) $x^2 + 6x + 7 = 0$
- (c) $9x^2 - 2 = 0$ (d) $x^2 - 7 = 0$
11. यदि किसी सांख्यिकी आँकड़ों, जिसमें n पद हैं, के प्रत्येक पद को 2 से कम कर दिया जाए, तो आँकड़ों का माध्य :
- (a) 2 कम हो जाएगा
- (b) अपरिवर्तित रहेगा
- (c) $2n$ कम हो जाएगा
- (d) 1 कम हो जाएगा
12. शून्यक - 3 और 5 वाले बहुपदों की संख्या है :
- (a) केवल एक (b) अनन्त
- (c) ठीक दो (d) अधिक-से-अधिक दो
13. समीकरण युग्म $x + y = a + b$ और $ax - by = a^2 - b^2$ का हल है :
- (a) $x = b, y = a$ (b) $x = -a, y = b$
- (c) $x = a, y = b$ (d) $x = a, y = -b$
14. एक A.P., जिसका n वाँ पद $a_n = 3n + 7$ द्वारा दिया गया है, का सार्व अंतर होगा :
- (a) 7 (b) 3
- (c) $3n$ (d) 1



8. 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) $\frac{0.07}{3}$
9. If $\sec \theta - \tan \theta = \frac{1}{3}$, then the value of $(\sec \theta + \tan \theta)$ is :
- (a) $\frac{4}{3}$ (b) $\frac{2}{3}$
- (c) $\frac{1}{3}$ (d) 3
10. A quadratic equation whose roots are $(3 - \sqrt{2})$ and $(3 + \sqrt{2})$ is :
- (a) $x^2 - 6x + 7 = 0$ (b) $x^2 + 6x + 7 = 0$
- (c) $9x^2 - 2 = 0$ (d) $x^2 - 7 = 0$
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. The number of polynomials having zeroes -3 and 5 is :
- (a) only one (b) infinite
- (c) exactly two (d) at most two
13. The solution of the pair of equations $x + y = a + b$ and $ax - by = a^2 - b^2$ is :
- (a) $x = b, y = a$ (b) $x = -a, y = b$
- (c) $x = a, y = b$ (d) $x = a, y = -b$
14. The common difference of the A.P. whose n^{th} term is given by $a_n = 3n + 7$, is :
- (a) 7 (b) 3
- (c) $3n$ (d) 1



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



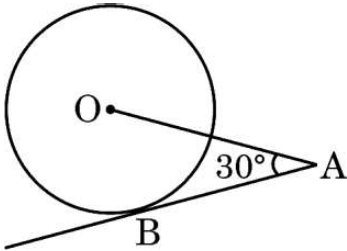
- (a) 6 (b) 12.5
(c) 8 (d) 10
16. त्रिभुजों ABC और DEF में, $\frac{AB}{DE} = \frac{BC}{FD}$ । निम्नलिखित में से कौन-सा इन दो त्रिभुजों को समरूप बनाएगा ?

- (a) $\angle A = \angle D$ (b) $\angle B = \angle D$
(c) $\angle B = \angle E$ (d) $\angle A = \angle F$

17. $\left(\frac{2 \tan 30^\circ}{1 + \tan^2 30^\circ} \right)$ बराबर है :

- (a) $\sin 60^\circ$ (b) $\cos 60^\circ$
(c) $\tan 60^\circ$ (d) $\sin 30^\circ$

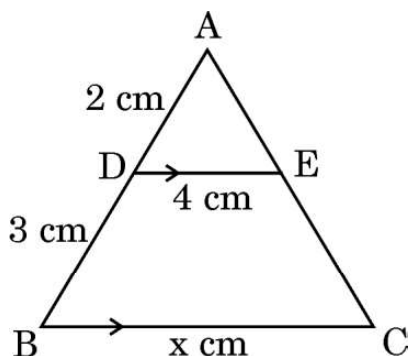
18. दी गई आकृति में, केन्द्र O के एक वृत्त पर AB एक स्पर्श-रेखा है । यदि $OA = 6$ cm और $\angle OAB = 30^\circ$ है, तो वृत्त की त्रिज्या होगी :



- (a) 3 cm (b) $3\sqrt{3}$ cm
(c) 2 cm (d) $\sqrt{3}$ cm



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



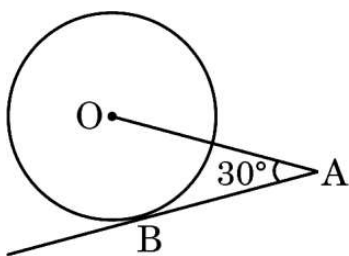
- (a) 6 (b) 12.5
(c) 8 (d) 10
16. In $\triangle ABC$ and $\triangle DEF$, $\frac{AB}{DE} = \frac{BC}{FD}$. Which of the following makes the two triangles similar ?

- (a) $\angle A = \angle D$ (b) $\angle B = \angle D$
(c) $\angle B = \angle E$ (d) $\angle A = \angle F$

17. $\left(\frac{2 \tan 30^\circ}{1 + \tan^2 30^\circ} \right)$ is equal to :

- (a) $\sin 60^\circ$ (b) $\cos 60^\circ$
(c) $\tan 60^\circ$ (d) $\sin 30^\circ$

18. 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



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. Find the greatest 3-digit number which is divisible by 18, 24 and 36.

22. (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

(b) Prove that :

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



23. Find the ratio in which y-axis divides the line segment joining the points $(5, -6)$ and $(-1, -4)$.
24. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.
25. (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.

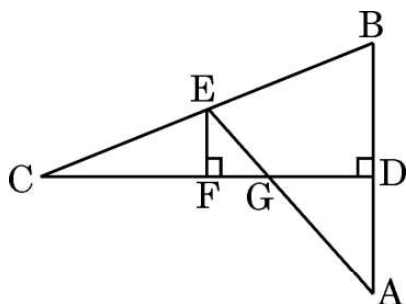
OR

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

SECTION C

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

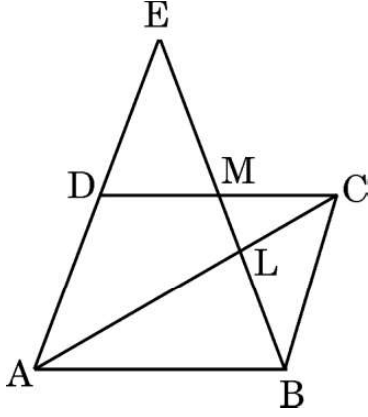
26. (a) In the given figure, CD is the perpendicular bisector of AB. EF is perpendicular to CD. AE intersects CD at G. Prove that $\frac{CF}{CD} = \frac{FG}{DG}$.



OR



- (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 $EL = 2BL$.



27. एक भिन्न के अंश में से 1 घटा देने पर भिन्न $\frac{1}{3}$ बन जाती है। यह भिन्न $\frac{1}{4}$ बन जाती है जब भिन्न के हर में 8 जोड़ दिया जाता है। भिन्न ज्ञात कीजिए।

28. सिद्ध कीजिए :

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

29. निम्नलिखित बारंबारता बंटन का माध्य ज्ञात कीजिए :

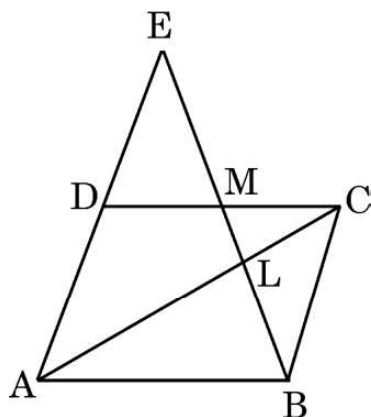
वर्ग अंतराल	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55	55 – 60
बारंबारता	14	22	16	6	5	3	4

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

अथवा



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



27. A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator. It becomes $\frac{1}{4}$ when 8 is added to the denominator. Find the fraction.

28. Prove that :

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

29. Find the mean of the following frequency distribution :

Classes	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55	55 – 60
Frequency	14	22	16	6	5	3	4

30. (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 ?

31. Find the common difference of an A.P. whose first term is 8, the last term is 65 and the sum of all its terms is 730.

SECTION D

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

32. (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 ?

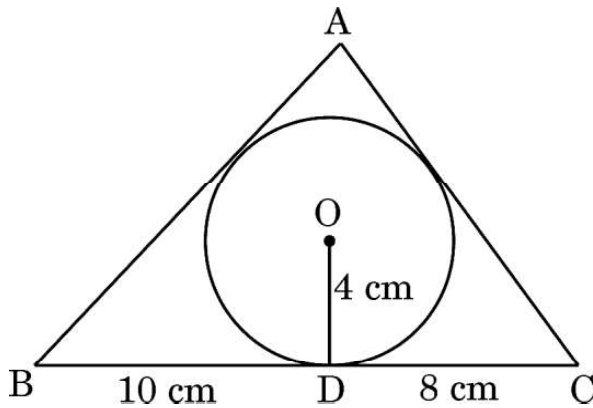
OR

- (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.

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 $\pi = 3.14$)

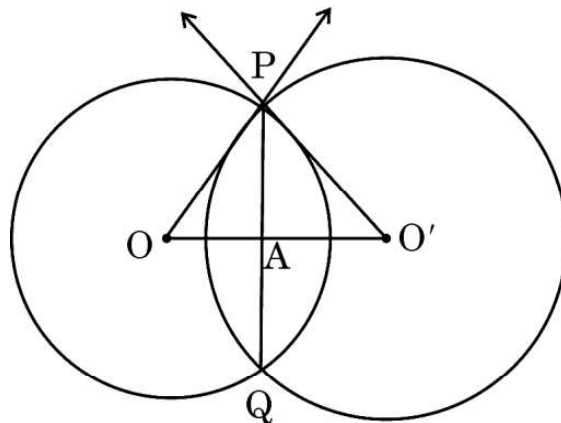


34. (a) A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC are of lengths 10 cm and 8 cm respectively. Find the lengths of the sides AB and AC, if it is given that area $\Delta ABC = 90 \text{ cm}^2$.



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.



35. Two pillars are standing on either side of a 80 m wide road. Height of one pillar is 20 m more than the height of the other pillar. From a point on the road between the pillars, the angle of elevation of the higher pillar is 60° , whereas that of the other pillar is 30° . Find the position of the point between the pillars and the height of each pillar. (Use $\sqrt{3} = 1.73$)



SECTION E

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

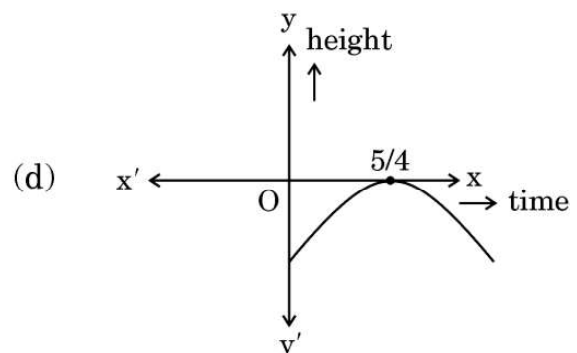
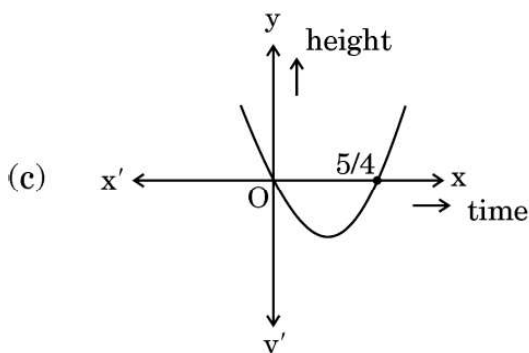
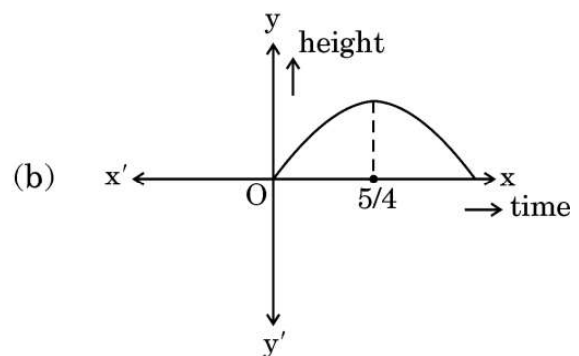
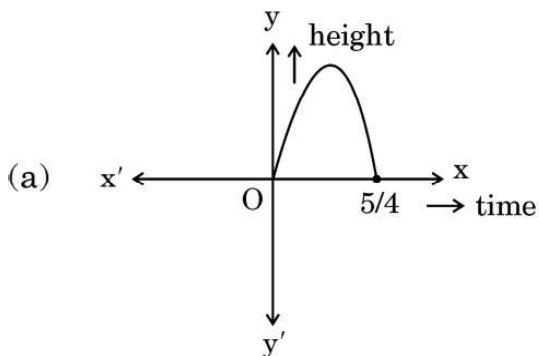
Case Study – 1

36. 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





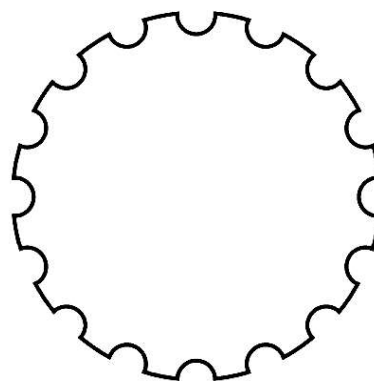
- (iii) (a) What would be the value of h at $t = \frac{3}{2}$? Interpret the result. 2

OR

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

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

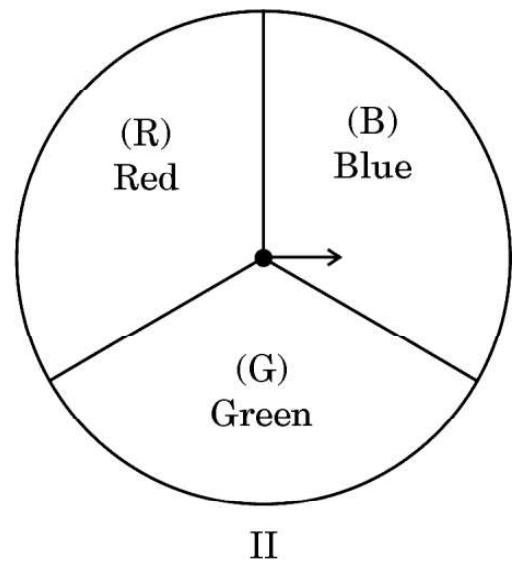
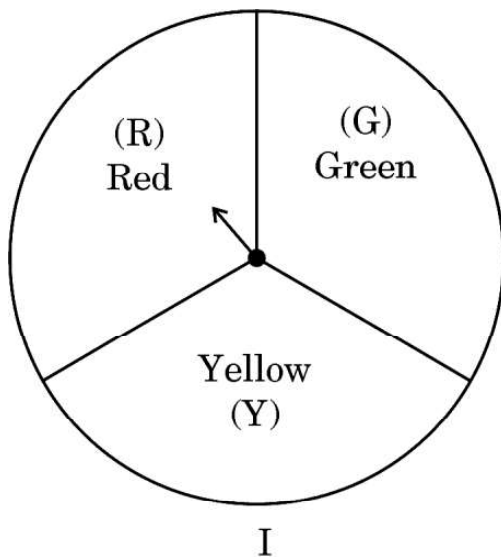
OR

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



Case Study – 3

38. 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