SAMPLE QUESTION PAPER

Subject : Mathematics
Class X

This is purely a set of sample questions for class X Mathematics course. Some questions in both Internal Examinations as well as final Board Examination will likely be of the nature given in this sample. But the questions and texts/statements will be different in both internal as well as Board Examination. Topics are chapter wise. Marks of questions are indicative only. Suggestions for any change/ Improvement will be appreciated which may be sent to samplepaperseba@gmail.com

Source : Central Board of Secondary Education (CBSE)

Chapter 1

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx) each.

1. LCM of (2^3 x 3 x 5) and (2^4 x 5 x 7) is :

    (a) 40   (b) 560   (c) 1680   (d) 1120

2. HCF of (3^4 x 2^4 x 7^3) and (3^2 x 5 x 7) is :

    (a) 630   (b) 63   (c) 729   (d) 567

3. HCF of (3^3 x 5^2 x 2), (3^2 x 5^3 x 2^2) and (3^4 x 5 x 2^3) is

    (a) 450   (b) 90   (c) 180   (d) 630

4. If H.C.F (420,189) = 21 then L.C.M(420,189) is

    (a) 420   (b) 1890   (c) 3780   (d) 3680

SECTION B

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

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

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

7. Find HCF of 660 and 704 by prime factorization.

8. Find LCM of 480 and 256 using prime factorization.

9. Prove that 7 - 2√3 is an irrational number, given that √3 is an irrational number.

10. Prove that 8 + 5√5 is an irrational number, given that √5 is an irrational number.

11. Prove that 11 + 3√2 is an irrational number, given that √2 is an irrational number.

12. (a) Find the H.C.F and L.C.M of 480 and 720 using the Prime factorization method.

Or

(b) The H.C.F of 85 and 238 is expressible in the form 85m -238. Find the value of m?

SECTION C

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

13. (a) Prove that √3 is an irrational number.

(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?

14. Prove that √5 is an irrational number.

15. Prove that √3 is an irrational number.

Chapter 2

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx..) each.

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 number of polynomials having zeroes -3 and 5 is :

(a) only one   (b) infinite   (c) exactly two (d) at most two

18. If one zero of the quadratic polynomial $kx^2 + 3x + k$ is 2, then the value of k is :

(a) -6/5   (b) 6/5   (c) 5/6   (d) -5/6

19. A quadratic polynomial whose zeroes are $\frac{2}{5}$ and $\frac{-1}{5}$ is

   (a) $25x^2 + 5x - 2$
   (b) $5x^2 - 2x + 1$

   (c) $5x^2 + 2x - 1$
   (d) $25x^2 - 5x - 2$

20. The graph of a quadratic polynomial p(x) passes through the points (-6,0) , (0,-30), (4,-20) and (6,0). The zeroes of the polynomial are

   (a) -6,0   (b) 4,6   (c) -30, -20   (d) -6, 6

21. A quadratic polynomial having zeroes -$\sqrt{\frac{5}{2}}$ and $\sqrt{\frac{5}{2}}$ is

   (a) $x^2 - 5\sqrt{2}x + 1$ (b) $8x^2 - 20$ (c) $15x^2 - 6$ (d) $x^2 - 2\sqrt{5}$ x -1

SECTION C

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

22. If α and β are zeroes of a polynomial $6x^2 - 5x + 1$ then form a quadratic polynomial whose zeroes are $α^2$, $β^2$

SECTION E

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

23. 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 ≠ 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.

   (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?

(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.

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.

24. 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 $p(t) = 20t - 16t^2$

(ii) Which of the following types of graph represents p(t) ?

(a)

(b)

(c)

(d)
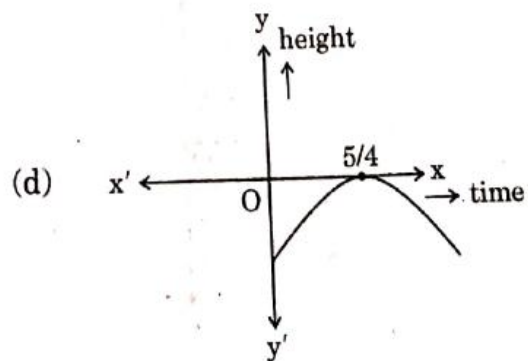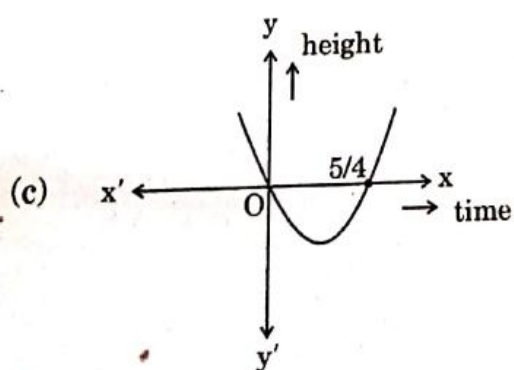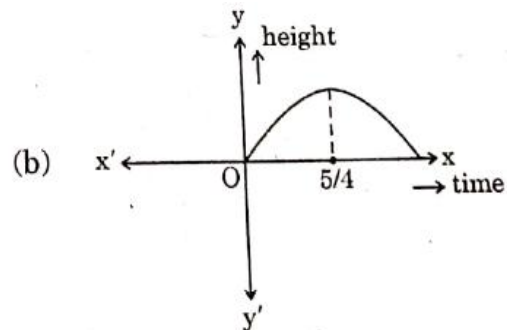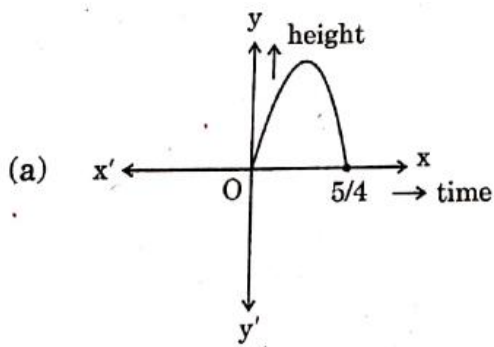
(iii)   (a)   What would be the value of h at t = 3/2? Interpret the result.

OR

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

25.   Radha, an aspiring landscape designer, is tasked with creating a visually captivating pool design that incorporates a unique arrangement of fountains. The challenge entails arranging the fountains in such a way that when water is thrown upwards, it forms the shape of a parabola. The graph of one such parabola is given below:
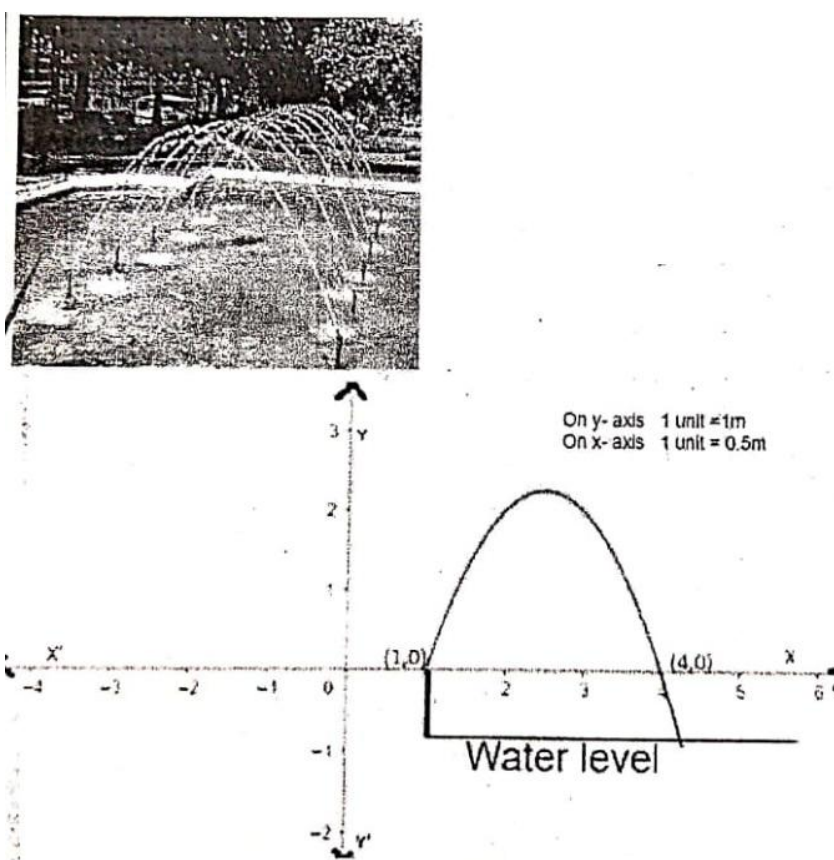
The height of each fountain rod above water level is 10cm. The equation of the downward-facing parabola representing the water fountain is given by $p(x) = -x^2 + 5x - 4$.
Based on the above information, answer the following question.

(a)   Find the zeroes of the polynomial p(x) from the graph

(b)   Find the value of x at which water attains maximum height.

(c)   (i)   If h is the maximum height attained by the water stream from the water level of the pool, then find the value of h.

(ii)   At what point(s) on x-axis, the height of water above x-axis is 2 meter?

Chapter 3

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx..) each.

26.   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) $x = a, y = -b$

27.   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) $ab = 6$

28.   If the lines represented by equations $3x + 2my = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of m is :

(a) 2/5   (b) $-5/4$

(c) 3/2   (d) 15/4

29.   The system of linear equation represented by the lines l and m are
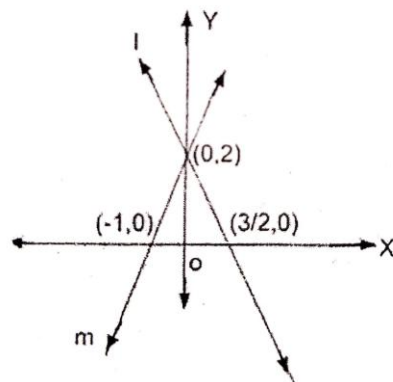
(a) Consistent with unique solution   (b) inconsistent

(c) Consistent with three solution   (c) consistent with many solution

30.   The value of k for which the system of equations $3x-ky= 7$ and $6x+ 10y =3$ is inconsistent, is

(a) -10   (b) -5   (c) 5   (d) 7

SECTION C

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

31. (a) Sabina went to a bank ATM to withdrew ₹ 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?

32. (a) Divide 16 into two parts such that twice the square of the greater part, exceeds the square of the smaller part by 164.

    OR

    (b) A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream, than to return to the same point. Find the speed of the stream and total time of the journey.

33. Two people are 16 km apart on a straight road. They start walking at the same time. If they walk towards each other with different speeds, they will meet in 2 hours. Had they walked in the same direction with same speed as before, they would have met in 8 hours. Find their walking speed.

34. 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.

35. A fraction becomes 1/3 when 1 is subtracted from the numerator. It becomes 1/4 when 8 is added to the denominator. Find the fraction?

36. The sum of a two-digit number and the number obtained by reversing the order of its digit is 99. If ten's digit is 3 more than the unit's digit, then find the number?

37. The sum of two numbers is 18 and the sum of their reciprocals is 9/40. Find the numbers.

SECTION D

This section comprises long answer (LA) type questions of 4/5 marks (approx.) each.

38. (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 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.

39. (a) Solve the following system of linear equation graphically:

x+2y = 3, 2x-3y+8 = 0

OR

(b) Places A and B are 180km apart on a highway. One car start from A and another from B at the same time. If the car travels in the same direction at different speed, they meet in 9 hours. If they travel towards each other with the same speed as before, they meet in an hour. What are the speeds of the two cars?

Chapter 4

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

40. A quadratic equation whose roots are (3-√2) and (3 + √2) is :

(a) $x^2 - 6x + 7 = 0$ (b) $x^2 +6x + 7 = 0$

(c) $9x^2 - 2 = 0$ (d) $x^2 - 7 = 0$

41. A quadratic equation whose roots are (2 + √3) and (2 - √3) is :

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

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

42. 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

43. The value(s) of k for which the roots of quadratic equation $x^2 + 4x + k = 0$ are real, is :

(a) k ≥ 4   (b) k ≤ 4   (c) k ≥ -4   (d) k ≤ -4

44. The value of k for which the quadratic equation $kx^2 – 5x + 1 = 0$ does not have a real solution is ?

(a) 0   (b) $\frac{25}{4}$ (c) $\frac{4}{25}$ (d) 7

45. The roots of quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$ are ?

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

46. The roots of the quadratic equation $x^2 + x - 1 = 0$ are

(a) Irrational and distinct   (b) not real

(c) rational and distinct   (d) real and equal

SECTION C

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

47. (a)   The difference of two numbers is 5 and the difference of their reciprocals is 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.

48. (a)   A 2-digit number is four times the sum of its digits and twice the product of its digits. Find the number.

OR

(b)   The length of the rectangle exceeds its breadth by 8 cm and the area of the rectangle is 240 cm^2. Find the dimensions of the rectangle.

SECTION D

This section comprises long answer (LA) type questions of 4/5 marks (approx.) each.

49. (a)   Amita buys some books for 1920. If she had bought 4 more books for the same amount each book would cost her 24 less. How many books did she buy? What was the initial price of one book?

OR

(b)   A train travels at a certain average speed for a distance of 132 km and then travels a distance of 140 km at an average speed of 4 km/h more than the initial speed. If it takes 4 hours to complete the whole journey, what was the initial average speed? Determine the time taken by train to cover the distances separately

Chapter 5

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

50.   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

51.   The 13th term from the end of the A.P.: 20, 13, 6, -1, ..., -148 is :

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

52.   The 11th term from the end of the A.P.: 10, 7,4, … -62 is :

(a) 25   (b) 16   (c) -32   (d) 0

53.   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

54.   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

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

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

56.   The sum of the first 50 odd natural numbers is :

(a) 5000   (b) 2500   (c) 2550   (d) 5050

57.   The 4th term from the end of the A.P -8, -5, -2, …… , 49 is

(a) 37   (b) 40   (c) 1   (d) 43

58.   If nth term of an A.P. is 7n-4 then the common difference of the A.P. is

(a) 7   (b) 7n   (c) -4   (d) 4

SECTION B

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

59.   Find the sum of the first 20 terms of the A.P. : 1/15, 1/12, 1/10, ……. .

60. Find the sum of the first 15 terms of the A.P. : 2/3, 0, -2/3, -4/3, ……. .

61. Find the sum of the first 20 terms of the A.P. : - 29/3, -9, -25/3, -23/3, …… .

62. (a) The sum of the first 12 terms of an A.P is 900. If its first term is 20 then find the common difference and 12th term.

<div align="center">OR</div>

(b) The sum of first n terms of an A.P. is represented by $s_n = 6n - n^2$. Find the common difference.

SECTION C

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

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

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

65. If pth term of an A.P. is q and qthterm is p, then prove that its nthterm is (p+q-n).

Chapter 6

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

66. In $\triangle$ ABC and $\triangle$ DEF, $\dfrac{AB}{DE} = \dfrac{BC}{FD}$. 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

67. In the given figure, DE || BC. The value of x is :
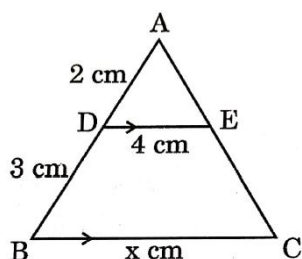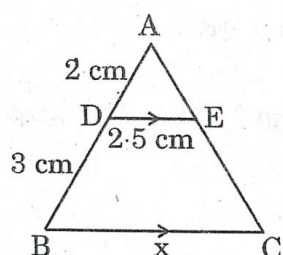

(a) 6   (b) 12.5

(c) 8   (d) 10

68. △ABC ~ △DEF and their perimeters are 32 cm and 24 cm respectively.

   If AB = 10 cm, then DE equals :

   (a) 8 cm   (c) 7.5 cm

   (b) 15 cm   (d) 5√3 cm

69. In the given figure, AD = 2 cm, DB = 3 cm, DE = 2.5 cm and DE || BC.

   The value of x is :

   (a) 6 cm   (b) 3.75 cm

   (c) 6.25 cm   (d) 7.5 cm

70. In two triangles △PQR and △ABC, 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) ∠A = ∠P   (b) ∠B = ∠Q

   (c) ∠B = ∠P   (d) CA = QR
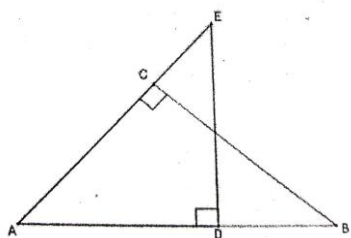

71. In the given figure, ABC is a triangle in which AD = 1.6 cm, BD = 48 cm, AE = 1.1 cm and EC = 2.2 cm. Then :
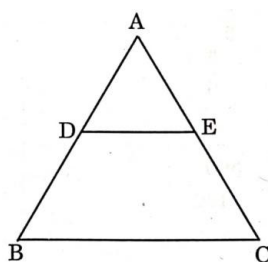
   (a) DE || BC

   (b) DE = 1/2 BC

   (c) DE = BC

   (d) DE is not parallel to BC (DE ∦ BC)

72. if △ ABC ~ △ PQR such that 3AB = 2PQ and BC = 10cm, then length QR is equal to

(a) 10cm   (b) 15cm   (c) $\frac{20}{3}cm$ (d) 30cm
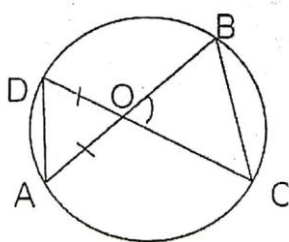
73. In the given figure, △BAC is similar to

(a) △AED   (b) △EAD   (c) △ACB   (d) △BCA

74. In the Given figure, if △OCA ~ △OBD then ∠OAC is equal to

(a) 58^0 (b) 55^0 (c) 128^0 (d) 52^0
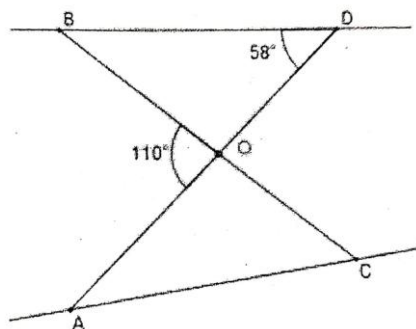
75. O is the point of intersection of two chords AB and CD of a circle.

If ∠BOC = 80^0 and OA = OD then △ODA and △OBC are

(a) Equilateral and similar   (b) Isosceles and similar

(c) isosceles but not similar   (d) not similar
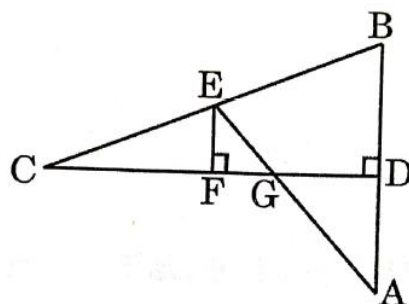
SECTION B

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

76. 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.
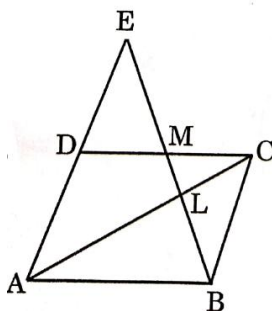
SECTION C

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

77. (a) In the given figure, CD is the perpendicular bisector of AB. EF is perpendicular to CD. AE intersects CD at G. Prove that CF/CD = FG/DG.
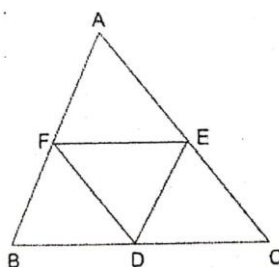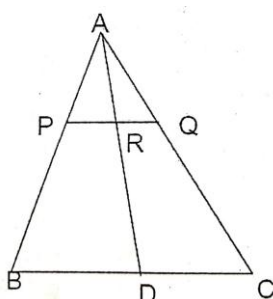

OR

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

78. (a) In △ABC, D, E and F are midpoints of BC, CA and AB respectively. Prove that △FBD ~ △DEF and △DEF ~ △ABC

(b) In △ABC, P and Q are points on AB and AC respectively such that PQ is parallel to BC. Prove that the median AD drawn from A on BC bisect PQ

SECTION D

This section comprises long answer (LA) type questions of 4/5 marks (approx.) each.

79. 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.

Chapter 7

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

80. If end points of a diameter of a circle are (-5, 4) and (1, 0), then the radius of the circle is :

(a) 2 √13 units   (b) √13 units

(c) 4√2 units   (d) 2√2 units

81. The distance between the points P(-11/3,5) and Q(-2/3,5) is :

(a) 6 units   (b) 4 units

(c) 2 units   (d) 3 units

82. 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

83. The distance between the points (6, 2) and (-6, 2) is :

(a) $6\sqrt{2}$ units   (b) 12 units

(c) $2\sqrt{6}$ units   (d) 6 units

84. The distance between the points (a,b) and (-a, -b) is

(a) $\sqrt{a^2 + b^2}$ (b) $a^2 + b^2$ (c) $2\sqrt{a^2 + b^2}$ (d) $4\sqrt{a^2 + b^2}$

85. The point on the X-axis nearest to the point (-4, -5) is

(a) (0,0)   (b) (-4, 0)   (c) (-5, 0)   (d) ($\sqrt{14}$, 0)

86. A point on the X-axis divides the line segment joining the points A(2, -3) and B (5, 6) in the ratio 1:2 . The point is

(a) (4, 0)   (b) ($\frac{7}{2}$, $\frac{3}{2}$)   (c) (3 , 0)   (d) (0 , 3)

SECTION B

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

87. Find the ratio in which y axis divides the line segment joining the points(5, -6) and (-1, -4).

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

89. (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.

90. (a) P (x,y) is a point equidistant from the points A(4,3) and B(3,4). Prove that x-y = 0

OR

(b)   In the given figure, △ ABC is a equilateral triangle. Coordinates of vertices A and B are (0,3) and (0,-3) respectively. Find the coordinates of Point C
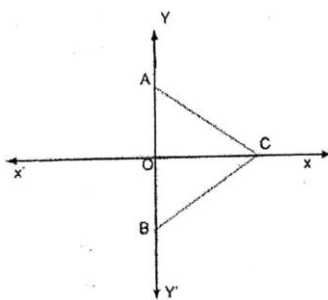
91.   Find the point(s) on the x-axis which is at distance of $\sqrt{41}$ units from the point (8, -5)

92.   Show that the points A(-5,6) , B(3,0) and C(9,8) are the vertices of an isosceles triangle.

SECTION C

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

93.   (a)   Show that A(1, 2), B(5, 4), C(3, 8) and D(-1, 6) are vertices of a parallelogram ABCD.
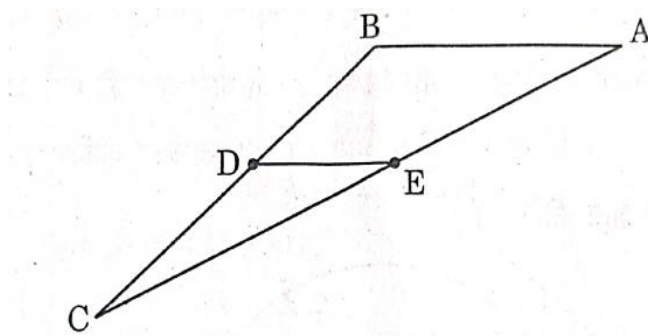
OR

(b)   Show that the points A(3, 0), B(6, 4) and C(-1, 3) are vertices of a right-angled triangle.

94.   (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 △ ABC, 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

95. (a) Find the ratio in which the y-axis divides the line segment joining the points (4,-5) and (-1,2). Also find the point of intersection.

OR

(b) Line 4x + y = 4 divides the line segment joining the points (-2,-1) and (3,5) in a certain ratio. Find the ration.

Chapter 8

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

96. If $\sec\theta - \tan\theta = \frac{1}{3}$. , then the value of $(\sec\theta + \tan\theta)$ is :

   (a) $\frac{1}{3}$.　　　(b) $\frac{2}{3}$.　　　(c) $\frac{1}{3}$.　　　(d) 3

97. $\dfrac{1 - \tan^2 30°}{1 + \tan^2 30°}$ is equal to :

   (a) sin 60°　　(b) cos 60°　　(c) tan 60°　　(d) cos 30°

98. $\dfrac{2\tan 30°}{1 + \tan^2 30°}$ Is equal to :

   (a) $\sin 60^0$　　(b) $\cos 60^0$　　(c) $\tan 60^0$　　(d) $\sin 30^0$

99. If $\tan\theta = \frac{5}{12}$, then the value of $\dfrac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta}$ is :

   (a) -17/7　　(b) 17/7　　(c)17/13　　(d) -7/13

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

   (a) $\dfrac{a}{\sqrt{b^2-a^2}}$.　　　　　(b) $\dfrac{b}{\sqrt{b^2-a^2}}$.

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

101. If $\sin Q = \frac{3}{4}$ then $\dfrac{(\sec^2 Q - 1)\cos^2 Q}{\sin Q}$ equals :

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

102. If $\cos \theta = \dfrac{3}{7}$, then $\dfrac{\cos \theta}{1 - \sin^2 \theta}$ is equal to :

(a) $\dfrac{3}{\sqrt{40}}$ (b) $\dfrac{3}{7}$ (c) $\dfrac{7}{3}$ (d) $\dfrac{7}{\sqrt{40}}$

103. If $3 \cot A = 4$, where $0^0 < A < 90^0$, then sec A is equal to

(a) $\dfrac{5}{4}$ (b) $\dfrac{4}{3}$ (c) $\dfrac{5}{3}$ (d) $\dfrac{3}{4}$

104. $\dfrac{1 - \tan^2 30^0}{1 + \tan^2 30^0}$ is equal to ?

(a) $\cos 60^0$ (b) $\sin 60^0$ (c) 1   (d) $\tan^2 60^0$

105. If $\tan \Theta = \dfrac{5}{2}$, then $\dfrac{4 \sin \Theta + \cos \Theta}{4 \sin \Theta - \cos \Theta}$ is equal to:

(a) $\dfrac{11}{9}$ (b) $\dfrac{3}{2}$ (c) $\dfrac{9}{11}$ (d) 4

106. If $\Theta = 30^0$ then the value of $3 \tan \Theta$ is

(a) 1   (b) $\dfrac{1}{\sqrt{3}}$ (c) $\dfrac{3}{\sqrt{3}}$ (d) not defined

SECTION B

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

107. (a) If a cos Θ + b sin Θ = m and a sin Θ - b cos Θ = n, then prove that

$a^2 + b^2 = m^2 + n^2$.

OR

(b) Prove that:

$$\sqrt{\dfrac{\sec A - 1}{\sec A + 1}} + \sqrt{\dfrac{\sec A + 1}{\sec A - 1}} = 2 \text{ cosec A}$$

108. (a) Evaluate :

$$\dfrac{\text{Sin } 30° + \tan 45°}{\sec 30° + \cot 45°}$$

OR

(b) For A = 30° and B = 60°, verify that :

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

109. Prove that :

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

110. Prove that:

$$\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} + \frac{\sin \theta - \cos \theta}{\sin \theta + \cos \theta} = \frac{2\sec^2\theta}{\tan^2\theta - 1}$$

111. Prove that:

$$\sqrt{\frac{\sec \theta - 1}{\sec \theta + 1}} + \sqrt{\frac{\sec \theta + 1}{\sec \theta - 1}} = 2 \text{ cosec } \theta$$

112. If $\sin(A - B) = \frac{1}{2}$ and $\cos(A + B) = \frac{1}{2}$, $0^0 <$ A+B $< 90^0$ and A > B, then find the values of A and B.

113. Evaluate $\frac{2\sin^2 60^0 - \tan^2 30^0}{\sec^2 45^0}$

SECTION C

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

114. Prove that :

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

115. Prove that :

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

116. Prove that :

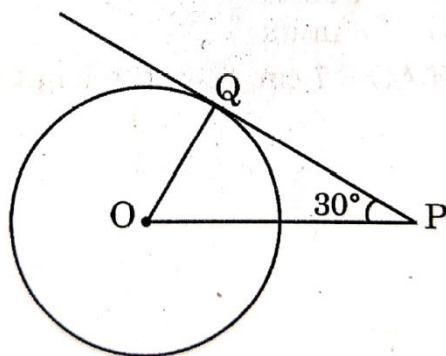$$(\textbf{cosec A} - \sin \textbf{A}) (\sec \textbf{A} - \cos \textbf{A}) = \dfrac{1}{\tan A + \cot A}$$

117. if $\cos \theta + \sin \theta = 1$, then prove that $\cos \theta - \sin \theta = \pm\, 1$

Chapter 10

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

118. PQ is a tangent to a circle at O. If the radius of the circle is 5cm, then the length of the tangent PQ is :
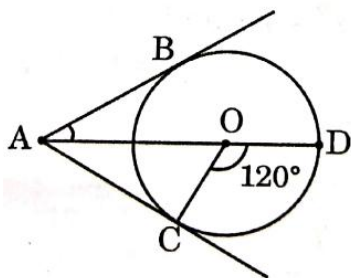

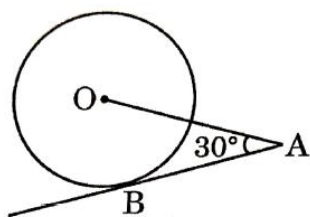(a) 5√3 cm   (b) 10/√3 cm

(c) 10 cm   (d) 5/√3 cm

119. In the given figure, AC and AB are tangents to a circle centered at O. If $\angle$ COD = 120°, then $\angle$BAO is equal to :

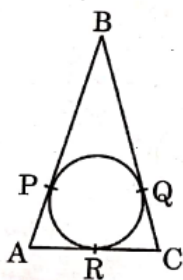(a) 30°   (b) 60°
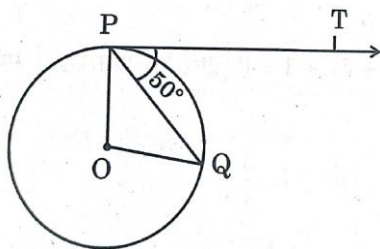
(c) 45°   (d) 90°

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

(a) 3 cm   (b) 3√3 cm

(c) 2 cm   (d) √3 cm

121. 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

122. In the given figure, O is the centre of a circle, PQ is a chord and the tangent PT at P makes an
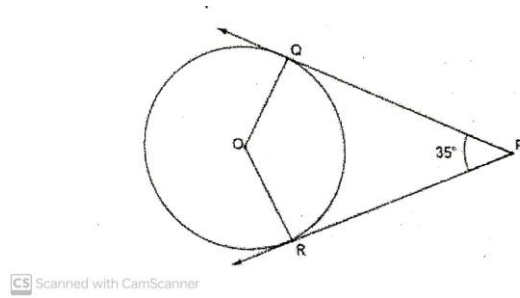   angle of 50° with PQ. The measure of $\angle$ POQ is :

(a) 130°   (b) 100°

(c) 90°   (d) 75°

123. A circle is of radius 3 cm. The distance between two of its parallel tangents is :
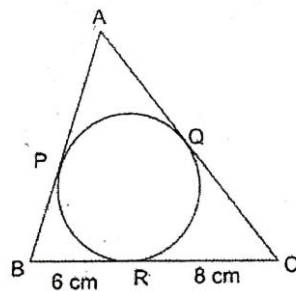
(a) 12 cm   (c) 6 cm

(b) 3 cm   (d) 4.5 cm

124. In the given figure, PQ and PR are tangents to a circle centred at O. If $\angle QPR = 35^0$ then $\angle QOR$ is equal to ?

(a) 70^0 (b) 90^0 (c) 135^0 (d) 145^0

125. If the perimeter of given triangle is 38 cm, then length AP is equal to

(a) 19 cm   (b) 5 cm   (c) 10cm   (d) 8 cm

126. Which of the following statements is not true?

a) A number of secants can be drawn at any point on the circle.

b) Only one tangent can be drawn at any point on a circle.

c) A chord is a line segment joining two points on the circle.

d) From a point inside a circle only two tangents can be drawn.

SECTION B

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

127. Prove that the tangent drawn at the ends of a diameter of a circle are parallel.

128. In the given figure, PQ is a chord of the circle centered at O. PT is a tangent to the circle at P. If ∠ QPT = 55°, then find ∠ PRQ.
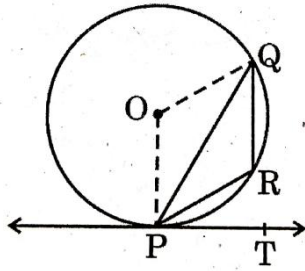
129. In two concentric circles, a chord of length 8 cm of the larger circle touches the smaller circle. If the radius of the larger circle is 5 cm, then find the radius of the smaller circle.

SECTION C

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

130. In the given figure, PT is a tangent to the circle centered at O. OC is perpendicular to chord AB. Prove that $PA.PB = PC^2 - AC^2$.
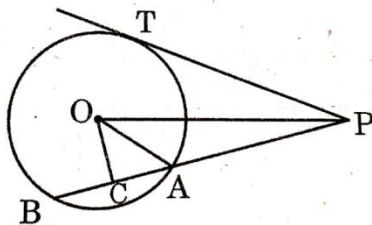
131. (a) In the given figure, PA and PB are tangents to a circle centred at O. Prove that :

   (i) OP bisects ∠APB

   (ii) OP is the right besector of AB
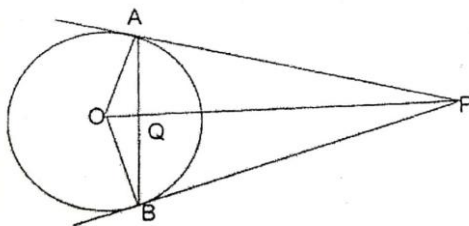
   (b) Prove that the lengths of tangents drawn from an external point to a circle are equal

132. In the given figure, O is the centre of the circle and PA is a tangent to the circle. If ∠ OAB = 60°, then ∠ OPA is equal to :
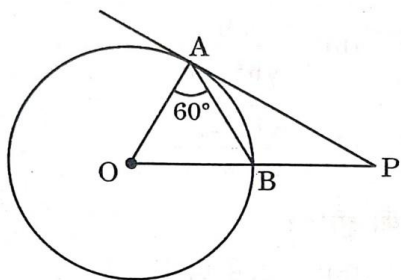
(a) 60°   (b) 30°

(a) 15°   (b) 20°

133. In the given figure, tangents AB and AC are drawn to a circle centred at O. If ∠ OAB = 60° and OB = 5 cm, find lengths OA and AC.
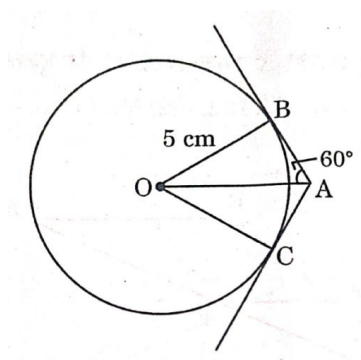
134. ABC is an isosceles triangle with AB = AC, circumscribed about a circle. Prove that BC is bisected at E.
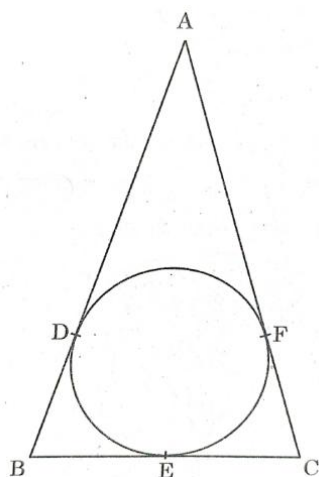
This section comprises long answer (LA) type questions of 4/5 marks (approx.) each.

135. (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 $\triangle$ ABC = 90 cm².
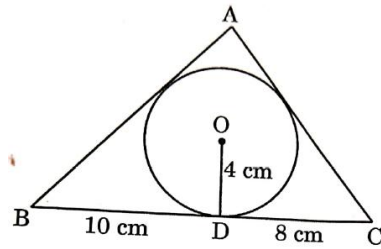
OR

(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.
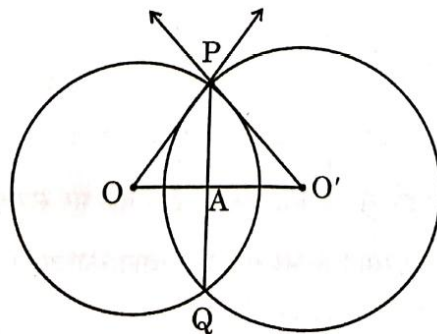
136.   Prove that the lengths of tangents drawn from an external point to a circle are equal.
       Using above result, find the length BC of △ABC Given that, a circle is inscribed in $\triangle$ ABC touching the sides AB, BC and CA at R, P and Q respectively and AB = 10cm, AQ = 7cm, CQ = 5cm.
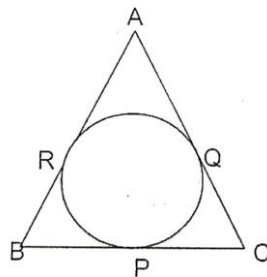
Chapter 12

SECTION C

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

137.　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 π = 3.14).

138.　(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 ∠ AOB = 90°. Also, find length of minor arc AB.
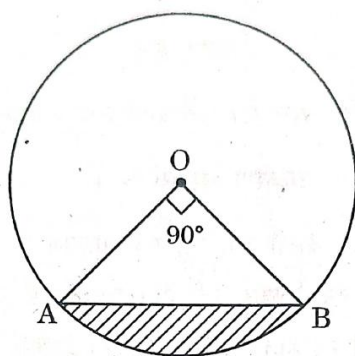
OR

　　(c)　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 ∠ AOB = 60°. Also, find the length of arc CD.
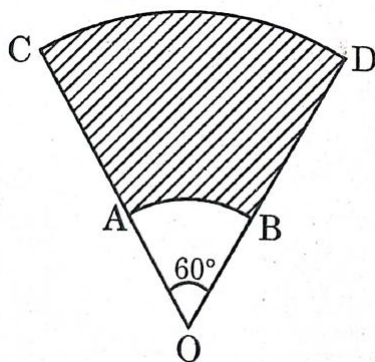
139.　(a)　The minute hand of a wall clock is 18cm long. Find the area of the face of the clock described by the minute hand in 35 minute.

Or

　　(b)　AB is a chord of a circle centred at O such that ∠ AOB = 60^0 . If OA = 14 cm then find the area of the minor segment (take $\sqrt{3} = 1.73$).
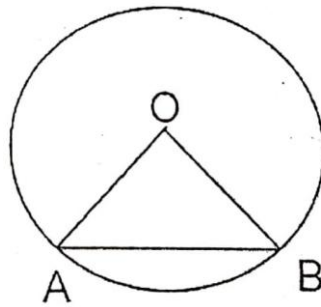
SECTION D

This section comprises long answer (LA) type questions of 4/5 marks (approx.) each.

140.   The perimeter of sector OACB of the circle centred at O and of radius 24, is 73.12 cm
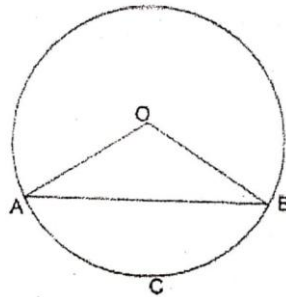
(a)   Find the central angle ∠ AOB.

(b)   Find the area of the minor segment ACB. (Using $\pi = 3.14\ and\ \sqrt{3} = 1.73$)

Chapter 13

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

141.   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

142.   The Total surface area of solid hemisphere of radius r is
        (a) πr^2 (b) $2\pi r^2$ (c) $3\pi r^2$ (d) $4\pi r^2$

143.   The radius of the base of a right circular cone and the radius of a sphere are each 5cm in length. If the volume of the cone is equal to the volume of the sphere then the height of the cone is:
        (a) 5cm   (b) 20 cm   (c) 10 cm   (d) 4 cm

144. The volume of a solid hemisphere is $\frac{396}{7}$ cm^3. The total surface area of the solid hemisphere (in sq. cm) is

(a) $\frac{396}{7}$ (b) $\frac{594}{7}$ (c) $\frac{549}{7}$ (d) $\frac{604}{7}$

SECTION E

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

145. 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.
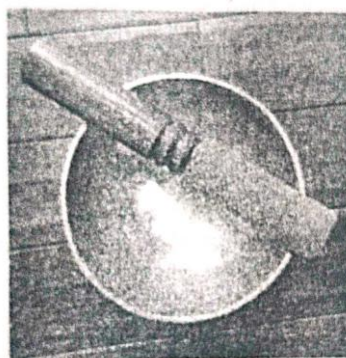
One such bowl is shown here whose dimensions are :

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?

(ii)   The bowl is to be polished from inside. Find the inner surface area of the bowl.

(iii)   (a)   Find the volume of metal used to make the bowl.

OR

(iii)   (b)   Find total surface area of the mallet. (Use π = 3.14)

146. 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.
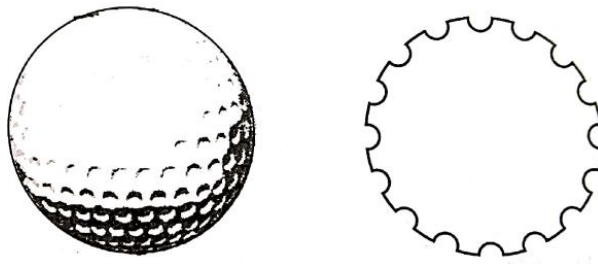
Based on the above, answer the following questions :

(i)   Find the surface area of one such dimple.

(ii)   Find the volume of the material dug out to make one dimple.

(iii)   (a)   Find the total surface area exposed to the surroundings.

OR

(iv)   (b)   Find the volume of the golf ball.

147.   Rinku was very happy to receive a fancy jumbo pencil from his best friend Rohan on his birthday. Pencil is a basic writing tool, when sharpened its shape is a combination of cylinder & cone as given in the picture.
Cylindrical pencil with conical head is a common shape worldwide since ages. Commonly pencils are made up of wood & plastic but we should promote pencils made up of eco-friendly material (many options available in the market these days) to save environment.

The dimensions of Rinku's pencil are given as follows:
Length of cylindrical portion is 21cm. Diameter of the base is 1 cm and height of the conical portion is 1.2 cm
Based on the above Information, answer the following questions:

(a)   Find the slant height of the sharpened part.
(b)   Find curved surface area of sharpened part (in terms of π).
(c)   (i)   Find the total surface area of the pencil (in terms of π).
        (ii)   The pencil's total height decreases by 8.2 cm after sharpening it many times, what is the volume of the cylindrical part of the shortened pencil (in terms of)?

148.   Metallic silos are used by farmers for storing grains. Farmer Girdhar has decided to build a new metallic silo to store his harvested grains. It is in the shape of a cylinder mounted by a cone.

Dimensions of the conical part of a silo is as follows:
Radius of base = 1.5 m
Height = 2 m

Dimensions of the cylindrical part of a silo is as follows:
Radius = 1.5 m
Height = 7 m

On the basis of the above information answer the following questions.

(a) Calculate the slant height of the conical part of one silo.

(b) Find the curved surface area of the conical part of one silo.

(c)   1. Find the cost of metal sheet used to make the curved cylindrical part of 1 silo at the rate of ₹2000 per m².

<div align="center">OR</div>

    2. Find the total capacity of one silo to store grains.

Chapter 14

SECTION A

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

149. 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

150. 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

151. 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

152. 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

(d) 40 – 60   (c) 60 – 80

153. 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

154. The following distribution shows the marks distribution of 80 students

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of Students	2	12	28	56	76	80

The median class is

(a) 20-30   (b) 40-50   (c) 30-40   (d) 10-20

155. Consider the frequency distribution of 45 observations.

Class	0-10	10-20	20-30	30 - 40	40-50
Frequency	5	9	15	10	6

The upper limit of median class is

(a) 20   (b) 10   (c) 30   (d) 40

156. Which of the following gives the middle most observation of the data ?

(a) Median   (b) Mean   (c) Range   (d) Mode

SECTION B

This section comprises short answer (SA) type questions of 2 marks (approx.) each.

157. Calculate mode of the following distribution

Class	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	5	6	15	10	5	4

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

158. 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

159. Find the mean of the following distribution :

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

160. Find the mean of the following distribution :

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

161. Find the mean using the step deviation method :

Class	0 - 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	6	10	15	9	10

SECTION D

This section comprises long answer (LA) type questions of 4/5 marks (approx.) each

162. Find the mean and median of the following data:

Class	85 - 90	90 – 95	95 – 100	100 -105	105 – 110	110-115
Frequency	15	22	20	18	20	25

OR

The monthly expenditure on milk in 200 families of a Housing Society is given below

Monthly Expenditure (in Rs)	1000 – 1500	1500 – 2000	2000 – 2500	2500 – 3000	3000 – 3500	3500 - 4000	4000 – 4500	4500 – 5000
Number of Families	24	40	33	x	30	22	16	7

Find the value of x and also find the mean expenditure?

Chapter 15

This Section Comprises multiple choice questions (MCQs) of 1 mark (approx.) each.

163. One card is drawn at random from a well shuffled deck of 52 playing cards. The probability that the drawn card is a queen is :
(a) 4/13   (b) 4/52   (c) 2/13   (d) 1/26

164. Two dice are rolled together. What is the probability of getting a sum greater than 10?

(a) 1/9   (b) 1/6   (c) 1/12   (d) 5/18

165. Which of the following numbers cannot be the probability of happening of an event ?
(a) 0   (b)7/0.01   (c) 0.07   (d) 0.07/3

166. Two coins are tossed together. What is the probability of getting at least one tail?
(a) 1/4   (b) 1/2   (c) 3/4   (d) 1

167. One card is drawn at random from a well shuffled deck of 52 playing cards. The probability of getting '4 of hearts ' ?
(a) 1/52   (b) 1/13   (c) 1/26   (d) 1/6

168. Two dice are rolled together. The probability that the sum of the numbers that appeared is 9, is :
(a) 5/36   (b) 1/9   (c) 1/12   (d) 1/6

169. One card is drawn at random from a well shuffled deck of 52 playing cards. The probability that it is a red king is :
(a) 1/52   (b) 1/26   (c) 2/26   (d) 2/13

170. Which of the following cannot be the probability of an event ?

(a) 0.4   (b) 4%   (c) 0.04%   (d) 4

171. In a bag containing 24 balls, 4 are blue, 11 are green and the rest are white. One ball is drawn at random. The probability that drawn ball is white in color is.
(a) 1/6   (b) 3/8   (c) 11/24   (d) 5/8

172. A card is drawn from a well shuffled deck of playing cards. The probability of getting red face card is:

(a) 3/13   (b) 1/2   (c) 3/52   (d) 3/26

SECTION B

This section comprises short answer (SA) type questions of 2 marks (approx.) each.

173. (a) Two dice are rolled together bearing number 4, 6, 7, 9, 11, 12. Find the probability that the product of numbers obtained is an odd number.

or

(b) How many positive three digit integers have the hundredths digit 8 and units digit 5? Find the probability of selecting one such number out of all three digit numbers.

SECTION E

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

174. 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 :
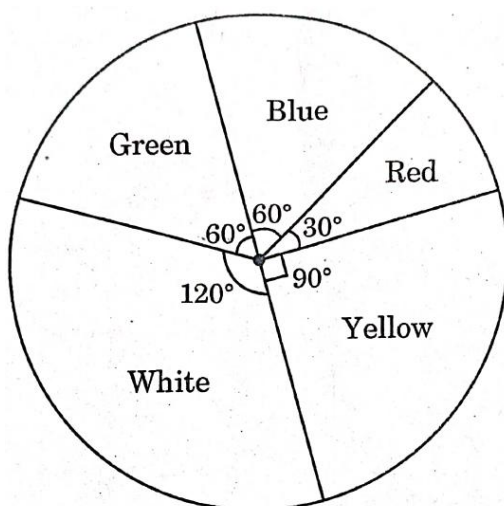

Study the pie chart and answer the following questions :

(i) If a student is chosen at random, then find the probability of his/her favourite colour being white ?

(ii) What is the probability of his/her favourite colour being blue or green ?

(iii) (a) If 15 students liked the colour yellow, how many students participated in the survey?

OR

(iii)   (b)   What is the probability of the favourite colour being red or blue ?

175.   A middle school decided to run the following spinner game as a fund-raiser on Christmas Carnival.
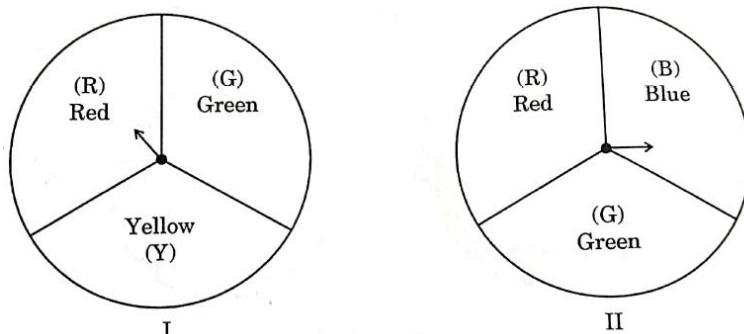
Making Purple: Spin each spinner once. Blue and red make purple. So, if one spinner shows Red (R) and another Blue (B), then you 'win'. One such outcome is written as 'RB'.

Based on the above, answer the following questions :

(i)   List all possible outcomes of the game.

(ii)   Find the probability of 'Making Purple'.

(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.

OR

(iv)   (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)

176.   A group of students conducted a survey to find out about the preferred mode of transportation to school among their classmates. They surveyed 200 students from their school. The results of the survey are as follows:

120 students preferred to walk to school.

25% of the students preferred to use bicycles.

10% of the students preferred to take the bus.

Remaining students preferred to be dropped off by car.

Based on the above information, answer the following questions:

(a)   What is the probability that a randomly selected student does not prefer to walk to school?

(b)   Find the probability of a randomly selected student who prefers to walk or use a bicycle.

(c)   (i)   One day 50% of walking students decided to come by bicycle. What is the

probability that a randomly selected student comes to school using a bicycle on that day?

<div align="center">OR</div>

(ii) What is the probability that a randomly selected student prefers to be dropped off by car?

Questions Based on Assertion and Reasoning

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.*

177. *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.

178. *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.

179. Assertion (A) : The surface area of largest sphere that can be inscribed in a hollow cube of side 'a' cm is πa^2 cm^2.

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

180. Assertion (A) : When two coins are tossed together, the probability of getting no tail is 1/4

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

181. Assertion (A) : The sequence -1, -1-1 ,.....,-1 is an AP.

Reason (R) : In an AP , $a_n - a_{n-1}$ is constant where n ≥ 2 and n ∈ N

182. Assertion (A) : $(2 + \sqrt{3})\sqrt{3}$ is an irrational number.

Reason (R) : Product of two irrational number is always irrational.

183. Assertion (A) : HCF of any two consecutive even natural numbers is always 2.

Reason (R) : Even natural number are divisible by 2

184.   Assertion (A) :   If the radius of sector of a circle is reduced to its half and angle is doubled then the perimeter of the sector remains the same.

Reason (R) :   The length of the arc subtending angle θ at the centre of a circle of radius

$r = \dfrac{\pi r \theta}{180}$.

N.B.1: Assertions and Reason based questions may be set from any chapter of the book which are included in the syllabus.

N.B.2: Students, Teachers may visit kagojornao.com for the video classes available in the website.

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