Moulana Azad Model School

Shikaripalya

SAMPLE PAPER 1

Class 10 - Mathematics

Time Allowed: 3 hours   **Maximum Marks: 80**

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.

2. Section A has 20 MCQs carrying 1 mark each

3. Section B has 5 questions carrying 02 marks each.

4. Section C has 6 questions carrying 03 marks each.

5. Section D has 4 questions carrying 05 marks each.

6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.

7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E

8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.
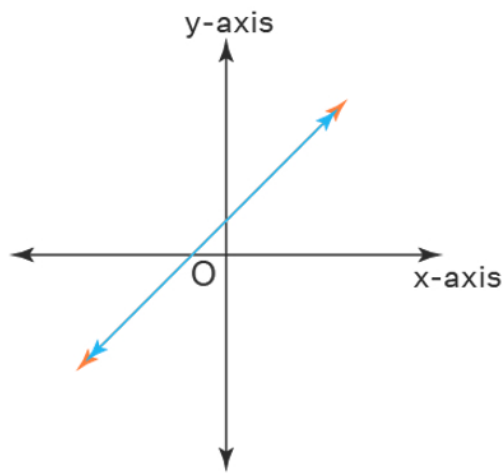
Section A

1. Which of the following is an irrational number? **[1]**

   a) Both (π) and ($\frac{22}{7}$)   b) π

   c) Neither (π) nor ($\frac{22}{7}$)   d) $\frac{22}{7}$

2. The graph of y = p(x) in a figure given below, for some polynomial p(x). Find the number of zeroes of p(x). **[1]**
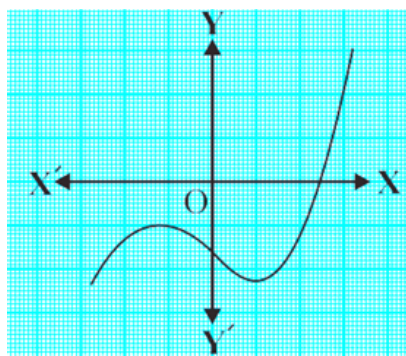
   a) 4   b) 1

   c) 2   d) 0

3. The number of solutions of two linear equations representing coincident lines is/are **[1]**

a) infinite solution

b) 0

c) 1

d) 5

4. Which of the following is not a quadratic equation? **[1]**

   a) $x = x^2 + 3 + 4x^2$

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

   c) $\left(\sqrt{2}x + \sqrt{3}\right)^2 + x^2 = 3x^2 - 5x$

   d) $2x - x^2 = x^2 + 5$

5. Which term of the AP 72, 63, 54 ..... is 0? **[1]**

   a) 11th
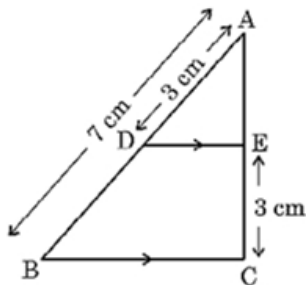
   b) 9th

   c) 10th

   d) 8th

6. If points A(5, p), B(1, 5), C(2, 1) and D(6, 2) form a square ABCD, then p = **[1]**

   a) 3

   b) 8

   c) 7

   d) 6

7. If the midpoint of the line segment joining the points (a, b - 2) and (-2, 4) is (2, -3), then the values of a and b are **[1]**
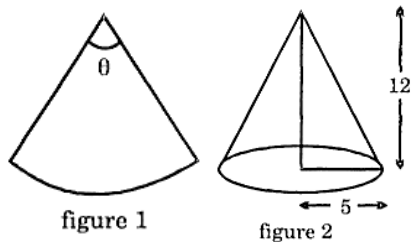
   a) 6, 8

   b) 6, -8

   c) 4, -5

   d) -6, 8

8. In the given figure, DE||BC. If AD = 3 cm, AB = 7 cm and EC = 3 cm, then the length of AE is **[1]**

   a) 4 cm

   b) 2.25 cm

   c) 2 cm

   d) 3.5 cm

9. In the given figure, the perimeter of ABCD is **[1]**

a) 44 cm

b) 36 cm

c) 40 cm

d) 48 cm

10. If O is the centre of a circle, AOC is its diameter and B is a point on the circle such that $\angle ACB = 50^o$. If AT is the tangent to the circle at the point A, then $\angle BAT =$ **[1]**

a) 60°

b) 40°

c) 65°

d) 50°

11. If $a\cos\theta + b\sin\theta = 4$ and $a\sin\theta - b\cos\theta = 3$, then $a^2 + b^2 =$ **[1]**

a) 25

b) 7

c) none of these

d) 12

12. $(\cos 0^o + \sin 30^o + \sin 45^o)(\sin 90^o + \cos 60^o - \cos 45^o) = ?$ **[1]**

a) $\frac{5}{8}$

b) $\frac{7}{4}$

c) $\frac{5}{6}$

d) $\frac{3}{5}$

13. An electric pole is tied from the top to a point (some distance away from the base) on the ground using a string. The ratio of the height of pole to the string is $\sqrt{3}$:2, then the angle of elevation of the top from the point on the ground is **[1]**

a) 60°

b) 45°

c) None of these

d) 30°

14. Find the area of the sector of a circle having radius 6 cm and of angle 30°. **[1]**

a) 8.42 cm^2

b) 9 cm^2

c) 9.42 cm^2

d) 9.52 cm^2

15. A piece of paper in the shape of a sector of a circle (see figure 1) is rolled up to form a right-circular cone (see figure 2). The value of angle θ is: **[1]**

figure 1　　figure 2

a) $\frac{5\pi}{13}$

b) $\frac{6\pi}{13}$

c) $\frac{10\pi}{13}$

d) $\frac{9\pi}{13}$

16. A bag contains 3 red, 5 black and 7 white balls. A ball is drawn from the bag at random. The probability that the ball drawn is not black, is: **[1]**

a) $\frac{5}{10}$

b) $\frac{2}{3}$

c) $\frac{1}{3}$

d) $\frac{9}{15}$

17. The probability that a leap year selected at random will have 53 Fridays is **[1]**

a) $\frac{1}{7}$

b) $\frac{2}{7}$

c) $\frac{4}{7}$

d) $\frac{6}{7}$

18. The arithmetic mean of 1, 2, 3, 4, ..., n is: **[1]**

a) $\frac{n-1}{2}$

b) $\frac{n(n+1)}{2}$

c) $\frac{n}{2}$

d) $\frac{n+1}{2}$

19. **Assertion (A):** Two identical solid cubes of side 5 cm are joined end to end. The total surface area of the resulting cuboid is 300 cm^2. **[1]**

Reason (R): Total surface area of a cuboid is 2(lb + bh + lh)

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** Sum of first hundred even natural numbers divisible by 5 is 500 **[1]**

Reason (R): Sum of first n-terms of an A.P. is given by S$_n$ = $\frac{n}{2}[a + l]$ where l = last term.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Section B

21. 2002 cartons of Lassi bottles and 2618 cartons of Frooti are to be stacked in a storeroom. If each stack is of the same height and is to contain cartons of the same type of bottles, what would be the greatest number of cartons each stack would have? **[2]**

22. $\triangle$ABD is a right triangle right-angled at A and AC$\perp$ BD. Show that AD^2 = BD.CD **[2]**

23. O is the centre of a circle of radius 8 cm. The tangent at a point A on the circle cuts a line through O at B such that AB = 15 cm. Find OB. **[2]**

24. Show that: $\tan^4 \theta + \tan^2 \theta = \sec^4 \theta - \sec^2 \theta$ for $0° \leq \theta \geq 90°$ **[2]**

OR

If tan (A - B) = $\frac{1}{\sqrt{3}}$ and tan(A + B) = $\sqrt{3}$, $0° <$ A + B $\leq 90°$, A > B find A and B.

25. A chord of a circle of radius 14 cm makes a right angle at the centre. Find the areas of the minor and the major **[2]** segments of the circle.

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

The minute hand of a clock is 7.5 cm long. Find the area of the face of the clock described by the minute hand in 56 minutes.

<div align="center">**Section C**</div>

26. 144 cartons of Coke cans and 90 cartons of Pepsi cans are to be stacked in a canteen. If each stack is of the same **[3]** height and if it equal contain cartons of the same drink, what would be the greatest number of cartons each stack would have?

27. Find the zeroes of the given quadratic polynomials and verify the relationship between the zeroes and their **[3]** coefficients x^2 - 6.

28. The difference between the two numbers is 26 and one number is three times the other. Find them by substitution **[3]** method.

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

Solve the system of linear equations by using the method of elimination by equating the co-efficients:

8x + 5y = 9

3x + 2y = 4

29. Find the length of a tangent drawn to a circle with radius 5 cm, from a point 13 cm from the centre of the circle. **[3]**

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

From an external point P, a tangent PT and a line segment PAB is drawn to a circle with centre O. ON is perpendicular on the chord AB. Prove that.

  i. PA.PB = PN^2 - AN^2

  ii. PN^2 - AN^2 = OP^2 - OT^2

  iii. PA.PB = PT^2

30. In a $\triangle$ABC it is given that $\angle$B = 90° and AB: AC = 1: $\sqrt{2}$. Find the value of $\left(\frac{2\tan A}{1+\tan^2 A} \right)$. **[3]**

31. The following distribution gives the state-wise teachers-student ratio in higher secondary schools of India. Find **[3]** the mode and mean of this data. Interpret the two measures:

Number of students per teacher	Number of states/U.T.
15 - 20	3
20 - 25	8
25 - 30	9
30 - 35	10
35 - 40	3
40 - 45	0
45 - 50	0
50 - 55	2

<div align="center">**Section D**</div>

32. The perimeter of a rectangular field is 82 m and its area is 400 square metre. Find the length and breadth of the rectangle. **[5]**
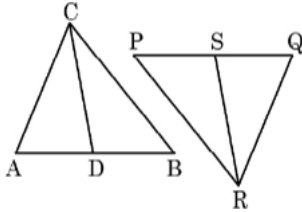
<div align="center">OR</div>

Find the values of k for which the equation $(3k+1)x^2 + 2(k+1)x + 1$,has equal roots. Also find the roots.

33. In the given figure, C D and R S are respectively the medians of $\triangle$ABC and $\triangle$PQR. If $\triangle$ABC $\sim$ $\triangle$PQR then prove that: **[5]**

  i. $\triangle$ADC $\sim$ ΔPSR

 ii. AD $\times$ PR = AC $\times$ PS

34. A tent is of the shape of a right circular cylinder upto a height of 3 metres and then becomes a right circular cone with a maximum height of 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of Rs.2 per square metre, if the radius of the base is 14 metres. **[5]**

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

A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter l of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

35. Find the median from the following data: **[5]**

Class	1 - 5	6 - 10	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45
Frequency	7	10	16	32	24	16	11	5	2

HINT Convert it to exclusive form.

<div align="center">Section E</div>

36. **Read the text carefully and answer the questions:** **[4]**

Elpis Technology is a laptop manufacturer. The company works for many branded laptop companies and also provides them with spare parts. Elpis Technology produced 6000 units in 3rd year and 7000 units in the 7th year.
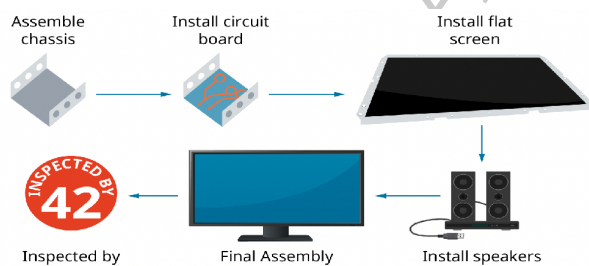
Assuming that production increases uniformly by a fixed number every year.

  (i)   Find the production in the 1st year.

  (ii)   Find the production in the 5th year.

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

        Find in which year 10000 units are produced?

 (iii)   Find the total production in 7 years.

37. **Read the text carefully and answer the questions:** **[4]**

There are two routes to travel from source A to destination B by bus. First bus reaches at B via point C and second bus reaches from A to B directly. The position of A, B and C are represented in the following graph:

Based on the above information, answer the following questions.

Scale: x-axis : 1 unit = 1 km

y-axis: 1 unit = 1 km
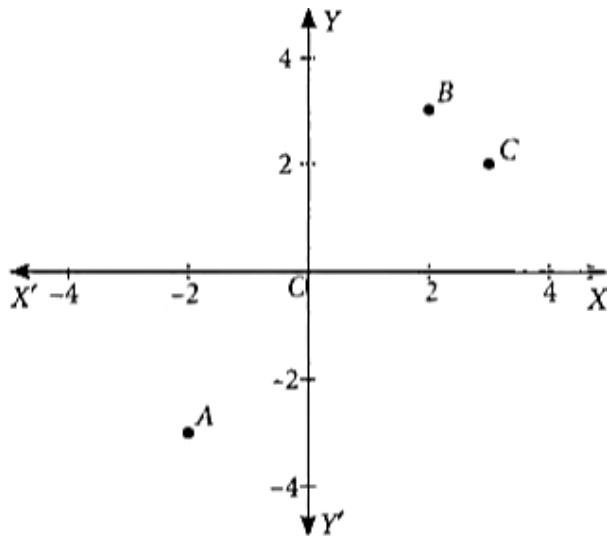
(i)   If the fare for the second bus is ₹15/km, then what will be the fare to reach to the destination by this bus?

(ii) What is the distance between A and B?

OR

If it is assumed that both buses have same speed, then by which bus do you want to travel from A to B?

(iii) What is the distance between A and C?

38. **Read the text carefully and answer the questions:**   **[4]**

Tower Bridge is a Grade I listed combined bascule and suspension bridge in London, built between 1886 and 1894, designed by Horace Jones and engineered by John Wolfe Barry. The bridge is 800 feet (240 m) in length and consists of two bridge towers connected at the upper level by two horizontal walkways, and a central pair of bascules that can open to allow shipping.

In this bridge, two towers of equal heights are standing opposite each other on either side of the road, which is 80 m wide. During summer holidays, Neeta visited the tower bridge. She stood at some point on the road between these towers. From that point between the towers on the road, the angles of elevation of the top of the towers was 60° and 30° respectively.
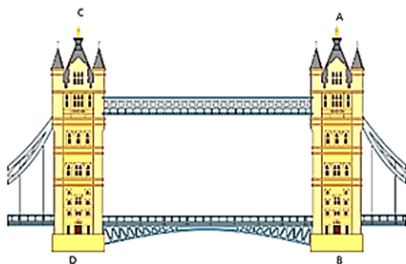
(i)   Find the distances of the point from the base of the towers where Neeta was standing while measuring the height.

(ii) Neeta used some applications of trigonometry she learned in her class to find the height of the towers without actually measuring them. What would be the height of the towers she would have calculated?

OR

Find the distance between Neeta and top tower CD?

(iii) Find the distance between Neeta and top of tower AB?