Mathematics SA -2 Sample paper-1

Time allowed: 3 hours Maximum Marks: 90

General Instructions:
a) All questions are compulsory.
b) The question paper consists of 31 questions divided into four sections – A, B, C and D.
c) Section A contains 4 questions of 1 mark each which are multiple choice questions, Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 11 questions of 4 marks each.
d) Use of calculator is not permitted.

Section A

1. Which of the following cannot be the probability of an event?
(a)1/4
(b) 0.6
(c) 5 %
(d)20/19

2. If the radius of a sphere is doubled, its volume becomes x times the volume of original sphere, What is the value of x
a) 2
b) 4
c) 8
d) 16

3. A box contains 3 blue, 2 white and 4 red marbles. If a marble is drawn at random from the box, the probability that it will not be a white marble is:
(a) 2/9
 (b) 4/9
 (c) 5/9
 (d) 7/9

4. A point on y – axis equidistant from the points A (6, 5) and B−4,3 is:
(a) (0, 3)
(b) (0, 4)
(c) (0, 6)
(d) (0, 9)

Section B

5. Find the solution of the equation $x^2 - 5x + 6 = 0$

6. Find the sum of the first 23 terms of the AP 7, 21/2, 14…………?

7. In two concentric circles, prove that a chord of larger circle which is tangent to a smaller circle is bisected at the point of contact

8. The radii of two circles are 6 cm and 8 cm. Find the radius of the circle whose area is equal to the sum of areas of two circles.

9. A solid metallic sphere of radius 12 cm is melted and recast into a number of small cones, each of radius 4 cm and height 3 cm. Find the number of cones so formed.

10. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tank will rise by 21 m.

Section C

11. If $x^2 - 5x + 1 = 0$, Find the value of $x + 1/x$

12. Find the sum of all two digit natural numbers which when divided by 3 yield 1 as remainder.

13. Draw a right triangle in which the sides (other than hypotenuse) are lenghts 5 cm and 4 cm. Then construct another triangle whose sides are 5/3 times of the corresponding sides of the given triangle

14. From the top of a hill 200 m high, the angles of depression of the top and the bottom of a pillars are 30^0 and 60^0 respectively. Find the height of the pillar and its distance from the hill

15. Rita saved Rs 5 in the first week of a year and then increased her weekly saving by Rs 1.75. If in the nth week, her week, her weekly savings become Rs 20.75, find n.

16. Find the value of p for which the points (−1, 3 , 2,) (p) and (5, 1−) are collinear.

17. Prove that the points (3, 0), (6, 4) and (−1,3) are vertices of a right angled triangle. Also, prove that the vertices of an isosceles triangle.

18. A copper wire when bent in the form of a square encloses an area of 121 cm^2. If the same wire is bent into the form of a circle, then find the area of the circle. (use π=22/7)

19. A chord AB of length 12 cm subtends an angle of 120^0 at the center of a circle. Find the area of the minor segment cut off by the chord AB

20. A hemispherical bowl of internal radius 9 cm is full of liquid. The liquid is to be filled into cylindrical shaped small bottles each of diameter 3 cm and height 4 cm. How many bottles are needed to empty the bowl?

Section D

21. Solve for x

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{x} = \frac{1}{a+b+x}$$

Where a≠0 , b≠0 and a+b+x≠0

22. if $\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n}$ is the Arithmetic Mean between a and b, then find the value of n

23. If the coordinates of two points P and Q are (3,4) and (5, -2) , Find the coordinates of the point S if PS = QS and Area of the triangle PQS is 10

24. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠ PTQ = 2∠ OPQ.

25. A circle touches the side BC of the triangle ABC at P and it touches AB and AC when extended at Q and R respectively
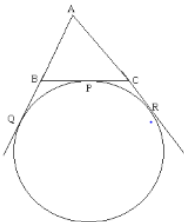
Show that

AQ = ½(AB+BC+AC)

26. Draw a circle of radius 6 cm. From a point 10cm away from its center, construct the pair of tangents to the circle and measure their lengths

27. An airplane flying at a height of 4000 m from the ground passes vertically above another airplane at an instant when the angle of elevation of the two planes from the same point as the ground are 60^0 and 45^0 respectively. Find the vertical distance between the airplanes at that instant.

28. Kings and Queens are removed from a deck of cards. A card is drawn at random.
Find the probability of drawing the following:
1. a Spade and
2. a Red card

3. a King
4. a Face card
5. Not a Face card

29. If p is the length of one of the sides of an equilateral triangle ABC, base BC lies on x – axis and vertex B is at the origin, then find the coordinates of the vertices of the triangle ABC.

30. A solid is in the form of a right circular cylinder with hemispherical ends. The total height of the solid is 19 cm and diameter of the cylinder is 7 cm. Find the total surface area and volume of the solid.

31. A circus tent is cylindrical up to a height of 3 cm and conical above it. If the diameter of the base is 105 m and the slant height of the conical part is 53m. Find the total canvas used in making the tent