Mathematics SA -2 Sample paper-2

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. If P(A) = 0.11, what is the probability of 'not A'?

2. If the radius of a circle is reduced by 10%, the its area is reduced by
(a) 10%
(b) 19%
(c) 36%
(d) 20%

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. Three solid of diameters 6 cm, 8 cm and 10 cm are melted to form a single solid sphere. The diameter of the new sphere is
(a) 6cm
(b) 4.5cm
(c) 3cm
(d) 12cm

Section B

5. A two-digit number is four times the sum of its digits and twice the product of its digits. Find the number

6. Determine the ratio in which the line 2x + y – 4 = 0 divides the line segment joining the points A (2, – 2) and B (3, 7).

7. A umbrella has 8 ribs which are equally spaced. Assuming umbrella to be a flat circle of radius 45 cm. Find the area between two consecutive ribs of the umbrella

8. Two circles touch externally. The sum of their areas is 130 π cm^2 and the distance between their centers is 14cm. Find the radii of the 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 value of p if the distance between the two points (p, -1) and (3, -2) is p+5

13. The tangents PA and PB from a point P to the Circle with center O are inclined to each other at an angle 60^0. Find the value of the angle AOB

14. A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is 60o. When he moves 20 m away from the bank, he finds the angle of elevation to be 30o. Find the heights of the tree and the width of the bank

15. Determine k for which 2k+1, k^2 + k + 1,3k^2 -3k+3 are the consecutive terms in Arithmetic Progression

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 cm2. 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 circular pond is 21 m in diameter. It is surrounded by 3.5 m wide path. Find the cost of constructing the path at the rate of Rs. 25 per m2.

20.. A right triangle whose sides are 15cm and 20cm, is made to revolve about its hypotenuse. Find the volume and total surface area of the double cone so formed

Section D

21. A train travels 360km at a uniform speed. If the speed had been 5km/hr more, it would have taken 1 hour less for the same journey. Find the speed of the train

22. A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows: Rs.250 for the first day, Rs.300 for the second day, Rs.350 for the third day etc., the penalty for each succeeding day being Rs.50 more than for the preceding day. How much money the contractor has to pay as penalty, if he has delayed the work by 20 days?

23. If the pth, qth & rth term of an AP is x, y and z respectively,

show that x(q-r) + y(r-p) + z(p-q) = 0

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. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.
Using the above result, find the length of PQ, if a tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm.

26. Two line segments AB and AC include an angle 60^0 such that AB=5cm and AC=7cm. Locate points X and Y on AB and AC such that AX: AB= 3:4 and AY: AC= 1: 4. Join the points X and Y and measure the length XY

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 is 60^0 and 45^0 respectively. Find the vertical distance between the airplanes at that instant.

28. A die is thrown once. Find the probability of getting
(i) a prime number
(ii) a number lying between 1 and 6
(iii) an odd number.
iv) Odd number
v) Less than or equal to 6

29 Prove that the lengths of tangents drawn from an external point to a circle are equal.
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30. Find the area of ABCD quadrilaterals whose coordinates are   A (-3,2) B (5,4) C (7, -6) and D (-5, -4)

31. A right circular cylinder volume 540π cm^2 is full of ice-cream. The ice-cream is to be filled in cones of height 12cm and radius 3 cm having a hemispherical shape on the top. Fin d the Number of such cones which can be filled with ice-cream