PAPER 7
CLASS 9

General Instructions:

1. This question paper contains 38 questions.
2. This question paper is divided into 5 sections A, B, C, D and E.
3. In Section A, Questions 1 – 18 are multiple choice questions (MCQs) and question number 19 and 20 are Assertion – Reason based questions of 1 mark each.
4. In Section B, Questions 21 – 25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions 26 – 31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions 32 – 35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Question number 36 – 38 are case study based questions, carrying 4 marks each with sub parts of the values 1, 1 and 2 marks each respectively.
8. All questions are compulsory. However, an internal choice in 2 questions of Section B, 2 questions of Section C and 2 questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = \frac{22}{7}$, wherever required if not stated.
11. Use of calculators is not allowed.

Section – A

Section A consists of 20 questions of 1 mark each.

1. The width of each of five continuous classes in a frequency distribution is 5 and the lower class limit of the lowest class is 10. The upper class limit of the highest class is:

a. 15 b. 25 c. 35 d. 40

2. The factors of $a(a-1)-b(b-1)$ are:

a. $(a+b)(a+b-1)$

b. $(a-b)(a+b)$
c. $(a+b-1)(a-b)$
d. $(b-a)(a+b)$

3. If $8^{x+1} = 64$, then the value of 3^{2x+1} is:

a. 1 b. 3 c. 9 d. 27

4. Degree of the polynomial $(x^5+2)+(x^5-2)$ is:

a. 10 b. 5 c. 2 d. 4

5. If the angles $(2x-10)°$ and $(x-5)°$ are complementary, then the value of x is:

a. $65°$ b. $75°$ c. $30°$ d. $35°$

6. In an isosceles triangle, if the vertical angle is thrice the sum of the base angles, then the measure of the vertical angle of the triangle will be:

a. $135°$ b. $120°$ c. $140°$ d. $22.5°$

7. In quadrilateral ABCD, $\angle A + \angle C$ is 2 times $\angle B + \angle D$. If $\angle A = 140°$ and $\angle D = 60°$, then $\angle B$ will be:

a. $60°$ b. $90°$ c. $120°$ d. $110°$

8. ABCD is a trapezium in which AB || CD. M and N are midpoints of AD and BC respectively. If AB = 12 cm, MN = 14 cm, then CD is equal to:

a. 10 b. 12 c. 14 d. 16

9. If AB, BC and CD are equal chords of a circle with O as the centre of the circle, AD is the diameter, then $\angle AOB =$

a. $60°$ b. $90°$ c. $120°$ d. $140°$

10. The three steps from solids to points are:

a. solids – surfaces – lines – points
b. solids – lines – surfaces – points
c. lines – points – surfaces – solids
d. lines – surfaces – points – solids

11. Twice the range of the given data: 4.5, 6.3, 7.5, 13.5, 2.5, 8.3 is:

a. 11 b. 22 c. 23 d. 11.5

12. The area of an equilateral triangle having side length equal to $\frac{\sqrt{3}}{4}$ cm is:

a. $\frac{2}{27}\ cm^2$ b. $\frac{2}{15}\ cm^2$ c. $\frac{3\sqrt{3}}{64}\ cm^2$ d. $\frac{3}{14}\ cm^2$

13. Which of the following is an irrational number?

a. 16.411411411411
b. 16.0141414141
c. 16.01414114114111441 14…

d. $16.14\overline{412}$

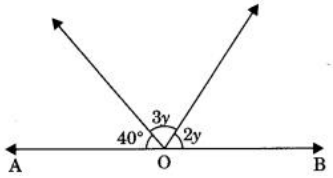
14. The graph of linear equation $x + 2y = 2$, cuts the $y - axis$ is:

a. $(2, 0)$ b. $(0, 2)$ c. $(0, 1)$ d. $(1, 1)$

15. The radius of a hemispherical balloon increases from 6 cm to 12 cm as air is being pumped into it. The ratio of the surface areas of the balloon in the two cases is:

a. 1 : 4 b. 1 : 3 c. 2 : 3 d. 2 : 1

16. In the given figure, find the value of y.

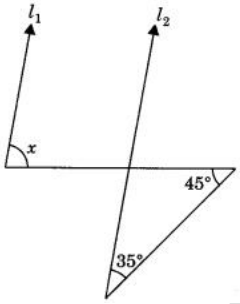


a. 28° b. 40° c. 140° d. 56°

17. Equal sides of an isosceles right triangle are 20 cm each. The area of the triangle is:

a. 225 cm^2 b. 200 cm^2 c. 100 cm^2 d. 450 cm^2

18. In the given figure, $l_1 \parallel l_2$, the value of x is:



a. 80° b. 100° c. 110° d. 70°

Directions: In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).
Choose the correct option.

a. Both assertion (A) and reason (R) are true, and reason (R) is the correct explanation of assertion (A).
b. Both assertion (A) and reason (R) are true, and reason (R) is not the correct explanation of 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 perpendicular distance of the point $A(3, 4)$ from the $y - axis$ is 4.

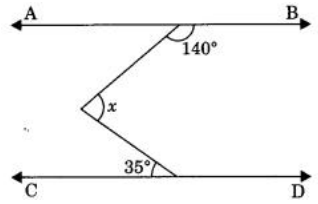
Reason (R): The perpendicular distance of a point from $y-axis$ is called its $x-$coordinate.

20. Assertion (A): The graph of the linear equation $2x-y=1$ passes through the point $(2,3)$.
Reason (R): Every point lying on the graph is not a solution of $2x-y=1$.

Section – B

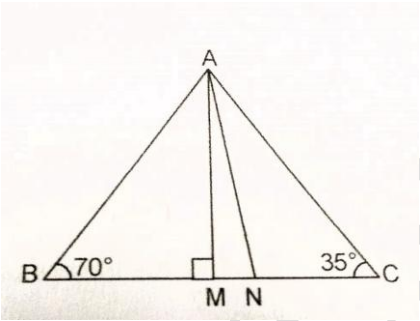
Section B consists of 5 questions of 2 marks each.

21. In the given figure, AB || CD. The value of x is:



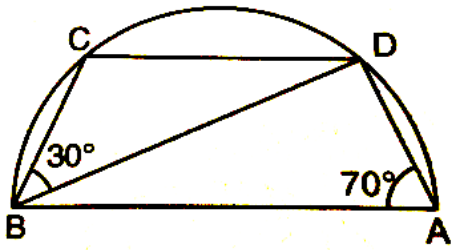
OR

In the given figure, AM ⊥ BC and AN is the bisector of $\angle BAC$. If $\angle B=70°$ and $\angle C=35°$, find the measure of $\angle MAN$.

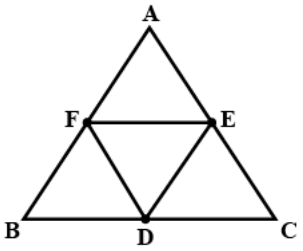


22. The surface area of a sphere of radius 5 cm is five times the area of the curved surface of a cone of radius 4 cm. Find the height of the cone.

23. In the given figure, C and D are points on the semicircle described on BA as diameter. Given $\angle BAD=70°$ and $\angle BDC=30°$. Calculate the measure of $\angle ABD$ and $\angle BDC$.

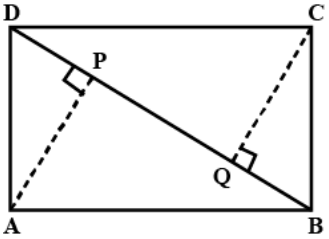


24. In the given figure, D, E and F are the midpoints of the sides BC, CA and AB of an equilateral ΔABC. Prove that ΔDEF is also an equilateral triangle.

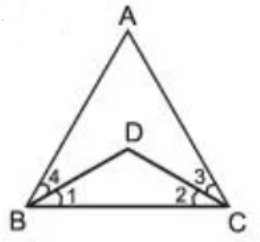


OR

ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on diagonal BD. Prove that AP = CQ.



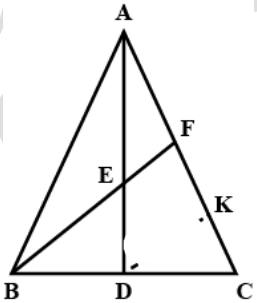
25. In the given figure, $\angle ABC = \angle ACB$ and $\angle 3 = \angle 4$. Prove that $\angle 1 = \angle 2$.



Section – C

Section C consists of 6 questions of 3 marks each.

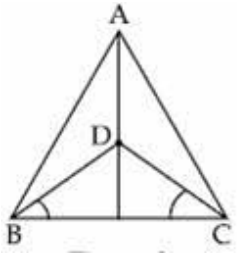
26. In ΔABC, AD is the median through A and E is the midpoint of AD. BE produced meets AC in F. Prove that AF = $\frac{1}{3}$ AC.



27. ΔABC is isosceles with AB = AC. Side BA is produced to point D such that AB = AD. Prove that $\angle BCD$ is a right triangle.

OR

In the given figure, AB = AC. D is the point in the interior of ΔABC such that $\angle DBC = \angle DCB$. Prove that AD bisects $\angle BAC$ of ΔABC.



28. Simplify: $\left(\frac{x^a}{x^{-b}}\right)^{a-b} . \left(\frac{x^b}{x^{-c}}\right)^{b-c} . \left(\frac{x^c}{x^{-a}}\right)^{c-a}$

OR

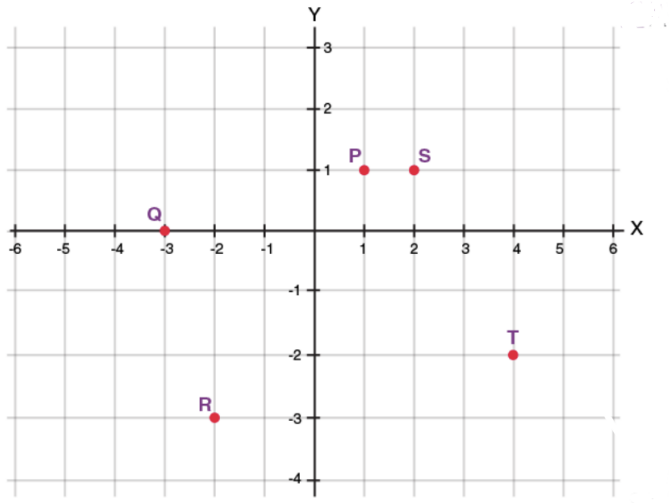
If $x = 9 - 4\sqrt{5}$, find the value of $x + \frac{14}{x}$.

29. (i) Write the coordinates of a point whose perpendicular distance from $x - axis$ is 5 units, the perpendicular distance from $y - axis$ is 3 units and it lies in II quadrant.

(ii) From the figure, find the following:

a. 3 (ordinate of S) – abscissa of Q

b. coordinates of image of point R about $y - axis$



30. Find the value of a and b, if the line $6ax + by = 24$ passes through $(2, 0)$ and $(1, 2)$. Find the point passing through this line, lying on the $y - axis$.

31. Find the value of k, if $(2x - 1)$ is a factor of $p(x) = 2x^3 - kx^2 + 2$.

Section – D

Section D consists of 4 questions of 5 marks each.

32. When a polynomial $p(x) = x^4 - 2x^3 + 3x^2 - ax + b$ is divided by $(x - 1)$ and $(x + 1)$, the remainders are 5 and 19 respectively. Find the remainder when $p(x)$ is divided by $(x - 2)$.

OR

If $(x - 3)$ and $\left(x - \frac{1}{3}\right)$ are both factors of $ax^2 + 5x + b$, show that $a = b$.

33. If $a = \frac{\sqrt{7}-\sqrt{6}}{\sqrt{7}+\sqrt{6}}$ and $b = \frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}-\sqrt{6}}$, find the value of $a^2 + b^2 + ab$.

34. Prove that the cyclic quadrilateral formed by the bisectors of a cyclic quadrilateral is also cyclic.

OR

Prove that the angle subtended by an arc at the centre is double the angle subtended by it at the remaining part of the circle.

35. Sarika distributed chocolates on Children's Day. She gave 5 chocolates to each child and 20 chocolates to adults. If the number of children is represented by x and the total distributed chocolates as y, form a linear equation in two variables to represent this statement and draw its graph.

Section – E

Section E consists of 3 case study based questions of 4 marks each.

36. 100 surnames were randomly picked up from a local telephone directory and a frequency distribution of the number of letters in the English alphabet in the surnames was found as follows:

Number of letters	Number of surnames
1 – 4	6
4 – 6	30
6 – 8	44
8 – 12	16
12 – 20	4

(i) What is the difference between the maximum and minimum class size?

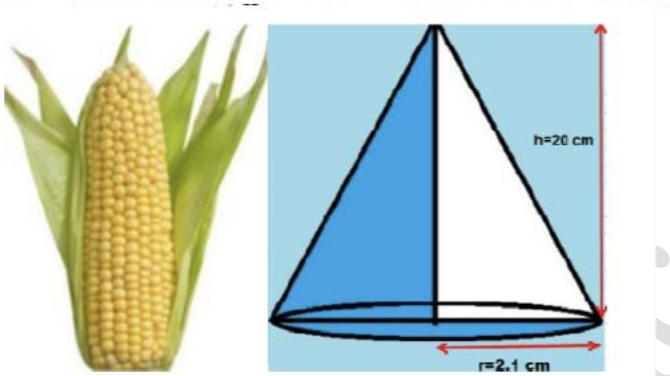
(ii) How many surnames have more than or equal to 4 letters but less than 8 letters?

(iii) What is the adjusted frequency for the class interval having the maximum class size?

OR

What is the difference in the class marks of the last two class intervals?

37. Once upon a time in Ghaziabad was a corn cob seller. During lockdown period in the year 2020, his business was almost lost. So, he started selling corn online through Amazon and Flipkart. Just to understand how many grains he will have from one corn cob, he assumed that one corn cob shaped somewhat like a cone, has the radius of its broadest end is 2.1 cm and length as 20 cm.



(i) What is the slant height of the corn cob?

(ii) What is the volume of the corn cob?

(iii) If each 1 cm^2 of the surface of the cob carries an average of four grains, find how many (approximately) you would find on the entire cob?

OR

How many cobs can be stored in the carton having a capacity of $0.05544\ m^3$.

38. A craft mela is organised by the Welfare Association to promote the art and culture for tribal people. Fairs and festivals are the custodians of our great cultural heritage. The pandal is to be decorated by using triangular flags around the field. Each flag has dimensions 25 cm, 25 cm and 22 cm.

(i) What is the semi – perimeter of the flag?

(ii) What is the area of the flag? $\left(Use\ \sqrt{14} = 3.74\right)$

(iii) If the rate of the cloth is ₹ 200 per m^2, find the total cost of 300 flags.

OR

Find the altitude of the triangular flag to the shortest side.