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PAPER 5
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 product of any two irrational numbers is:

a. always an irrational number
b. always a rational number
c. always an integer
d. sometimes rational, sometimes irrational

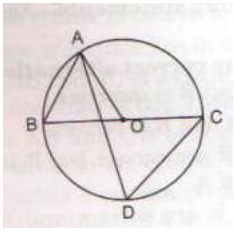
2. The perimeter of a triangle is 60 cm. If its sides are in the ratio 1 : 3 : 2, then its smallest side is:

a. 15 cm b. 5 cm c. 10 cm d. none of these

3. If $(2, 0)$ is a solution of the linear equation $2x + 3y = k$, then the value of k is:

a. -4 b. 6 c. 5 d. 4

4. In the given figure, BC is a diameter of the circle and $\angle BAO = 60°$. The degree measure of $\angle ADC$ is:



a. $30°$ b. $45°$ c. $60°$ d. $120°$

5. The base diameter of a cone is 10.5 cm, and its slant height is 10 cm. The area of the curved surface is:

a. 150 sq. cm b. 165 sq. cm c. 177 sq. cm d. 180 sq. cm

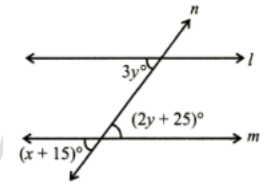
6. If $x + 2$ is a factor of $x^3 - 2ax^2 + 16$, then the value of a is:

a. -7 b. 1 c. -1 d. 7

7. If the ratio of the radius of two spheres is 1 : 4, then the ratio of their volumes will be:

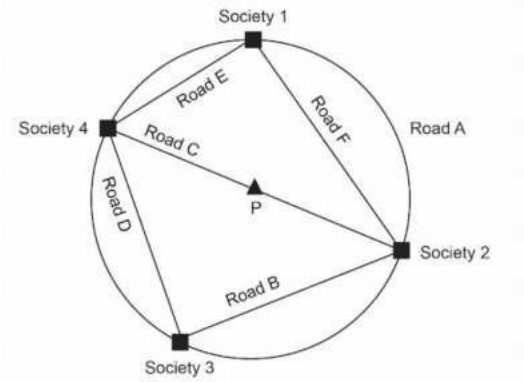
a. 1 : 5 b. 5 : 4 c. 5 : 16 d. 1 : 64

8. In the given figure, if $l \parallel m$, then the value of x is:



a. $60°$ b. $50°$ c. $45°$ d. $30°$

9. Given below is a map giving the position of four housing societies and roads connecting them in a township.



What would be the measure of the sum of angles formed by the straight roads at Society 1 and Society 3?

a. 60° b. 90° c. 180° d. 360°

10. The edges of a triangular board are 6 cm, 8 cm and 10 cm. The cost of painting it at the rate of 9 paise per cm^2 is:

a. ₹ 2.16 b. ₹ 2.00 c. ₹ 2.48 d. ₹ 3.00

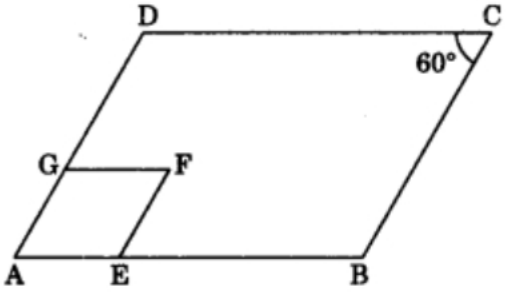
11. Which of these needs a proof?

a. theorem b. axiom c. definition d. postulate

12. For two triangles, if two angles and the included side of one triangle are equal to two angles and the third side of another triangle, then the congruence rule is:

a. SSS b. ASA c. SAS d. none of the above

13. In the following figure ABCD and AEFG are two parallelograms. If $\angle C = 60°$, then $\angle AEF$ is:



a. 90° b. 80° c. 120° d. 60°

14. $\left(\sqrt{a}+\sqrt{b}\right)\left(\sqrt{a}-\sqrt{b}\right)$ is:

a. $a-b$ b. $2b$ c. $2a$ d. $2\sqrt{a}$

15. An ice – cream cone has a radius of base 4 cm and height 15 cm. An ice – cream seller keeps $\left(\frac{1}{4}\right)^{th}$ of it empty. What is the volume (in cm^3) of the empty part of the cone?

a. 12π b. 15π c. 19π d. 20π

16. If a linear equation has solutions $(-2, 2), (0, 0)$ and $(2, -2)$, then it is of the form:

a. $y - x = 0$
b. $x + y = 0$
c. $-2x + y = 0$
d. $x + 2y = 0$

17. Which one of the following is not the graphical representation of statistical data?

a. bar graph
b. histogram
c. frequency polygon
d. tally marks

18. The sides of a triangular flower bed are 5 m, 8 m and 11 m. The area of the flower bed will be:

a. $4\sqrt{21}\, m^2$ b. $5\sqrt{21}\, m^2$ c. $\sqrt{21}\, m^2$ d. $\sqrt{11}\, m^2$

Directions:

19. Assertion (A): Parallel lines are those which never intersect each other.
Reason (R): Parallel lines can be two or more lines.

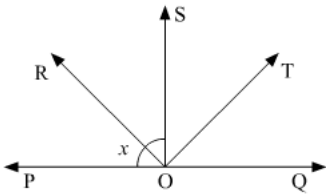
20. Assertion (A): Degree of a non – zero polynomial is zero.
Reason (R): Polynomial having two terms is called a binomial.

Section – B

Section B consists of 5 questions of 2 marks each.

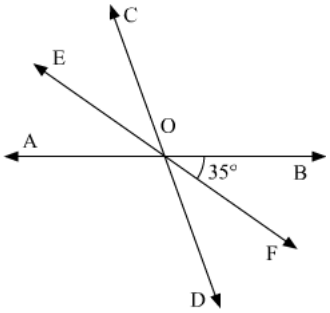
21. The angles of a quadrilateral are in the ratio 3 : 5 : 9 : 13. Find all the angles of the quadrilateral.

22. In the given figure, ray OS stands on a line POQ. Ray OR and ray OT are angle bisectors of $\angle POS$ and $\angle SOQ$ respectively. If $\angle POS = x$, find the value of $\angle ROT$.



OR

AB, CD and EF are three concurrent lines passing through the point O such that OF bisects $\angle BOD$. If $\angle BOF = 35°$, find $\angle BOC$ and $\angle AOD$.



23. If a point C lies between two points A and B such that AC = BC, then prove that $AC = \frac{1}{2} AB$. Explain by drawing the figure.

OR

Write Euclid's fifth postulate.

24. Prove that equal chords of a circle subtend equal angles at the centre.

25. The following is the monthly expenditure (in ₹) of ten families of a particular area.

14,5 115, 129, 135, 139, 158, 170, 175, 188, 163

Make a frequency distribution table by using the following class interval:
100 – 120, 120 – 140, 140 – 160, 160 – 180, 180 – 200.

Section – C

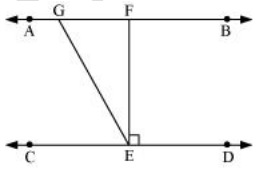
Section C consists of 6 questions of 3 marks each.

26. Rationalise the denominator of $\frac{1}{9+\sqrt{5}+\sqrt{6}}$.

27. It is given that $\angle XYZ = 64°$ and XY is a produced to point P. Draw a figure from the given information. If ray YQ bisects $\angle ZYP$, find the value of $\angle XYQ$ and reflex $\angle QYP$.

OR

In the given figure, if AB || CD, EF ⊥ CD and $\angle GED = 126°$, find the value of $\angle AGE, \angle GEF$ and $\angle FGE$.



28. The sides of a triangular plot are in the ratio of 3 : 5 : 7 and its perimeter is 300 m. Find its area.

29. A random survey of the number of children of various age groups playing in a park was found as follows:

Age (in years)	Number of children
1 – 2	5
2 – 3	3
3 – 5	6
5 – 7	12
7 – 10	9
10 – 15	10
15 – 17	4

Draw a histogram to represent the above data.

30. Write three solutions for the equation $2x + y = 7$.

31. Simplify: $(x + y + z)^2 - (x - y - z)^2$.

OR

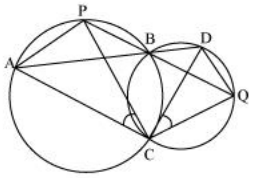
If $x^2 + y^2 = 49$ and $x - y = 3$, then find the value of $x^3 - y^3$.

Section – D

Section D consists of 4 questions of 5 marks each.

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

33. Two circles intersect at two points B and C. Through B, two line segments ABD and PBQ are drawn to intersect the circles at A, D and P, Q respectively. Prove that $\angle ACP = \angle QCD$.



OR

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

34. Rahul distributed chocolates on his birthday. He gave 5 chocolates to each child and 20 chocolates to adults. If the number of chocolates is represented by x and the total distributed chocolates as y:

(i) Express the given situation in the form of a linear equation in two variables.

(ii) If he distributed 145 chocolates in all, find the number of children.

OR

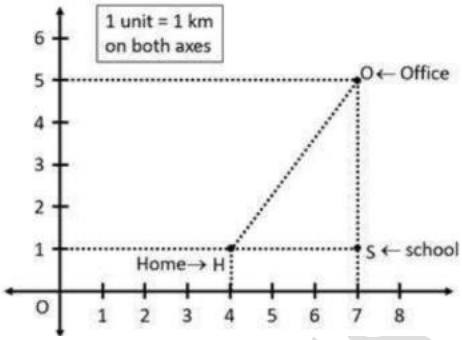
Write $3y = 8x$ in the form of $ax + by + c = 0$. Also find the values of a, b and c. Write two solutions of this equation. How many solutions does this equation have?

35. Campaigning regarding girl's education was organised by students of class IX. Students made $(x - 5)$ rows and $(3x - 4)$ columns for the rally. Write the total number of students in the form of a polynomial.

Section – E

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

36. Natasha has to reach her office every day at 9:00 a.m. On the way to her office, she drops her son at school. The location of Natasha's house, her son's school and her office are represented by the amp below. Using the details given, answer the following questions:



(i) Find the coordinates of Natasha's house.

(ii) Name the figure formed by joining the coordinates of Natasha's house, her son's school and her office.

(iii) Which distance is shorter: Natasha's house and her son's school or her son's school and her office?

OR

If Natasha has changed her office to a new location that is exactly mid – way of the school and her home, then what are the coordinates of her new office location.

37. The Great Stupa at Sanchi is one of the oldest stone structures in India, and an important monument of Indian Architecture. It was originally commissioned by the emperor Ashoka in the 3rd century B.C. Its nucleus was a simple hemispherical brick structure built over the relics of the Buddha. It is a perfect example of combination of solid figures. A big hemispherical dome with a cubical structure mounted on it.

Based on the information above, answer the following questions:

(i) What is the area of the circle of the base of the hemispherical brick structure having radius 14 m?

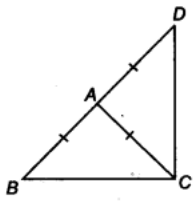
(ii) If the radius of the hemisphere is doubled, then what is the ratio of the surface areas in these two cases.

(iii) Calculate the volume of the hemispherical dome, if the height of the dome is 21 m.

OR

Find the area of the cloth required to cover the hemispherical dome if the radius of its base is 14 m.

38. There is a garden in a government building in the form of a triangle represented by ΔABC in the figure which is an isosceles triangle in which AB = AC. The side BA is produced to D such that AD = AB as shown in the figure.



Based on the given information, answer the following questions:

(i) In ΔADC, which two angles are equal?

(ii) If the two sides are equal in a triangle, then what can you say about the opposite angles to these sides.

(iii) Find the measure of $\angle BCD$.

OR

Which is the complementary pair of angles in the given figure?