

Annual Examination, 2020-2021
Mathematics

Grade: 9

Time allowed: 3 hours

Date: 14.02.2021

Maximum Marks: 80

General Instructions.

(i) This question paper contains two parts A and B.

(ii) Both Part A and Part B have internal choices.

Part – A:

(i) It consists two sections – I and II

(ii) Section 1 has 16 questions of 1 mark each. Internal choice is provided in 5 questions.

(iii) Section II has 4 questions on case study. Each case study has 5 case - based sub – parts. Attempt any 4 out of 5 sub – parts.

Part – B:

(i) Question Number 21 to 26 are Very Short Answer Type questions of 2 mark each.

(ii) Question No 27 to 33 are Short Answer Type questions of 3 marks each.

(iii) Question Number 34 to 36 are Long Answer Type questions of 5 marks each.

(iv) Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

Part A

Section – I

Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.

1. Express 3.777.....in $\frac{p}{q}$ form. 1
2. Simplify $\left[\left(625^{\frac{-1}{2}} \right)^{\frac{-1}{4}} \right]^2$ 1
3. Find the value of k , if $x - 2$ is a factor of $4x^3 + 3x^2 - 4x + k$. 1
4. Evaluate using suitable identity: $116 \times 116 - 106 \times 106$ 1
5. If the point (2,2) is a solution of the equation $2x + 3k = y$, then find the value of k . 1

6. At what point the graph of the linear equation $-x + y = -10$ cuts the y-axis. 1
7. If the coordinates of the two points are $P(-5,3)$ and $Q(8,-9)$, then find (ordinate of Q)–(abscissa of P). 1

OR

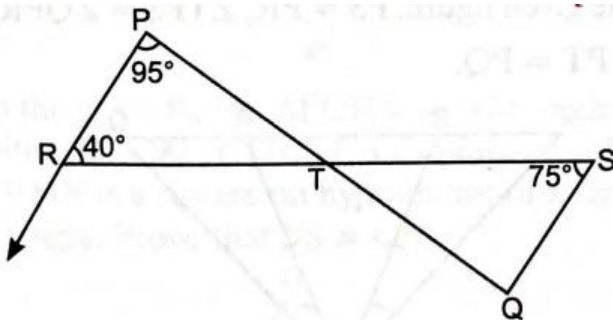
In which quadrant, the points $(-4,2)$ and $(2,-5)$ lies?

8. In $\triangle ABC$ and $\triangle DEF$, $AB = DF$ and $\angle A = \angle D$. Write the third condition for which two triangles are congruent by SAS congruence rule. 1

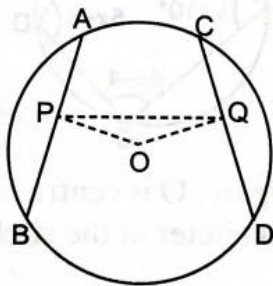
OR

It is given that $\triangle ABC \cong \triangle FDE$ and $AB = 6$ cm, $\angle B = 80^\circ$ and $\angle A = 40^\circ$. Find the length of side DF and $\angle E$ of $\triangle FDE$.

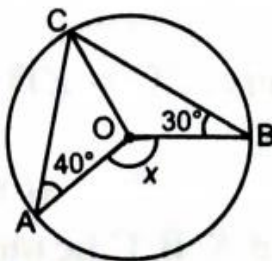
9. In the given figure, line segments PQ and RS intersect each other at a point T such that $\angle PRT = 40^\circ$, $\angle RPT = 95^\circ$ and $\angle TSQ = 75^\circ$. Find $\angle SQT$. 1



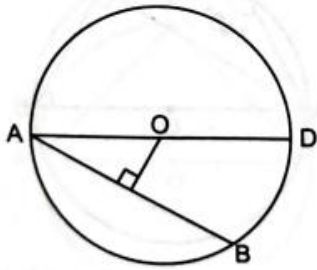
10. In the given figure, $\angle POQ = 150^\circ$ and AB, CD are equal chords, OP perpendicular to AB and OQ perpendicular to CD. Then find $\angle BPQ$. 1



11. In the given figure, O is the centre of the circle. Find the value of x. 1



- 12 AD is a diameter of a circle and AB is a chord. If AD = 34 cm and AB = 30 cm, find the distance of AB from the centre of the circle. 1



- 13 Find the cost of leveling the ground in the form of a triangle having sides 51 m, 37 m, 20 m at the rate of ₹3 per m^2 . 1

OR

Find the area of an equilateral triangle whose perimeter is 60 m.

- 14 The radius of a spherical balloon increases from 6 cm to 12 cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases. 1

OR

A cone is 8.4 cm high and the radius of its base is 2.1 cm. It is melted and recast into a sphere. Find the diameter of the sphere.

- 15 The volume of a cylinder is $448\pi \text{ cm}^3$ and height 7 cm. Find its total surface area. 1
(Write the answer in π)

- 16 Find the range of the data: 1
25, 18, 20, 22, 16, 6, 17, 15, 12, 30, 32, 10, 19, 8, 11, 20

OR

Find the mean of prime numbers between 20 and 30.

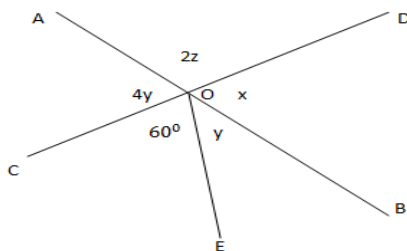
Section – II

Case study questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark.

17. **Case Study Based – 1**

Lines and angles

Maths teacher draws a straight line AB on the blackboard as per the following figure.



Now the teacher told Raju to draw another line CD as in the figure.

The teacher told Ajay to mark $\angle AOD$ as $2z$.

Suraj was told to mark $\angle AOC$ as $4y$.

Clive marked $\angle COE$ as 60° .

Peter marked $\angle BOE$ and $\angle BOD$ as y and x respectively.

- i) What is the value of x ? 1
a) 48° b) 96° c) 100° d) 120°
- ii) What is the value of y ? 1
a) 48° b) 96° c) 100° d) 24°
- iii). What is the value of z ? 1
a) 48° b) 96° c) 42° d) 120°
- iv) What should be the value of $x+2z$? 1
a) 148° b) 360° c) 180° d) 120°
- v) What is the relation between y and z ? 1
a) $2y + z = 90^\circ$ b) $2y + z = 180^\circ$ c) $4y + z = 120^\circ$ d) $y = 2z$

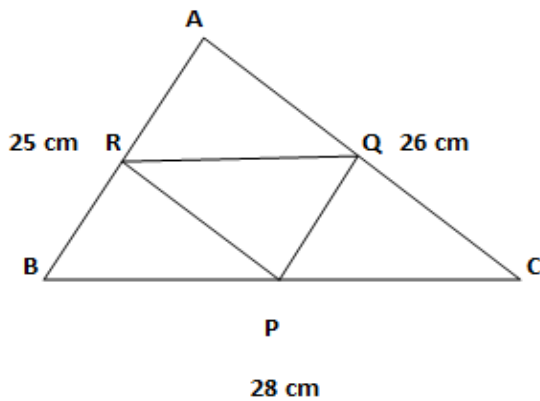
18. Case Study Based – 2

Applications of Geometry in real life - Decorations

There is a Diwali celebration in the DPS school Janakpuri New Delhi. Girls are asked to prepare Rangoli in a triangular shape. They made a rangoli in the shape of $\triangle ABC$.

Dimensions of $\triangle ABC$ are 26 cm, 28 cm, 25 cm.



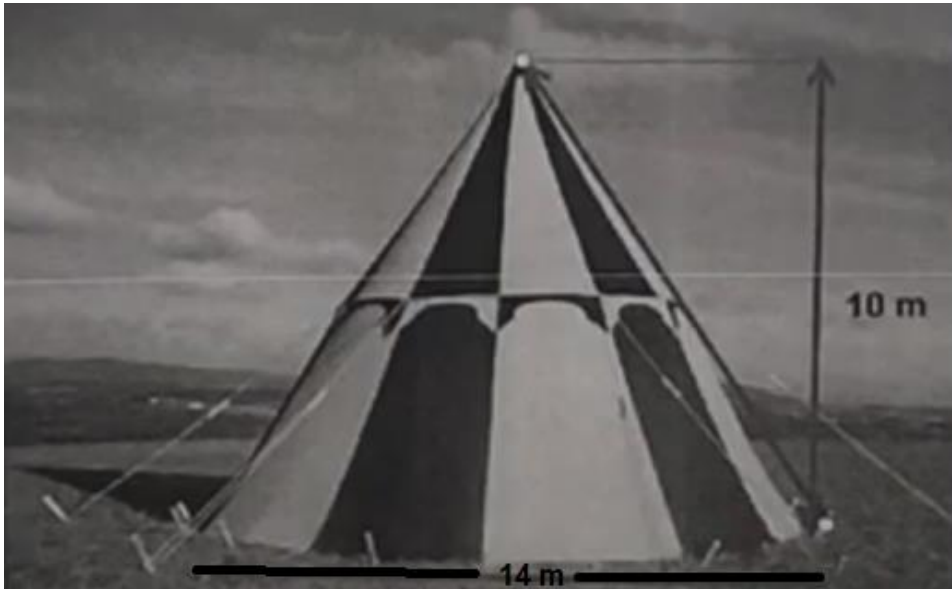


- i) In the figure, R is the midpoint of AB and $RQ \parallel BC$, then AQ is equal to 1
 a) BC b) RB c) QC d) AD
- ii) In the figure, R and Q are the midpoints of AB and AC respectively. The length of RQ is: 1
 a) 14 cm b) 13 cm c) 12.5 cm d) 13.5 cm
- iii) If garland is to be placed along the side of ΔPQR , which is formed by joining midpoints of sides of ΔABC , what is the length of garland? 1
 a) 79 cm b) 39.5 cm c) 35 cm d) 79.5 cm
- iv) R, P and Q are the midpoints of respective sides AB, BC and AC of ΔABC . The figure so obtained BPQR will be: 1
 a) Parallelogram b) Trapezium c) Quadrilateral d) None of these
- v) R, P and Q are the midpoints of respective sides AB, BC and AC of ΔABC . Which of the following is the area of ΔPQR ? 1
 a) $\frac{1}{2} \text{ area}(\Delta ABC)$ b) $\frac{1}{3} \text{ area}(\Delta ABC)$ c) $\frac{1}{4} \text{ area}(\Delta ABC)$ d) $\frac{1}{6} \text{ area}(\Delta ABC)$

19. **Case Study Based – 3**

Applications of Mensuration in real life – Camping

Once four friends Rahul, Arun, Ajay and Vijay went for a picnic at a hill station. Due to peak season, they did not get a proper hotel in the city. The weather was fine so they decided to make a conical tent at a park. They were carrying 300 m^2 cloth with them. As shown in the figure they made the tent with height 10 m and diameter 14 m. The remaining cloth was used for the floor.

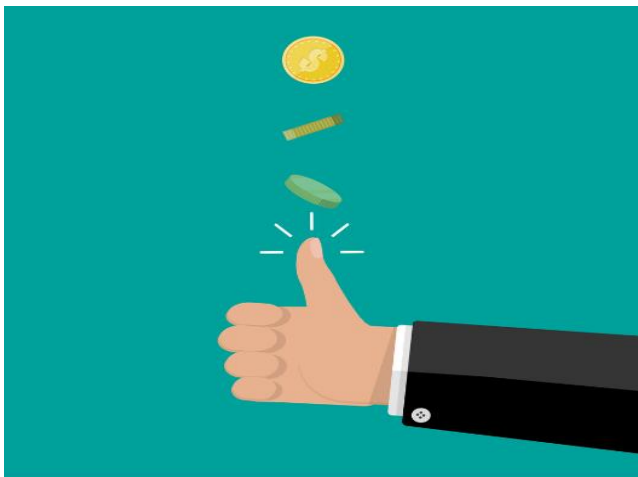


- i) What was the slant height of the tent? 1
 - a) 12 m
 - b) 12.2 m
 - c) 15 m
 - d) 17 m
- ii) How much cloth was used for the floor? 1
 - a) 31.6 m²
 - b) 16 m²
 - c) 10 m²
 - d) 20 m²
- iii) What was the volume of the tent? 1
 - a) 300 m³
 - b) 160 m³
 - c) 513.3 m³
 - d) 500 m³
- iv) What was the area of the floor? 1
 - a) 50 m²
 - b) 100 m²
 - c) 150 m²
 - d) 154 m²
- v) What was the total surface area of the tent? 1
 - a) 400 m²
 - b) 422.4 m²
 - c) 300 m²
 - d) 400 m²

20. **Case Study Based – 4**

Applications of Probability in real life – Gaming

Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes given in the table. Read the data given in the table carefully.



Outcome	3 tails	2 tails	1 tail	no tails
Frequency	20	68	82	30

If these coins are simultaneously tossed again, compute the probability of

- | | | | | |
|------------------------------|---------|---------|---------|---|
| i) Getting less than 3 tails | | | | 1 |
| a) 0.9 | b) 0.1 | c) 0.01 | d) 0.02 | |
| ii) Exactly 2 heads | | | | 1 |
| a) 0.68 | b) 0.41 | c) 0.34 | d) 0.5 | |
| iii) Exactly one head | | | | 1 |
| a) 0.68 | b) 0.86 | c) 0.34 | d) 0.11 | |
| iv) At least one tail | | | | 1 |
| a) 0.58 | b) 0 | c) 1 | d) 0.85 | |
| v) All heads | | | | 1 |
| a) 0.51 | b) 0.55 | c) 0.9 | d) 0.15 | |

Part - B

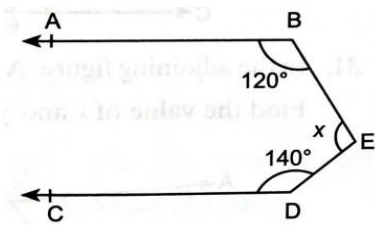
All questions are compulsory. In case of internal choice, attempt any one.

21. Represent $\sqrt{3}$ on the number line. 2
22. A part of monthly expenses of a family on milk is fixed which is ₹500 and remaining varies with the quantity of milk taken extra at the rate of ₹20 per litre. Taking the quantity of milk required extra as x litres and total expenditure on milk as ₹ y , write a linear equation for this information. If the total expenditure on milk is ₹740, find the quantity of milk taken extra? 2

OR

If x years represents the present age of the father and y years represents the present age of the son, then express the statement “ present age of father is 4 more than 7 times age of the son “ as a linear equation. If the present age of father is 67 years, find the present age of the son?

23. In the given figure, $AB \parallel CD$. Find the value of x . 2



24. Show that the bisectors of angles of a parallelogram form a rectangle. 2

OR

Show that the line segments joining the mid-points of the opposite sides of a quadrilateral bisect each other.

25. The sides of triangle are in the ratio 25 : 17 : 12 and its perimeter is 540 m. Find the area of the triangle. 2
26. The expenditure of a family on different heads in a month is given below: 2

Heads	Expenditure (in ₹)
Food	4000
Education	2500
Clothing	1000
House rent	3500
Others	2500
Savings	1500

Draw a bar graph to represent the above data.

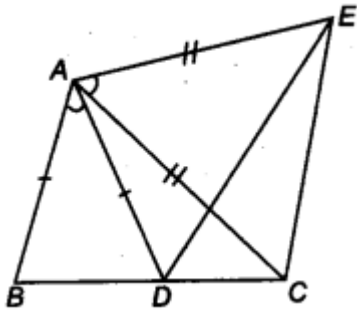
27. If $x = 3 + 2\sqrt{2}$, find the value of $x^2 + \frac{1}{x^2}$ 3
28. Divide $3y^4 - 8y^3 - y^2 - 5y - 5$ by $y - 3$ and find the quotient and remainder. 3

OR

If $a + b + c = 9$ and $ab + bc + ca = 26$, then find $a^2 + b^2 + c^2$.

29. Determine the point which satisfy the linear equation $2x + 5y = 19$, whose ordinate is $1\frac{1}{2}$ times its abscissa. 3
30. Plot the points $P(5,5)$, $Q(-3,-3)$ and $R(5,-3)$ on the Cartesian plane. Name the figure obtained by joining the points P, Q and R. Also find the area of the figure so obtained. 3

31. In figure $AC = AE$, $AB = AD$ and $\angle BAD = \angle EAC$. Show that $BC = DE$. 3



32. Construct a triangle ABC in which $BC = 5$ cm, $\angle B = 75^\circ$ and $AB + AC = 9$ cm. 3

OR

Construct a triangle ABC in which $BC = 4.5$ cm, $\angle B = 45^\circ$ and $AB - AC = 2.5$ cm.

33. Below are the marks obtained by 30 students of a class in Mathematics test out of 100. 3
Make a frequency distribution table for this data with class interval of size 10 and draw a histogram to represent the data.

55, 61, 46, 100, 75, 90, 77, 60, 48, 58, 64, 59, 60, 78, 55, 88, 60, 37, 58, 84, 62, 44, 52, 50, 56, 98, 67, 70, 39, 68.

34. Let p and q be the remainders, when the polynomials $x^3 + 2x^2 - 5ax - 7$ 5
and $x^3 + ax^2 - 12x + 6$ are divided by $x + 1$ and $x - 2$ respectively. If $2p + q = 6$, find the value of a .
35. Prove that the angle subtended by an arc at the centre of a circle is double the angle 5
subtended by it at any point on the remaining part of the circle.

OR

Prove that an isosceles trapezium is always cyclic and its diagonals are equal.

36. A rectangular water reservoir is 10.8 m by 3.75 m at the base. Water flows into it at the 5
rate of 18 m/s through a pipe having the cross section 7.5 cm by 4.5 cm. Find the height to which the water will rise in the reservoir in 30 minutes.