


STUDY
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Sample Paper
(2018-19)

Date : 04-02-19
Duration : 3 Hrs.
Max. Marks : 80

Mathematics
(Set-1)

Class

IX

Instructions:

- ▶ All questions are compulsory.
- ▶ The question paper consists of 30 questions divided into four sections A, B, C, and D.
- ▶ Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.
- ▶ There is no overall choice. However, an internal choice has been provided in 2 questions of 1 mark each, 2 questions of 2 marks each, 4 questions of 3 marks each and 3 questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
- ▶ Use of calculators is not permitted.

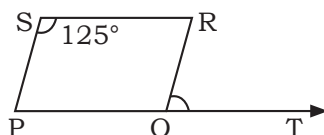
Section - A

1. Find the total surface area of a hemisphere of radius 7 cm.
2. ABCD is a parallelogram having an area of 60cm^2 . P is any point on CD. Find the area of triangle APB.
3. Simplify : $(3 + \sqrt{3}) - (1 - 2\sqrt{3})$.
4. Is (2, 0) a solution of $x = 2y + 4$?

OR

The graph of the linear equation $2x - y = 4$ cuts x -axis at ?

5. PQRS is a parallelogram in which $\angle PSR = 125^\circ$. What is the measure of $\angle RQT$?



6. Find the class size, if the class marks of a frequency distribution are 6, 10, 14, 18, 22, 26 and 30.

OR

What is the class mark of the class interval 45 – 52?

Section - B

7. Find the area of a triangle when two sides are 24 cm and 10 cm and the perimeter of triangle is 62 cm.
8. If mean of seven observations 28, 32, x , $x + 2$, $x + 5$, 43, 45 is 38, find x .

OR

The following observations are arranged in ascending order; 26, 29, 42, 53, x , $x + 2$, 70, 75, 82, 93. If median is 65, find the value of x .

9. A bag contains cards numbered from 1 to 28. A card is drawn at random from the bag. Find the probability that the card bears a number
(a) Which is a multiple of 6 (b) Which is greater than or equal to 27

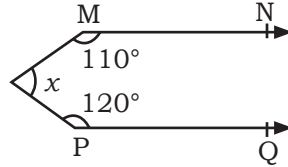
10. Show that diagonals of a rhombus are perpendicular to each other.

OR

In a parallelogram, if diagonals are equal, show that it is a rectangle.

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

12. In the given figure, $PQ \parallel MN$, find the measure of x .



Section - C

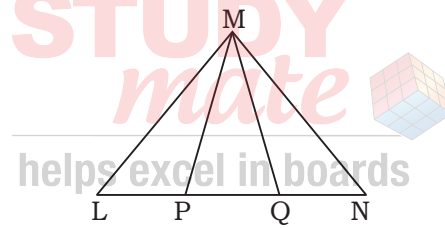
13. Express $0.12\bar{3}$ in the form $\frac{p}{q}$, $q \neq 0$, p and q are integers.

OR

If $5^{x-3} \cdot 3^{2x-8} = 225$, find the value of x .

14. Factorise : $16x^2 + 4y^2 + 9z^2 - 16xy - 12yz + 24xz$.

15. In the figure, it is given that $LM = MN$ and $LP = QN$. Prove that $\triangle LMQ \cong \triangle NMP$.



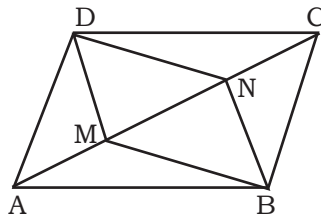
OR

Prove that sum of any two sides of a triangle is greater than twice the median on the third side.

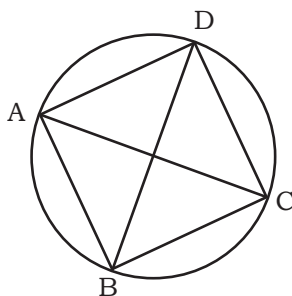
16. Show that line segments joining the mid points of opposite sides of a quadrilateral bisect each other.

OR

Points M and N are taken on diagonal AC of a parallelogram ABCD such that $AM = CN$. Prove that BMDN is a parallelogram.



17. In the given figure, ABCD is a cyclic quadrilateral in which AC and BD are the diagonals, if $\angle DBC = 55^\circ$ and $\angle BAC = 45^\circ$, find $\angle BCD$.



18. The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 revolutions to move once over to level a playground. Find the area of playground in m^2 . $\left[\pi = \frac{22}{7}\right]$.

OR

A room is 22 m long, 15 m wide and 6 m high. Find the area of its four walls and cost of painting it at the rate of ₹12 per m^2 .

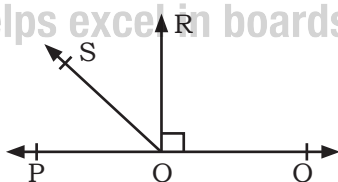
19. If mean of the following data is 20.2, find the missing frequency p :

x	10	15	20	25	30
f	6	8	p	10	6

20. Find the coordinates of the point:

- which lies on x and y axes both.
- whose ordinate is -4 and which lies on y -axis.
- whose abscissa is 5 and which lies on x -axis.

21. If figure, POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that : $\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$.



22. A die is rolled 120 times and the outcomes are recorded as follows :

Outcomes	1	even no. < 6	odd no. > 1	6
Frequency	25	40	35	20

Find the probability of getting

- An even number
- One
- An odd number greater than 1

Section - D

23. Solve the equation $2x + 1 = x - 3$ and represent the solution(s) on
- The number line.
 - The Cartesian plane.

OR

Draw the graphs of two lines whose equations are $x + y - 6 = 0$ and $x - y - 2 = 0$ on the same graph paper. Also, find the coordinates of the point of intersection of the lines.

24. If $x = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$ and $y = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$, then find the value of $x^2 + y^2$.

25. The polynomials $ax^3 + 3x^2 - 3$ and $2x^3 - 5x + a$ when divided by $(x - 4)$ leave the remainders R_1 and R_2 respectively. Find a , if $R_1 + R_2 = 0$.
26. D, E and F are respectively the mid-points of the sides BC, CA and AB of $\triangle ABC$. Show that $ar(\triangle DEF) = \frac{1}{4}ar(\triangle ABC)$.
27. If two circles intersect at two points, prove that their centres lie on the perpendicular bisector of common chord.

OR

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

28. Construct a triangle ABC, in which $\angle B = 60^\circ$, $\angle C = 45^\circ$ and $AB + BC + CA = 11$ cm.
29. Draw the histogram and frequency polygon for the following data :

Cost of living index	Number of months
440 – 460	2
460 – 480	4
480 – 500	3
500 – 520	5
520 – 540	3
540 – 560	2
560 – 580	1
580 – 600	4
Total	24

30. Twenty seven solid iron spheres, each of radius ' r ' and surface area ' S ' are melted to form a sphere with surface area S' and radius r' . Find the
- (i) Radius r' of the new sphere (ii) Ratio of S and S' .

OR

At a fair, a stall keeper in one of the food stalls has a large cylinder of radius 15 cm filled upto a height of 32 cm with orange juice. The juice is filled in small cylindrical glasses of radius 3 cm upto a height of 8 cm and sold for ₹ 3 each. How much money does the stall keeper receive by selling the juice completely?



Hints/Solutions to Sample Paper (2018-19)

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1. TSA of a hemisphere = $3\pi r^2$
= $3 \times \frac{22}{7} \times 7 \times 7 = 462 \text{ cm}^2$.

2. $\text{ar}(\triangle APB) = 30 \text{ cm}^2$

3. $3\sqrt{3} + 2$.

4. $x = 2y + 4$, if $y = 0$ then $x = 4$
 $\therefore (2, 0)$ is not a solution of the given equation.

OR

$(2, 0)$ is the required point.

5. $\angle RQT = 55^\circ$

6. Class size = 4

OR

Class mark = $\frac{45 + 52}{2} = \frac{97}{2} = 48.5$

7. $a = 24 \text{ cm}$, $b = 10 \text{ cm}$, $c = 28 \text{ cm}$

Semiperimeter(s) = 31 cm

\therefore Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$
= $\sqrt{31 \times 7 \times 21 \times 3}$
= $21\sqrt{31} \text{ cm}^2$

8. Mean = $\frac{\text{sum of observations}}{\text{No. of observations}}$

$38 = \frac{3x + 155}{7}$

$3x + 155 = 266$

$3x = 111$

$\therefore x = 37$

OR

Median = $\frac{\left(\frac{n}{2}\right)^{\text{th}} + \left(\frac{n}{2} + 1\right)^{\text{th}}}{2}$

$65 = \frac{5^{\text{th}} + 6^{\text{th}}}{2}$ [$\because n = 10$]

$65 = \frac{2x + 2}{2} \Rightarrow 65 = x + 1$

$\therefore x = 64$

9. (a) $\frac{4}{28} = \frac{1}{7}$

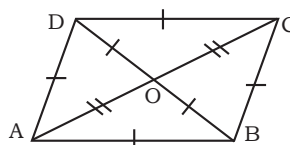
(b) $\frac{2}{28} = \frac{1}{14}$

10. Rhombus is also a parallelogram

$\therefore AO = CO$

Now, in $\triangle AOB$ and $\triangle COB$

$AO = CO$



BO = BO (common)

AB = CB (sides of rhombus)

∴ $\triangle AOB \cong \triangle COB$ (By SSS)

$\angle AOB = \angle COB$ (cpct)

... (i)

Also, $\angle AOB + \angle COB = 180^\circ$ (Linear pair)

$\Rightarrow 2\angle AOB = 180^\circ$ [From (i)]

$\Rightarrow \angle AOB = 90^\circ$

Hence, $AC \perp BD$.

OR

Refer to NCERT, Ex. 8.1, Q. 2

11. Refer to NCERT, Ex. 5.1, Q. 4

12. Draw $EF \parallel MN$

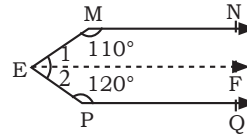
Also, $PQ \parallel MN$ (given)

∴ $EF \parallel PQ$

$\angle 1 + \angle 110^\circ = 180^\circ \Rightarrow \angle 1 = 70^\circ$

$\angle 2 + \angle 120^\circ = 180^\circ \Rightarrow \angle 2 = 60^\circ$

∴ $x = \angle 1 + \angle 2 = 70^\circ + 60^\circ = 130^\circ$



13. Let $x = 0.12\bar{3}$

$\Rightarrow 100x = 12.\bar{3}$

$\Rightarrow 1000x = 123.\bar{3}$

$\Rightarrow 1000x - 100x = 123.\bar{3} - 12.\bar{3}$

$900x = 111$

$x = \frac{111}{900} = \frac{37}{300}$

∴ $0.12\bar{3} = \frac{37}{300}$

OR

$5^{x-3} \cdot 3^{2x-8} = 225$

$5^{x-3} \cdot 3^{2x-8} \cdot 5^2 \cdot 3^2$

$\Rightarrow x - 3 = 2$ and $2x - 8 = 2$ [Comparing powers of equal bases]

∴ $x = 5$

14. $(4x)^2 + (-2y)^2 + (3z)^2 + 2(4x)(-2y) + 2(-2y)(3z) + 2(3z)(4x)$
 $= (4x - 2y + 3z)^2$ [$\because a^2 + b^2 + c^2 + 2ab + 2bc + 2ca = (a + b + c)^2$]

$= (4x - 2y + 3z)(4x - 2y + 3z)$

15. $LM = NM$ (given)

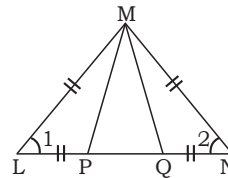
$\Rightarrow \angle 1 = \angle 2$ (isosceles \triangle theorem)

$LP = QN$ (given)

$\Rightarrow LQ = NP$ [$LP + PQ = NQ + PQ$]

So, by SAS congruency,

$\triangle LMQ \cong \triangle NMP$



OR

Produce median AD to point E such that $AD = DE$

In $\triangle ADB$ and $\triangle EDC$

$BD = CD$ (AD is median on BC)

$AD = ED$ (By construction)

$\angle ADB = \angle EDC$ (vertically opp. angles)

∴ $\triangle ADB \cong \triangle EDC$ (by SAS)

$\Rightarrow AB = EC$ (CPCT)

... (i)

Now, in $\triangle ACE$

$AC + EC > AE$

$AC + AB > 2AD$ [$\because AB = EC$ as in equation (i) and $AD = ED$]

16. Refer to NCERT, Ex. 8.2, Q. 6.

OR

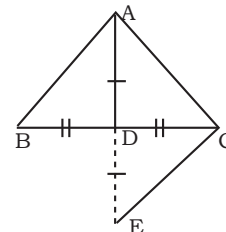
Refer to NCERT, Ex. 8.1, Q. 9

17. $\angle DAC = \angle DBC$ (Angles in same segment)

∴ $\angle DAC = 55^\circ$

$\angle BAD = \angle DAC + \angle BAC = 55^\circ + 45^\circ = 100^\circ$

Now, $\angle BAD + \angle BCD = 180^\circ$ [ABCD is cyclic]



∴ $\angle BCD = 80^\circ$

18. Radius (r) = 42 cm = $\frac{42}{100}$ m = $\frac{21}{50}$ m
 Length (h) = 120 cm = $\frac{120}{100}$ m = $\frac{6}{5}$ m
 ∴ Area of playground = No. of revolutions \times CSA of roller
 = $500 \times 2\pi rh$
 = $500 \times 2 \times \frac{22}{7} \times \frac{21}{50} \times \frac{6}{5}$ m² = 1584 m²

OR

Area of four walls = $2(l + b) \times h = 2(22 + 15) \times 6 = 444$ m²
 Cost of painting = Area of four walls \times rate = $444 \times 12 = ₹5328$

19.

x	10	15	20	25	30	Mean = 20.2
f	6	8	p	10	6	$\Sigma f = 30 + p$
fx	60	120	20p	250	180	$\Sigma fx = 610 + 20p$

Now, Mean = $\frac{\Sigma fx}{\Sigma f}$

$\Rightarrow 20.2 = \frac{610 + 20p}{30 + p} \Rightarrow 606 + 20.2p = 610 + 20p \Rightarrow 0.2p = 4$

$\Rightarrow p = \frac{4}{0.2} \therefore p = 20$

20. (a) (0, 0) (b) (0, -4) (c) (5, 0)

21. $\angle POR = \angle QOR$ (each 90°)

$\Rightarrow \angle POS + \angle ROS = \angle QOR$

$\Rightarrow \angle POS + \angle ROS + \angle ROS = \angle QOR + \angle ROS$ [Add $\angle ROS$ both sides]

$\Rightarrow \angle POS + 2\angle ROS = \angle QOS$

$\therefore \angle ROS = \frac{1}{2}(\angle QOS - \angle POS)$

22. (i) $\frac{40 + 20}{120} = \frac{60}{120} = \frac{1}{2}$ (ii) $\frac{25}{120} = \frac{5}{24}$

(iii) $\frac{35}{120} = \frac{7}{24}$

23. Refer to NCERT, Chapter 4, Example No. 9

OR

$x + y - 6 = 0$

x	0	6	4
y	6	0	2

$x - y - 2 = 0$

x	3	2	0
y	1	0	-2

Coordinates of point of intersection is (4, 2).

24. $x = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}} = \frac{(\sqrt{3})^2 + (\sqrt{2})^2 + 2(\sqrt{3})(\sqrt{2})}{(\sqrt{3})^2 - (\sqrt{2})^2} = 5 + 2\sqrt{6}$

$y = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}} \times \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} - \sqrt{2}} = \frac{(\sqrt{3})^2 + (\sqrt{2})^2 - 2(\sqrt{3})(\sqrt{2})}{(\sqrt{3})^2 - (\sqrt{2})^2} = 5 - 2\sqrt{6}$

$\therefore x^2 + y^2 = (5 + 2\sqrt{6})^2 + (5 - 2\sqrt{6})^2$
 = $(25 + 24 + 20\sqrt{6}) + (25 + 24 - 20\sqrt{6}) = 98$

25. $R_1 = a(4)^3 + 3(4)^2 - 3 = 64a + 45$

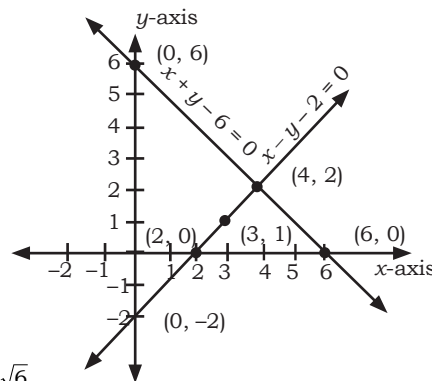
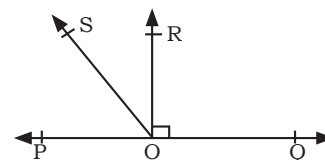
$R_2 = 2(4)^3 - 5(4) + a = 108 + a$

Now, $R_1 + R_2 = 0$ [Given]

$\therefore 64a + 45 + 108 + a = 0$

$\Rightarrow 65a + 153 = 0$

$\therefore a = -\frac{153}{65}$



26. Refer to NCERT, Ex, 9.3, Q. 5

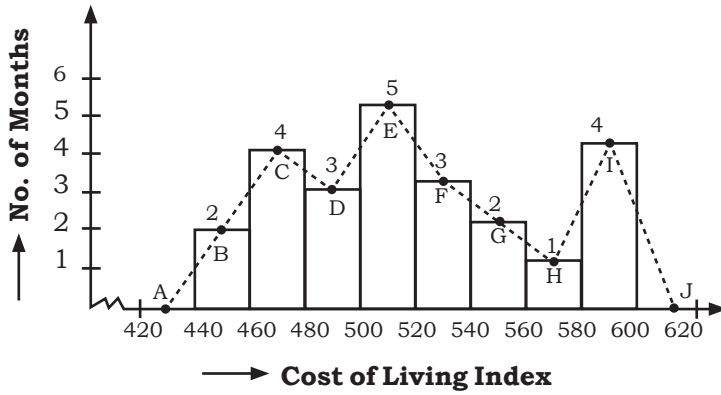
27. Refer to NCERT, Ex. 10.3, Q. 3

OR

Refer to NCERT, Chapter 10 Theorem 10.8

28. Refer to NCERT, Page No.195 Example No. 1

29.



30. Refer to NCERT, Ex. 13.8, Q. 9

OR

$$\text{Volume of orange juice} = \pi r^2 h = \pi(15)^2 \times 32 \text{ cm}^3$$

$$\text{Volume of orange juice in one glass} = \pi(3)^2 \times 8 \text{ cm}^3$$

$$\therefore \text{No of glasses filled with orange juice} = \frac{\pi(15)^2 \times 32 \text{ cm}^3}{\pi(3)^2 \times 8 \text{ cm}^3}$$

$$= 100 \text{ glasses}$$

$$\text{Cost of orange juice} = \text{No. of glasses filled with juice} \times \text{Rate}$$

$$= 100 \times 3$$

$$= ₹ 300$$

\therefore Stall keeper receives ₹300 by selling the juice completely.

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