Gurukul
The School

SAMPLE PAPER-1
HALF YEARLY, 2018-19

MATHEMATICS

Time Allowed: 3hrs **CLASS – IX** **Maximum Marks : 80**

General Instructions :

1. *The question paper comprises of **thirty questions divided into four Sections- A, B, C and D**.*
2. ***Section A** comprises of **six questions Q1 to Q6** of **one mark** each.*
3. ***Section B** comprises of **six questions Q7 to Q12** of **two marks** each.*
4. ***Section C** comprises of **ten questions Q13 to Q22** of **three marks** each.*
5. ***Section D** comprises of **eight questions Q23 to Q30** of **four marks** each.*
6. ***All** questions are **compulsory.***
7. *Use of **calculators** is **not permitted**.*

SECTION – A

1 Find two rational numbers between $\sqrt{47}$ and $\sqrt{65}$. **1**

2 Find the remainder when $y^{101}+101$ is divided by $y+1$. **1**

3 Find the image of the point lying on y – axis at a distance of 4 units from x-axis when x-axis is taken as a plane mirror. **1**

4 Write any one equation of a line passing through a point lying on x-axis and whose abscissa is 5. **1**

5 An angle is $\frac{4}{5}$ times its complement. Find the angle. **1**

6 In a cricket match, Bumrah bowled 60 balls and took 3 wickets. Find the probability that he did not take a wicket. **1**

SECTION – B

7 Simplify : $\left[\left\{(625)^{\frac{-1}{2}}\right\}^{\frac{-1}{4}}\right]^2$. **2**

8 Without actually calculating the cubes, find the value of: $\left(\frac{-1}{2}\right)^3+\left(\frac{-1}{3}\right)^3+\left(\frac{5}{6}\right)^3$. **2**

9 If $x = 2a+1$ and $y = a-1$ is a solution of the equation $x + 2y - 6 = 0$, find the value of a. **2**

10 A point C lies between two points A and B such that AC = CB. Using Euclid's axiom prove that $AC = \frac{1}{2} AB$. **2**

11 Name the type of triangle if its angles are in the ratio 1:3:2. **2**

12 ΔABC is an isosceles triangle with AB = AC, if AD bisects $\angle BAC$, prove that $AD \perp BC$. **2**

SECTION – C

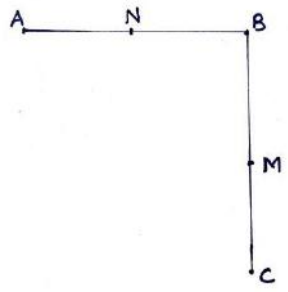
13 If $\sqrt{2} = 1.14$ *and* $\sqrt{3} = 1.73$, then evaluate $\sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}} + \sqrt{\frac{2-\sqrt{3}}{2+\sqrt{3}}}$ **3**

14 If $x^3 + ax^2 + bx + 6$ has $(x-2)$ as a factor and leaves a remainder 3 when divided by $(x-3)$, find the values of a *and* b. **3**

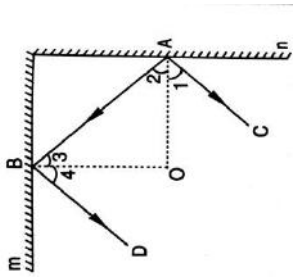
15 Plot the points $(-2, -2)$ and $(3, -2)$ on the Cartesian plane. Also find the images of these points taking X-axis a plane mirror and hence find the area of the polygon formed by joining these points and their images. **3**

16 Draw the graph of the linear equation 2x + 3y = 12. At what point, the graph of the equation cuts the x – axis and y – axis? **3**

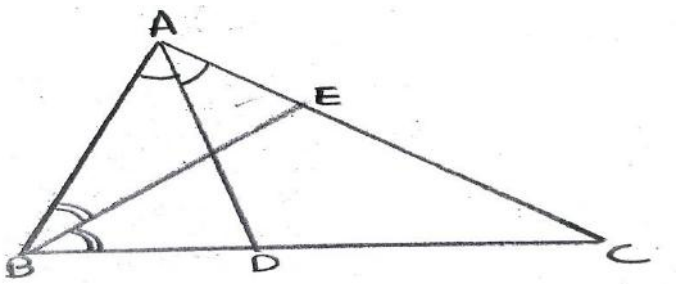
17 In the given figure AB = BC, N is the mid-point of AB and M is the mid-point of BC. Using Euclid's axiom show that AN = MC. **3**



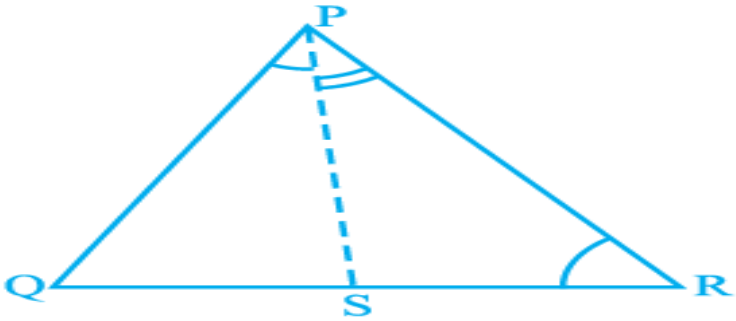
18 In fig., m and n are two plane mirrors perpendicular to each other. Show that the incident ray CA is parallel to the reflected ray BD. **3**



19 In fig., ABC is a triangle in which $\angle B = 2\angle C$. D is a point on side BC such that AD bisects $\angle BAC$ and AB = CD. BE is the bisector of $\angle B$. Find the measure of $\angle BAC$. **3**



20 In fig., PR > PQ and PS bisects $\angle$QPR. Prove that $\angle$PSR > $\angle$PSQ. **3**



21 Construct a Δ ABC with AB = 6 cm, BC – AC = 2 cm and $\angle BAC = 60^0$. Justify the construction. **3**

22 If the mean of the following data is 20, find the value of ***P***. **3**

x_i	10	15	20	25	30
f_i	***P* +4**	16	*40*	20	12

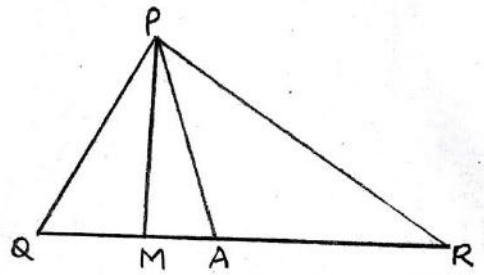
SECTION – D

23 If $x = \dfrac{2-\sqrt{3}}{2+\sqrt{3}}$ *and* $y = \dfrac{2+\sqrt{3}}{2-\sqrt{3}}$ then find the value of $x^2 + y^2$. **4**

24 Using factor theorem factorise: $x^3 + 2x^2 - x - 2$. **4**

25 A part of monthly expenses of a family on milk is fixed is Rs.500 and the remaining varies with the quantity of milk taken extra at the rate of Rs.20 per litre. Taking the quantity of milk required as ***x litres*** and total expenditure on milk is Rs. ***y*** **,** write a linear equation for this information and draw its graph. **4**

26 In figure $\angle Q > \angle R$, PA is the bisector of $\angle QPR$ and PM $\perp$ QR. Prove that $\angle APM = \frac{1}{2}(\angle Q - \angle R)$. **4**



27 State and prove ASA congruence rule. **4**

28 Construct a ΔABC with perimeter 10 cm and base angles of measure 45^0 and 60^0. Justify your construction. **4**

29 Draw a histogram to represent the following distribution: **4**

C.I.	10 – 15	15– 20	20 – 30	30 – 50	50 – 80
Frequency	6	10	10	8	18

30 A recent survey found that the ages of workers in a factory is distributed as follows: **4**

Age (in years)	20 – 29	30 – 39	40 – 49	50 – 59	60 and above
No. of workers	38	27	86	46	3

If a person is selected at random, find the probability that the person is :

a) 40 years or more
b) under 40 years
c) less than 60 years
d) under 60 but over 39

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MARKING SCHEME - SAMPLE PAPER-1
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MATHEMATICS
CLASS - IX

	SECTION – A	
1	$\sqrt{49} = 7$, $\sqrt{64} = 8$	**1**
2	$f(-1) = (-1)^{101} + 101 = -1 + 101 = 100$	**1**
3	$(0 , -4)$	**1**
4	Any point lying on x-axis will have its ordinate = 0 So, point = (5, 0) Equation: x + y = 5	**1**
5	Let angle = x Its complement = $(90^0 - x)$ $x = \frac{4}{5}(90 - x)$ So, $x = 40^0$	**1**
6	$\frac{57}{60} = \frac{19}{20}$	**1**
	SECTION – B	
7	5	**2**
8	As $\left(\frac{-1}{2}\right) + \left(\frac{-1}{3}\right) + \left(\frac{5}{6}\right) = \frac{-3-2+5}{6} = \frac{0}{6} = 0$ *So.* $\left(\frac{-1}{2}\right)^3 + \left(\frac{-1}{3}\right)^3 + \left(\frac{5}{6}\right)^3 = 3\left(\frac{-1}{2}\right)\left(\frac{-1}{3}\right)\left(\frac{5}{6}\right) = \frac{5}{12}$	**2**
9	Putting $x = 2a + 1$ and $y = a - 1$ in $x + 2y - 6 = 0$, we get $(2a + 1) + 2(a - 1) = 6$ $a = \frac{5}{4}$	**2**

10	$AB = AC + CB$ (*things which coincides with one another are equal to one another.*) $AB = AC + AC$ ($as\ AC = CB$) $AC = \frac{1}{2} AB.$	**2**
11	Angles are 30^0, 90^0 and 60^0 Hence, the triangle is a right angle triangle.	**2**
12	*First prove that*: $\Delta ABD \cong \Delta ACD$ $\therefore \angle ADB = \angle ADC$ (*cpct*) Prove that *but*, $\angle ADB + \angle ADC = 180^0$ $\therefore \angle ADB = \angle ADC = 90^0$ *Hence*, $AD \perp BC$.	**2**
	SECTION – C	
13	$\sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}} = \sqrt{\frac{(\sqrt{2}-1).(\sqrt{2}-1)}{(\sqrt{2}+1).(\sqrt{2}-1)}} = \sqrt{\frac{(\sqrt{2}-1)^2}{2-1}} = (\sqrt{2}-1) = 1.14-1 = 0.14$ *Similarly*, $\sqrt{\frac{2-\sqrt{3}}{2+\sqrt{3}}} = 2-\sqrt{3} = 2-1.73 = 0.27$ $\therefore \sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}} + \sqrt{\frac{2-\sqrt{3}}{2+\sqrt{3}}} = 0.14 + 0.27 = 0.41$	**3**
14	$f(x) = x^3 + ax^2 + bx + 6$ $f(2) = 0$ $8 + 4a + 2b + 6 = 0$ $2a + b = -7$ $f(3) = 3$ $27 + 9a + 3a + 6 = 3$ $3a + b = -10$ *Solving, we get* $a = -3$ *and* $b = -1$	**3**
15	Image of $(-2, -2) = (-2, 2)$; Image of (3, 2) The figure formed will be a rectangle, whose length = 5 units and breadth = 4 units So, area = ½ ×5×4=10 square units.	**3**

16 At x – axis: (6, 0) and at y – axis :(0, 4) **3**

17
$AB = BC$

$\frac{1}{2}AB = \frac{1}{2}BC$

$AN = MC$ $(\because N \text{ and } M \text{ are the midpoints of } AB \text{ and } BC \text{ respectively})$ **3**

18
$\angle 1 = \angle 2$

$\angle 3 = \angle 4$

$\angle AOB = 90^0$

$\therefore In \Delta AOB,$

$\angle 2 + \angle 3 = 90^0$

$\Rightarrow 2(\angle 2 + \angle 3) = 180^0$

$\Rightarrow \angle CAB + \angle DBA = 180^0$

$Hence, CA \text{ is parallel to } BD.$ **3**

19 72^0 **3**

20
In ΔPQR,

$PR > PQ$

$\therefore \angle Q > \angle R$

$\Rightarrow \angle Q + \angle QPS > \angle R + \angle QPS$

$\Rightarrow \angle Q + \angle QPS > \angle R + \angle RPS$ $(\angle QPS = \angle RPS, \text{ as PS bisects } \angle QPR)$

$\Rightarrow \angle PSR > \angle PSQ$ **3**

21 Construction

Steps of constructions **3**

22

x_i	10	15	20	25	30	Total
f_i	***P + 4***	16	*40*	20	12	92+P
$x_i f_i$	10P + 40	240	*800*	500	360	1940+10P

$Now, Mean = \frac{\sum x_i f_i}{\sum f_i}$

$\Rightarrow 20 = \frac{1940 + 10P}{92 + P}$

$\Rightarrow P = 10$ **3**

	SECTION – D	
23	*On rationalising* $x = 7 - 4\sqrt{3}$ *and* $y = 7 + 4\sqrt{3}$ $\therefore x^2 + y^2 = 194$	**4**
24	$f(x) = x^3 + 2x^2 - x - 2.$ $f(1) = (1)^3 + 2(1)^2 - 1 - 2 = 0$ $\therefore f(x-1)$ *is a factor of* $f(x)$ On dividing *f(x) by (x –1)* we get: $x^2 + 3x + 2$ *as the quotient* *Now,* $x^2 + 3x + 2 = (x+1)(x+2)$ *So,* $f(x) = (x-1)(x+1)(x+2)$	**4**
25	$20x + 500 = y$	**4**
26	Let us consider $\angle QPA = \angle RPA = x$ and $\angle APM = y$ So, $\angle QPM = x - y$ $\angle RPM = x + y$ $\angle Q = 90^0 - x + y$ And $\angle R = 90^0 - x - y$ $\therefore \frac{1}{2}(\angle Q - \angle R) = \frac{1}{2}[(90 - x + y) - (90 - x - x)]$ $= \frac{1}{2}[90 - x + y - 90 + x + y]$ $= \frac{1}{2}[2y] = y$	**4**
27	Statement and proof as given in the NCERT textbook. All three cases to be shown.	**4**
28	Construction	**4**

29

C.I.	Frequency	Class Size	Proportion of length of rectangle w.r.t. least class size-5
10 – 15	6	5	6
15– 20	10	5	10
20 – 30	10	10	2
30 – 50	8	20	2
50 – 80	18	30	3

Histogram to be drawn.

4

30

Total workers = 200

a) $\frac{86+46+3}{200} = \frac{135}{200} = \frac{27}{40}$

b) $\frac{38+27}{200} = \frac{65}{200} = \frac{13}{40}$

c) $\frac{200-3}{200} = \frac{197}{200}$

d) $\frac{86+46}{200} = \frac{132}{200} = \frac{33}{50}$

4

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