Gurukul The School

SAMPLE PAPER 2
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 the product of $\sqrt[3]{2}.\sqrt[4]{2}.\sqrt[12]{32}$. **1**

2 Evaluate: $\frac{(2.3)^3-0.027}{(2.3)^2+0.69+0.09}$ **1**

3 Find the distance of the point $(5,-12)$ from the origin. **1**

4 Find the coordinates of that points where the line $3x+5y=15$ intersects x-axis and y-axis. **1**

5 If complement of an angle is equal to $\frac{2}{5}$ times its supplement. Find the angle. **1**

6 A coin was tossed 20 times and outcomes were noted. If the experimental probability of getting heads is $\frac{3}{5}$, then how many times tails came up? **1**

SECTION – B

7 Solve:$5^{x-3}.3^{2x-8}=225$. **2**

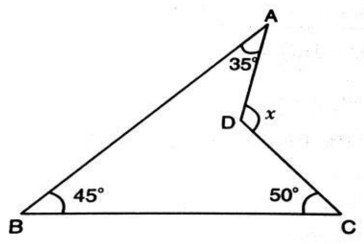
8 If $a^2+\frac{1}{a^2}$=102, find the value of $a-\frac{1}{a}$. **2**

9 If the point A (3, 0) and B (1, 2) lie on the graph of the line $px+qy-9=0$,then find the value of p^2-$pq+q^2$. **2**

2

10 Prove that an equilateral triangle can be constructed on any given line segment.

11 Find the value of x: **2**



12 Prove that the angles opposite to the equal sides of an isosceles triangle are equal. **2**

SECTION – C

13 Evaluate : $\left(\frac{81}{16}\right)^{\frac{-3}{4}} \times \left[\left(\frac{25}{9}\right)^{\frac{-3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right]$ **3**

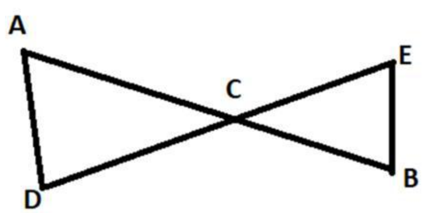
3

14 If $a+b+c=0$ then, find the value of $\frac{(b+c)^2}{bc}+\frac{(c+a)^2}{ca}+\frac{(a+b)^2}{ab}$.

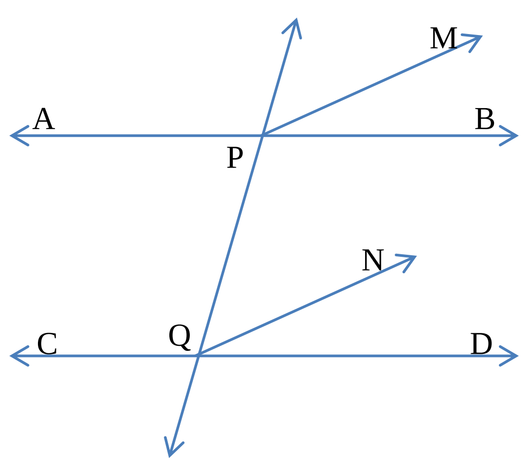
15 Plot the points A (0, 4), and B (-3, 0) on the Cartesian plane. Find the IMAGE of Point A taking x-axis as mirror and image of point B taking y-axis as mirror. Find the area of the figure formed by joining these points. **3**

16 Draw the graph of the linear equation $3x+4y=7$ and $3x-2y=1$ and find the point of intersection of the lines representing the equations. **3**

17 In fig., if AC=DC and CB = CE then show that AB=DE. **3**



18 In the given figure, PM and QN are the bisectors and PM∥QN. Prove that AB ∥ CD. **3**



19 BE and CF are two equal altitudes of a triangle ABC. Prove that the triangle ABC is isosceles. **3**

20 Prove that the sum of the lengths of the medians of a triangle is less than the perimeter of the triangle. **3**

21 Construct an isosceles triangle whose base is 7.4cm and the vertical angles twice each of the base angle. **3**

22 If the mean of the following data is 8.05, find the value of k. **3**

x_i	4	6	8	10	12
f_i	4	$2k+2$	14	11	k

SECTION – D

23 Express $\frac{1}{1+\sqrt{2}-\sqrt{3}}$ with rational denominator. **4**

24 The polynomials $x^3+2x^2-5ax-8$ and $x^3+ax^2-12x-6$ when divided by $(x-2)$ and $(x-3)$ leave the remainder ***p and q*** respectively. If ***q – p = 10***, find the value of ***a.*** **4**

25 A guest house has a fixed charge for the first two days and an additional charge for each day thereafter. Mr. Sharma paid ₹1600 for a room for eight days. If fixed charges are ₹ x and per day charge be ₹ y. Write the linear equation representing the above equation. Draw the graph from linear equation. **4**

26 If two parallel lines are intersected by a transversal, prove that bisectors of the interior angle on same side of transversal intersect each other at right angles. **4**

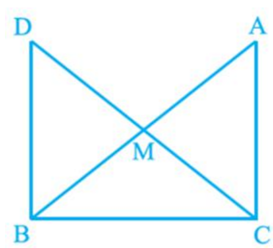
27 In given fig, △ABC is right-angled triangle with ∠C=90°, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B. Show that: **4**

(i) △AMC ≅ △BMD

(ii) ∠DBC is a right angle.

(iii) △ DBC ≅ △ ACB

(iv) CM= $\frac{1}{2}$ AB



28 Construct a △XYZ in which ∠Y = 30°, ∠Z = 90° and XY + YZ + ZX = 11 cm. **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 die is rolled 200 times and its outcomes are recorded as below: **4**

Outcome	1	2	3	4	5	6
Frequency	25	35	40	28	42	30

Find the probability of getting:

(a) an even prime

(b) a multiple of 3

(c) number greater than 6

(d) an odd number

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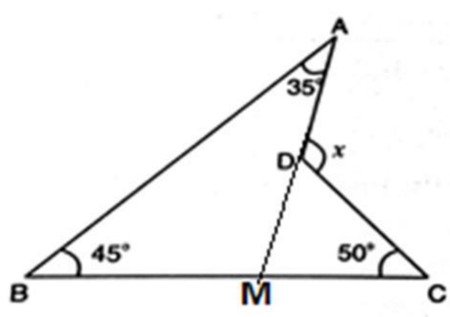
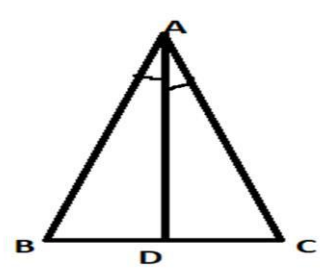
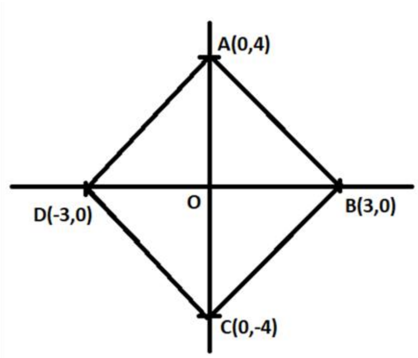
MARKING SCHEME- SAMPLE PAPER-2
HALF YEARLY EXAMINATION- 2018-19

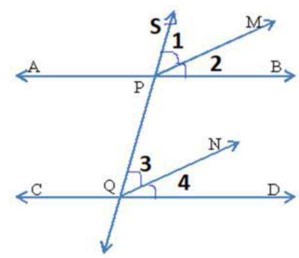
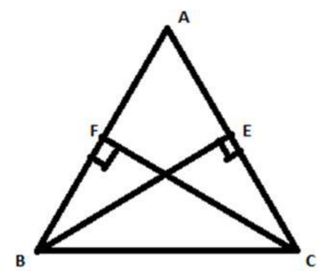
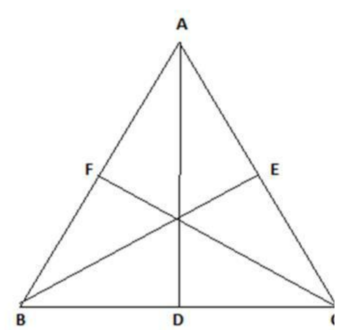
MATHEMATICS

CLASS – IX

	SECTION – A	
1	$= \sqrt[12]{2^4}.\sqrt[12]{2^3}.\sqrt[12]{32^1}$ $=\sqrt[12]{2^{4+3+5}}$ $= 2$	**1**
2	$\frac{(2.3)^3-(0.3)^3}{(2.3)^2+2.3\times 0.3+(0.3)^2}$ $=\frac{(2.3-0.3)[(2.3)^2+2.3\times0.3+(0.3)^2]}{(2.3)^2+2.3\times0.3+(0.3)^2}$ =2	**1**
3	$= \sqrt{5^2+12^2}$ $=\sqrt{25+144}$ =13	**1**
4	When x=0, $5y = 15 - 0$ $y = \frac{15}{5}$ Coordinates of point are (0,3) When $y = 0$, $3x = 15 - 0$ $x = \frac{15}{3}$ Coordinates of point are (5,0)	**1**
5	$(90 - x) = \frac{2}{5}(180 - x)$ $450 - 5x = 360 - 2x$ $3x = 90$ $x = 30°$	**1**
6	No. of times tails came up = $(20 - 20 \times \frac{3}{5})$ $= 20 - 12$ =8	**1**

	SECTION – B	
7	$5^{x-3}.3^{2x-8} = 5^2.3^2$ Comparing exponents, $\Rightarrow x - 3 = 2 \; and \; 2x - 8 = 2$ $\Rightarrow x = 5$	**2**
8	$\Rightarrow a^2 + \frac{1}{a^2} - 2 = 102 - 2$ $\Rightarrow \left(a - \frac{1}{a}\right)^2 = 100$ $\Rightarrow \left(a - \frac{1}{a}\right) = 10$	**2**
9	Since,(3,0) is on graph, $3p - 9 = 0$ $p = 3$ Also, (1,2) is on graph, $3 + 2q = 9$ $2q = 6$ $q = 3$	**2**
10	A circle is drawn with point A as the centre and AB as the radius. Similarly, another circle with point B as the centre and BA as the radius. The two circles meet a point, say C. Now, the line segments AC and BC are drawn to form △ABC.	**2**
11	**<u>Construction</u>**: AD is extended such that it meets BC at M. **<u>Sol:</u>**  In △ABM, ∠AMC=45°+35°(Exterior angle property) ∠AMC=80° In △DMC, ∠ADC=80°+50°(Exterior angle property) $x = 130°$	**2**
12	**To prove:** ∠B=∠C **Construction**: Draw bisectors of ∠A intersecting BC at D.  **Proof**: In △ABD and △ACD, AB=AC (given) ∠BAD= ∠CAD (given) AD=AD (common)	**2**

	$\triangle BAD \cong \triangle CAD$ (SAS)	
	SECTION – C	
13	$\left(\frac{81}{16}\right)^{\frac{-3}{4}} \times \left[\left(\frac{25}{9}\right)^{\frac{-3}{2}} \div \left(\frac{5}{2}\right)^{-3}\right]$ $= \left(\frac{16}{81}\right)^{\frac{3}{4}} \times \left[\left(\frac{9}{25}\right)^{\frac{3}{2}} \times \left(\frac{5}{2}\right)^{3}\right]$ $= \left(\frac{2}{3}\right)^{4\times\frac{3}{4}} \times \left[\left(\frac{3}{5}\right)^{2\times\frac{3}{2}} \times \left(\frac{5}{2}\right)^{3}\right]$ $= \left(\frac{2}{3}\right)^{3} \times \left[\left(\frac{3}{5}\right)^{3} \times \left(\frac{5}{2}\right)^{3}\right]$ =1	**3**
14	Since, $a+b+c=0, \Rightarrow a+b=-c \ \ or \ \ b+c=-a \ \ or \ \ c+a=-b$ $\frac{(b+c)^2}{bc}+\frac{(c+a)^2}{ca}+\frac{(a+b)^2}{ab}$ $=\frac{(-a)^2}{bc}+\frac{(-b)^2}{ca}+\frac{(-c)^2}{ab}$ $=\frac{a^3+b^3+c^3}{abc}$ $=\frac{3abc}{abc}$ $=3$	**3**
15	Image of A(0,4) when x-axis is mirror = (0,-4) Image of B(-3,0) when y-axis is mirror = (3,0) Figure formed is Quadrilateral. Ar($\triangle$ABD)=$\frac{1}{2}\times 4\times 6$ $=12$ sq. units Ar($\triangle$CBD)=$\frac{1}{2}\times 4\times 6$ $=12$ sq. units Ar(ABCD)= 24 sq. units 	**3**

16	Correct graphical representation Point of intersection is (1,1)	**3**
17	**Proof**: Given, AC=DC CB=CE Adding both equations, AC+CB=DC+CE (if equals are added to equals, wholes remain equal.) AB=CD	**3**
18	In the given figure, PM and QN are the bisectors and PM∥QN. Prove that AB ∥ CD Proof: $\angle 1=\angle 2$ (given, MP||NP) $2.\angle 1=2.\angle 2$ (If equals are multiplied to equals, wholes are equal) $\angle SPB=\angle PQD$ Since, corresponding angles are equal, so lines are parallel. Hence, AB∥CD. 	**3**
19	**Proof**: In △BCE and △CBF, $\angle BEC = \angle CFB$ (each 90°) BE = CF (given) BC = BC (common) △BCE ≅ △CBF (RHS) AB = AC (CPCT) 	**3**
20	**To Prove** : AB+BC+CA>AD+BE+CF **Proof**: Since, sum of two sides of a triangle is greater than the third sid So, AB+BD > AD AC+CD > AD BC+CE > B E AB+AE > BE CA+ AF > CF BC+ BF > CF Adding all equations, 2(AB+BC+CA) > 2(AD+BE+CF) AB+BC+CA > AD+BE+CF 	**3**

21	Correct construction	**3**

22 (**3**)

x_i	f_i	$f_i x_i$
4	4	16
6	$2k+2$	$12k+12$
8	14	112
10	11	110
12	k	$12k$
Total:	$\Sigma f_i = 31+3k$	$\Sigma f_i x_i = 250+24k$

$$mean = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$\Rightarrow 8.05(31+3k) = 250+24k$$

$$\Rightarrow 249.55 + 24.15k = 50 + 24k$$

$$0.45 = 0.15k$$

$$k = 3$$

SECTION – D

23 (**4**)

$=\frac{1}{(1+\sqrt{2})-(\sqrt{3})} \times \frac{(1+\sqrt{2})+(\sqrt{3})}{(1+\sqrt{2})+(\sqrt{3})}$

$=\frac{1}{(1+\sqrt{2})-(\sqrt{3})} \times \frac{(1+\sqrt{2})+(\sqrt{3})}{(1+\sqrt{2})+(\sqrt{3})}$

$=\frac{(1+\sqrt{2}+\sqrt{3})}{(1+2+2\sqrt{2})-3}$

$$= \frac{(1+\sqrt{2}+\sqrt{3})}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$$

$$= \frac{\sqrt{2}+2+\sqrt{6}}{4}$$

24 (**4**)

P(2) = p

$$(2)^3 + 2(2)^2 - 5a(2) - 8 = p$$
$$\Rightarrow 8 - 10a = p$$

g(3) = q

$$\Rightarrow (3)^3 + a(3)^2 - 12(3) - 6 = q$$

$\Rightarrow 9a - 15 = q$

$$q - p = 10$$
$$\Rightarrow 9a - 15 - 8 + 10a = 10$$

$\Rightarrow a = \dfrac{33}{19}$

25 (Marks: **4**)

$1600 = x + y(8 - 2)$

$1600 = x + 6y$

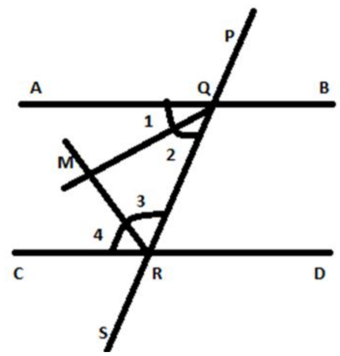
Graph can be drawn for above equation.

26 (Marks: **4**)

<u>Proof</u>:
∠1+∠2+∠3+∠4= 180 (co-interior angles)
2(∠2+∠4) = 180
(∠2+∠4) = 90

In △QMR,
By angle sum property,

∠QMR = 90°



27 (Marks: **4**)

<u>Proof:</u>

△AMC ≅ △BMD(SAS)

AC= BD(cpct)

∠MAC=∠MBD (cpct)
⇒BD||CA (converse of alternate int angle property)

∠DBC=ACB=90° (co-interior angles)

△ DBC ≅ △ ACB (SAS)

CM = DM =$\frac{1}{2}$ AB (cpct)

28 (Marks: **4**)

Correct construction

29 (Marks: **4**)

CI	Frequency	Width of class	New Frequency
10-15	6	5	6
15-20	10	5	10
20-30	10	10	5
30-50	8	20	2
50-80	18	30	3

Correct histogram for above data.

30 (Marks: **4**)

(a) $\mathrm{P}(\text{even prime}) = \frac{35}{200}$

(b) $P(\text{multiple of } 3) = \frac{70}{200}$

	(c) $P(\text{number greater than 6}) = 0$ (d) $P(\text{an odd number}) = \frac{107}{200}$		

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