KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION

SAMPLE PAPER 01 FOR SESSING ENDING EXAM (2017-18)

SUBJECT: MATHEMATICS(041)

BLUE PRINT : CLASS IX

Unit	Chapter	VSA (1 mark)	SA – I (2 marks)	SA – II (3 marks)	LA (4 marks)	Total	Unit Total
Number system	**Number Systems**	1(1)	--	**3(1)***	4(1)	**8(3)**	**8(3)**
Algebra	**Polynomials**	--	2(1)	3(1)	**4(1)***	**9(3)**	**17(6)**
	Linear Equations in two variables	1(1)	--	3(1)	4(1)	**8(3)**	
Coordinate Geometry	**Coordinate Geometry**	--	--	--	4(1)	**4(1)**	**4(1)**
Geometry	**Introduction to Euclid's Geometry**	--	--	3(1)	--	**3(1)**	**28(10)**
	Lines and Angles	--	--	**3(1)***	--	**3(1)**	
	Triangles	--	--	**3(1)***	--	**3(1)**	
	Quadrilaterals	--	2(1)	--	**4(1)***	**6(2)**	
	Area of Parallelograms and triangles	--	2(1)	**3(1)***	--	**5(2)**	
	Circles	1(1)	--	3(1)	--	**4(2)**	
	Constructions	--	--	--	4(1)	**4(1)**	
Mensuration	**Heron's Formula**	1(1)	2(1)	3(1)	--	**6(3)**	**13(6)**
	Surface Areas and Volumes	1(1)	2(1)	--	**4(1)***	**7(3)**	
Statistics and Probability	**Statistics**	--	2(1)	--	4(1)	**6(2)**	**10(4)**
	Probability	1(1)	--	3(1)	--	**4(2)**	
	Total	**6(6)**	**12(6)**	**30(10)**	**32(8)**	**80(30)**	**80(30)**

Note: * - Internal Choice Questions

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION

SAMPLE PAPER 01 FOR SESSING ENDING EXAM (2017-18)

SUBJECT: MATHEMATICS **MAX. MARKS : 80**

CLASS : IX **DURATION : 3 HRS**

General Instruction:

(i) **All** questions are compulsory.

(ii) This question paper contains **30** questions divided into four Sections A, B, C and D.

(iii) **Section A** comprises of 6 questions of **1 mark** each. **Section B** comprises of 6 questions of **2 marks** each. **Section C** comprises of 10 questions of **3 marks** each and **Section D** comprises of 8 questions of **4 marks** each.

(iv) There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of Calculators is not permitted

SECTION – A

Questions 1 to 6 carry 1 mark each.

1. Find the total surface area of a hemisphere of radius 10 cm. (Use $\pi = 3.14$)

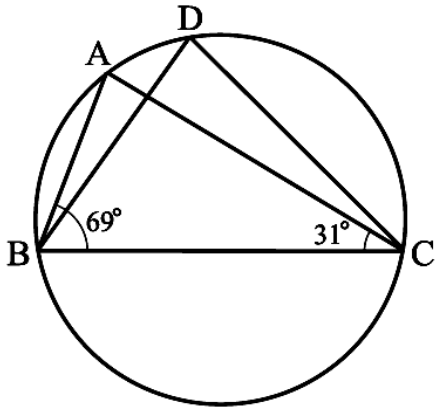
2. If the point (3, 4) lies on the graph of the equation $3y = ax + 7$, find the value of a.

3. Simplify: $\dfrac{\sqrt{32}+\sqrt{48}}{\sqrt{8}+\sqrt{12}}$

4. In a bag, there are 100 bulbs out of which 30 are defective ones. A bulb is taken out of the bag at random. Find the probability of the selected bulb to be a good one.

5. If its perimeter of an equilateral triangle is 180 cm, what will be its area?

6. In the below figure, $\angle ABC = 69°$, $\angle ACB = 31°$, find $\angle BDC$.



SECTION – B

Questions 6 to 12 carry 2 marks each.

7. A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute?

8. Find the value of $x^3 + y^3 + 15xy - 125$ if $x + y = 5$.

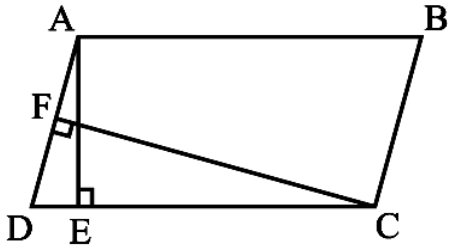
9. The following observations have been arranged in ascending order. If the median of the data is 63, find the value of x.

29, 32, 48, 50, x, x + 2, 72, 78, 84, 95

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

11. Find the area of a triangle two sides of which are 18cm and 10cm and the perimeter is 42cm.

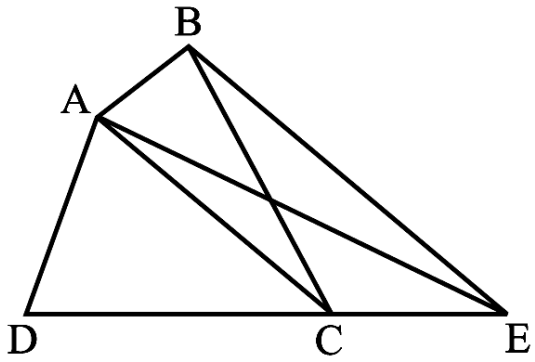
12. In the below figure, ABCD is a parallelogram, AE $\perp$ DC and CF $\perp$ AD. If AB = 16 cm, AE = 8 cm and CF = 10 cm, find AD.



SECTION – C

Questions 13 to 22 carry 3 marks each.

13. In the below figure, ABCD is a quadrilateral and BE || AC and also BE meets DC produced at E. Show that area of Δ ADE is equal to the area of the quadrilateral ABCD.



OR

Show that a median of a triangle divides it into two triangles of equal areas.

14. Factorise $x^3 - 23x^2 + 142x - 120$.

15. A die is rolled 300 times and following outcomes are recorded:

Outcome	1	2	3	4	5	6
Frequency	42	60	55	53	60	30

Find the probability of getting a number (i) more than 4 (ii) less than 3

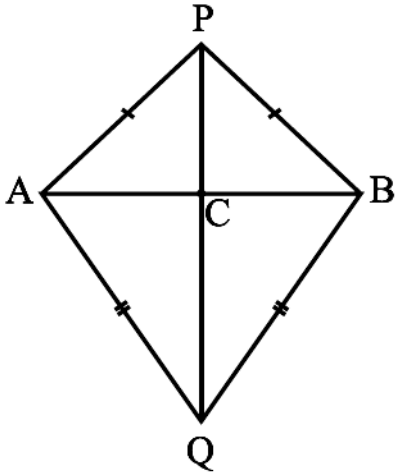
16. A floral design on a floor is made up of 16 tiles which are triangular, the sides of the triangle being 9 cm, 28 cm and 35 cm. Find the cost of polishing the tiles at the rate of 50p per cm^2.

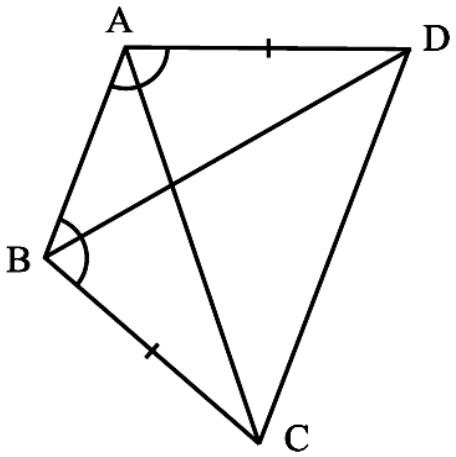
17. If a point C lies between two points A and B such that AC = BC, then prove that AC = $\frac{1}{2}$ AB.

Explain by drawing the figure.

18. Solve the equation 2x + 1 = x – 3, and represent the solution(s) on (i) the number line, (ii) the Cartesian plane.

19. AB is a line-segment. P and Q are points on opposite sides of AB such that each of them is equidistant from the points A and B (see below left figure). Show that the line PQ is the perpendicular bisector of AB.

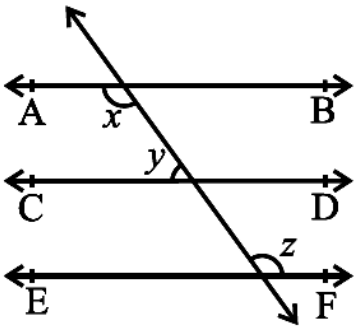


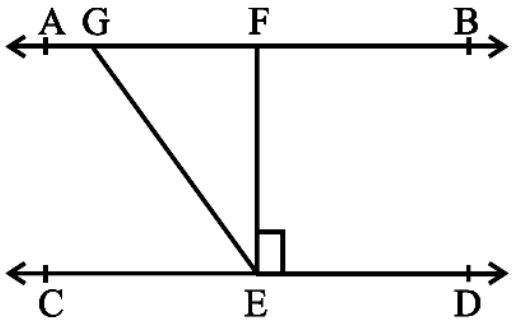


OR

ABCD is a quadrilateral in which AD = BC and $\angle DAB = \angle CBA$ (see the above right sided figure). Prove that (i) $\Delta ABD \cong \Delta BAC$ (ii) BD = AC (iii) $\angle ABD = \angle BAC$.

20. In the below left figure, if AB || CD, CD || EF and y : z = 3 : 7, find x.





OR

In the above right sided figure, if AB || CD, EF $\perp$ CD and GED = 126°, find $\angle AGE$, $\angle GEF$ and $\angle FGE$.

21. A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the minor arc and also at a point on the major arc.

22. Find the value of a and b in $\dfrac{5+2\sqrt{3}}{7+4\sqrt{3}} = a + b\sqrt{3}$

OR

Simplify $\dfrac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}} + \dfrac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ by rationalizing the denominator.

SECTION – D

Questions 23 to 30 carry 4 marks each.

23. Find the value of $\dfrac{4}{(216)^{\frac{-2}{3}}} + \dfrac{1}{(256)^{\frac{-3}{4}}} + \dfrac{2}{(243)^{\frac{-1}{5}}}$

24. A dome of a building is in the form of a hemisphere. From inside, it was white-washed at the cost of Rs 498.96. If the cost of white-washing is Rs 2.00 per square metre, find the (i) inside surface area of the dome, (ii) volume of the air inside the dome.

OR

Monica has a piece of canvas whose area is 551 m^2. She uses it to have a conical tent made, with a base radius of 7 m. Assuming that all the stitching margins and the wastage incurred while cutting, amounts to approximately 1 m^2, find the volume of the tent that can be made with it.

25. Construct a triangle XYZ in which $\angle Y = 30°$, $\angle Z = 90°$ and XY + YZ + ZX = 11 cm.

26. Show that if the diagonals of a quadrilateral bisect each other at right angles, then it is a rhombus.

OR

Prove that "The line-segment joining the mid-points of any two sides of a triangle is parallel to the third side and is half of it."

27. Plot the points A (4, 4) and (–4, 4) on a graph sheet. Join the lines OA, OB and BA. What figure do you obtain.

28. A man hired an auto for 5 km. The fare was 10 for first km and 3 for every subsequent km. He paid 50, to which the auto driver said that its not the correct amount. The actual fare is somewhat less than that the amount you have paid to me.
(i) Calculate the correct fare.
(ii) Which value is being promoted by the auto driver?

29. The following table gives the life times of 400 neon lamps:

Life time (in hours)	Number of Lamps
300 – 400	14
400 – 500	56
500 – 600	60
600 – 700	86
700 – 800	74
800 – 900	62
900 – 1000	48

(i) Represent the given information with the help of a histogram.
(ii) How many lamps have a life time of more than 700 hours?

30. 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.

OR

Without actual division, prove that $2x^4 – 6x^3 + 3x^2 + 3x – 2$ is exactly divisible by $x^2 – 3x + 2$.

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION

SAMPLE PAPER 02 FOR SESSING ENDING EXAM (2017-18)

SUBJECT: MATHEMATICS(041)

BLUE PRINT : CLASS IX

Unit	Chapter	VSA (1 mark)	SA – I (2 marks)	SA – II (3 marks)	LA (4 marks)	Total	Unit Total
Number system	**Number Systems**	1(1)	--	**3(1)***	4(1)	**8(3)**	**8(3)**
Algebra	**Polynomials**	--	2(1)	3(1)	**4(1)***	**9(3)**	**17(6)**
	Linear Equations in two variables	1(1)	--	3(1)	4(1)	**8(3)**	
Coordinate Geometry	**Coordinate Geometry**	--	--	--	4(1)	**4(1)**	**4(1)**
Geometry	**Introduction to Euclid's Geometry**	--	--	3(1)	--	**3(1)**	**28(10)**
	Lines and Angles	--	--	**3(1)***	--	**3(1)**	
	Triangles	--	--	**3(1)***	--	**3(1)**	
	Quadrilaterals	--	2(1)	--	**4(1)***	**6(2)**	
	Area of Parallelograms and triangles	--	2(1)	**3(1)***	--	**5(2)**	
	Circles	1(1)	--	3(1)	--	**4(2)**	
	Constructions	--	--	--	4(1)	**4(1)**	
Mensuration	**Heron's Formula**	1(1)	2(1)	3(1)	--	**6(3)**	**13(6)**
	Surface Areas and Volumes	1(1)	2(1)	--	**4(1)***	**7(3)**	
Statistics and Probability	**Statistics**	--	2(1)	--	4(1)	**6(2)**	**10(4)**
	Probability	1(1)	--	3(1)	--	**4(2)**	
	Total	**6(6)**	**12(6)**	**30(10)**	**32(8)**	**80(30)**	**80(30)**

Note: * - Internal Choice Questions

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION

SAMPLE PAPER 02 FOR SESSING ENDING EXAM (2017-18)

SUBJECT: MATHEMATICS **MAX. MARKS : 80**

CLASS : IX **DURATION : 3 HRS**

General Instruction:

(i) **All** questions are compulsory.

(ii) This question paper contains **30** questions divided into four Sections A, B, C and D.

(iii) **Section A** comprises of 6 questions of **1 mark** each. **Section B** comprises of 6 questions of **2 marks** each. **Section C** comprises of 10 questions of **3 marks** each and **Section D** comprises of 8 questions of **4 marks** each.

(iv) There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of Calculators is not permitted

SECTION – A

Questions 1 to 6 carry 1 mark each.

1. What is the total surface area of a hemisphere of base radius 7cm?

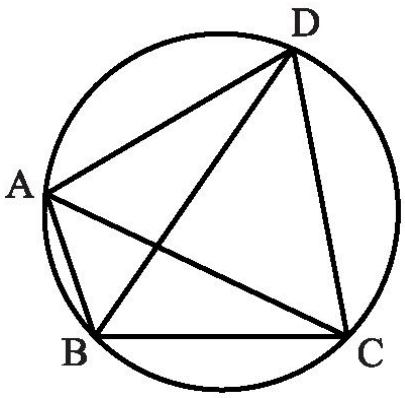
2. Find the value of k, if x = 2, y = 1 is a solution of the equation 2x + 3y = k.

3. The height of an equilateral triangle measures $9\sqrt{3}$ cm. Find its area.

4. Without actually calculating, find the value of $(25)^3 - (75)^3 + (50)^3$.

5. The record of a weather station shows that out of the past 250 consecutive days, its weather forecasts were correct 175 times. What is the probability that it was not correct on a given day?

6. In the Fig, ABCD is a cyclic quadrilateral in which AC and BD are its diagonals. If $\angle DBC = 60°$ and $\angle BAC = 30°$, find $\angle BCD$.



SECTION – B

Questions 6 to 12 carry 2 marks each.

7. A right triangle with sides 6 cm, 8 cm and 10 cm is revolved about the side 8 cm. Find the volume of the solid so formed.

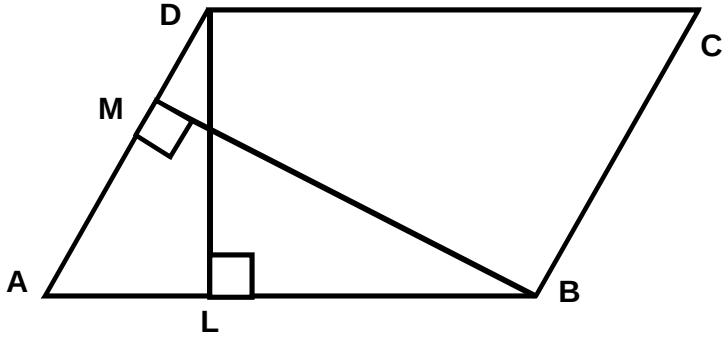
8. Factorise: $27x^3 - \frac{1}{216} - \frac{9}{2}x^2 + \frac{1}{4}x$

9. The following number of goals were scored by a team in a series of 10 matches:
2, 3, 4, 5, 0, 1, 3, 3, 4, 3
Find the mean, median and mode of these scores.

10. The angle between two altitudes of a parallelogram through the vertex of an obtuse angle of the parallelogram is 60^0. Find the angles of the parallelogram.

11. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.

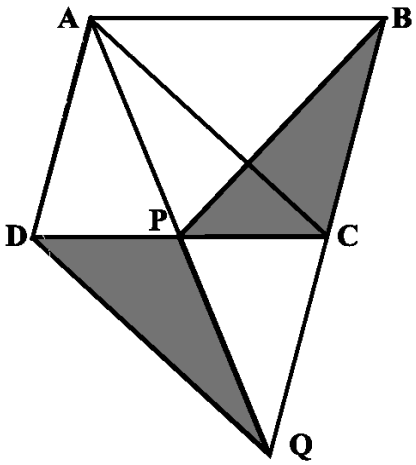
12. In the below figure, ABCD is a parallelogram; AB = 10 cm; BM = 8 cm and DL = 6 cm, then find AD.



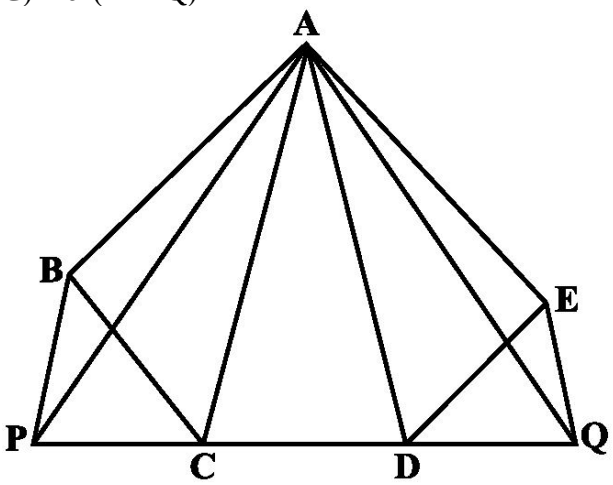
SECTION – C

Questions 13 to 22 carry 3 marks each.

13. In the below fig. ABCD is a parallelogram and BC is produced to a point Q such that AD = CQ. If AQ intersects DC at P, show that ar(ΔBPC) = ar(ΔDPQ)

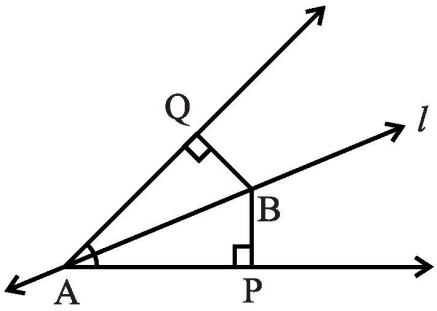


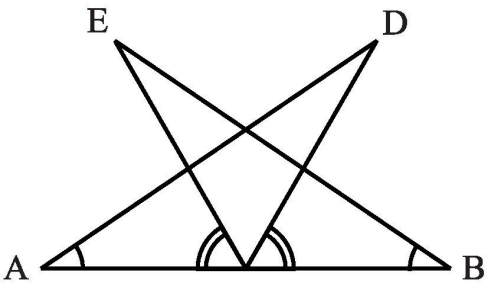
In the below figure, ABCDE is any pentagon. BP drawn parallel to AC meets DC produced at P and EQ drawn parallel to AD meets CD produced at Q. Prove that ar (ABCDE) = ar (APQ)



14. Line *l* is the bisector of an angle ∠A and B is any point on *l*. BP and BQ are perpendiculars from B to the arms of ∠A (see the below figure). Show that:

(i) Δ APB ≅ ΔAQB (ii) BP = BQ or B is equidistant from the arms of ∠A.





OR

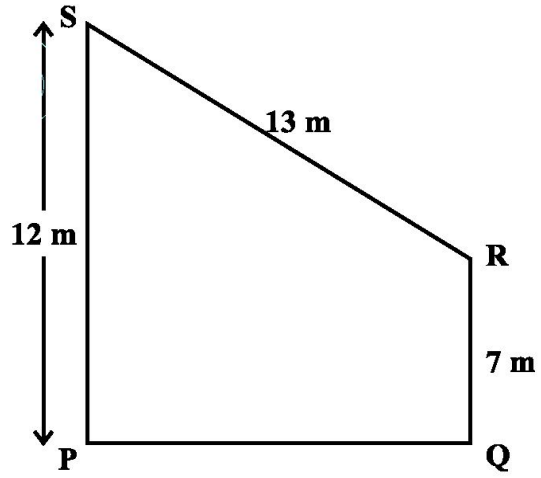
AB is a line segment and P is its mid-point. D and E are points on the same side of AB such that ∠BAD = ∠ABE and ∠EPA = ∠DPB (see the above right sided figure). Show that (i) ΔDAP ≅ ΔEBP (ii) AD = BE

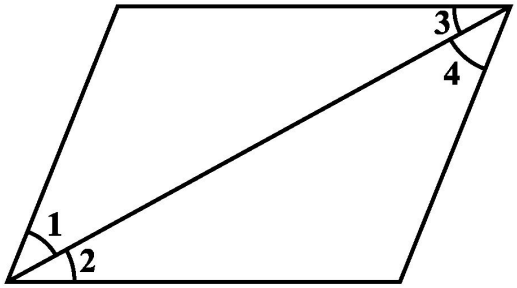
15. 1500 families with 2 children were selected randomly, and the following data were recorded:

Number of girls in a family	0	1	2
Number of families	475	814	211

Compute the probability of a family, chosen at random, having
(i) 2 girls (ii) 1 girl (iii) No girl

16. Find the area of the trapezium PQRS with height PQ given in the below left Figure.

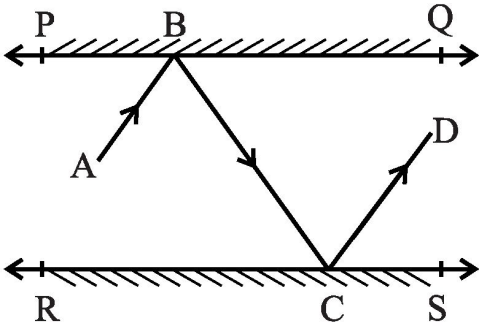


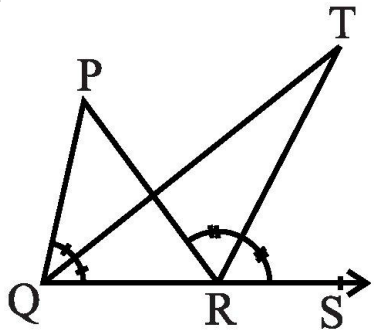


17. In the above right sided figure., if $\angle 1 = \angle 3$, $\angle 2 = \angle 4$ and $\angle 3 = \angle 4$, write the relation between $\angle 1$ and $\angle 2$, using an Euclid's axiom.

18. Verify: (i) $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$ (ii) $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$

19. In the adjoining figure, PQ and RS are two mirrors placed parallel to each other. An incident ray AB strikes the mirror PQ at B, the reflected ray moves along the path BC and strikes the mirror RS at C and again reflects back along CD. Prove that AB || CD.





OR

In the above right sided figure, the side QR of $\tilde{P}QR$ is produced to a point S. If the bisectors of $\angle PQR$ and $\angle PRS$ meet at point T, then prove that $\angle QTR = \frac{1}{2}\angle QPR$.

20. Give the geometric representations of 2x + 9 = 0 as an equation (i) in one variable (ii) in two variables.

21. Find the value of a and b in $\frac{2+\sqrt{3}}{2-\sqrt{3}} = a + b\sqrt{3}$

OR

Simplify $\frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}}$ by rationalizing the denominator.

22. Two chords AB and CD of lengths 5 cm and 11 cm respectively of a circle are parallel to each other and are on opposite sides of its centre. If the distance between AB and CD is 6 cm, find the radius of the circle.

SECTION – D

Questions 23 to 30 carry 4 marks each.

23. A cloth having an area of 165 m2 is shaped into the form of a conical tent of radius 5 m.

(i) How many students can sit in the tent if a student, on an average, occupies $\frac{5}{7}\text{m}^2$ on the ground?

(ii) Find the volume of the cone.

OR

Shanti Sweets Stall was placing an order for making cardboard boxes for packing their sweets. Two sizes of boxes were required. The bigger of dimensions 25 cm × 20 cm × 5 cm and the smaller of dimensions 15 cm × 12 cm × 5 cm. For all the overlaps, 5% of the total surface area is required extra. If the cost of the cardboard is Rs 4 for 1000 cm2, find the cost of cardboard required for supplying 250 boxes of each kind.

24. Construct a triangle ABC, in which $\angle B = 60°$, $\angle C = 45°$ and AB + BC + CA = 11 cm.

25. Represent the real number $\sqrt{2}, \sqrt{3}, \sqrt{5}$ on a single number line.

26. P, Q, R and S are respectively the mid-points of the sides AB, BC, CD and DA of a quadrilateral ABCD such that AC ⊥ BD. Prove that PQRS is a rectangle.

27. A triangular park has (5, 4), (0, 0) and (5, 0) vertices,

(i) Find the area of this park by plotting them on the graph.

(ii) If 10 plants can be planted in one square unit area. Then, how many plants can be planted in the park. How is this beneficial to the society?

(iii) Write the coordinates of the point whose sign cannot be changed? What values in our life this point indicates?

28. The length of 40 leaves of a plant are measured correct to one millimetre, and the obtained data is represented in the following table:

Length (in mm)	118 – 126	127 – 135	136 – 144	145 – 153	154 – 162	163 – 171	172 – 180
Number of leaves	3	5	9	12	5	4	2

(i) Draw a histogram to represent the given data.

(ii) Is there any other suitable graphical representation for the same data?

(iii) Is it correct to conclude that the maximum number of leaves are 153 mm long? Why?

29. Draw the graph of the linear equation $2x + 3y = 12$. At what points, the graph of the equation cuts the *x*-axis and the *y*-axis?

30. Find the values of a and b so that the polynomial $x^3 - 10x^2 + ax + b$ is exactly divisible by (x – 1) as well as (x – 2).

OR

Without actual division, prove that $2x^4 - 5x^3 + 2x^2 - x + 2$ is divisible by $x^2 - 3x + 2$.

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION

SAMPLE PAPER 03 FOR SESSING ENDING EXAM (2017-18)

SUBJECT: MATHEMATICS(041)

BLUE PRINT : CLASS IX

Unit	Chapter	VSA (1 mark)	SA – I (2 marks)	SA – II (3 marks)	LA (4 marks)	Total	Unit Total
Number system	**Number Systems**	1(1)	--	**3(1)***	4(1)	**8(3)**	**8(3)**
Algebra	**Polynomials**	--	2(1)	3(1)	**4(1)***	**9(3)**	**17(6)**
	Linear Equations in two variables	1(1)	--	3(1)	4(1)	**8(3)**	
Coordinate Geometry	**Coordinate Geometry**	--	--	--	4(1)	**4(1)**	**4(1)**
Geometry	**Introduction to Euclid's Geometry**	--	--	3(1)	--	**3(1)**	**28(10)**
	Lines and Angles	--	--	**3(1)***	--	**3(1)**	
	Triangles	--	--	**3(1)***	--	**3(1)**	
	Quadrilaterals	--	2(1)	--	**4(1)***	**6(2)**	
	Area of Parallelograms and triangles	--	2(1)	**3(1)***	--	**5(2)**	
	Circles	1(1)	--	3(1)	--	**4(2)**	
	Constructions	--	--	--	4(1)	**4(1)**	
Mensuration	**Heron's Formula**	1(1)	2(1)	3(1)	--	**6(3)**	**13(6)**
	Surface Areas and Volumes	1(1)	2(1)	--	**4(1)***	**7(3)**	
Statistics and Probability	**Statistics**	--	2(1)	--	4(1)	**6(2)**	**10(4)**
	Probability	1(1)	--	3(1)	--	**4(2)**	
	Total	**6(6)**	**12(6)**	**30(10)**	**32(8)**	**80(30)**	**80(30)**

Note: * - Internal Choice Questions

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SAMPLE PAPER 03 FOR SESSING ENDING EXAM (2017-18)

SUBJECT: MATHEMATICS **MAX. MARKS : 80**

CLASS : IX **DURATION : 3 HRS**

General Instruction:

(i) **All** questions are compulsory.

(ii) This question paper contains **30** questions divided into four Sections A, B, C and D.

(iii) **Section A** comprises of 6 questions of **1 mark** each. **Section B** comprises of 6 questions of **2 marks** each. **Section C** comprises of 10 questions of **3 marks** each and **Section D** comprises of 8 questions of **4 marks** each.

(iv) There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

(v) Use of Calculators is not permitted

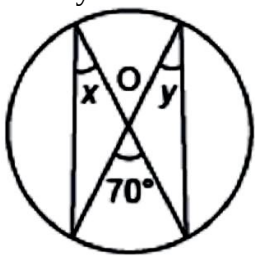
SECTION – A

Questions 1 to 6 carry 1 mark each.

1. Find the value of the polynomial $p(y) = y^2 - 5y + 6$ at (i) $y = 2$ (ii) $y = -2$

2. A rabbit covers y metres distance by walking 10 metres in slow motion and the remaining by x jumps, each jump contains 2 metres. Express this information in linear equation.

3. In the given figure, find the value of x and y where O is the centre of the circle.



4. Find the area of an equilateral triangle with side $2\sqrt{3}$ cm.

5. Two coins are tossed simultaneously 500 times, and we get
Two heads : 105 times One head : 275 times
Find the probability of getting 0 head.

6. Find the height of cone, if its slant height is 34 cm and base diameter is 32 cm.

SECTION – B

Questions 6 to 12 carry 2 marks each.

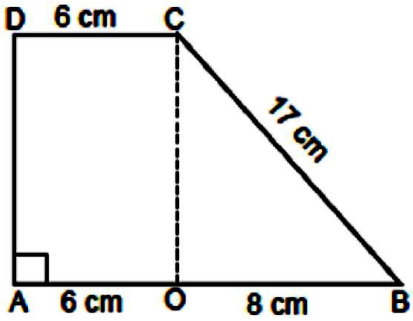
7. Using suitable identity, evaluate $(-32)^3 + (18)^3 + (14)^3$

8. If angles A, B, C and D of the quadrilateral ABCD, taken in order, are in the ratio 3 : 7 : 6 : 4, then name the type of quadrilateral ABCD.

9. Diagonals AC and BD of a quadrilateral ABCD intersect each other at P. Show that ar(APB) × ar(CPD) = ar(APD) × ar(BPC)

10. Find the median and mode of 14, 25, 14, 28, 18, 17, 18, 14, 23, 22, 14, 18.

11. Calculate the area of trapezium as shown in the figure:



12. How many square metres of canvas is required for a conical tent whose height is 3.5 m and the radius of whose base is 12 m?

SECTION – C

Questions 13 to 22 carry 3 marks each.

13. Find the value of a and b, if $\frac{2-\sqrt{5}}{2+3\sqrt{5}} = a\sqrt{5} + b$

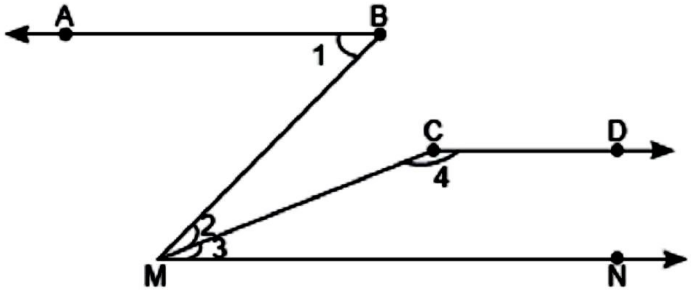
OR

Write the value of $\left(\frac{x^a}{x^b}\right)^{a+b} \times \left(\frac{x^b}{x^c}\right)^{b+c} \times \left(\frac{x^c}{x^a}\right)^{c+a}$

14. If $2x + 3y = 12$ and $xy = 6$, find the value of $8x^3 + 27y^3$.

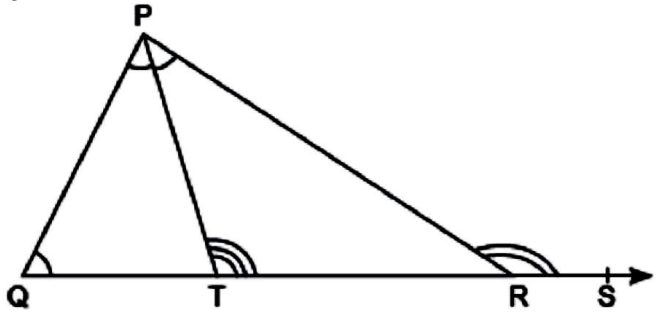
15. Draw the graph of the linear equation $x + 2y = 8$ and find the point on the graph where abscissa is twice the value of ordinate.

16. In the given figure, $\angle 1 = 55°$, $\angle 2 = 20°$, $\angle 3 = 35°$ and $\angle 4 = 145°$. Prove that AB || CD.



OR

Side QR of ΔPQR is produced to a point S as shown in the figure. The bisector of P meets QR at T. Prove that $\angle PQR + \angle PRS = 2\ \angle PTR$.

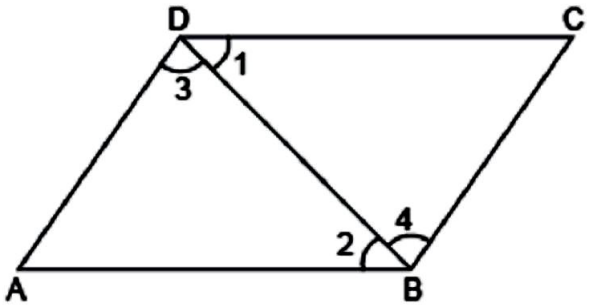


17. If the altitude drawn from the vertices of ABC to the opposite sides are equal, prove that the triangle is equilateral.

OR

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

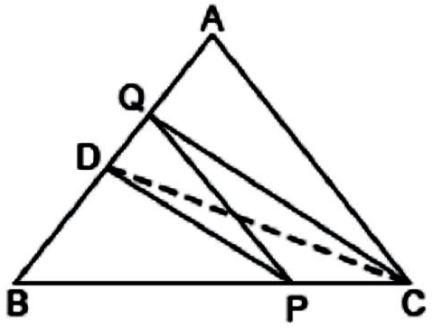
18. In the given figure, it is given that $\angle 1 = \angle 4$ and $\angle 3 = \angle 2$. By which Euclid's axiom, it can be shown that if $\angle 2 = \angle 4$, then $\angle 1 = \angle 3$.



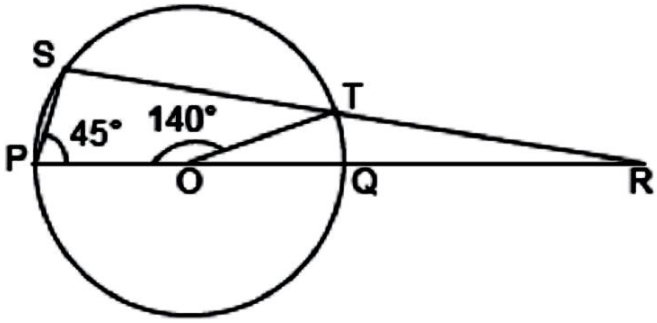
19. ABCD is a parallelogram. E is a point on BA such that BE = 2EA and F is a point on DC such that DF = 2FC. Prove that AECF is a parallelogram whose area is one-third of the area of parallelogram ABCD.

OR

In ABC, D is the mid-point of AB and P is any point on BC. If CQ || PD meets AB in Q in the given figure, then prove that ar(ΔBPQ) = ar(ΔABC)



20. If O is centre of circle as shown in figure, find $\angle$RQT and $\angle$RTQ



21. A die is thrown 1000 times with the frequencies for the outcomes 1, 2, 3, 4, 5 and 6 as given in the following table :

Outcome	1	2	3	4	5	6
Frequency	179	150	157	149	175	190

Find the probability of getting each outcome.

22. The sides of a triangle are in the ratio 13 : 14 : 15 and its perimeter is 84 cm. Find the area of the triangle.

SECTION – D

Questions 23 to 30 carry 4 marks each.

23. Prove that $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 5$

24. Plot the points A(0, 3), B(5, 3), C(4, 0) and D(– 1, 0) on the graph paper. Identify the figure ABCD and find whether the point E(2, 2) lies inside the figure or not?

25. If a + b + c = 0, then prove that $\frac{(b+c)^2}{3bc}+\frac{(c+a)^2}{3ca}+\frac{(a+b)^2}{3ab}=1$

OR

Find the value of m and n so that the polynomial f(x) = x3 – 6x2 + mx – n is exactly divisible by (x –1) as well as (x – 2).

26. In a class, number of girls is x and that of boys is y. Also, the number of girls is 10 more than the number of boys. Write the given data in the form of a linear equation in two variables. Also, represent it graphically. Find graphically the number of girls, if the number of boys is 20.

27. ABC is a triangle right angled at C. A line through the mid-point M of hypotenuse AB and parallel to BC intersects AC at D. Show that

(i) D is the mid-point of AC (ii) MD $\perp$ AC (iii) CM = MA = $\frac{1}{2}$ AB

OR

Show that the quadrilateral formed by joining the mid-points of the sides of a square, is also a square.

28. As a part of Corporate Social Responsibility (CSR) activity, an industrialist wishes to construct a hospital for animals on a triangular shaped plot.

(i) Construct a triangle for the same in which BC = 8 m, $\angle$B = 45° and AB – AC = 3.5 m by using proper scale.

(ii) What ideas are promoted by the industrialist?

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	3
5 – 7	12
7 – 10	9
10 – 15	10
15 – 17	4

Draw a histogram to represent the data above.

30. A wall 6 m long, 5 m high and 0.5 m thick is to be constructed with bricks, each having length 25 cm, breadth 12.5 cm and height 7.5 cm. Find the number of bricks required to construct the wall, if it is given that cement and sand mixture occupy of the volume of the wall.

OR

A lead pencil consists of a cylinder of wood with solid cylinder of graphite filled into it. The diameter of the pencil is 7 mm, the diameter of the graphite is 1 mm and the length of the pencil is 10 cm. Calculate the weight of the whole pencil, if the specific gravity of the wood is 0.7 g/cm^3 and that of the graphite is 2.1 g/cm^3.