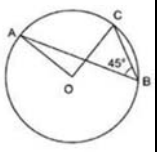
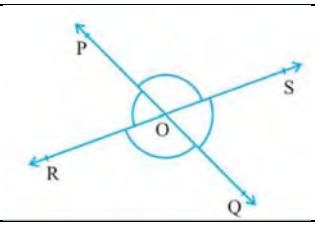
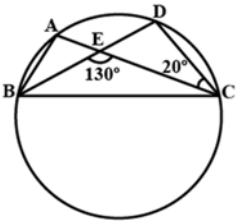
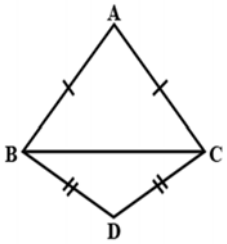
ITL PUBLIC SCHOOL
ANNUAL EXAMINATION (2022-23)

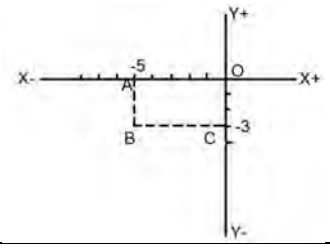
Date: 20.02.2023 **ANSWER KEY** **Class: IX**

MATHEMATICS (041) – SET A

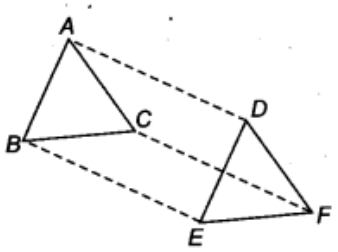
Time: 3 hrs **M. M: 80**

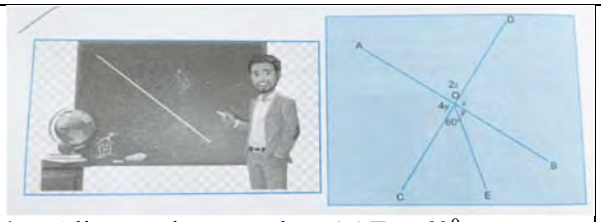
	SECTION – A	
1	If x-2 is a factor of polynomial $2x^2 + kx - 15$, then find the value of k ? **7/2**	1
2	Without plotting the points indicate the quadrant in which they will lie if: abscissa is -4 and ordinate is -8**. III**	1
3	The angles of Quadrilateral are in the ratio 1:2:3:4, find the measure of largest angle? **144^0**	1
4	In Δ ABC, BC = AB and ∠B = 80°. Then ∠A is equal to _____.**50^0**	1
5	If ∠ABC = 45^0, find the measure of ∠ AOC. Also state the property used.  **90^0 by degree measure theorem**	1
6	Write a rational number between $\sqrt{2}$ and $\sqrt{3}$? **1.6**	1
7	Write one postulate and one axiom given by Euclid. **Axiom Things which are equal to the same thing are also equal to one another.** **Postulates A straight line may be drawn from any point to any other point.** **A terminated line segment can be produced in a straight line continuously in either direction.**	1
8	In the given figure, by which congruence criterion are the triangles ACB and ADB congruent? **SSS**	1
9	Find the coefficient of y in the expansion of $(5-y)^2$. **-10**	1
10	Subtract $(6\sqrt{2} + 3\sqrt{5})$ from $(3\sqrt{2} - 5\sqrt{5})$. **$-3\sqrt{2} - 8\sqrt{5}$**	1
11	If the graph of equation 2x + ky = 10k, intersect the x axis at the point (5,0), then find the value of k. **1**	1
12	If the radius of Sphere is 2r, then find its volume in terms of π? **(32 π r3/3)**	1
13	If an angle is 14° more than its complement, then find its measure. **38^0**	1
14	The class mark of the class 85-90 is _____. **87.5**	1
15	Determine the degree of the polynomial $(x^3 - 1)(x^3 + 1)$. **6**	1
16	The perimeter of an equilateral triangle is 180 cm. Find its area? **$900\sqrt{3}$ sq. cm**	1
17	Find one solution for the equation 4x – 5y = 6. **(0,-6/5)**	1
18	If each side of an equilateral triangle of area A is doubled, then the area of the new triangle is **4 times** times the first triangle?	1
	Instructions: Choose the correct option in question no 19 and 20.	
19	**Assertion:** The area of a triangle is 9cm^2 whose sides are 3 cm, 4 cm and 5 cm respectively. **Reason:** Area of triangle= √s(s-a)(s-b)(s-c) **d) Assertion (A) is false but reason (R) is true.**	1
20	**Assertion-** If POQ is a diameter of a circle and R is a point on the circle then ar (ΔPQR) = $\frac{1}{2}$ (PR × QR) **.** **Reason –** Angle in a semi - circle is a right angle . **a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).**	1
	SECTION – B	

21	Lines PQ and RS intersect each other at point O. If ∠POR : ∠ROQ = 5 : 7 , find all the angles. **5x + 7x = 180** **12x = 180** **x = 15** **75, 105,75,105** 	2
22	If p(y) = $y^2 - 5y + 1$ evaluate p (2) – p (1) + p ($\frac{1}{3}$). **p(2)=4-10+1= -6+1= -5** **p(1/3)=1/9-5/3+1= -5/9 p(2)-1+p(1/3)= -5-1-5/9 = -59/9**	2
23	The heights of 30 students, measured to the nearest centimetre, have been found to be as follows: 161 150 154 165 168 161 154 162 150 151 162 164 171 165 158 154 156 172 160 170 153 159 161 170 162 165 166 168 165 164 Represent the data given above by a grouped frequency distribution table, taking the class intervals as 145 – 150, 150 – 155, etc. **0.5 marks for each step**	2
24	Frame two linear equations in two variables passing through (-1,4). **x + y = 3 x – y = -5**	2
25	Prove that a cyclic parallelogram is a rectangle. **Let ABCD be the cyclic parallelogram.** **We know that opposite angles of a parallelogram are equal.** **∠A = ∠C and ∠B = ∠D ... (1)** **We know that the sum of either pair of opposite angles of a cyclic quadrilateral is 180°.** **∠A + ∠C = 180° SO ∠A + ∠A = 180° (From equation (1))** **2∠A = 180° Hence ∠A = 90°** **We know that if one of the interior angles of a parallelogram is 90°, all the other angles will also be equal to 90°.** **Since all the angles in the parallelogram are 90°, we can say that parallelogram ABCD is a rectangle.** **OR** A, B, C, D are four points on a circle. AC and BD intersect at a point E such that ∠ BEC = 130^0 and ∠ECD = 20^0 . Find ∠BAC .  **∠BEC+∠CED=180 ⇒∠CED=50∘** **Also, in ΔCED, sum of all interior angles is 180∘** **∴∠CDE=180−50−20=110∘** **For segment BADCB, ∠BAC and ∠BDC are in same segment so must be equal. ∴∠BAC=∠CDB and hence ∠BAC=110∘**	2
	SECTION – C	
26	ΔABC and ΔDBC are two isosceles triangles on the same base BC. Show that ∠ABD = ∠ACD. **In isosceles ΔABC AB=AC** **Then ∠ABC=∠ACB.....(1)** **In isosceles ΔBDC BD=DC** **Then ∠CBD=∠BCD.....(2)** **Add (1) and (2) we get** **∠ABC+∠CBD=∠ACB+∠BCD** **But ΔABC and ΔDBC on same base** **∴∠ABD=∠ACD** 	3

27	Write the coordinates of the vertices of a rectangle whose length and breadth are 5 and 3 units respectively, one vertex at the origin, the longer side lies on the *x*-axis and one of the vertices lies in the third quadrant**.** Represent it graphically. **The vertices of the rectangle are O(0,0),A(−5,0),B(−5,−3),C(0,−3).** 	3
28	Express $0.777 \ldots . + 0.4777 \ldots$ in the form of $\frac{p}{q}$, where p and q are integers and q $\neq$0 . **i) Let x = 0.77777….** **10x = 7.7777 …. 9x = 7 ⇒ x = 7/9** **ii) 10x = 4.777 100x = 47.77 90x = 43 x = 43/90** **iii)113/90**	3
29	In a class, the marks obtained by students has the following distribution: Draw a histogram for the distribution. Hence draw the frequency polygon. **Histogram 2 M Frequency Polygon 1 M**	3
30	The sides of a triangular plot are in the ratio of 3:5:7 and its perimeter is 300m. Find its area. **Sides are 60, 100,140 m S = 150 m** **Therefore , The Area of the Triangular Plot is 1500√3m²** **OR** If the perimeter of an isosceles triangle is 32cm and the ratio of the equal side to its base is 3:2 , then find the area of the triangle? **32 = 3x + 3x + 2x 32 = 8x x = 32/8 x = 4 cm** **12 cm & 8 cm Area of isosceles triangle = 32√2 cm²**	3
31	A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 5 cm. Next time it revolved about the side 12 cm. Find the ratio of volumes of the solid obtained in two cases. **r=5cm, l=13cm, h=12cm** **Volume =31πr2h=31π×5×5×12=100πcm3** **r=12, h=5cm, l=13cm** **Volume =31π×12×12×5=240πcm3 Ratio =240π100π=2410=125 5:12** **OR** The diameter of the moon is approximately one-fourth of the diameter of the earth. What fraction of the volume of the earth is the volume of the moon? Let d_1 be the diameter of the moon and d_2 and be the diameter of the earth. **Let r1 be the radius of the moon and r2 be the radius of the earth.** **d1=41d2 =2r1=41×2r2 =r1=41×r2 =1:16**	3
	SECTION – D	
32	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**.** **Given To prove 1 mark Case 1 2 mark Case 2 and 3 1 mark each**	5

Marks	0 - 10	10-20	20-30	30-40	40-50
No.of students	8	32	18	10	12

33	In ΔABC and ΔDEF, AB = DE, AB || DE, BC = EF and BC || EF. Vertices A, B and C are joined to vertices D, E and F, respectively. Show that: (i) quadrilateral ABED is a parallelogram (ii) quadrilateral BEFC is a parallelogram (iii) ΔABC ≅ ΔDEF.  **(i) Consider the quadrilateral ABED** **We have , AB=DE and AB∥DE** **One pair of opposite sides are equal and parallel. Therefore ABED is a parallelogram.** **(ii) In quadrilateral BEFC , we have** **BC=EF and BC∥EF. One pair of opposite sides are equal and parallel.therefore ,BEFC is a parallelogram.** **(iii) AD=BE and AD∥BE | As ABED is a ∥gm ... (1)** **and CF=BE and CF∥BE | As BEFC is a ∥gm ... (2)** **From (1) and (2), it can be inferred** **AD=CF and AD∥CF** **AD=CF and AD∥CF** **One pair of opposite sides are equal and parallel** **⇒ ACFD is a parallelogram. Since ACFD is parallelogram.** **AC=DF | As Opposite sides of a∥ gm ACFD** **In triangles ABC and DEF, we have** **AB=DE | (opposite sides of ABED** **BC=EF | (Opposite sides of BEFC** **CA=FD | Opposite. sides of ACFD** **Using SSS criterion of congruence, ΔABC≅ΔDEF**	5
34	Simplify using identity: a) $(2x - 5y)^3 - (2x + 5y)^3$ **$-250y3-120x2y$** b) $(-12)^3 + (7)^3 + (5)^3$ **-1260**. **OR** Use long division method to factorise the polynomial: $2x^3 - x^2 - 13x - 6$. **(2x + 1), (x – 3) and (x + 2)**.	5
35	Simplify: $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$. **→ (√30 - 3) - (2√30 - 10) - (6 - √30) → √30 - 2√30 + √30 - 3 + 10 - 6** **→ 2√30 - 2√30 + 10 – 9 → 10 – 9 1.**	5
	SECTION – E	
36	**Case Study based-1** **Picnic in a tent** 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 in a park. They were carrying 300 m^2 cloth with them. As shown in the figure they made the tent with height 8 m and diameter 12 m. The remaining cloth was used for the floor. 	
(i)	What was the slant height of the tent? **10 m**	1
(ii)	What was the area of the canvas used for making the tent? **188.4 sq. m**	1
(iii)	What was the volume of air present in the tent? **376.8 cu.m** **OR** Was the canvas sufficient for flooring. Justify your answer.	2

37	**Case Study based-2** Mathematics Teacher draws a straight line AB shown on the blackboard as per the following figure.  Now he told Afjal to draw another line CD as in the figure. The teacher told Ajay to mark ∠AOD as 2z. Suraj was told to mark ∠AOC as 4y. Alive made an angle ∠COE = 60^0 . Bhupinder marked ∠BOE and ∠BOD as y and x respectively. Now , answer the questions:	
(i)	Find the value of y? **30**	1
(ii)	Find the value of x? **90**	1
(iii)	Find the value of x + z ? **135** **OR** Write a pair of vertically opposite angles and linear pair from a given figure ? **i) AOD and BOC ii) AOD and DOB**	2
38	**Case Study based-3** **A match and the Old Age Home** In a one-day international cricket match between India and England, Sarita decided to donate as much money as to 'ORPHAN AGE HOME' as the runs scored by the first pair of Indian batsmen. Sachin and Rahul were the opener batsmen. The runs scored by Sachin is thrice the run scored by Rahul.	
(i)	Taking x and y as the runs scored by Sachin and Rahul respectively, then represent the given information using linear equation in two variables. **x-3y =0**	1
(ii)	If Sachin scored 180 runs then, the find the number of runs scored by Rahul? 60	1
(iii)	If Rahul's score is 99, then how much money is donated to the old age home? **396** **OR** If Sarita donates ₹ 180, then how many runs are scored by Rahul and Sachin respectively? **45 and 135**	2