VELAMMAL BODHI CAMPUS

GRAND TEST - IV

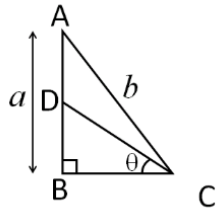
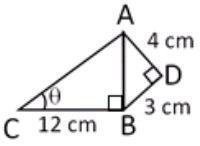
MATHEMATICS -041

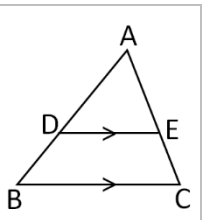
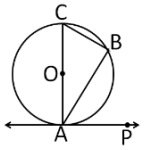
Time Allowed: 3 Hours **Maximum MARKS :80**

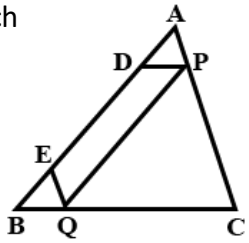
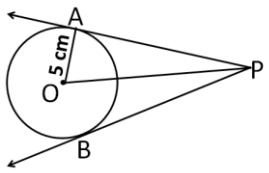
GRADE : X (FOUNDATION) **Date: 24.01.2024**

SECTION – A

Section A consists of 20 questions of 1 mark each.

S.NO		Marks
1.	The HCF of two numbers is 27 and their LCM is 162. If one of the numbers is 54, then the other number is (a) 35 (b) 36 (c)9 (d)81	1
2.	If the roots of $x^2 + 4mx + 4m^2 - m - 1 = 0$ are real, then (a) $m = -1$ (b) $m \leq -1$ (c)$m \geq -1$ (d) $m \geq 0$	1
3.	If one zero of the polynomial $x^2 - 8x + k$ exceeds the other by 2 , then the value of k is (a) 35 (b) 25 (c)15 (d)5	1
4.	The pair of equations $2x + ky = 1$ and $5x - 7y = 5$ has no solution when (a) $k = \frac{13}{5}$ (b) $k = \frac{-13}{5}$ (c) $k = \frac{-14}{5}$ (d) $k = \frac{-16}{5}$	1
5.	AOBC is rectangle whose three vertices are A(0,3) B(5,0) and O(0,0). The length of its diagonal is (a) 5 (b) 4 (c)$\sqrt{34}$ (d $\sqrt{44}$	1
6.	In ΔABC and ΔDEF , $\angle B = \angle E$, $\angle F = \angle C$ and AB = 3 DE. Then the two triangles are (a)congruent but not similar (b) similar but not congruent (c)neither congruent nor similar (d)congruent as well as similar	1
7.	In the given figure AB= a , AC= b, AD = BD and $\angle B = 90^\circ$, then the value of $\tan\theta$ is (a) $\frac{a}{2\sqrt{b^2-a^2}}$ (b) $\frac{a}{\sqrt{b^2-a^2}}$ (c) $\frac{b}{\sqrt{a^2+b^2}}$ (d) $\frac{b}{2\sqrt{a^2+b^2}}$ 	1
8.	In the figure given, AD= 4 cm , BD = 3 cm , CD = 12 cm then $sec\,\theta$ is (a)$\frac{5}{12}$ (b) $\frac{12}{5}$ (c) $\frac{13}{5}$ (d) $\frac{12}{13}$ 	1

9.	D and E are respectively the points on the sides *AB* and *AC* of ΔABC such that $AD = 2cm, BD = 3\ cm,\ BC = 7.5\ cm$ and $DE \parallel BC$, then the length of $DE\ (in\ cm)$ is (a) 2.5 (b) 3 (c) 5 (d) 6 	**1**
10.	$\Delta\ ABC \sim \Delta\ DEF$, such that *AB* = $9.1\ cm$ and *DE* = $6.5\ cm$. If the perimeter of $\Delta\ DEF$ is $25\ cm$, then the perimeter of ΔABC is (a) $36cm$ (b) $30cm$ (c) $34cm$ (d) $35cm$	**1**
11.	In the figure, AB is a chord of a circle with centre *O* and *AC* is the diameter. $\angle ACB = 50°$, and AP is a tangent to the circle at A. Then $\angle BAP\ is$ (a) $65°$ (b) $60°$ (c) $50°$ (d) $40°$ 	**1**
12.	If the areas of 2 circles are is the ratio 4:9, then the ratio of the perimeters of the semicircles is (a) $2:3$ (b) 3:2 (c) $1:2$ (d) $1:3$	**1**
13.	From a solid, right circular cylinder of height 14 cm and base radius 6 cm, a right circular cone of same height and same radius is removed. The volume of the remaining solid is (a) $1112\ cm^3$ (b) $1056cm^3$ (c) $1000cm^3$ (d) $1058cm^3$	**1**
14.	If the mean and median of a frequency distribution are 20 and 24 respectively, then the value of mode is (a) 30 (b) 32 (c) 28 (d) 12	**1**
15.	The length of the minor arc of a circle is $\left(\frac{2}{9}\right) th$ of its circumference. Then the angle subtended by the arc at the centre of the circle is (a) 80° (b) 60° (c) 45° (d) 30°	**1**
16.	For the following distribution, half the sum of lower limit of median class and the upper limit of the modal class is C.I | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50-60 | 60-70 freq. | 4 | 7 | 15 | 18 | 4 | 2 (a) 80 (b) 40 (c)50 (d) 60	**1**
17.	The probability of selecting a boy randomly from a class is 0.6 and there are 45 students in the class. Then the number of girls is (a) 9 (b) 12 (c)36 (d)18	**1**
18.	If $\sin\theta = \frac{1}{3}$, then the value of $3cot^2\theta + 3$ is (a) 6 (b) 9 (c) 18 (d)27	**1**

	Direction for questions 19 & 20: In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.	**1**
19	**Assertion** : 6^n cannot end with the digit zero, where n is a natural number. **Reason** : Any number ends with the digit zero , if its prime factorization includes $2^m \times 5^n$ where *m* and *n* are whole numbers. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A). (c) Assertion (A) is true but Reason (R) is false. (d) Assertion (A) is false but Reason (R) is true.	**1**
20.	**Assertion**: A line formed by joining (-1 , 3) and (9 , 8) is divided by the point (3 , 5) in the ratio 1:3 **Reason** *:* The co- ordinates of the point which divides the line joining (x_1, y_1) and (x_2, y_2) in the ratio *m: n* is $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$ (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A). (c) Assertion (A) is true but Reason (R) is false. (d) Assertion (A) is false but Reason (R) is true	**1**
	Section B	
	Section B consists of 5 questions of 2 marks each.	
21.	ABCD is a cyclic quadrilateral such that $\angle A=(4y+20)^0$, $\angle B=(3y-5)^0$, $\angle C=(4x)^0$ and $\angle D=(7x+5)^0$. Find the four angles.	**2**
22.	Let ABC be a triangle and D and E be two points on side AB such that AD=BE. If DP||BC and EQ||AC, then prove that PQ||AB.  	**2**
23.	In the figure the angle between two tangents drawn from an external point P to a circle of radius 5 cm and centre O is 60°, then find the length of OP .  	**2**
24.	The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm . Find the area of the sector. **[OR]** A pendulum swings through an angle of 30° and describes an arc of length 8.8 cm. Find the length of the pendulum.	**2**

25.	If $2\sin(3x-15)^{\circ} = \sqrt{3}$, find the value of $sin^2(2x+10)$.	**2**
	Section C	
	Section C consists of 6 questions of 3 marks each.	
26.	Prove that $7-2\sqrt{3}$ is an irrational number.	**3**
27.	If the sum of the zeroes of the polynomial $(a+1)x^2+(2a+3)x+(3a+4)$ is -1 , find the product of its zeroes.	**3**
28.	In a painting competition of a school, a student made a flag whose perimeter was $50\ cm$. Its area will be decreased by $6cm^2$, if length is decreased by $3cm$ and breadth is increased by $2cm$, then find the dimensions of the flag. **[OR]** A two digit number is obtained by either multiplying the sum of the digits by 8 and subtratcting 5 or multiplying the difference of the digits by 16 and then adding 3. Find the number .	**3**
29.	If Sin A + Cos A = $\sqrt{3}$,then find the value of Tan A+Cot A .	**3**
30.	State and prove converse of Thales theorem	**3**
31.	Two dice are thrown simultaneously. Find the probability of getting: (i)The sum as a prime number. (ii) A total of at least 10. (iii) A multiple of 2 on on. dice and a multiple of 3 on the other dice.	**3**
	Section D	
	Section D consists of 4 questions of 5 marks each.	
32.	A plane left 30 minutes late than its scheduled time and in order to reach the destination $1500\ km$ away on-time, it had to increase its speed by $100\ km/hr$ from the usual speed. Find its usual speed. **[OR]** To fill a swimming pool two pipes are used. If the pipe of larger diameter used for 4 hours and the pipe of smaller diameter for 9 hours, only half of the pool can be filled. Find, how long it would take for each pipe to fill the pool separately, if the pipe of smaller diameter takes 10 hours more than the pipe of larger diameter to fill the pool?	**5**
33.	Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that $\Delta ABC \sim \Delta PQR$	**5**
34.	Along a road lie an odd number of stones and distance between consecutive stones is 10m. A person can carry only one stone at a time and his job is to assembled all the stones around the middle stone. If he starts his job from one of the end stone and in carrying all the stones, he covers a distance of 3km. Find the number of stones. **[OR]** The sum of the third and the seventh terms of an A.P is 6 and their product is 8. Find the sum of first sixteen terms of the A.P.	**5**

35. If the median of the following distribution is 32, find the values of *x* and *y* where the total number of frequencies is 100. **5**

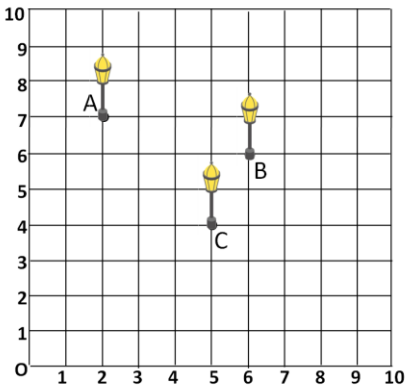
Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of students	10	*x*	25	30	*y*	10

Section E

Case study based questions are compulsory.

36 **Case Study – 1**

Resident Welfare Association (RWA) of Gulmohar society in Delhi has installed three electric poles A, B and C in the society's common park. Despite these three poles, some parts of the park are still in dark. So they decide to have more poles in the park. The park can be modelled as a co-ordinate system as shown in the figure.



Based on the above information answer the following questions.

(i)	What is the distance of the pole B from the corner O of the park?	1
(ii)	Find the coordinates of the fourth pole D so that the points A, B, C and D taken in order form a parallelogram.	1
(iii)	Find the relation between *x* and *y* such that E (x, y) is equidistant form A and C. (OR) Find the ratio in which *P* (4, *m*) divides the line segment joining *A* and *C*. Hence find m	2

Case Study – 2

37.

Mathematics teacher of a school took her 10th standard students to show Red fort. It was a part of their Educational trip. The teacher had interest in history as well. She narrated the facts of Red fort to students. Then the teacher said in this monument one can find combination of solid figures. There are 2 pillars which are cylindrical in shape. Also 2 domes at the corners which are hemispherical.7 smaller domes at the centre. Flag hoisting ceremony on Independence Day takes place near these domes.

Base on the above information answer the following questions :

(i)	Write the formula to find the volume of a cylindrical pillar.	1
(ii)	Find the lateral surface area of two pillars if height of the pillar is 7m and radius of the base is 1.4m	1
(iii)	How much cloth material will be required to cover 2 big domes each of radius 2.5 metres? (Take π = 22/7) **OR** What is the ratio of sum of volumes of two hemispheres of radius 1cm each to the volume of a sphere of radius 2 cm?	2

38. **Case Study – 3**

Friends Forever: Ramu and Somu are best friends. One day Ramu had to go overseas for higher studies by ship. Two ships C and D are on either side of a light house AB in such a way that the ships and the light house are in the same straight line. Ramu standing on the deck of ship C which is 10 m above the water level, waves to Somu standing on the top of the light house at an angle of elevation of 30°. Distance between Ramu and Somu is 100 m. Somu observes ship D at an angle of depression of 60°.(Use $\sqrt{3} = 1.73$).

Based on the above information answer the following questions

(i)	Draw a neat labelled figure to show the above situation diagrammatically.	1
(ii)	Find the height of the light house.	1
(iii)	Find the distance between the ships. **[OR]** Find the distance between Somu and the ship D.	2