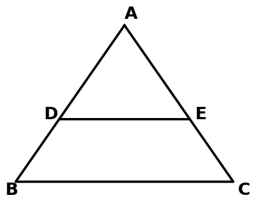
KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION
FIRST PRE-BOARD EXAMINATION 2026–27
MATHEMATICS (BASIC) – CODE 241
CLASS X

Time: 3 Hours **Maximum Marks: 80**

General Instructions:

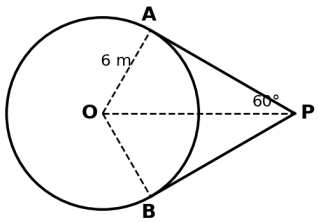
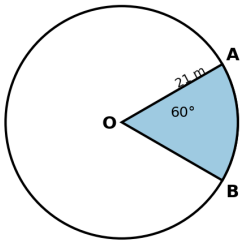
- This Question Paper has 5 Sections A, B, C, D and E.
- Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each. (Q.19 and Q.20 are Assertion–Reason questions.)
- Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.
- Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
- Section D has 4 Long Answer (LA) type questions carrying 5 marks each.
- Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks respectively.
- All Questions are compulsory. However, an internal choice has been provided in Q.25 (Section B), Q.28 and Q.31 (Section C), Q.34 and Q.35 (Section D) and in the last sub-part of each case study in Section E.
- Draw neat figures wherever required. Take $\pi = 22/7$ wherever not stated.
- Use of calculators is not allowed.

Q. No.	Question	Marks
	SECTION – A (Section A consists of 20 questions of 1 mark each)	
1	If $a = p^3q$ and $b = p^2q^3$, where p and q are distinct prime numbers, then LCM (a, b) is: (a) p^2q (b) p^5q^4 (c) pq (d) p^3q^3	1
2	If α and β are the zeroes of the polynomial $x^2 – 7x + 10$, then the value of $\alpha + \beta – \alpha\beta$ is: (a) –3 (b) 3 (c) 17 (d) –17	1
3	The value of k for which the pair of linear equations $2x + 3y = 7$ and $4x + ky = 14$ has infinitely many solutions is: (a) 3 (b) 4 (c) 6 (d) 7	1
4	The quadratic equation $2x^2 – 5x + 4 = 0$ has: (a) two distinct real roots (b) two equal real roots (c) more than two real roots (d) no real roots	1
5	The 11th term of the AP –5, –5/2, 0, 5/2, … is: (a) 15 (b) 20 (c) 25 (d) 30	1
6	If sin A = 3/5, where A is an acute angle, then sec A is equal to: (a) 4/5 (b) 3/4 (c) 5/4 (d) 5/3	1
7	If the distance between the points (2, –3) and (10, y) is 10 units, then the value of y is: (a) 3 only (b) –9 only (c) 9 or –3 (d) 3 or –9	1
8	In ΔABC and ΔPQR, AB/QR = BC/PR = CA/PQ. Then: (a) ΔPQR ~ ΔCAB (b) ΔPQR ~ ΔABC (c) ΔCBA ~ ΔPQR (d) ΔBCA ~ ΔPQR	1

9	In the given figure, DE ∥ BC. If AD = x, DB = x – 2, AE = x + 2 and EC = x – 1, then the value of x is:  (a) 3 (b) 4 (c) 5 (d) 6	1
10	The value of sin 60° cos 30° + sin 30° cos 60° is: (a) 0 (b) 1/2 (c) 3/2 (d) 1	1
11	If 5 tan θ = 4, then the value of (5 sin θ – 3 cos θ)/(5 sin θ + 2 cos θ) is: (a) 1/6 (b) 1/5 (c) 1/3 (d) 6	1
12	The value of 9 sec²A – 9 tan²A is: (a) 1 (b) 9 (c) 8 (d) 0	1
13	The length of the shadow of a 10 m tall pole is 10√3 m. The angle of elevation of the Sun is: (a) 60° (b) 45° (c) 90° (d) 30°	1
14	From a point P at a distance of 13 cm from the centre O of a circle of radius 5 cm, a tangent PQ is drawn to the circle. The length of PQ is: (a) 8 cm (b) √194 cm (c) 12 cm (d) 18 cm	1
15	Two tangents PA and PB drawn from an external point P to a circle with centre O are inclined to each other at an angle of 70°. Then ∠AOB is equal to: (a) 110°(b) 70° (c) 90° (d) 140°	1
16	The length of the arc of a sector of a circle of radius 21 cm and sector angle 60° is: (Use π = 22/7) (a) 11 cm (b) 22 cm (c) 44 cm (d) 66 cm	1
17	The total surface area of a solid hemisphere of radius 7 cm is: (Use π = 22/7) (a) 154 cm² (b) 308 cm² (c) 462 cm² (d) 616 cm²	1
18	If the radius of a cylinder is doubled and its height is halved, then its volume: (a) remains the same (b) becomes double (c) becomes four times (d) becomes half	1

	Q.19 and Q.20 are Assertion–Reason type questions. A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as: (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.	
19	**Assertion (A):** $5 - \sqrt{3}$ is an irrational number. **Reason (R):** The difference of a rational number and an irrational number is an irrational number.	1
20	**Assertion (A):** The pair of linear equations $x + 2y = 5$ and $3x + 6y = 12$ has no solution. **Reason (R):** If $a_1/a_2 = b_1/b_2 \neq c_1/c_2$, then the pair of linear equations is consistent.	1
	SECTION – B (Section B consists of 5 questions of 2 marks each)	
21	Two friends jog around a circular park. One takes 20 minutes and the other takes 25 minutes to complete one round. If they start together from the same point and in the same direction, after how many minutes will they meet again at the starting point?	2
22	Find the coordinates of the point which divides the line segment joining A(–1, 7) and B(4, –3) in the ratio 2 : 3.	2
23	A kite is flying at a height of 45 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The string makes an angle of 30° with the ground. Find the length of the string, assuming that there is no slack in the string.	2
24	Evaluate: $2\tan^2 45° + \cos^2 30° - \sin^2 60°$	2
25	Find the area of a quadrant of a circle whose circumference is 44 cm. (Use $\pi = 22/7$) **OR** The minute hand of a clock is 21 cm long. Find the area swept by the minute hand in 5 minutes. (Use $\pi = 22/7$)	2
	SECTION – C (Section C consists of 6 questions of 3 marks each)	
26	Given that $\sqrt{3}$ is irrational, prove that $5 - 2\sqrt{3}$ is irrational.	3
27	If α and β are the zeroes of the polynomial $x^2 - 5x + k$ such that $\alpha - \beta = 1$, find the value of k.	3
28	Find the sum of the first 22 terms of an AP in which the common difference is 7 and the 22nd term is 149. **OR** The first and the last terms of an AP are 17 and 350 respectively. If the common difference is 9, how many terms are there in the AP and what is their sum?	3
29	Show that the points A(3, 0), B(6, 4) and C(–1, 3) are the vertices of a right-angled isosceles triangle.	3

30	In ΔABC, D and E are points on the sides AB and AC respectively such that DE ∥ BC. If AD = 4x – 3, AE = 8x – 7, BD = 3x – 1 and CE = 5x – 3, find the value of x.	3
31	4 pencils and 3 pens together cost ₹ 29, whereas 3 pencils and 4 pens together cost ₹ 27. Form a pair of linear equations for this situation and solve it to find the cost of one pencil and the cost of one pen. **OR** The sum of the digits of a two-digit number is 11. The number obtained by reversing its digits exceeds the original number by 27. Form a pair of linear equations and find the original number.	3
SECTION – D (Section D consists of 4 questions of 5 marks each)		
32	A train travels 300 km at a uniform speed. If the speed of the train had been 10 km/h more, it would have taken 1 hour less to cover the same distance. Find the speed of the train.	5
33	State and prove the Basic Proportionality Theorem (Thales Theorem).	5
34	From the top of a 20 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45°. Find the height of the tower. (Use √3 = 1.73) **OR** From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 30 m high building are 45° and 60° respectively. Find the height of the transmission tower. (Use √3 = 1.73)	5
35	A tent is in the shape of a cylinder surmounted by a conical top. The height and the diameter of the cylindrical part are 3 m and 7 m respectively, and the slant height of the conical top is 4 m. Find the area of the canvas used for making the tent. Also, find the cost of the canvas at the rate of ₹ 400 per m². (The base of the tent will not be covered with canvas.) (Use π = 22/7) **OR** A solid toy is in the form of a hemisphere surmounted by a right circular cone of height 8 cm. The radius of the base of the cone is 6 cm. Find the volume of the toy and also its total surface area. (Use π = 3.14)	5
SECTION – E (Case Study Based Questions)		
36	**Case Study – 1** Ravi wants to buy a bicycle and decides to save money every week. In the first week he saves ₹ 100, and in each of the following weeks he saves ₹ 20 more than he saved in the previous week. The amounts that he saves in the successive weeks form an Arithmetic Progression (AP). Based on the above information, answer the following questions:	
	(i) How much does Ravi save in the 4th week?	1
	(ii) In which week does Ravi save ₹ 300?	1

	(iii) Find the total amount saved by Ravi in the first 12 weeks. **OR** (iii) Find the total amount saved by Ravi from the 6th week to the 10th week (both weeks included).	2
37	**Case Study – 2** A circular pond with centre O and radius 6 m is built in a park. Two straight paths PA and PB are to be laid from a point P outside the pond such that they touch the pond at A and B respectively. The angle between the two paths, ∠APB, is 60°.  Based on the above information, answer the following questions:	
	(i) Find the measure of ∠OPA.	1
	(ii) Find the distance OP.	1
	(iii) Find the length of the path PA. (Use √3 = 1.73) **OR** (iii) Find the perimeter of ΔPAB. (Use √3 = 1.73)	2
38	**Case Study – 3** A circular garden of radius 21 m has a sprinkler fixed at its centre O. The sprinkler waters only the sector OAB shown shaded in the figure, where ∠AOB = 60°. (Use π = 22/7)  Based on the above information, answer the following questions:	
	(i) Find the length of the arc AB.	1
	(ii) Find the area of the sector OAB which is watered by the sprinkler.	1
	(iii) Find the area of the garden which is not watered by the sprinkler. **OR** (iii) Find the perimeter of the sector OAB.	2

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