



IMMANUEL HIGH SCHOOL

Nagavara, Bangalore – 560045

IMPORTANT QUESTIONS FOR SA-1

MATHEMATICS — CLASS X (SSLC)

Compiled from Previous Years' KSEAB SSLC Papers & DSERT LBA Question Bank

Legend: (PY) = repeatedly seen in past KSEAB SSLC annual/SA papers. (LBA) = matches DSERT Lesson Based Assessment style/competency. (PY+LBA) = both — highest priority for revision.

1. REAL NUMBERS

1-mark / MCQ / VSA

1. HCF of two co-prime numbers / of two prime numbers. [1] (PY+LBA)
2. If a and b are positive integers, $\text{HCF}(a,b) \times \text{LCM}(a,b) = \underline{\hspace{2cm}}$. [1] (PY+LBA)
3. State whether a given rational number (e.g. $13/3125$, $17/8$) has a terminating or non-terminating repeating decimal expansion, by inspecting the denominator. [1] (LBA)
4. State Euclid's Division Lemma / State the Fundamental Theorem of Arithmetic. [1] (PY+LBA)

2 & 3 marks

5. Prove that $\sqrt{2}$ is irrational. (Also asked for $\sqrt{3}$, $\sqrt{5}$, $\sqrt{7}$, and for $5+\sqrt{2}$, $3+2\sqrt{5}$, etc.) [2 or 3] (PY+LBA)
6. Express $140 / 156 / 3825 / 7429$ as a product of its prime factors, and hence find HCF/LCM using the Fundamental Theorem of Arithmetic. [2/3] (PY)
7. Find LCM and HCF of 6 and 20 (or similar pairs) by the Fundamental Theorem of Arithmetic and verify $\text{LCM} \times \text{HCF} = \text{product of the numbers}$. [3] (PY+LBA)

2. POLYNOMIALS

1-mark / MCQ / VSA

1. Maximum number of zeroes a quadratic/cubic polynomial can have; degree of a given polynomial. [1] (LBA)
2. If the graph of $y = p(x)$ touches the x -axis at one point, how many zeroes does $p(x)$ have? [1] (PY+LBA)
3. Sum and product of zeroes directly from $ax^2 + bx + c$ (formula recall: $-b/a$, c/a). [1] (LBA)

2 & 3 marks

4. Find the zeroes of the quadratic polynomial and verify the relationship between zeroes and coefficients — very frequently set on: $x^2 - 2x - 8$, $4u^2 + 8u$, $6x^2 - 3 - 7x$, $t^2 - 15$, $x^2 - 3x - 10$, $4x^2 - 4x - 3$. [2] (PY+LBA)
5. Find a quadratic polynomial whose sum and product of zeroes are given (e.g. $1/4$ & -1 ; -3 & 2 ; $1/4$ & -1). [2/3] (PY+LBA)
6. Given that two zeroes of a quartic (degree-4) polynomial are known (e.g. 1 and -1 for $x^4 - 3x^3 + x^2 + 3x - 2$), find all the remaining zeroes using division. [3] (PY)
7. α and β are zeroes of a quadratic polynomial with $\alpha + \beta = -3$, $\alpha\beta = 2$ — form the polynomial and also find a related expression such as $(\alpha - \beta)$ or $\alpha^2 + \beta^2$. [3] (PY)

3. PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1-mark / MCQ / VSA

1. Condition on a_1/a_2 , b_1/b_2 , c_1/c_2 for a unique solution / no solution / infinitely many solutions. [1] (PY+LBA)
2. Find the value of k for which the pair of equations has no solution / infinitely many solutions (e.g. $x + y - 4 = 0$, $2x + ky - 3 = 0$). [1] (PY+LBA)

2 & 3 marks

3. Check whether a pair of linear equations is consistent or inconsistent, giving reason (e.g. $5x-4y+8=0$, $7x+6y-9=0$). [2] (LBA)
4. Solve a pair of linear equations by substitution / elimination method. [2/3] (PY+LBA)
5. Solve graphically and shade the triangular region formed by the two lines and the x-axis or y-axis; state the vertices (e.g. $x-y=1$ & $2x+y=8$; $x+y=5$ & $2x-y=4$; $2x+y=6$ & $2x-y+2=0$). [3] (PY+LBA)
6. Solve a pair of linear equations by the cross-multiplication method (e.g. $3x-5y-4=0$ & $9x=2y+7$). [3] (PY+LBA)

Word problems — 3 & 4 marks (very high repeat rate)

7. Ages problem: 'Five years ago, A was thrice as old as B. Ten years later, A will be twice as old as B' — find present ages. [3/4] (PY+LBA)
8. Two-digit number problems: sum of the number and its reverse; digits differing by a given value — find the number(s). [3/4] (PY)
9. Fraction problems: 'A fraction becomes x when p is added to numerator & denominator, and becomes y when q is added' — find the fraction. [3/4] (PY)
10. Taxi/auto fare problems: fixed charge + per-km charge given two journeys — find the fixed charge and rate per km. [4] (PY+LBA)
11. Cost of items problems: '2 pencils and 3 pens cost ₹___; 4 pencils and 6 pens cost ₹___' type simultaneous-purchase problems. [3/4] (PY)
12. Income and expenditure / ratio-based word problem forming two linear equations. [3/4] (PY)

4. QUADRATIC EQUATIONS

1-mark / MCQ / VSA

1. Write the standard form of a quadratic equation; write the quadratic formula. [1] (LBA)
2. Find the discriminant of a given quadratic equation and state the nature of roots (e.g. $3x^2 - 7x + 4 = 0$; $x^2 - 4x + 4 = 0$). [1/2] (PY+LBA)
3. Sum/product of the roots of a quadratic equation directly from coefficients. [1] (LBA)

2 & 3 marks

4. Solve a quadratic equation by factorisation (e.g. $x^2 - 3x - 10 = 0$). [2] (PY+LBA)
5. Solve a quadratic equation using the quadratic formula (e.g. $2x^2 - 5x + 3 = 0$). [2/3] (PY+LBA)
6. Find the value of k for which a quadratic equation has equal/real roots (e.g. $2x^2 + kx + 3 = 0$; $kx^2 + 2x + 1 = 0$; $2x^2 - 4x + k = 0$). [2/3] (PY+LBA)

Word problems — 3 & 4 marks (very high repeat rate)

7. Sum of squares of two consecutive positive integers / consecutive odd integers is given — find the integers. [3] (PY+LBA)
8. Product of a person's age (5 years ago) and age (10 years later) is given — find the present age. [3/4] (PY)
9. Speed–distance–time (train/boat) problem: 'If speed had been x km/h more/less, it would take 1 hour more/less' — find original speed. [4] (PY+LBA)
10. Two-digit / cottage-industry cost-of-production problem leading to a quadratic equation — find the number of articles. [3/4] (PY)
11. Rectangular park/plot/field area problems — find length and breadth given perimeter/area relation. [3/4] (PY)

5. ARITHMETIC PROGRESSIONS

1-mark / MCQ / VSA

1. Find the common difference / first term / n th term formula recall from a given A.P. [1] (PY+LBA)
2. Given $a_n = 3n - 1$ (or similar), find the first term / common difference. [1] (LBA)

2 & 3 marks

3. Find the sum of the first n terms of a given A.P. using $S_n = n/2[2a+(n-1)d]$ (e.g. first 15 terms of 7,13,19,25,...). [2] (PY+LBA)

4. 'Which term of the A.P. ____ will be ____ more than its kth term?' type question. [3] (PY+LBA)
5. How many terms of a given A.P. must be taken so that their sum is a given value (e.g. 9,17,25,... sum = 636). [3] (PY+LBA)
6. Given sum of two specific terms (e.g. 4th & 8th, and 6th & 10th) find the first three terms of the A.P. [3/4] (PY+LBA)
7. Given $S_n = An^2 + Bn$ (e.g. $3n^2 + 5n$ or $4n - n^2$), find the A.P. and a required term. [3/4] (PY)
8. An A.P. of 20 terms has first term 12 and last term 106 — find the sum of the progression. [2/3] (PY)

Word problems — 3 & 4 marks (very high repeat rate)

9. Trees-planted-by-students / bricks-in-a-wall / seats-in-a-stadium type real-life AP sum problem. [3/4] (PY+LBA)
10. Savings/loan repayment in equal monthly instalments forming an A.P. — find total paid or a specific instalment. [3/4] (PY)
11. Sum of first 24 terms given $a_n = 3 + 2n$, or similar nth-term-given problems. [3] (LBA)

6. TRIANGLES

1-mark / MCQ / VSA

1. State the Basic Proportionality Theorem (Thales) / AA similarity criterion. [1] (PY+LBA)
2. In a triangle, $DE \parallel BC$; given two ratios/lengths, state (not prove) the relation $AD/DB = AE/EC$. [1] (LBA)

2 & 3 marks (numericals using BPT / similarity)

3. $DE \parallel BC$ in $\triangle ABC$; given AD, DB, AE find EC (or similar BPT numericals). [2] (PY+LBA)
4. If $\triangle ABC \sim \triangle PQR$ with given corresponding sides, find the unknown side / perimeter ratio. [2/3] (PY+LBA)
5. 'If one angle of a triangle equals one angle of another and the sides including these angles are proportional, the triangles are similar' — prove (SAS similarity). [3] (PY)
6. Prove: the diagonals of a trapezium ABCD ($AB \parallel CD$) intersecting at O divide each other proportionally. [3/4] (PY+LBA)

4 & 5 marks — theorem proofs (guaranteed every year, choose one of these two as the 5-mark question)

7. State and prove the Basic Proportionality Theorem (Thales' Theorem). [5] (PY+LBA)
8. State and prove converse of Thales Theorem. [5] (PY+LBA)
9. Prove AA similarity [4/5] (PY+LBA)
10. State and prove the Converse of the Pythagoras Theorem / Converse of BPT. [4/5] (PY)

7. COORDINATE GEOMETRY

1-mark / MCQ / VSA

1. Write the distance formula / section formula / midpoint formula / area-of-triangle formula. [1] (PY+LBA)
2. Identify a point lying on the x-axis or y-axis from given coordinates. [1] (LBA)

2 & 3 marks

3. Find the distance between two given points; find the distance of a point from the origin (e.g. (6,8) from origin). [2] (PY+LBA)
4. Find the coordinates of the midpoint of a line segment (e.g. A(5,4), B(1,4)). [1/2] (PY+LBA)
5. Find the point which divides a line segment in a given ratio (section formula), internally (e.g. (4,-3) & (8,5) in ratio 3:1). [3] (PY+LBA)
6. Find the ratio in which the x-axis or y-axis divides the segment joining two given points. [2/3] (PY+LBA)
7. Find the value of x for which the distance between the points A(2, -3) and B(x, 5) is 10 units.. [2/3] (PY+LBA)
8. Circle passes through a given point; given the centre, find the radius (uses distance formula). [2] (PY+LBA)
9. Find the value of x (or y) given the distance between two points, one of which has an unknown coordinate. [3] (PY)

10. Fourth-vertex-of-a-parallelogram problem: given A, B, C find D such that ABCD is a parallelogram (using midpoint of diagonals). [3] (PY)

Tip for revision planning: the (PY+LBA) tagged items above are the highest-yield questions — they appear almost every year in KSEAB SSLC papers AND match the DSERT LBA competency format, so they are the safest and most efficient starting point for both classroom LBA unit tests and the SA-1 exam. Encourage students to master the two theorem proofs under Triangles (Q7 & Q8) first, since one of them is guaranteed to appear as the 5-mark question.

