S3 Mathematics Practice Paper: Polynomials and Identities, Quadratic Equations, Graphs of Functions, Triangles and Quadrilaterals, Properties of Circles, Statistics

Level: S3 | Subject: Mathematics | 60 minutes | 100 marks | 24 questions | question paper

Section A: Polynomials and Identities (18 marks)

Show all working. Simplify by collecting like terms, and factorise completely.

#	Question	Marks
1	Expand (2x - 3)(x + 5) and evaluate the expression when x = 2.	5
2	Factorise (a) x^2 - 7x + 12, (b) 2x^2 - 5x - 3.	5
3	Given that (x + a)^2 = x^2 + 10x + b is an identity, find a and b.	4
4	Use long division to divide 2x^3 - 5x^2 - 4x + 3 by (2x - 1), and hence solve 2x^3 - 5x^2 - 4x + 3 = 0.	4

Section B: Quadratic Equations (17 marks)

Any valid method is accepted; give approximate answers correct to 2 decimal places.

#	Question	Marks
5	Solve x^2 - 6x + 5 = 0.	5
6	Solve 2x^2 + 3x - 4 = 0 using the quadratic formula, correct to 2 decimal places.	5
7	If the equation kx^2 - 8x + 2 = 0 (k not equal to 0) has equal roots, find k.	4
8	Find two consecutive positive integers whose product is 156.	3

Section C: Graphs of Functions (17 marks)

Show the completing-the-square steps; for intersections give both x and y coordinates.

#	Question	Marks
9	Given y = x^2 - 4x + 3, (a) find the vertex and axis of symmetry by completing the square, (b) find the intercepts with both axes.	5
10	Given y = -2(x - 1)^2 + 8, find (a) the maximum value and the corresponding x, (b) the x-intercepts.	4
11	Find the points of intersection of the line y = 3x - 2 and the curve y = x^2.	4
12	Describe the transformation that maps y = x^2 onto y = (x + 2)^2 - 5, and state the minimum point of the latter graph.	4

Section D: Triangles and Quadrilaterals (16 marks)

State the theorem or formula used; give areas in cm^2.

#	Question	Marks

13	A triangle has sides 8 cm, 15 cm and 17 cm. (a) Show that it is right-angled; (b) find its area and perimeter.	5
14	An isosceles triangle has base 12 cm and equal sides 10 cm. Find its height and area.	4
15	A rhombus has diagonals 6 cm and 8 cm. Find (a) its area, (b) its side length, (c) its perimeter.	4
16	Find the sum of the interior angles of a regular 12-sided polygon and the size of each interior angle.	3

Section E: Properties of Circles (16 marks)

Quote the circle property used; lengths in cm and angles in degrees.

#	Question	Marks
17	A circle of radius 10 cm has a chord of length 16 cm. Find the distance from the centre to the chord.	5
18	The angle at the centre is 130 degrees and C lies on the major arc. Find (a) the angle at the circumference subtended by AB, (b) the angle in the opposite segment.	4
19	P is an external point with OP = 13 cm, the radius is 5 cm and PT is a tangent. Find PT.	4
20	In a cyclic quadrilateral ABCD, angle A = 3x and angle C = 2x + 30 degrees. Find x and the sizes of these two angles.	3

Section F: Statistics (16 marks)

Give non-integer means and standard deviations correct to 2 decimal places.

#	Question	Marks
21	The data are 12, 14, 14, 15, 18, 19, 21 and 27. Find the mean, median, mode and range.	5
22	Find the mean and standard deviation of the data 2, 4, 6, 8 and 10.	4
23	A bag contains 5 red, 3 blue and 2 green balls. One ball is drawn at random. Find (a) the probability that it is red, (b) the probability that it is not blue.	4
24	The mean of 5 numbers is 12. A number 18 is added. Find the new mean.	3