

Presidential Schools Grade 5 Pre-selection Test

Mathematics Specification

Contents

1	Structure of the Mathematics test	3
2	Sample questions	4
3	Subject content.....	7
4	Rules for selecting candidates for admission.....	13

1 Structure of the Mathematics test

The Mathematics test will consist of one 60-minute paper.

The paper will contain 30 multiple-choice questions. Each question is worth one mark. Questions will test a range of knowledge and skills, including number and calculation, algebra, geometry, data and problem solving within a mathematics context.

Questions will have five options from which candidates select one option. Candidates record their answers on a separate answer sheet, which will be scanned.

There will be no penalty for incorrect answers, so candidates are advised to answer all the questions in the paper.

Calculators, mobile phones and any other electronic devices and unauthorized materials, such as dictionaries, are **not** allowed.

2 Sample questions

These sample questions are provided to give an indication of the types of questions that will appear in the test. They are not intended to be a comprehensive description of all of the types of questions that will be used.

Example 1

Aziz has 136 coloured pencils.

Zebo has 38 coloured pencils.

Kamola has 29 coloured pencils.

Kamola gives Aziz all her coloured pencils.

Now, how many more coloured pencils does Aziz have than Zebo?

- A 98
- B 127
- C 133
- D 145
- E 165

Correct answer: **B**

Example 2

Δ is a whole number.

$$67 - 2 \times \Delta + 49 = 100$$

Find the value of Δ .

- A 3
- B 6
- C 8
- D 13
- E 16

Correct answer: **C**

Example 3

Here is a sequence of numbers.

..... ; 3; 6; 12; ; 48

Two numbers are missing.

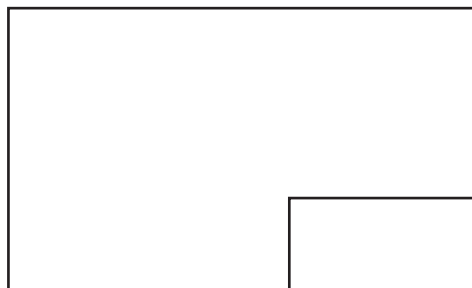
What is the sum of the two missing numbers?

- A 15
- B 19,5
- C 24
- D 25,5
- E 30

Correct answer: **D**

Example 4

A square of side length 6 cm and a square of side length 4 cm are joined together to make a new shape.



What is the perimeter of the new shape?

- A 24 cm
- B 32 cm
- C 36 cm
- D 40 cm
- E 52 cm

Correct answer: **B**

Example 5

An isosceles triangle has a perimeter of 18 cm.

The length of one of the sides is 8 cm.

What is the shortest possible side length in the triangle?

A 2 cm

B 4 cm

C 5 cm

D 6 cm

E 8 cm

Correct answer: **A**

Example 6

$p = 36$, $q = 6$, $r = 4$ and $s = 3$

Which of these statements is/are correct?

I. $p + q : s = 38$

II. $p : q \times s = 18$

III. $p - s \times s + r = 31$

A I only

B II only

C I and III only

D II and III only

E All of them

Correct answer: **E**

3 Subject content

The questions in the Pre-selection test may assess learning in any of the following topic areas. Questions will focus mainly on topic areas studied in Grade 4. However, these topics build on those already studied in Grades 1-3.

Grade 4 topic areas

	<i>Multidigit numbers</i>
1	Decimal numeration system
2	Multidigit numbers. Number position
3	Lines' perpendicularity
4	Four arithmetic operation and their execution order
5	Polyhedron
6	Rectangular parallelepiped. Cube
7	Writing technics of adding and subtracting
8	Parallel lines
9	Velocity. Time. Distance
10	Multiplying by a one-digit number
11	Dividing by a one-digit number
12	Coordinate plane (I quadrant) Quadrantal angle
13	Multiplying by numbers ending with zeros
16	Graphs
17	Diagrams. Tables
18	Dividing by numbers ending with zeros
19	Multiplying by two-and three-digit numbers
20	Fractions
21	Dividing by two-and three-digit numbers
22	Statements (sentences)
23	Using of calculator
24	Division with remainders
25	Addition of fractions with the same denominator
26	Subtraction of fractions with the same denominator
27	Comparison of fractions with the same denominator

Grade 3 topic areas

	<i>Repeating of the material studied in previous grades</i>
1	Expressions with brackets and without them
2	Adding and subtracting of two-digit numbers with transition through tens
3	Expressions with brackets
4	Associative law of addition
5	Subtracting sum from a number
6	Subtracting difference from a number
7	Relation between multiplication and division
8	Multiplying a number by 0 and 1
9	Dividing 0 by a number.
10	Dividing a number by 1
11	Dividing a number by a number
12	Commutative law of multiplication
13	Multiplication and division grid
16	Finding of a number's part. Finding a number knowing it's part.
	<i>Extra grid multiplication and division</i>
17	Calculations of type $20 \cdot 3$, $3 \cdot 20$
18	Calculations of type $60:3$, $100:2$
19	Calculations of type $90:30$
20	Multiplication of a sum by a number or a number by a sum
21	Calculations of type $24 \cdot 3$, $3 \cdot 24$
22	Expressions containing terms with letters
23	Dividing sum by a number
24	Calculations of type $39:3$, $42:3$, $72:4$
25	Checking of division
26	Dividing two-digit number by two-digit number
27	Checking of multiplication
28	Division with remainder (within the multiplication and division grid)
29	Division with remainder beyond the table
30	Checking of division with reminder
31	Multiplication of three and more multipliers
	<i>Numbering of three-digit numbers</i>
32	Hundreds
33	Composing numbers from hundreds, tens and ones.
34	Tree digit numbers
35	Relation between thousands, hundreds, tens and ones.
36	Representation of tree digit numbers as a sum of hundreds, tens, ones
37	Comparison of tree digit numbers
38	Units of length. Kilometre
39	A tenfold increase. A hundredfold increase
40	A tenfold decrease. A hundredfold decrease
41	Equation containing unknown summand
42	Equations of type $x - 27 = 54$, $63 - x = 26$
43	Equation containing unknown multiplier
44	Equations of type $x : 3 = 12$, $56 : x = 14$
45	Types of angles
46	Types of triangles
	<i>Addition and subtraction within 1000</i>
47	Methods of calculation
48	Expressions of type $240 + 80$, $240 - 80$, $320 + 250$, $580 - 350$

49	Roman numbers
50	Units of mass. Kilogram. Gram. Ton.
51	Adding and subtracting without transition through tens and hundreds
52	Adding with transition through tens, hundreds
53	Time units. Year, month, week, day, hour, minute.
54	Subtracting with transition through tens, hundreds
55	Expressions of type $504 - 265$
56	Equations of type $x + 125 = 142$, $156 + x = 342$
57	Equations of type $x - 125 = 142$, $236 - x = 158$, $x - 305 = 601 - 98$, $917 - x = 328 - 39$
	<i>Multiplication and division within 1000</i>
58	Multiplication and division by 1 and 0
59	Multiplication and division by 10 and 100
60	Expressions of type $30 * 4$, $200 * 3$, $320 * 3$
61	Expressions of type $800 : 4$, $490 : 7$, $600 : 20$, $900 : 300$, $240 : 30$
62	Time units: seconds
63	Digital clock
64	Century. Table of the time units
65	Multiplication without transition through tens and hundreds
66	Commutative law of multiplication
67	Multiplication with transition through tens and hundreds
68	Expressions of type $396 : 3$, $346 : 2$, $852 : 4$, $216 : 3$, $276 : 4$, $668 : 4$, $742 : 7$
69	Checking multiplication using division
70	Checking division using multiplication
71	Division with remainder and its checking
72	Equations of the type $x * 4 = 140$, $3 * x = 126$, $x : 3 = 258$, $581 : x = 7$
73	Value of expressions $a + b$, $a - b$, $a * b$, $a : b$
74	Square decimetre
75	Comparison of figure areas

Grade 2 topic areas

1	Simple tasks on finding sum and difference
2	Tasks with equal results
3	Checking of addition
4	Checking of subtraction
5	Right angle. Not right angle
6	Perimeter of a polygon
7	Number line and its models
8	Addition and subtraction within 100 with transition through tens.
9	Solving simple and compound problems
10	Digit's place value for two-digits numbers
11	Column method of addition
12	Working out the next terms of a sequence
13	Model of a coordinate system from the day-to-day life
16	Methods of subtraction within 100 with transition through tens
17	Column method of subtraction
18	Compound problems on subtraction
19	Time units: hour, minutes. Simple problems on determining time, distance, velocity
20	Transformation of simple figures into complex ones and vice-versa
21	Property of the opposite sides of rectangle
22	Square
23	Relation between components and results of addition and subtraction
24	Geometrical figures and values
25	Sum of several equal summands
26	Designation of a number as a sum of several equal summands
27	Solving simple and compound problems
28	Literal expressions
29	Designation of geometrical figures
30	Equations. Equation solving by trial and error method
31	Multiplying. What this operation used for
32	Multipliers and product
33	Relation between components and results of multiplication
34	Dividing. What this operation is used for
35	Dividing into equal parts. Part of a whole
36	Solving the problem using multiplying and dividing
37	Table method of problem solving
38	Finding of unknown multiplier
39	Finding of unknown dividend
40	Millimetre
41	Multiplying by 0, 1, 10
42	Dividing by 1, 10
43	Expressions with brackets and without them
44	Order of calculations in the expressions with brackets and without them
45	Multiplication and division within 100. Multiplication and division grid. Multiplying of a single-digit numbers and dividing by them
46	Compound problems
47	Fractions. Fractions of a number
48	Names and designation of fractions
49	Composing and solving a problem
50	Geometrical figures: square, rectangle, triangle, circle, and related values
51	Comparison and colouring the figures. Constructing a figure from parts and dividing it into parts.

52	Correct writing of dividend, divisor, quotient and remainder
53	Area of a rectangle and a square
54	Unit of area: square centimetre, and its notation cm^2
55	Area of figures drawn on the squared paper
56	Notation of the three-digits numbers
57	Composing numbers using hundreds, tens, ones
58	Representation of three-digit numbers as a sum of hundreds, tens, ones
59	Comparison of three-digit numbers
60	Verbal and written numbering within thousand
61	Unit of length: kilometre
62	Relation between thousands, hundreds, tens and ones
63	A number 1000
64	Multiplying and subtracting within 1000
65	Circle and circumference. Centre, radius, diameter of the circle.
66	Pair of compasses
67	Positional relationship of two circles on a plane
68	Finding of a number's part. Finding a number knowing its part. Comparison of parts.

Grade 1 topic areas

1	Objects and their properties
2	Numbers from 1 to 10.
3	Comparison of the numbers from 1 to 10
4	Designation of time
5	Even and odd numbers
6	Point. Line segment. Polygonal and curve lines
7	Addition and subtraction of number 0
8	Summands and sum
9	To add, to subtract. Meaning
10	Numbers from 11 to 20
11	Brackets
12	Addition pairs that make 10
13	Subtraction of single digits within ten
16	Reading and writing of numbers from 21 to 100
17	Counting in tens
18	Length and its unit: centimetre
19	Angle and its types
20	Polygons
21	Learning to solve problems
22	Textual tasks with addition and subtraction
23	Unit of mass: kilogram
24	Unit of volume: litre
25	Subjects' reflection in a mirror
26	Plane figures and solids
27	Units of length: decimetre and metre
28	Numerical expressions. Tables
29	Compound tasks
30	How to get the whole from the parts, and parts from the whole
31	Subtraction of a single digit from 100
32	Subtraction of a two-digit number from 100
33	Finding of a third summand
34	Working out the next terms of a sequence
35	Logical concepts "everything", "half", "the rest"
36	Measurement and comparison of lengths and distances
37	Constructing of different figures
38	Solving of intriguing problems

4 Rules for selecting candidates for admission

Scores in the Pre-selection Test are used to select the 480 most able applicants in each region, who then go forward to take the final Selection Test for admission to a Presidential School.

To ensure that candidates cannot be advantaged or disadvantaged by any slight differences that might exist in the overall difficulty of the test papers used for different test sittings, a process called Rasch analysis is used to equate the test scores. Instead of candidates being ranked on the basis of their actual score out of 30, they are ranked on the basis of their underlying ability score, which in this case is reported on a scale out of 100.

There is a trend of gradually increasing question difficulty as the Pre-selection Test proceeds. Where more than one candidate has the same ability score for the whole test, they are therefore ranked in the following order:

1. The candidate who scored highest on Questions 21-30.
2. (If still tied) the candidate who scored highest on Questions 11-20.
3. (If still tied) the candidate who scored highest on Questions 1-10.

If the candidates' scores are still tied, the younger candidate will be ranked higher.