Mathematics · Grade 7

Patterns, Functions and Algebra

Term 1–4 | 13 questions | CAPS-aligned

TOTAL 80 MARKS

NAME AND SURNAME _____ CLASS _____ DATE _____

Instructions

1. Read all the questions carefully before you begin writing.
2. Answer all the questions on the question paper itself.
3. Show all your working where the question asks for it.
4. Write neatly. Work that cannot be read cannot be marked.
5. You may use a pencil and a ruler for drawings.
6. Calculators are not allowed.

Question	Content of the question	Marks	Obtained
1	Multiple choice	3	
2	Matching	4	
3	Short questions	2	
4	Patterns, algebra and graphs	12	
5	Expressions with integers	5	
6	Numeric and geometric patterns	5	
7	Functions and relationships	2	
8	Graphs	3	
9	Equations	7	
10	Missing values in a table	3	
11	Algebraic expressions and equations	12	
12	More patterns and algebra	12	
13	Equations and graphs	10	
	Total	**80**	
	Percentage		%

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1 Multiple choice

3 marks

Choose the correct answer and circle its letter.

PRACTICE EXAMPLE · DO THIS ONE TOGETHER FIRST

If x = 2, what is the value of 4x + 1?

a 6 b 9 c 8

Replace x with 2: 4 × 2 = 8, then 8 + 1 = 9. The answer is b. Circle the b.

This example does not count for marks. It only shows you how to answer.

1.1 Which value of x makes x − 3 = −8 true? **(1)**

(a) x = −5 (b) x = 5 (c) x = −11

1.2 Which formula matches the rule "add 5 to the input x, and then multiply the answer by 2"? **(1)**

(a) y = 2x + 5 (b) y = 2(x + 5) (c) y = x + 10

1.3 If x = 4, what is the value of 3x − 5? **(1)**

(a) 12 (b) 17 (c) 7

2 Matching

4 marks

Match the description in COLUMN A with the correct word in COLUMN B. Write only the LETTER. One word is left over.

2.1 **(4)**

COLUMN A	COLUMN B	Answer
1. A letter that stands for an unknown number	A. Equation	1 = _____
2. A mathematical sentence with an equals sign	B. Term	2 = _____
3. A number in an expression that does not change, like the 8 in x + 8	C. Variable	3 = _____
4. One number in a pattern	D. Factor	4 = _____
	E. Constant	

3 Short questions

2 marks

3.1 If $y = x^2 + 1$, calculate y when $x = 3$. **(1)**

3.2 Solve by inspection: $x - 6 = -2$ **(1)**

4 Patterns, algebra and graphs

12 marks

4.1 Study the pattern and complete the table. **(3)**

Term number (n)	1	2	3	4	6	10
Term	4	9	14			

4.2 Write a general rule for the pattern in 4.1 that gives the term from the term number n. **(2)**

4.3 Look at the pattern: 1 ; 8 ; 27 ; 64 ; _____ **(3)**

a. Write the next term: _____

b. Describe how each term is related to its position: _____

c. What is the 10th term? _____

4.4 Solve by inspection and check your answer by substitution: $6x + 7 = 55$ **(2)**

4.5 An electrician charges R300 for a call-out plus R220 per hour. Write a formula for the total cost (C) if she works h hours, and calculate the cost for 3 hours. **(2)**

5 Expressions with integers

5 marks

5.1 If m = −4 and n = 6, calculate: a. m + n b. n − m **(2)**

5.2 Write an algebraic expression for: a. the temperature T drops by 9 degrees; b. −3 is subtracted from a number k. **(2)**

5.3 Solve by inspection: 3x − 4 = 23 **(1)**

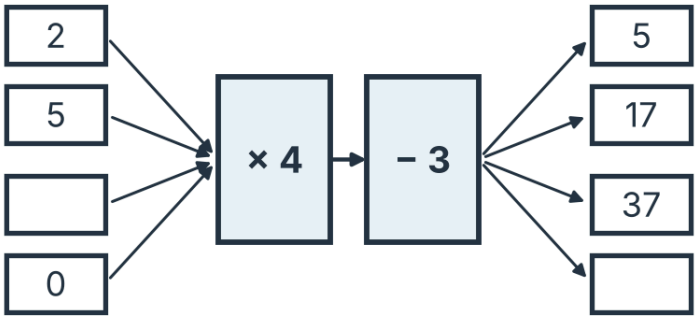
6 Numeric and geometric patterns

5 marks

6.1 Extend the number pattern: 8 ; 5 ; 2 ; −1 ; _____ ; _____ **(2)**

6.2 Write down the rule of this pattern. **(1)**

6.3 Complete the flow diagram. **(2)**



7 Functions and relationships

2 marks

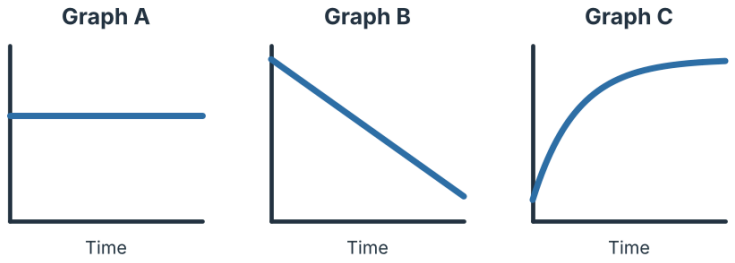
7.1 The rule is y = 5 − x. Complete the table. **(2)**

x	2	5	8
y	3		

8 Graphs

3 marks

8.1 Match each description with graph A, B or C. **(3)**



a. The temperature inside a fridge stays the same. _____

b. A candle burns down at a steady rate. _____

c. A seedling grows quickly at first and then more and more slowly. _____

9 Equations

7 marks

9.1 Solve by inspection or by trial and improvement. **(3)**

a. $4x + 5 = 33$ x = _____

b. $2(x - 3) = 14$ x = _____

c. $x \div 5 + 2 = 6$ x = _____

9.2 If a = 3 and b = −2, calculate: a. $2a - 3b$ b. $a^2 + b$ **(2)**

_____

_____

9.3 I think of a number. I multiply it by 3 and subtract 4, and the answer is 26. Write an equation and solve it. **(2)**

_____

_____

10 Missing values in a table

3 marks

10.1 The rule for the table is output = 4 × input + 3. Find a, b and c. **(3)**

Input	1	2	5	10
Output	7	a	b	c

11 Algebraic expressions and equations

12 marks

11.1 In the expression $7x - 4y + 9$: **(3)**

a. Which letters are the VARIABLES? _____

b. What is the CONSTANT? _____

c. Calculate the value of the expression if $x = 2$ and $y = 1$. _____

11.2 If $a = 4$ and $b = -3$, calculate: a. $a + b$ b. $a^2 - b$ **(2)**

11.3 Solve by inspection or by trial and improvement. Check your answer. **(4)**

a. $8x + 5 = 61$

b. $4x + 9 = 29$

11.4 I think of a number. I multiply it by 6 and add 5. The answer is 47. Write a number sentence and solve it by inspection. **(3)**

12 More patterns and algebra

12 marks

12.1 Find the integer that makes each number sentence true. **(4)**

a. $\square + 7 = 2$ b. $-4 - \square = -10$

c. $\square - (-3) = 1$ d. $-9 + \square = -9$

12.2 Write an algebraic expression for each sentence. **(3)**

a. Seven more than a number n: _____

b. Five times a number n: _____

c. Three less than a number n: _____

12.3 A geometric pattern uses matchsticks: 3 for the first triangle, then 2 for each one after that. **(3)**

a. How many matchsticks for 4 triangles? _____

b. Write the rule for n triangles: _____

c. How many for 10 triangles? _____

12.4 Solve: 3(x + 2) = 18 **(2)**

13 Equations and graphs

10 marks

13.1 Solve by inspection or by trial and improvement. **(4)**

a. x + 14 = 23 x = _____ b. 8x = 48 x = _____

c. x ÷ 3 = 5 x = _____ d. 2x − 5 = 11 x = _____

13.2 Draw a global graph (no numbers) of the distance a bus has travelled against time: the bus travels at a steady speed, stops at a bus stop for a while, and then travels on at a higher steady speed. Label the axes "time" and "distance". **(3)**

13.3 A taxi fare is R15 plus R4 per kilometre. **(3)**

a. What is the fare for 12 km? _____

b. Write a rule for the fare (F) for k kilometres: _____

c. What is the fare for 30 km? _____

Total **80 marks**



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