

# TEACHERS WITHOUT BORDERS PROGRAMME

BROUGHT TO YOU BY



basic education

Department:  
Basic Education  
REPUBLIC OF SOUTH AFRICA

With grateful thanks to our associate partners, The [National Department of Basic Education](#), The [Independent Examinations Board](#), [Siyavula Education](#), [Smarticks](#), [Noteshare](#), [Lemonlicious](#), [datacentrix](#), and most of all, to the schools and teachers from both the public and private education sectors who as founder contributors, have lent content to the [Teachers without Borders programme](#), for the benefit of all South Africa's learners.

In Bill Gates words, at the Mandela Day 'Living Together' address: "Maintaining the quality of this country's higher education system while expanding access to more students will not be easy. But it's critical to South Africa's future" – working together, we can help achieve this."

## Contributing schools to date:

Clifton School	Milnerton High	Rustenburg Girls' High	St Peter's
Durban Girls'	Northwood High	St Anne's DC	St Stithians
Fairmont High	Roedean	St John's DSG	Wynberg Boys' High
Herzlia High	Rondebosch Boys'	St Mary's DSG Kloof	Wynberg Secondary

**GRADE 9 MATHEMATICS  
JUNE 2019**

**Time: 2 Hours**

**Total: 120**

---

**PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY**

1. This question paper consists of 5 pages. Please check that your paper is complete.
  2. Read the questions carefully.
  3. Answer all the questions.
  4. Number your answers exactly as the questions are numbered.
  5. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
  6. Round off your answers to one decimal digit where necessary.
  7. All the necessary working details must be clearly shown. Answers only, without relevant calculations, may incur penalties.
  8. It is in your own interest to write legibly and to present your work neatly.
-

**Question 1**

- 1.1 Write 0,000 000 000 679 543 in Scientific notation. (2)
- 1.2 Express  $2,34 \times 10^{-4}$  as a number (2)
- 1.3 Simplify  $(5,123 \times 10^4) \times (2 \times 10^{-2})$ , leave your answer in Scientific notation (3)
- 1.4 Simplify, leaving your answer with a positive exponent:
- 1.4.1  $-2a^3b \times 6a^4b^2$  (2)
- 1.4.2  $(2x^2y^4)^3$  (2)
- 1.4.3  $\sqrt{16a^{16}}$  (2)
- 1.4.4  $\left(\frac{2x^3}{x^{-2}y}\right)^2$  (3)

**[16]****Question 2**

- 2.1 Expand and simplify:
- 2.1.1  $(a-3)(a+1)$  (2)
- 2.1.2  $(x+3)^2 - (2x-1)(2x+1)$  (4)
- 2.2 Factorise completely:
- 2.2.1  $3p^2q + 15pq^2 - 12pq$  (2)
- 2.2.2  $75x^3 - 12x$  (3)
- 2.2.3  $3x(x-3) + 2(3-x)$  (3)
- 2.2.4  $2x+8+bx+4b$  (3)
- 2.3 Find the value of  $2x^2 + 5x - 12$  if  $x = -3$ . (2)
- 2.4 If  $5^y = k$ , find  $5^{y+1}$  in terms of  $k$ . (3)

**[22]**

**Question 3**

3.1 Simplify:

$$3.1.1 \quad \frac{2x^3y^3}{2x^4} \times \frac{4xy^3}{6y} \times \frac{3x^2}{xy^3} \quad (4)$$

$$3.1.2 \quad \sqrt[3]{\frac{54x^6}{2x^3}} - \sqrt{\frac{8x^2y^3}{2y}} \quad (4)$$

$$3.1.3 \quad \frac{5m}{m^2 - 25} \div \frac{m+3}{m^2 + 2m - 15} \quad (4)$$

3.2 Solve for  $x$ :

$$3.2.1. \quad 3(x+1) = 2x - 3 \quad (3)$$

$$3.2.2 \quad \frac{2x+1}{3} = 5 - \frac{1}{2}x \quad (5)$$

$$3.2.3 \quad 2^{x+1} = 16 \quad (3)$$

$$3.2.4. \quad \left(\frac{1}{9}\right)^{x-2} = 81 \quad (4)$$

3.3 Monica received  $x$  marks in a test. Sandra received 4 marks more than Monica.3.3.1 Write down Sandra's marks in terms of  $x$ . (1)

3.3.2 When Monica subtracts 7 from her mark and squares the result, her answer is 1 more than Sandra's mark.

Write down an equation in  $x$  and show that it simplifies to

$$x^2 - 15x + 44 = 0 \quad (4)$$

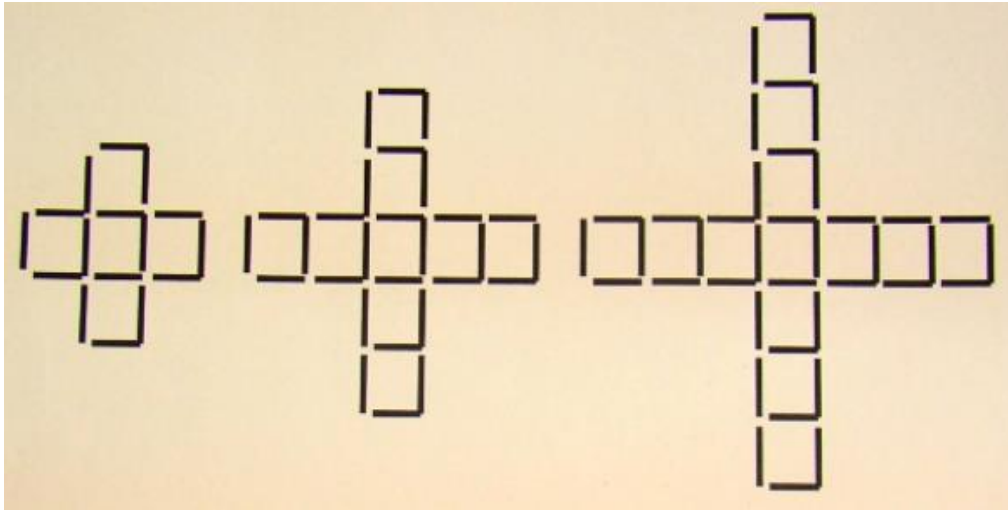
3.3.3 Solve the equation  $x^2 - 15x + 44 = 0$ . (3)

3.3.4 The test was marked out of 10. Write down the mark each girl received. (3)

**[38]**

**Question 4**

4.1 The following diagrams were built using sticks:



Picture 1

Picture 2

Picture 3

4.1.1 Study the diagrams above. Give the correct values of (a), (b) and (c).

Picture number (n)	1	2	3	4	5	6	...	(c)
Number of sticks (S)	16	28	40	52	(a)	(b)	...	124

(3)

4.1.2 Write down an equation for the  $n$ th term.

(3)

4.1.3 Use your formula to calculate which picture has 1228 sticks in total.

(2)

4.2 Given the pattern 2 ; 8 ; 32 ; 128

4.2.1 Give the next two terms.

(2)

4.2.2 Write down an equation for the  $n$ th term.

(3)

4.2.3 Find the value of the 10<sup>th</sup> term?

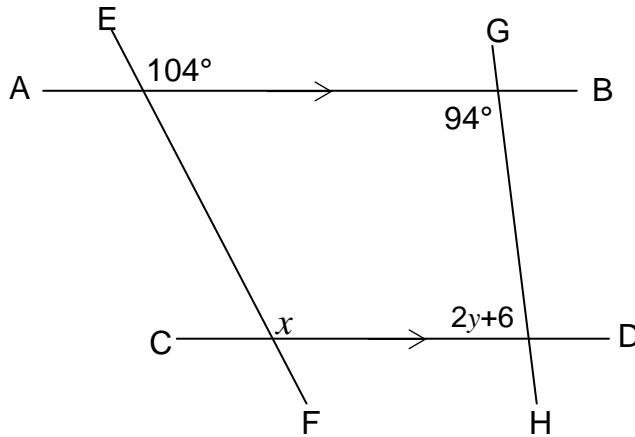
(3)

**[16]**

**Question 5**

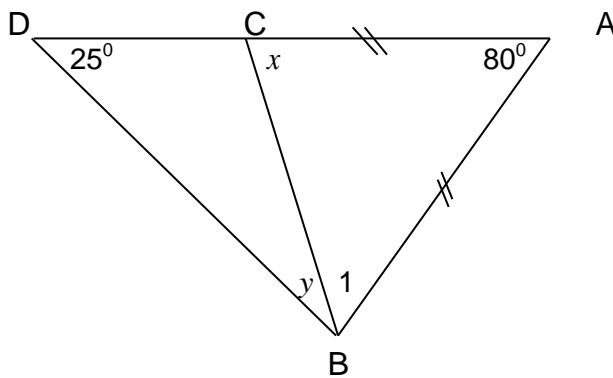
5.1 Solve for  $x$  and  $y$  in the diagrams below. Give reasons for your answers.

5.1.1



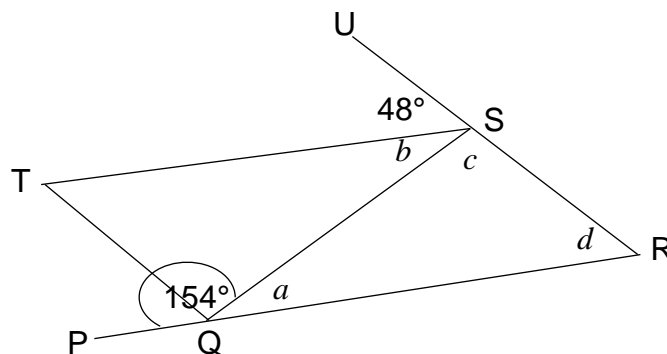
(5)

5.1.2



(8)

5.2 In the diagram below QRST is a parallelogram. Solve for the unknowns ( $a - d$ ) in the diagram below. Give reasons for your answers



(9)

5.3 The foot of a ladder is 10 m from the wall. The length of the ladder is 2 m longer than the height that it reaches on the wall. What is the length of the ladder?

(Hint: Let  $x$  = the height)

(6)

**[28]**