

**GAUTENG PROVINCE**

EDUCATION  
REPUBLIC OF SOUTH AFRICA

**GAUTENG DEPARTMENT OF EDUCATION  
PROVINCIAL EXAMINATION**

**JUNE 2016**

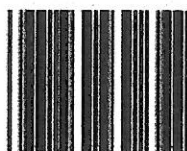
**GRADE 9**

**MATHEMATICS**

**TIME: 120 minutes**

**MARKS: 100**

**9 pages + 1 data sheet and 2 answer sheets**



**\* I 5 \***

**P.T.O.**

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**TIME: 120 minutes**

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**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1. This question paper consists of 9 questions and 12 pages.
2. Answer ALL questions.
3. A non-programmable calculator may be used unless stated otherwise.
4. Clearly show ALL calculations, diagrams and graphs, etc. that you have used in determining the answers. Answers only will NOT necessarily be awarded full marks.
5. If necessary, round-off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Use ANSWER SHEETS A and B to answer Questions 1 and 4. Detach these ANSWER SHEETS and submit them together with your ANSWER BOOK.
9. Write neatly and legibly.

## QUESTION 1

## MULTIPLE-CHOICE QUESTIONS

Answer this question on ANSWER SHEET A. Circle the letter of the correct answer from the 4 possible answers given.

1.1 The prime factors of 30 are ...

- A 1; 2; 3; 5; 12.
- B 3; 5; 6.
- C 2; 3; 5.
- D None of the above.

(1)

1.2 The number 0,000147560 in scientific notation is ...

- A  $0,14756 \times 10^{-3}$
- B  $1,4756 \times 10^{-4}$
- C  $1,4756 \times 10^4$
- D  $0,14756 \times 10^{-5}$

(1)

1.3  $1\frac{3}{4} + 1\frac{4}{5} =$

- A  $3\frac{11}{20}$ .
- B  $2\frac{7}{9}$ .
- C  $2\frac{7}{20}$ .
- D  $3\frac{7}{9}$ .

(1)

1.4 0,034297 correctly rounded-off to 4 decimals is ...

- A 0,0342.
- B 0,3430.
- C 0,0343.
- D 0,034.

(1)

1.5 Which number is both a square **and** a cube?

- A 64
- B 16
- C 8
- D 4

(1)

1.6 Which number is missing in the sequence:  $1; \frac{1}{2}; \frac{1}{4}; \dots; \frac{1}{16}$ ?

- A  $\frac{1}{8}$
- B  $\frac{1}{10}$
- C  $\frac{1}{12}$
- D  $\frac{1}{14}$

(1)

1.7  $(x-2)^2 =$

- A  $x^2 - 4.$
- B  $x^2 - 4x + 4.$
- C  $x^2 + 4.$
- D  $x^2 + 4x + 4.$

(1)

1.8 If  $3(x-1)(x+2) = 0$ ; then  $x =$

- A  $-1$  or  $2.$
- B  $1$  or  $-2.$
- C  $3$  or  $1$  or  $2.$
- D  $2$  or  $1.$

(1)

1.9 The factors of  $x^2 + 5x - 6$  are ...

- A  $(x-3)(x-2).$
- B  $(x+2)(x+3).$
- C  $(x+6)(x-1).$
- D  $(x-3)(x-2).$

(1)

1.10 The area of a rectangular figure is  $200 \text{ m}^2$ . If the length is doubled, the new area will be ...

- A  $300 \text{ m}^2.$
- B  $400 \text{ m}^2.$
- C  $200 \text{ m}^2.$
- D  $600 \text{ m}^2.$

(1)  
[10]

**QUESTION 2**

2.1 Calculate the value of  $3x^3 - 2x^2 - 9x + 2$  if  $x = -2$ . (2)

2.2 Simplify the following expressions. (Leave your answer in its positive exponential form.)

2.2.1  $3xy^2 - 5x^2y - 9xy^2 + 8x^2y - 3x^2$  (2)

2.2.2  $2^{x+y} \cdot 2^{x-y}$  (1)

2.2.3  $\frac{-2pq \times (2p^2q^3)^2}{32p^6q^7}$  (3)

2.2.4  $(2x-4)(2x+4)$  (2)

2.2.5  $\frac{2m+4}{m-3} \times \frac{m^2-3m+2}{m^2-4}$  (4)

2.3 Simplify the following without using a calculator. (Leave your answer in scientific notation.)

$3,4 \times 10^{-3} + 5,8 \times 10^{-5}$  (2)

2.4 Solve for  $x$ .

2.4.1  $8x + 3 = 3x - 22$  (2)

2.4.2  $x - \frac{x-1}{2} = 3$  (3)

2.4.3  $2^x = 16$  (2)

2.5 Factorise fully.

2.5.1  $3a^3 - 9a^2 + 6a$  (4)

2.5.2  $9x^2 - y^2$  (2)

2.5.3  $t^2(x-y) - w^2(y-x)$  (2)

[31]

### QUESTION 3

Nomvula and Sam decided to apply for motor vehicle finance to buy a car for the amount of R 150 000, 00. The loan is payable over 5 years at 9 % compound interest per annum.

3.1 Use the formula on ANNEXURE A to calculate the total amount payable at the end of the 5 years. (3)

3.2 Calculate the monthly instalments that will be paid. (3)

3.3 The previous owner bought the car for R 120 000,00 and sold it for R 150 000,00. Calculate the percentage profit made by the owner. (3)

[9]

### QUESTION 4

It takes the Gautrain 2 hours to travel a certain distance at an average speed of 150 km/h. The following table shows other options as well:

Average speed (km/h)	<i>a</i>	150	300	<i>c</i>
Time travelled in hours	4	2	<i>b</i>	$2\frac{1}{2}$

4.1 Determine *a*, *b* and *c* by showing all calculations. (6)

4.2 Plot the graph using the table and answers from Question 4.1. Use ANSWER SHEET B to answer this question. (4)

4.3 By using the graph that you have drawn for Question 4.2, determine how long it will take to cover the distance at an average speed of 100 km/h. (2)

[12]

### QUESTION 5

The following patterns are constructed by laying out matches in a pattern. Study the diagram below to answer the questions that follow.

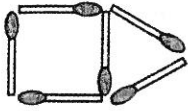


Figure 1

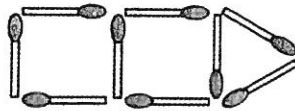


Figure 2

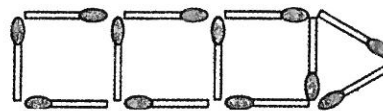
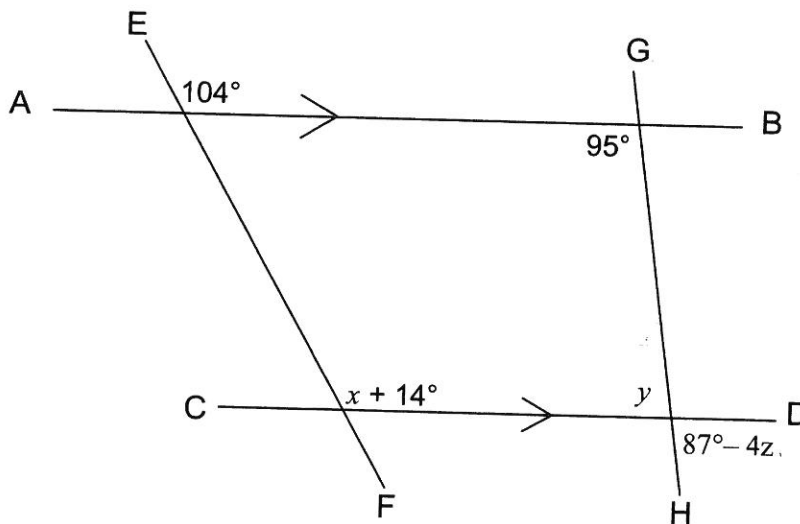


Figure 3

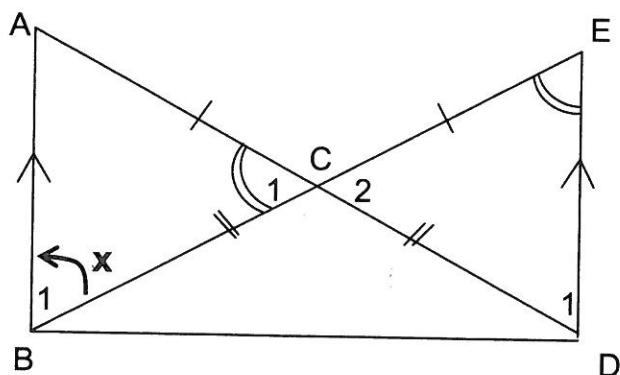
- 5.1 Determine the number of matchsticks in the next figure if the pattern is continued. (1)
  - 5.2 Describe the pattern rule in your own words. (1)
  - 5.3 Write the general term of the pattern in the form  $T_n =$ . (2)
  - 5.4 Use your answer to Question 5.3 to determine the number of matchsticks in the 20<sup>th</sup> figure. (2)
- [6]

### QUESTION 6



- 6.1 Calculate  $y$ . (3)
  - 6.2 Calculate  $x$ . (3)
  - 6.3 Construct a special angle of  $30^\circ$  without using a protractor. (3)
- [9]

QUESTION 7



In the given figure  $AB \parallel ED$ ,  $AC = CE$ ,  $BC = CD$ ,  $\hat{C}_1 = 60^\circ$  and  $\hat{C}_1 = \hat{E}$ .

7.1 Prove, with reasons, that  $\triangle ABC \equiv \triangle EDC$ .

(4)

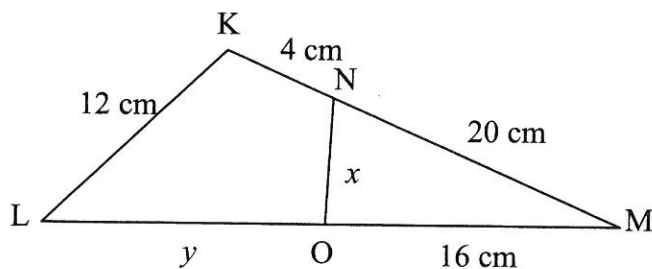
7.2 Calculate  $x$ .

(3)

[7]

QUESTION 8

In the diagram below it is proven that  $\triangle KLM \sim \triangle ONM$ .



8.1 Calculate the length of NO ( $x$ ).

(2)

8.2 Calculate the length of LO ( $y$ ).

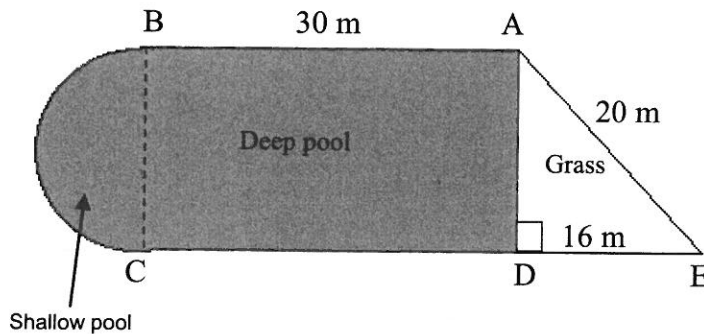
(3)

[5]



### QUESTION 9

Refer to ANNEXURE A for formulae to answer this question.



Study the diagram above of the entertainment area at a family resort. The grey area is made up of a shallow children's pool and a deep adults' pool. There is a triangular-shaped grass area, where visitors can relax. The dimensions of the space are as follows:

AB is 30 m, AE is 20 m, EC is 46 m and AD is perpendicular to EC.

- 9.1 Calculate the width of the entire swimming pool (AD). (2)
  - 9.2 Determine the area of the entire pool if the width is given as 12 m. (4)
  - 9.3 Determine the perimeter of the entire entertainment area.  
(Make use of the width as stated in Question 9.2.) (5)
- [11]

**TOTAL: 100**

**END**

**ANNEXURE A****QUESTION 3.1**

$$A = P(1+i)^n \text{ or } A = P\left(1 + \frac{r}{100}\right)^n$$

**QUESTION 9****Full circle:**

$$\text{Area} = \pi r^2$$

$$\text{Perimeter} = 2\pi r$$

$$\pi = 3,14$$

**Rectangle:**

$$\text{Area} = l \times b$$

$$\text{Perimeter} = 2(l + b)$$

**Triangle:**

$$\text{Area} = \frac{1}{2} b \times h$$

$$\text{Perimeter} = \text{Side}_1 + \text{Side}_2 + \text{Side}_3$$

Name and Surname: \_\_\_\_\_ Grade : \_\_\_\_\_

**ANSWER SHEET A**

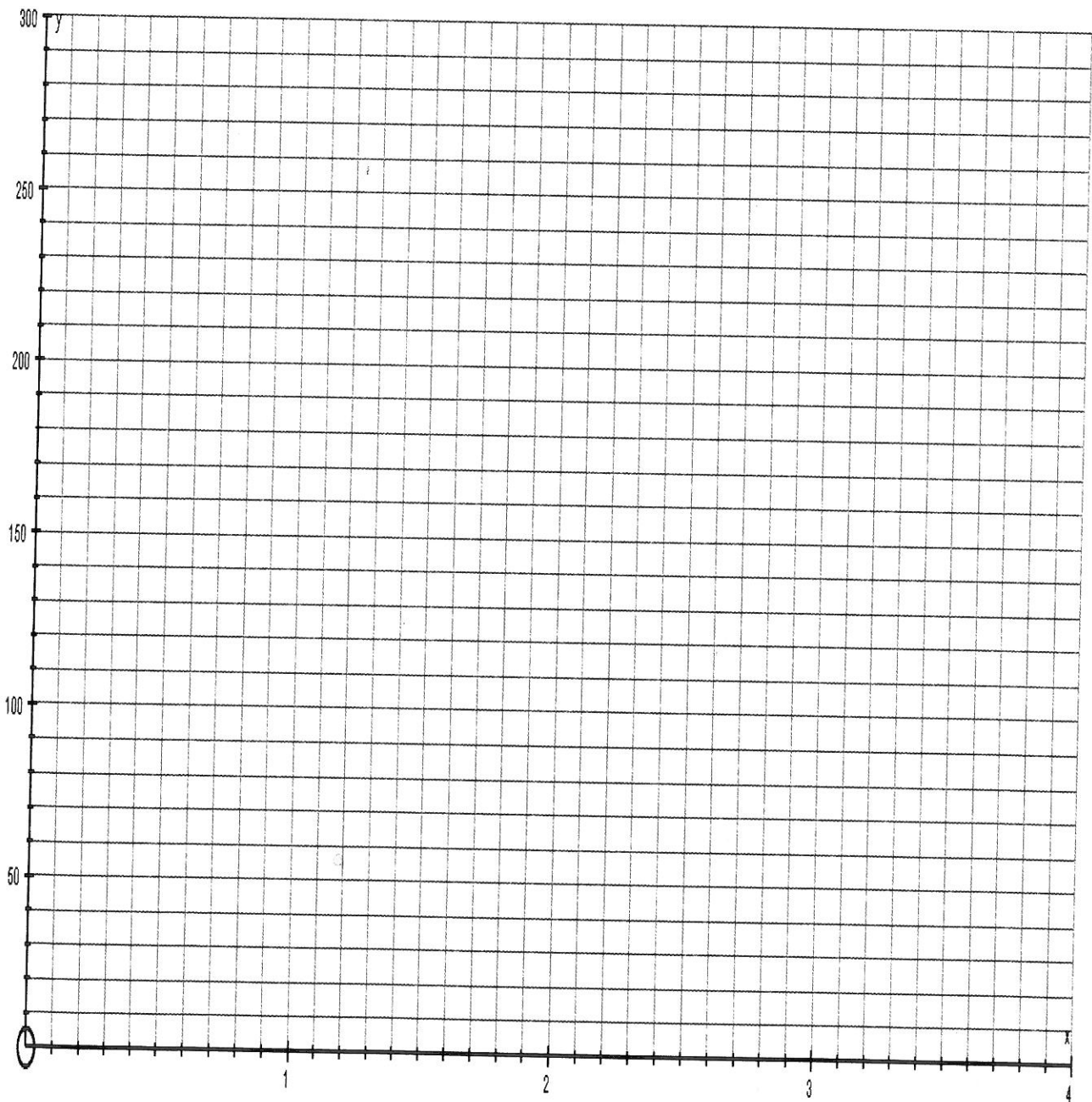
**QUESTION 1**

<b>1.1.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.2.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.3.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.4.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.5.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.6.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.7.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.8.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.9.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>1.10.</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>

Name and Surname: \_\_\_\_\_ Grade : \_\_\_\_\_

**ANSWER SHEET B**

**QUESTION 4**



## 6. GRADE 9 MATHEMATICS

### 6.1 Format of the question paper

Paper	Types of questions	Marks	Duration	Total
1	Numbers and number operations	27	2 hours	100
	Patterns, Functions and Algebra	40		
	Space and Shape (Geometry)	21		
	Measurements	12		

### 6.2 Numbering and sequence of questions

#### Question 1: Multiple-choice

Sub-questions numbered 1.1 to 1.10

#### Question 2: Algebraic expressions and equations; Exponents

Sub-questions numbered 2.1 to 2.5

#### Question 3: Whole numbers

Sub-questions numbered 3.1 to 3.3

#### Question 4: Whole numbers

Sub-questions numbered 4.1 to 4.3

#### Question 5: Numeric and geometric patterns

Sub-questions numbered 5.1 to 5.4

#### Question 6: Geometry of straight line

Sub-questions numbered 6.1 to 6.3

#### Question 7: Geometry of 2-D shapes

Sub-questions numbered 7.1 to 7.2

#### Question 8: Geometry of 2-D shapes

Sub-questions numbered 8.1 to 8.2

#### Question 9: Measurements

Sub-questions numbered 9.1 to 9.3

All questions are set across cognitive levels and arranged from lower to higher cognitive levels.

### 6.3 Cognitive demands of the paper

The question paper includes questions across all cognitive levels as outlined in the CAPS document.

The cognitive levels are in accordance with the taxonomies as devised by Bloom and Barrett.

#### 6.3.1 Weighting of cognitive levels

Cognitive levels	Description	% Paper 1
1	Knowledge	24 %
2	Routine procedures	46 %
3	Complex procedures	20 %
4	Problem solving	10 %

#### 6.3.2 Weighting of prescribed content

	Marks	Total	Duration
Number, Operations and Relations	27	100	2 hour
Patterns, Functions and Algebra	40		
Space and Shapes (Geometry)	21		
Measurement	12		

# DESIGN GRID FOR FORMAL TASKS: TESTS / EXAMINATIONS

MATHEMATICS: 2016			GRADE: 9			
TYPE OF TASK ANALYSED			EXAMINATION			
DATE			JUNE 2016			
Questions & Topics			Cognitive levels			
Questions	Topics	Total	Knowledge	Routine	Complex	Problem solving
<b>1</b>	<b>Multiple Choice(Variety of cognitive levels)</b>	<b>10</b>				
1.1				1		
1.2				1		
1.3				1		
1.4			1			
1.5			1			
1.6			1			
1.7				1		
1.8				1		
1.9				1		
1.10				1		
<b>2</b>	<b>Algebraic expressions and equations Exponents</b>	<b>31</b>				
2.1				2		
2.2.1			2			
2.2.2			1			
2.2.3					3	
2.2.4				2		
2.2.5				4		
2.3			2			
2.4.1						
2.4.2				3		
2.4.3			2			
2.5.1			4			
2.5.2			2			
2.5.3					2	
<b>3</b>	<b>Whole Numbers</b>	<b>9</b>				
3.1			3			
3.2				3		
3.3					3	
<b>4</b>	<b>Functions and relationships</b>	<b>12</b>				
4.1				6		
4.2					4	
4.3						2

<b>5</b>	<b>Numeric and Geometric patterns</b>	<b>6</b>				
5.1			1			
5.2			1			
5.3					2	
5.4						2
<b>6</b>	<b>Geometry of straight lines</b>	<b>9</b>				
6.1				3		
6.2				3		
6.3					3	
<b>7</b>	<b>Geometry of 2D shapes (Similar and Congruency)</b>	<b>7</b>				
7.1				4		
7.2			3			
<b>8</b>	<b>Geometry of 2D shapes (Proportions)</b>	<b>5</b>				
8.1						2
8.2					3	
<b>9</b>	<b>Measurements</b>	<b>11</b>				
9.1				2		
9.2						4
9.3				5		
	<b>TOTAL MARKS</b>	<b>100</b>	<b>24</b>	<b>46</b>	<b>20</b>	<b>10</b>
	<b>TOTAL PERCENTAGE</b>	<b>100 %</b>	<b>24 %</b>	<b>46 %</b>	<b>20 %</b>	<b>10 %</b>

#### 6.4 General information

- Learners will have a separate, correctly numbered answer sheet.
- Adhere to examination instructions.
- Ensure that learners answer all the questions.

#### 6.5 Marking guidelines

- Marks are only awarded for a correct answer. Therefore, no half-mark should be awarded. e. g (full mark/)
- No marks will be awarded for incorrect answers.
- Refer to the memorandum for marking.