ANNUAL NATIONAL ASSESSMENT 2014
GRADE 9 MATHEMATICS
TEST

MARKS: 140

TIME: $2\frac{1}{2}$ hours

PROVINCE ____________________________

DISTRICT ____________________________

SCHOOL NAME _______________________

EMIS NUMBER (9 digits) ________ ________ ________ ________ ________

CLASS (e.g. 9A) ______________________

SURNAME __________________________

NAME ______________________________

GENDER (✓) BOY ☐ GIRL ☐

DATE OF BIRTH C C Y Y M M D D

This test consists of 21 pages, excluding the cover page.
Instructions to the learner

1. Read all the instructions carefully.
2. Question 1 consists of 10 multiple-choice questions. You must circle the letter of the correct answer.
3. Answer Questions 2 – 12 in the spaces provided.
4. All working must be shown.
5. Give a reason for each of your statements in Question 9 and Question 10.
6. The test is out of 140 marks.
7. The test duration is $2\frac{1}{2}$ hours.
8. The teacher will lead you through the practice question before you start the test.
9. Approved scientific calculators (non-programmable and non-graphical) may be used except in Question 2.2 and Question 12.

Practice question

Circle the letter of the correct answer.

1. The next number in the sequence 3; 6; 11; 18; ... is

   A  25  
   B  24  
   C  26  
   D  27  

You have done it correctly if you circled D.

The test starts on the next page.
QUESTION 1

1.1 \( \sqrt{16x^{16}} = \ldots \)
   A 8x^8  
   B 8x^4  
   C 4x^4  
   D 4x^8

1.2 The LCM of 5a^3 and 60a^2 is \ldots
   A 60a^5  
   B 30a^3  
   C 60a^3  
   D 300a^6

1.3 The product of a number and 6 decreased by 4 is equal to 20. Which of the following equations matches the statement?
   A 6x + 4 = 20  
   B 6x - 4 = 20  
   C 6(x + 4) = 20  
   D 6 - 4x = 20
1.4 The value of $-x^2 - 2(2x - 1)$ when $x = -2$ is ...

A 6
B 1
C -6
D -1

1.5 What is the value of $(\frac{2}{3})^{-3}$?

A $\frac{-6}{9}$
B $\frac{5}{6}$
C $\frac{8}{27}$
D $\frac{27}{8}$

1.6 $(a + b)^0 =$

A $a + b$
B 2
C 1
D 0

1.7 What is the value of $x$ if $3^x = \frac{1}{9}$?

A -3
B 3
C -2
D 2
1.8 \[ \frac{x}{y} - 1 = \]
A \[ \frac{y - x}{x} \]
B \[ \frac{y - x}{y} \]
C \[ x - y \]
D \[ \frac{x - y}{y} \]

1.9 If 3 is a root of the equation \[ x^2 + x + t = 0 \] the value of t is …
A \[ 12 \]
B \[ -12 \]
C \[ \frac{1}{2} \]
D \[ \frac{1}{12} \]

1.10 If T is a point on the line defined by \[ y = x \], the co-ordinates of T are …
A \[ (5; -5) \]
B \[ (5; 0) \]
C \[ (-5; 5) \]
D \[ (-5; -5) \]
QUESTION 2

2.1 Write 0,000 000 207 \( mm^2 \) in scientific notation.

2.2 Calculate without using a calculator. Show in each case all the calculation steps.

2.2.1 \( \sqrt{73} - (-3)^2 \)

2.2.2 Between which two consecutive integers does \( \sqrt{110} \) lie?

2.2.3 \( \frac{3 \times 5^9}{5^7} \)

2.3 Calculate leaving the answer in decimal form.

\( 1,03 \times 10^{-2} + 3,8 \times 10^{-3} \)
QUESTION 3

Simplify each of the following expressions. The denominators in the fractions are not equal to zero.

3.1 \(2(x + 2)^2 - (2x - 1)(x + 2)\)

3.2 \(\frac{15x^2y^3 + 9x^2y^3}{8x^2y^3}\)

3.3 \(\frac{x^2 - 4x}{x^2 - 2x - 8}\)
3.4 \[ \frac{x^2}{2} + \frac{2x^2}{3} - \frac{7x^2}{6} \]

(3)

3.5 \[ \frac{6x^2}{7xy} \times \frac{3y^2}{2x} \]

(2)

[14]

QUESTION 4

Factorise fully:

4.1 \[ 3x^2y - 9xy^2 + 12x^3y^5 \]

(2)

4.2 \[ 2(x + y) - t(x + y) \]

(2)

4.3 \[ 4x^2 - y^2 \]

(2)

4.4 \[ x^2 - 11x + 18 \]

(2)

[8]
QUESTION 5

Solve for $x$:

5.1 $(x - 2)^2 + 3x - 2 = (x + 3)^2$

5.2 $x^2 - 5x - 6 = 0$

5.3 $\frac{x + 2}{3} - \frac{x - 3}{4} = 0$

[9]
QUESTION 6

6.1 Complete the table below:

<table>
<thead>
<tr>
<th>Position in pattern</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>Term</td>
<td>1</td>
<td>8</td>
<td>27</td>
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</table>

(2)

6.2 Write down the general term $T_n$ of the above number pattern.

(1)

6.3 If $T_n = 512$, determine the value of $n$.

(2)

[5]
QUESTION 7

Study the graph below.

7.1 Use the graph to calculate the gradient of the straight line.

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________ (3)
7.2 Determine the equation of the straight line.


(2)

7.3 Write down the gradient of any other straight line which can be drawn parallel to the given line.


(1)

[6]

QUESTION 8

8.1 Decrease 240 kg by 15%.


(2)

8.2 Nthabi’s car uses 1 litre of fuel to travel 12 km. How much fuel will be needed to travel 420 km?


(2)
8.3 There are **44** boys and girls in Mary’s class. The ratio of the number of boys to the number of girls is 5:6. How many boys are there in Mary’s class?


(3)

8.4 Study the table below.

<table>
<thead>
<tr>
<th>The length of a side of a square in cm</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of the square in cm²</td>
<td>4</td>
<td>9</td>
<td>16</td>
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</table>

Is this an example of a direct or an indirect proportion? Give a reason for your answer.


(2)

8.5 Calculate how long it will take for an investment of R4 000 at 3% per annum simple interest to earn an interest of R840.


(6)

8.6 Calculate the final amount that I will have in my savings account if I invest R600 for 2 years at a rate of 6% per annum compound interest.


(4)

[19]
QUESTION 9

9.1  Complete each of the following statements:

9.1.1  \( \tilde{D} \) and \( \tilde{F} \) are complementary angles if \( \) _________________.  \( \) (1)

9.1.2  The sum of the interior angles of a triangle is equal to \( \) __________.  \( \) (1)

9.1.3  The sum of the exterior angles of any polygon is equal to \( \) __________.  \( \) (1)

9.1.4  A trapezium is a quadrilateral with one pair of ________ sides.  \( \) (1)

9.1.5  The diagonals of a rectangle are ________________ in length.  \( \) (1)

9.2

In the figure above, \( \overline{AB} \parallel \overline{TC} \), \( \hat{C}_1 = 65^\circ \) and \( \hat{C}_2 = 43^\circ \). Calculate the size of \( \hat{A} \), \( \hat{B}_1 \) and \( \hat{B}_2 \).

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(3)
In \( \Delta ABC \), \( AB = AC \) and \( \hat{C} = x^\circ \). Determine the size of \( \hat{A} \) in terms of \( x \).

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\[ (3) \]

QUESTION 10

10.1

Which triangle is congruent to \( \Delta PQR \)?

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\[ (2) \]
10.2 In the given figure, \( P \) and \( T \) are points on a circle with centre \( M \). \( N \) is a point on a chord \( PT \) such that \( MN \perp PT \).

Prove that \( PN = NT \).

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(8)
In the above diagram, $AC = DF$, $AB = DE$ and $BF = CE$.

10.3.1 Prove that $BC = EF$.

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(2)

10.3.2 Prove that $\triangle ABC \cong \triangle DEF$.

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(5)
10.3.3 Why is $\bar{B} = \bar{E}$?

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<th>Reason</th>
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<tr>
<td>$\bar{B} = \bar{E}$</td>
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(1)

10.3.4 What is the relationship between $AB$ and $ED$?

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(2)
In the figure, $\overline{BE} = \overline{CE}$, $AD = 9 \text{ cm}$, $AE = 7 \text{ cm}$ and $CE = 21 \text{ cm}$.

10.4.1 Prove that $\triangle ABD \parallel \triangle ACE$.

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(6)

10.4.2 Calculate the length of $BD$.

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(5)

[31]
QUESTION 11

In parallelogram $ABCD$, $AB = 5\ cm$, $AD = 12\ cm$, $BT = 3\ cm$ and $AT \perp BC$.

11.1 Calculate the length of $AT$.

11.2 Calculate

11.2.1 the perimeter of trapezium $ADCT$.

11.2.2 the area of trapezium $ADCT$.
11.3 The circumference of a circle is 52 cm. Calculate the area of the circle correct to 2 decimal places.

__________________________________________

__________________________________________

__________________________________________

__________________________________________

__________________________________________ (4)

11.4 The length of a rectangle is doubled. Write down the value of $k$ if the area of the enlarged rectangle = $k \times$ the area of the original rectangle.

__________________________________________ (1)

[12]
QUESTION 12

Solve for $x$ without using a calculator. Show the calculation steps.

12.1 $x = (\sqrt{8} + \sqrt{2})^2$

$\phantom{\text{Step 1}}$

$\phantom{\text{Step 2}}$

$\phantom{\text{Step 3}}$ (3)

12.2 $\frac{1}{\sqrt{x}} = 3$

$\phantom{\text{Step 1}}$

$\phantom{\text{Step 2}}$

$\phantom{\text{Step 3}}$ (3)

[6]

TOTAL: 140