ANNUAL NATIONAL ASSESSMENT 2013
GRADE 9 MATHEMATICS
TEST

MARKS: 140

TIME: 2\(\frac{1}{2}\) hours

PROVINCE __________________________________________

REGION ___________________________________________

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 24 pages, excluding the cover page.
Instructions to the learner

1. Read all the instructions carefully.
2. Question 1 consists of 10 multiple-choice questions. Circle the letter of the correct answer.
3. Answer questions 2 to 14 in the spaces or frames provided.
4. Show all working.
5. Give a reason for each statement in QUESTION 8.
6. The test counts 140 marks.
7. The test duration is $2\frac{1}{2}$ hours.
8. The teacher will lead you through the practice exercise before you start the test.
9. You may use an approved scientific calculator (non-programmable and non-graphical).

Practice exercise

Circle the letter of the correct answer.

Which of the numbers below is a mixed number?

0; 0,2; $\frac{1}{8}$; $2\frac{1}{4}$

A 0

B $2\frac{1}{4}$

C 0,2

D $\frac{1}{8}$

You have answered the question correctly if you have circled B.

The test starts on the next page.
QUESTION 1

1.1 Which ONE of the following numbers is an irrational number?

A \( \frac{-3}{5} \)
B \( \sqrt{5} \)
C \( 0.3 \)
D \( \sqrt[3]{-64} \)

1.2 Which number is missing in the number sequence?

\( \frac{1}{3}; \ldots; \frac{1}{12}; \frac{1}{24}; \frac{1}{48} \)

A \( \frac{1}{6} \)
B \( \frac{1}{8} \)
C \( \frac{1}{9} \)
D \( \frac{1}{10} \)

1.3 The straight line graph defined by \( 3y + 2x + 1 = 0 \) will cut the X-axis at the point ...

A \( (-2; 0) \)
B \( (-\frac{1}{2}; 0) \)
C \( (-3; 0) \)
D \( (-\frac{1}{3}; 0) \)
1.4 Given the expression: \( \frac{x-y}{3} + 4 - x^2 \)

Circle the letter of the incorrect statement.

A The expression consists of 3 terms.
B The coefficient of \( x \) is 1.
C The coefficient of \( x^2 \) is -1.
D The expression contains 2 variables.

1.5 Complete: \( (-3xy^2)^2 = \)

A \(-6x^2y^2\)
B \(-9x^2y^4\)
C \(9x^2y^4\)
D \(6x^2y^2\)

1.6 0,000065 written in scientific notation is:

A \(0.65 \times 10^{-5}\)
B \(7.0 \times 10^{-5}\)
C \(6.5 \times 10^{-5}\)
D \(65 \times 10^{-5}\)

1.7 Complete: \( 9^{-1} \div 3^{-1} = \)

A \(3^2\)
B 9
C 3
D \(\frac{1}{3}\)
1.8 In the figure below, \( PS \parallel QR \). Which ONE of the following statements is true for this figure?

A. \( \triangle PTS \equiv \triangle PQT \)

B. \( \triangle PTS \equiv \triangle RTQ \)

C. \( \triangle PTS \cong \triangle SRT \)

D. \( \triangle PTS \cong \triangle RTQ \)

1.9 In the figure below, side \( DF \) of \( \triangle EDF \) is produced to \( C \). Calculate the size of \( \hat{E} \) in terms of \( x \).

A. \( 2x \)

B. \( 12x \)

C. \( 7x \)

D. \( 9x \)
1.10

The above discs are placed into a bag. What is the probability of taking out a disc marked with a number that is a multiple of 4?

A \( \frac{1}{11} \)

B \( \frac{8}{11} \)

C \( \frac{4}{11} \)

D \( \frac{3}{11} \)

[10]
QUESTION 2

Simplify each of the following expressions:

2.1 \[ \frac{6x^3}{x^4} - \frac{15x^3}{3x^2} \]

(3)

2.2 \[ x(x + 2) - (x - 1)(x - 3) \]

(4)

2.3 \[ \sqrt{225x^4} - \frac{3}{\sqrt{125x^6}} \]

(5)
2.4 \[ \frac{2x+1}{4} - \frac{x+2}{2} - \frac{1}{4} \]

\[ \text{[4]} \]

QUESTION 3

Factorise fully:

3.1 \[ 6a^3 - 12a^2 + 18a \]

\[ \text{[2]} \]

3.2 \[ 7x^2 - 28 \]

\[ \text{[2]} \]
QUESTION 4

Solve for $x$:

4.1 $3x - 1 = 5$

4.2 $2(x - 2)^2 = (2x - 1)(x - 3)$

4.3 $\frac{2x - 3}{2} + \frac{x + 1}{3} = \frac{3x - 1}{2}$

4.4 $x^3 = 64$
**QUESTION 5**

5.1 Write down the next TWO terms in the number sequence 7; 11; 15; ….  
____________________________________________________________ (2)

5.2 Write down the general term $T_n$ of the above number sequence.  
$T_n =$ ______________________________________________________ (2)

5.3 Calculate the value of the 50th term.  
____________________________________________________________  
____________________________________________________________  
____________________________________________________________ (2)
QUESTION 6

6.1 How long will it take to travel 432 kilometres at an average speed of 96 kilometres per hour?

_____________________________________________________________
_____________________________________________________________
(2)

6.2 Calculate the simple interest on R3 500 invested at 6% per annum for 3 years.

_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
(5)

6.3 Calculate how much money you will owe the bank after 3 years if you borrow R7 500 from the bank at 13% per annum compound interest.

_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
_____________________________________________________________
(4)
QUESTION 7

7.1 Use the graph below to answer the questions that follow.

7.1.1 Write down the coordinates of points A, B and C in the table.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-coordinate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y-coordinate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.1.2 Use the table in question 7.1.1 or any other method to determine the equation of line ABC.

________________________________________________________________________
________________________________________________________________________

(2)

7.2 Use the grid below to answer the questions that follow.

7.2.1 Draw the graphs defined by $y = -2x + 4$ and $x = 1$ on the given set of axes. Label each graph and clearly mark the points where the lines cut the axes.
7.2.2 Write down the coordinates of the point where the two lines cut one another.

______________________________________________________

(2)

QUESTION 8

8.1 In $\triangle PRT$ below, $M$ is the midpoint of $PR$ and $MR = MT$.

If $\hat{P} = 25^\circ$, calculate with reasons:

8.1.1 The size of $\hat{T}$

______________________________________________________

(1)

8.1.2 The size of $\hat{M}$

______________________________________________________

(1)

8.1.3 The size of $\hat{R}$

______________________________________________________

(3)
8.2 In $\triangle ABC$, $D$ and $E$ are points on $BC$ such that $BD = EC$ and $AD = AE$.

8.2.1 Why is $BE = CD$?

________________________________________________________________________ (1)

8.2.2 Which triangle is congruent to $\triangle ABE$?

________________________________________________________________________ (1)
8.3 In the figure below \(\triangle KNQ\) and \(\triangle MPQ\) have a common vertex \(Q\).

\(P\) is a point on \(KQ\) and \(N\) is a point on \(MQ\).

\(KQ = MQ\) and \(PQ = QN\).

Prove with reasons that \(\triangle KNQ \cong \triangle MPQ\).

____________________________________________________________
____________________________________________________________
____________________________________________________________
____________________________________________________________

(4)
8.4 In $\triangle NML$ below, $P$ and $Q$ are points on the sides $MN$ and $LN$ respectively such that $QP \parallel LM$.

$MN = 16\text{ cm}, QP = 3\text{ cm}$ and $LM = 8\text{ cm}$.

8.4.1 Complete the following (give reasons for the statements):

Prove with reasons that $\triangle QPN \parallel \parallel \triangle L MN$.

In $\triangle QPN$ and $\triangle L MN$

1. $\hat{N} =$ ............... ........................................

2. $\hat{P}_1 =$ ............... ........................................

3. $\hat{Q}_1 =$ ............... ........................................

$\therefore \triangle QPN \parallel \parallel \Delta$ ............... ........................................ (4)

8.4.2 Hence, calculate the length of $PN$.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________ (3)

[18]
QUESTION 9

9.1 Use the given grid to draw \( \Delta A'O'B' \), the reflection of \( \Delta AOB \) in the X-axis. (2)

9.2 Write down the coordinates of \( B' \), the image of \( B \). (1)

9.3 On the same grid, draw the rotation of \( \Delta AOB \) through \( 180^\circ \) about the origin to form \( \Delta A''O'B'' \). (2)

9.4 Hence, determine the length of \( A'A'' \). (1)
QUESTION 10

10.1

10.1.1 Show that the area of the shaded ring is equal to \( \pi (R^2 - r^2) \).

\[ \text{\hspace{1cm}} \]

\[ \text{\hspace{1cm}} \] (2)

10.1.2 Determine the area of the shaded ring in terms of \( \pi \) if
\( R = 14 \, \text{cm} \) and \( r = 8 \, \text{cm} \).

\[ \text{\hspace{1cm}} \]

\[ \text{\hspace{1cm}} \] (2)
10.2 In the triangular prism below, \( \triangle PQT \equiv \triangle PRT, PQ = PR \) and \( PT \perp QR \).

10.2.1 Determine the length of QT if QR = 48 cm. (Give a reason for your answer).

_______________________________________________________________________________________________________________________________________________________ (2)

10.2.2 If \( PQ = PR = 25 \text{ cm} \), show that \( PT = 7 \text{ cm} \).

_______________________________________________________________________________________________________________________________________________________
_______________________________________________________________________________________________________________________________________________________
_______________________________________________________________________________________________________________________________________________________
_______________________________________________________________________________________________________________________________________________________ (4)

10.2.3 Hence, calculate the area of \( \triangle PQR \).

_______________________________________________________________________________________________________________________________________________________
_______________________________________________________________________________________________________________________________________________________
_______________________________________________________________________________________________________________________________________________________
_______________________________________________________________________________________________________________________________________________________ (3)
10.2.4 Calculate the volume of the prism if \( RS = 80 \text{ cm} \).

_______________________________________________________

_______________________________________________________

_______________________________________________________

_______________________________________________________ (2)

10.2.5 Calculate the surface area of the prism.

_______________________________________________________

_______________________________________________________

_______________________________________________________

_______________________________________________________ (5)
QUESTION 11

The histogram below illustrates the Mathematics test marks, out of 10, obtained by a Grade 9 class.

11.1 Complete the frequency table for the given histogram.

<table>
<thead>
<tr>
<th>Mark ( x )</th>
<th>Frequency ( f )</th>
<th>Product ( f \cdot x )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11.2 How many learners were tested?

__________________________________________________________  (1)

11.3 Calculate the mean test mark.

The mean mark = ______________________________________

= ______________________________________

= ______________________________________  (3)

11.4 What percentage of the learners obtained 7 or more out of 10 for the test?

__________________________________________________________

__________________________________________________________  (2)

[10]
QUESTION 12

The following are the heights, in centimetres, of a group of Grade 9 learners.

156  147  173  165  170
145  153  165  149  158
163  156  153  157  137
177  146  150  153  158

12.1 Draw a stem-and-leaf plot to illustrate the data.

<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>
| 17   |        | (5)

12.2 Use the data to complete each of the following:

12.2.1 The range = ____________________________.

12.2.2 The mode = ____________________________.

12.2.3 The median = ____________________________.

12.2.4 The number of learners who are shorter than 160 cm = _________. [9]
QUESTION 13

A box contains 3 blue, 4 white and 5 green marbles of the same size.

13.1 If you take out 1 marble, what is the probability that you will take out a green marble?

__________________________________________________________________________ (1)

13.2 What is the probability of then taking out a white marble if you replace the marble that you took out of the box previously?

__________________________________________________________________________ (1)

13.3 If you take out a white marble and do not replace it, what is the probability of taking out another white marble?

__________________________________________________________________________ (1) [3]

QUESTION 14

The 200 Grade 9 boys in a school play soccer, hockey or both. If 150 boys play soccer and 130 play hockey, calculate how many of them play BOTH soccer and hockey.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________ (3) [3]

TOTAL: 140