Secondary School Annual Examinations 2010
Directorate for Quality and Standards in Education
Educational Assessment Unit

Form 4 Mathematics Scheme B
Non-Calculator Paper

Name ____________________________ Class _______

Instructions to Candidates

• Answer all questions. There are 20 questions to answer.
• Each question carries 1 mark.
• Calculators and protractors are not allowed.
• You are not required to show your working. However space for working is provided if you need it.
<table>
<thead>
<tr>
<th>No.</th>
<th>QUESTION</th>
<th>Space for Working if Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Work out ( \frac{a}{2} + \frac{a}{5} )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ans________</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Calculate the median of the numbers: 7, 3, 4, 6.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ans________</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Write 3·2 × 10^{-2} as an ordinary number.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ans________</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Simplify: ( 7a - 9 + 2a + 19 )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ans____________</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The area of the parallelogram is 36 cm². Find the height ( h ).</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="" alt="Parallelogram Diagram" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ans________ cm</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Which of the following are not the sides of a right angled triangle?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A) 3, 4, 5                  B) 5, 12, 13                  C) 4, 5, 6       D) 9, 12, 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ans________</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Express 40,000 cm² as m².</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ans________ m²</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Work out: ( 3 \frac{7}{8} - 1\frac{1}{2} )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ans________</td>
<td></td>
</tr>
</tbody>
</table>
9 EKH, EFL and NKGM are all straight lines. Which one of the following pairs of lines are parallel?

(A) EH and FG
(B) EL and NM
(C) FK and GH
(D) EL and GH

Ans_______

10 This is a scale drawing of the floor of a room. 1 cm represents 2 m. Calculate the perimeter of the floor of the actual room.

Ans_________m

11 Write the value of $\tan P$ as a decimal.

Ans_________

12 P is the reflection of Q(2, 3) in the y axis. What are the coordinates of P?

A) (3, 2) B (−2, −3) C(−2, 3) D(2, −3)

Ans_____}

13 The probability that an operation succeeds is $\frac{99}{100}$. How many operations out of 1000 will probably not succeed?

Ans_____

14 Which one of the following is equal to $k$?

A) $x + y$
B) $x + z$
C) $y + z$
D) $x − y − z$

Ans_______
<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Make $b$ the subject of the formula: $a = \frac{bh}{2}$</td>
<td>Ans_______</td>
</tr>
<tr>
<td>16</td>
<td>Three of the following points lie on a straight line. Which one does not?</td>
<td>Ans_______</td>
</tr>
<tr>
<td></td>
<td>A) (1, 3)       B (4, 12)       C(−5, −15)       D(9, 3)</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>What is the bearing of E from F?</td>
<td>Ans_______</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>What is the 100\textsuperscript{th} term of the sequence: 3, 6, 9, 12, ...?</td>
<td>Ans_______</td>
</tr>
<tr>
<td>19</td>
<td>Work out $\frac{3}{10} \div 6\frac{1}{2}$</td>
<td>Ans_______</td>
</tr>
<tr>
<td>20</td>
<td>Which of B, C and D is a 90° clockwise rotation of shape A about O?</td>
<td>Ans_______</td>
</tr>
</tbody>
</table>
1) The following frequency table shows information about the times that 50 factory workers take to travel to work.

<table>
<thead>
<tr>
<th>Time in minutes</th>
<th>0 &lt; t ≤ 10</th>
<th>10 &lt; t ≤ 20</th>
<th>20 &lt; t ≤ 30</th>
<th>30 &lt; t ≤ 40</th>
<th>40 &lt; t ≤ 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>8</td>
<td>22</td>
<td>14</td>
<td>4</td>
</tr>
</tbody>
</table>

Draw a **histogram** on the grid below to show all the information.

![Histogram Grid](image-url)
2) 
   a) Solve the equation: \( 5(2k - 1) = 35 \)
   Ans\______________
   
   b) Expand and simplify: \( 3(3a + 1) + 2(4 + 2a) \)
   Ans\______________
   
   c) Factorise completely: \( 7ax^2 + 21x \)
   Ans\______________

(6 marks)

3) 
   a) Calculate the length of AC.
   Ans\______________cm
   
   b) Calculate \( \angle CAB \).
   Ans\______________
   
   c) Explain why the quadrilateral ABCD is a trapezium.
   Ans\______________________________________
   _________________________________________
   _________________________________________
   (5 marks)
4)

a) Calculate the volume of a 50 cm long cylindrical copper rod of cross-sectional diameter 0.8 cm.
   Give your answer in cm\(^3\) correct to 2 decimal places.

\[
\text{Volume} = \pi r^2 h
\]

\[
\pi \approx 3.14159
\]

\[
r = 0.4 \text{ cm} \\
h = 50 \text{ cm}
\]

Ans \(
\approx \boxed{654.52} \text{ cm}^3
\)

b) Copper weighs 8.94 g/cm\(^3\). Calculate the weight in grams of one rod correct to 1 decimal place.

\[
\text{Weight} = \text{Volume} \times \text{Density}
\]

\[
\text{Density} = 8.94 \text{ g/cm}^3
\]

Ans \(
\approx \boxed{584.9} \text{ g}
\)

c) How many of these rods can be cast out of 7 kg of copper?

\[
\text{Number of rods} = \frac{\text{Total weight}}{\text{Weight of one rod}}
\]

\[
\text{Total weight} = 7 \text{ kg} = 7000 \text{ g}
\]

Ans \(
\approx \boxed{111} \text{ rods}
\)

(9 marks)
5) Janet used these ingredients to make 24 buns.

100 g butter
80 g sugar
2 eggs
90 g flour
30 ml milk

a) How much **flour** is needed to make 40 buns?

Ans______________g

b) Robert followed the same recipe and used 30 g sugar. How many **buns** did he make?

Ans______________buns

(4 marks)

6) The shape below is made up of a trapezium and a semicircle. Calculate the **total area** giving your answer correct to 3 significant figures.

![Diagram]

**Ans______________cm\(^2\)**

(7 marks)
7)  
   a) Complete the following table to obtain the coordinates of 7 points on the graph of the equation:  
      \[ y = x^2 + 2x - 5. \]
      
      \[
      \begin{array}{|c|c|c|c|c|c|c|}
      \hline
      x & -4 & -3 & -2 & -1 & 0 & 1 & 2 \\
      \hline
      x^2 & 16 & & 1 & 0 & & 4 & \\
      +2x & -8 & -6 & & 2 & & & \\
      -5 & -5 & -5 & -5 & -5 & -5 & -5 & -5 \\
      y & 3 & & -5 & & & -2 & \\
      \hline
      \end{array}
      \]
   
   b) Draw a set of axis taking values of \( x \) from \(-4 \) to \( 2 \) and values of \( y \) from \(-6 \) to \( 4 \). Use 2 cm for each unit on the \( x \) axis and 1 cm for each unit on the \( y \) axis.
   
   c) **Plot** the points found in (a) and **draw** the curve.
   
   d) From your graph find:
      
      i) The **minimum** value of \( y \).
      
      Ans ____________
      
      ii) The **value of** \( y \) when \( x = 0.9 \).
      
      Ans ____________
      
      iii) The **values of** \( x \) when \( y = 0 \).
      
      Ans ____________

(9 marks)
8) A two-digit number is formed by randomly taking the tens digit from set T and the units digit from set U.

![Sets T and U](image)

a) Complete the possibility space to show all the possible outcomes.

<table>
<thead>
<tr>
<th>Set T</th>
<th>Set U</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>26</td>
<td>9</td>
</tr>
</tbody>
</table>

b) Work out the probability that the number formed is:

i) A prime number.

 Ans________

ii) A multiple of 3.

 Ans________

(6 marks)

9) a) Write as a fraction in its lowest terms:

\[2^3 \times 4^{-2} = \text{__________}\]

b) Simplify:

i) \((n^5)^2 = \text{__________}\)

ii) \(\frac{p^6}{p^4} = \text{__________}\)

(8 marks)
10)  
   a) Gregory and Cynthia share €180 between them in the ratio 2 : 3. Calculate the amount that Cynthia receives.
      
      \[ \text{Ans } € \underline{\hspace{2cm}} \]

   b) Use the map below to answer the questions that follow:

   [Map Image]

   i) Measure the \textbf{map distance} in cm between Fort Manoel and Fort Ricasoli.
      
      \[ \text{Ans } \underline{\hspace{2cm}} \text{ cm} \]

   ii) Calculate the \textbf{actual distance} in metres between Fort Manoel and Fort Ricasoli.
      
      \[ \text{Ans } \underline{\hspace{2cm}} \text{ m} \]

   iii) What is the \textbf{bearing} of Fort Ricasoli from Fort Manoel?
      
      \[ \text{Ans } \underline{\hspace{2cm}} \]

   iv) A boat sails from point A on a bearing of 230°. \textbf{Where} is it heading to?
      
      \[ \text{Ans } \underline{\hspace{2cm}} \]

      (9 marks)
11) Calculate the size of an exterior angle of a 12-sided regular polygon.

\[ \text{Ans } \]

b) Write a Logo program which draws a 12-sided regular polygon of side 20 turtle steps, using the “repeat” function.

\[ \text{Ans } \]

(5 marks)

12) The following formula is used to change temperature from degrees Fahrenheit to degrees Celsius:

\[ C = \frac{5(F - 32)}{9} \]

* F is the temperature in degrees Fahrenheit and C is the temperature in degrees Celsius.

a) This is a spreadsheet. Write down a formula in cell B2 used to change the value in A2 from degrees Fahrenheit to degrees Celsius.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fahrenheit</td>
<td>Celsius</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>131</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) What number will be displayed in cell B2 when you press enter?

\[ \text{Ans } \]

(3 marks)
13) Lydia went for a bicycle ride. The distance-time graph shows part of her ride.

She set off from home at noon and stopped for a rest. At 14:30 she had a flat tyre and stopped again for 15 min to repair it. She then cycled back home at 25 km per hour.

a) At what time did she stop for a rest?

Ans________________

b) How far was Lydia from home when she had a flat tyre?

Ans_________km

c) How long did Lydia take to go back home?

Ans__________

d) Complete the distance-time graph to show the whole journey.

e) At what time did Lydia arrive back home?

Ans_____________

(6 marks)