SECONDARY SCHOOL ANNUAL EXAMINATIONS 2010
Directorate for Quality and Standards in Education
Educational Assessment Unit

FORM 3         MATHEMATICS (Non-Calculator Paper)   TIME:  30 minutes

1  2  3  4  5  6  7  8  9  10  Total

DO NOT WRITE ABOVE THIS LINE

Name: _________________________________  Class: ____________

INSTRUCTIONS TO CANDIDATES

• Answer ALL questions
• This paper carries a total of 25 marks
• Calculators and protractors are NOT ALLOWED
1. Calculate the **simple interest** on €5000 invested at 6% per annum for 3½ years.

   Ans: __________

   ___________________________________________________ (2 marks)

2. Work out the **selling price** of a watch bought for €60 and sold at a profit of 20%.

   Ans: __________

   ___________________________________________________ (2 marks)

3. I think of a number, multiply it by 4 and add 5. The answer is 57. What is the **number**?

   Ans: __________

   ___________________________________________________ (2 marks)

4. a) **Solve** the equation $4x + 8 = 29 + x$.

   Ans: $x = _____$

   b) Use the diagram to find the **value** of $y$.

   Ans: $y = _____$

   (4 marks)
5. Which is the **larger** $2^{-3}$ or $3^{-2}$, and by how much?

Ans: ____________
_________________________________________________ _______________________
(3 marks)

6. Put the following numbers in order of size, starting with the **smallest**.

\[
\frac{3}{4}, \sqrt{5}, 0.5, \frac{2}{5}, \frac{7}{10}, \frac{\pi}{3}
\]

Ans: _____; _____; _____; _____; _____; _____.
___________________________________________________ _____________________
(3 marks)

7. Which of the two shapes below has the **larger area**, and by how **much**?
(The diagrams are **not** to scale.)

Parallelogram

Circle (**Take** $\pi = \frac{22}{7}$)

Ans: _______________; ____________
_________________________________________________ _______________________
(3 marks)
8. Each exterior angle of a regular polygon is 15°. How **many sides** does this polygon have?

Ans: __________  
___________________________________________________ ______________________  (1 mark)

9. AB is a straight line joining the points A (3,4) and B (1,6). What is the **gradient** of line AB?

Ans: __________  
___________________________________________________ ______________________  (2 marks)

10. a) Work out : i) 4% of 150 m

Ans: __________  

ii) \( \frac{3}{10} \) of 850 kg

Ans: __________

b) What **fraction** of the circle’s area is the area of the minor sector shown?  
(O is the centre of the circle. Give the answer in the lowest terms.)

Ans: __________  
___________________________________________________ ______________________  (3 marks)

**END OF PAPER**
DO NOT WRITE ABOVE THIS LINE

Name: _________________________________  Class: ____________

CALCULATORS ARE ALLOWED BUT ALL NECESSARY WORKING MUST BE SHOWN.
ANSWER ALL QUESTIONS.

1. a) Work out: $5^{99} \div 5^{97}$
   Ans: __________

   b) The mass of an elephant is 20,000 kg. Write this number in standard form.
   Ans: __________

   c) Write $8.3 \times 10^{-5}$ as an ordinary number.
   Ans: __________

   _________________________________________________________
   (3 marks)

2. a) Factorise: $8a - 4b + 16c$
   Ans: __________

   b) Expand: $(x - 5)^2$
   Ans: __________

   c) The formula for the $n^{th}$ term of a sequence is $4n - 3$.
      i) Write down the first 4 terms of the sequence.
      Ans: _____, _____, _____, _____

      ii) Which term is equal to 117?
      Ans: __________

   _________________________________________________________
   (5 marks)
3. a) **Draw** a circle of radius 3 cm. Construct a regular hexagon of side 3 cm inside this circle.

   b) Use your protractor to **measure** one of the interior angles. **Ans:**

   c) Show how you can check your answer by using the formula for the sum of the interior angles.

   ____________________________________________________  ________________  (5 marks)

4. Gail and Thomas start a business. Gail invests €9,000 and Thomas €15,000. Each month Gail and Thomas share profits in the same ratio of their investment.

   a) Write the ratio €9,000: €15,000 in its **simplest form**.

      **Ans:**  ____ : ____

   b) In May the profit is €800. How much does each get?

      **Ans:** Gail _____; Thomas_____

   c) In June Gail gets €480. Work out the **total** profit.

      **Ans:**  __________

   d) In July Gail gets €312 less than Thomas. How much does each receive?

      **Ans:** Gail_____ ; Thomas _____
5. The heights, in metres, of a group of people are:
   
   1.62, 1.75, 1.90, 1.78, 1.60, 1.65, 1.54, 1.85, 1.65, 1.76.

   a) What is the modal height?
   
   Ans: ______

   b) What is the median height?
   
   Ans: ______

   c) Show that the mean height is 1.71 m.

   d) When a new member joins the group, the mean height becomes 1.7 m.
   
   Is this new member taller or shorter than 1.71 m? Why?
   
   Ans: _________________________________________________ _________________
   _____________________
   (5 marks)

6. a) The diagram shows a prism. Its uniform cross-section is a quarter of a circle of radius 3 cm. The prism is 5 cm long. Find its volume.
   
   Give your answer correct to the nearest cm³

   Ans: a) ______

   b) A cylinder is closed at both ends. Its diameter is 4 cm and its height is 12 cm. Calculate the total surface area of the cylinder. Give your answer correct to 2 decimal places.

   Ans: b) ______
7. The diagram shows triangle ABC in which AB is 4 cm, AC is 5 cm and BC is 3 cm. BN is perpendicular to AC.
   a) What is the size of $\angle ABC$?
   
   Ans: __________

   b) Work out the area of triangle ABC.
   
   Ans: __________

   c) Using your answer to part b), or otherwise, work out the length of BN.
   
   Ans: __________

   d) Work out the length of AN.
   
   Ans: __________

___________________________________________________ _____________________ (6 marks)
8. a) In the diagram O is the centre of the circle. A, B and C are points on the circumference.

Fill in: i) $\angle ABO = x^\circ$ reason: __________________________

ii) $\angle BOD = ____$ reason: exterior angle of a $\triangle$ is equal to the sum of the opposite interior angles.

Let $\angle CAO$ be $y^\circ$. Fill in:

iii) $\angle COD = _____$

Use the above facts to show that:

iv) $\angle BOC$ is twice $\angle BAC$.

b) Find the angles marked $p$ and $q$ in the diagram below. O is the centre of the circle.

Ans: $p = _____$, $q = _____$
9. The equation of a curve is \( y = 9 - x^2 \).

a) **Complete** this table of values.

<table>
<thead>
<tr>
<th>( x )</th>
<th>(-4)</th>
<th>(-3)</th>
<th>(-2)</th>
<th>(-1)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 9 )</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>( -x^2 )</td>
<td>-16</td>
<td>-4</td>
<td>-1</td>
<td>-1</td>
<td>-4</td>
<td>-9</td>
<td>-16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( y )</td>
<td>-7</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Using a scale of 2 cm for 1 unit on the \( x \)-axis and 1 cm for 1 unit on the \( y \)-axis **draw** the graph of \( y = 9 - x^2 \).

c) What are the **coordinates** of the maximum point? \textbf{Ans:} \( x = \) \hphantom{000000} ; \( y = \) \hphantom{000000}

d) Use **your graph** to solve the equation \( 9 - x^2 = 3 \). Give your answers correct to 1 decimal place.

\textbf{Ans:} \( x = \) \hphantom{000000} ; \( x = \) \hphantom{000000}

(9 marks)

10. From A the angle of depression of C is 54º and of D is 39º. AB is 24 m high.

Calculate, correct to 3 **significant figures**:

i) the distance \( BC \)  \hphantom{0000} ii) the distance \( CD \).

\textbf{Ans:} i) \( BC = \) \hphantom{000} \hphantom{000} ii) \( CD = \) \hphantom{00000000000}

(5 marks)
11. a) Using O as the centre of enlargement and a scale factor of 2, **draw** the enlargement of
ABCD. The image D’ of vertex D has been plotted for you.
**Label** the vertices A’, B’ and C’.

b) A ship sails 10 km from A on a bearing of 100° to point B. It then sails 12 km to C on a
bearing of 070°. Using a scale of 1 cm to represent a distance of 2 km, draw a diagram to
show this information.
Measure the length AC and write down the actual distance from A to C. Give your
answer correct to the nearest km.

**Ans:** _____________

(5 marks)
12. a) The formula for converting a temperature in degrees Fahrenheit to degrees Celsius is given by $C = \frac{5}{9}(F - 32)$.

i) **Find** the value of $C$ when $F = 68$.

Ans: ______° C

ii) Make $F$ the **subject** of the formula.

Ans: __________

iii) **Find** the value of $F$ when $C = 30$.

Ans: ______ ° F

b) **Solve** the simultaneous equations: $x + y = 5$ and $y = 1 + x$.

Ans: ______ ° F

\[ x = _____ \quad y = _____ \]
13. a) (i) Draw a tessellation of 4 more parallelograms using the parallelogram on the grid below.

(ii) Is it true that all parallelograms **tessellate**?  
Ans: _____________

b) One bag contains one 5c coin and two 10c coins. A second bag contains two 5c coins, one 10c coin and one 20c coin. One coin is taken at random from each bag. The possibility space below shows the total value of the two coins taken.

<table>
<thead>
<tr>
<th></th>
<th>1st bag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5c 10c 10c</td>
</tr>
<tr>
<td>5c</td>
<td>10c 15c</td>
</tr>
<tr>
<td>5c</td>
<td>10c</td>
</tr>
<tr>
<td>10c</td>
<td>15c 20c</td>
</tr>
<tr>
<td>20c</td>
<td>30c</td>
</tr>
</tbody>
</table>

(i) Complete this possibility space to show all the possible outcomes.

(ii) Find the probability that the total value of the two coins is 25c.  
Ans: ___________  

_______________________________________________________________ (4 marks)

END OF PAPER