COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

LEVEL 2: NON-CALCULATOR PAPER

Monday 26 January 2015

Please read this information before the examination starts.

- This examination is 60 minutes long.
- All questions should be attempted.
- A row of dots .......... denotes a space for your answer.
- You must show all your working or you may receive no marks.
- Answers given as fractions should be reduced to their lowest terms.
1. (a) Ann has £19.25 and Beth has £9.89
   How much money do Ann and Beth have in total?
   
   Answer: £ ........................................... (2)

(b) Colin has £21.32 and then he buys a bag which costs £8.73
   How much money does Colin have left?
   
   Answer: £ ........................................... (2)

(c) A box of pens costs £3.25
   How much would it cost to buy 8 of these boxes of pens?
   
   Answer: £ ........................................... (2)

(d) 8 identical boxes of pencils cost £28 altogether.
   How much does 1 box of these pencils cost?
   
   Answer: £ ........................................... (2)
2. Dan is 18 years old and Emma is 24 years old.
   (i) Write down the ratio of Dan’s age to Emma’s age in its simplest form.

   Answer: ................ : ................ (2)

   Mother shares £350 between Dan and Emma in the ratio of their ages.
   (ii) How much does Dan receive?

   Answer: £ ......................... (2)

3. Work out the value of
   (i) \(-4 + 8 \times 5\)

   Answer: .............................. (2)

   (ii) \(5 \times \sqrt{9} + 7\)

   Answer: .............................. (2)
4. (a) Work out 55% of £96

Answer: £.......................... (2)

(b) Jessica’s first throw of a javelin is 33 metres.
    Her second throw is 20% longer.
    How long is Jessica’s second throw?

Answer: .......................... m (2)

(c) (i) Write \( \frac{9}{20} \) as a percentage.

Answer: ..........................% (2)

(ii) Write the following numbers in order of size, starting with the smallest.

\[
55\% \quad \frac{9}{20} \quad 0.505
\]

Answer: .........................., .........................., .......................... (2)
5. (i) Write the number 32 as a product of its prime factors.

Answer: ............................................. (2)

(ii) Use your answer to part (i) to write 320 as a product of its prime factors.

Answer: ............................................. (1)

6. You are told that \( 654 \times 32.5 = 21255 \)
   Use this fact to work out

   (i) \( 654 \times 3.25 \)

   Answer: ............................................. (1)

   (ii) \( 655 \times 32.5 \)

   Answer: ............................................. (2)

   (iii) \( 21255 \div 3.25 \)

   Answer: ............................................. (1)
7. (i) Write each of the numbers in the following calculation correct to 1 significant figure.

\[
\begin{array}{c}
305 \times 6.123 \\
0.499 \\
\end{array}
\]

Answer: \[\underline{\hspace{2cm}} \times \underline{\hspace{2cm}}\] \hspace{2cm} (2)

(ii) Use your answer to part (i) to estimate the value of:

\[
\begin{array}{c}
305 \times 6.123 \\
0.499 \\
\end{array}
\]

Answer: \[\underline{\hspace{2cm}}\] \hspace{2cm} (2)

8. Paul is building a bookcase.
   All the shelves are \(\frac{3}{8}\) of a metre long.
   Paul has a piece of wood which is \(\frac{17}{20}\) of a metre long.
   He cuts 1 shelf from this piece of wood.
   (i) What fraction of a metre of wood is left over?

Answer: \[\underline{\hspace{2cm}}\text{m}\] \hspace{2cm} (2)

He then cuts another shelf from what is left over.
(ii) What is the length, in centimetres, of the piece of wood that remains?

Answer: \[\underline{\hspace{2cm}}\text{cm}\] \hspace{2cm} (2)
Paul buys a piece of wood which is 3 metres long.

(iii) How many shelves can he cut from this piece?

Answer: ........................................ (2)

9.  (i) At 9 am the temperature in Alaska is $-12.7\,^\circ C$ and in Washington it is $-2.9\,^\circ C$.

(a) What is the difference between these two temperatures?

Answer: ......................... $^\circ C$ (1)

By noon, the temperature in Washington has risen by $4.5\,^\circ C$.

(b) What is the temperature in Washington at noon?

Answer: ......................... $^\circ C$ (1)

(ii) There are two different temperature scales: Celsius ($^\circ C$) and Fahrenheit ($^\circ F$).

To convert Celsius to Fahrenheit multiply by $\frac{9}{5}$ then add 32

(a) If the temperature is $35\,^\circ C$, what is the temperature in Fahrenheit?

Answer: ......................... $^\circ F$ (2)

(b) If the temperature is $50\,^\circ F$, what is the temperature in Celsius?

Answer: ......................... $^\circ C$ (2)
10. If \( x = 2 \), \( y = -2 \), and \( z = 6 \) find the value of

(i) \( 7x + 4y \)

Answer: ........................................... (2)

(ii) \( xyz \)

Answer: ........................................... (2)

(iii) \( z - y^3 \)

Answer: ........................................... (2)

(iv) \( 2z^2 \)

Answer: ........................................... (2)
11. (i) Work out the size of each of the angles marked $a$, $b$, $c$ and $d$ in the diagram below.

Answer: $a = \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldOTS (1)

(ii) Is shape $ABCD$ a parallelogram?
Give a reason for your answer.

Answer: Yes/No reason: \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldOTS (2)
12. The currency in the Czech Republic is the koruna (CZK).
   £1 is worth 28 CZK.

   (i) What is £20 worth in CZK?

   Answer: .................................................. CZK (1)

   (ii) Draw a straight line on the grid below to convert CZK to £.

   (iii) **Showing clearly where you take your readings**, use your graph to help you
        answer the following questions:

   (a) How many CZK are worth £17.50?

        Answer: .............................................. CZK (2)

   (b) How many pounds are worth 420 CZK?

        Answer: £ .............................................. (2)

   (c) Tomas has 350 CZK.

        James has £14

        Who has more money and by how many pounds?

        Answer: .............................................. by £ ......................... (2)
13. (i) Using ruler and compasses, construct an equilateral triangle with sides of length 8 cm. (One side has been drawn for you already.)

(ii) Draw a line of symmetry of the triangle as accurately as you can.

(iii) By taking suitable measurements, calculate the area of the triangle.

Answer: \[ \ldots \ldots \ldots \ldots \ldots \text{ cm}^2 \] (2)

Look at the shape \( ABCD \).

(iv) What is the area of \( ABCD \)?

Answer: \[ \ldots \ldots \ldots \ldots \ldots \text{ cm}^2 \] (2)
14. A straight line has the equation \( y = 3 - 2x \)

(i) (a) Complete the table of values below for the line \( y = 3 - 2x \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>-1</th>
<th>1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Draw and label the line \( y = 3 - 2x \) on the grid opposite.

Another straight line has the equation \( y = 3x - 2 \)

(ii) (a) Complete the table of values below for the line \( y = 3x - 2 \)

<table>
<thead>
<tr>
<th>( x )</th>
<th>-1</th>
<th>1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td></td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

(b) Draw and label the line \( y = 3x - 2 \) on the grid opposite.

Look at the triangle formed by \( y = 3 - 2x, \ y = 3x - 2 \) and the y axis.

(iii) How many points with integer co-ordinates lie on the perimeter of the triangle?

Answer: ........................................

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15. The patterns below are made up of grey and white squares.

(pattern 1) (pattern 2) (pattern 3)

(i) (a) Draw pattern 4 in the grid below.

(b) Complete the table below to show the number of grey and white squares in each pattern.

<table>
<thead>
<tr>
<th>pattern</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>grey squares</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>white squares</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) How many grey squares are there in pattern 8?

Answer: ........................................ (1)

(d) In which pattern are there 16 white squares?

Answer: ........................................ (1)

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(ii) The sequence of numbers below shows the total number of squares in each pattern.

10 13 16 19 ..... ..... 

(a) What is the 8th term in this sequence?

Answer: ........................................ (1)

(b) Explain why the number 64 is in the sequence.

Answer: ............................................................................................................. (1)

TURN OVER FOR QUESTION 16
16. (a) Chris is building a patio using the rectangular paving blocks shown below.

(i) In terms of x, what is the perimeter of the block? Simplify your answer.

\[ 4x \text{ cm} \]
\[ (x + 5) \text{ cm} \]

Answer: \( \ldots \ldots \ldots \ldots \text{cm} \) (2)

(ii) The perimeter of the block is 90 cm.

(a) Using this information, write down an equation in terms of \( x \)

Answer: \( \ldots \ldots \ldots \ldots \) \( \) (1)

(b) Solve your equation to find the value of \( x \)

Answer: \( x = \ldots \ldots \) (1)

(iii) Calculate the area of the block.

Answer: \( \ldots \ldots \ldots \text{cm}^2 \) (2)

(b) Matt is building a rectangular swimming pool and has drawn the plan of it below.

Form an equation from this information and solve it to find the value of \( y \)

\[ (4y + 1) \text{ m} \]
\[ (2y + 11) \text{ m} \]
\[ (7y - 1) \text{ m} \]

Answer: \( y = \ldots \ldots \) (2)

(Total marks: 100)