Formative Mathematics Tasks

Contents

2
Task FM1  2
Task FM2  3
Task FM3  3
Task FM4  4
Task FM5  4
Task FM6  5
Task FM7  6
Task FM8  6
Task FM9  7
Task FM10 7
This unit contains a number of mathematics tasks for you to work on. You will need to complete two of these tasks for TMA 01. There are some notes that give additional information following the tasks but no answers or comments. You should work on these tasks either before Units 1, 2 or 3 or alongside the units. As you are working on these mathematics tasks you need to be aware of how you are working on them. This awareness will help you with your assignments.

Task FM1

Zin zing

The table below contains a number of clues. Consider each of the clues and use them to answer the following question. You may find it helpful to make a copy of the clues, cut them out and move them around as you work.

Here is a Word file of the Zin Zing clues for you to print and cut out.

**Question:** On which day was the Zin finished?

<table>
<thead>
<tr>
<th>The length of the zin is 50 feet.</th>
<th>Does work take place on Sunday?</th>
<th>There are 8 ponks in a schlib.</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is a cubit?</td>
<td>What is a zin?</td>
<td>Each block is one cubic foot.</td>
</tr>
<tr>
<td>The height of the zin is 100 feet.</td>
<td>The zin is built of stone blocks.</td>
<td>A working day starts at daybreak.</td>
</tr>
<tr>
<td>No work takes place on Daydoldrum.</td>
<td>Work started on Aquaday.</td>
<td>The working day has nine schlibs.</td>
</tr>
<tr>
<td>Only one gang is working on the construction of the zin.</td>
<td>The basic measurement of time in Atlantis is a day.</td>
<td>There are 3½ feet in a megalithic yard.</td>
</tr>
<tr>
<td>One member of each gang has religious duties and does not lay blocks.</td>
<td>Each worker takes rest periods during the working day totalling 16 ponks.</td>
<td>At any time when work is taking place, there is a gang of 9 people on site.</td>
</tr>
<tr>
<td>Which way up does the zin stand?</td>
<td>The zin is made of green blocks.</td>
<td>There are 8 gold scales in a gold fin.</td>
</tr>
<tr>
<td>Day Four in the Atlantian week is called Mermaiday.</td>
<td>Day Five in the Atlantian week is called Daydoldrum.</td>
<td>Day Three in the Atlantian week is called Sharkday.</td>
</tr>
<tr>
<td>Day Two in the Atlantian week is called Neptimus.</td>
<td>Day One in the Atlantian week is called Aquaday.</td>
<td>Green has special religious significance in Mermaiday.</td>
</tr>
<tr>
<td>An Atlantian day is divided into schlibs and ponks.</td>
<td>There are 5 days in an Atlantian week.</td>
<td>Workers each lay 150 blocks per schlib.</td>
</tr>
<tr>
<td>The width of the zin is 10 feet.</td>
<td>Each block costs two gold fins.</td>
<td>Each gang includes 2 women.</td>
</tr>
</tbody>
</table>

TMA 01 note
If you choose Task FM1 in TMA 01 then you must include justifications for your solution. This should include all the assumptions you have made.
Task FM2

Types of problem

1. A car goes from one town to another at 90 km/h and returns at 60 km/h. What was the average speed of the car?

2. How many first class stamps can you buy for £5?

3. A bus carries 47 passengers. A school wishes to transport 210 students and 7 teachers on a school trip. How many buses are needed?

4. The sum of two whole numbers is 17. What is the greatest product possible?

5. How many heads will you get if you toss a coin six times?

6. Show that the sum of the angles of a triangle equal 180°.

7. A gardener makes compost from loam, peat and sand in the ratio 7:3:2. If she had 1.5 litres of peat, how much loam and sand would she require?

8. Design a bookcase to hold 200 paperbacks and 20 CDs.

9. Find when $6 + 8 = 2$.

10. Find $x$ when $2(x + 3) = 2x + 6$.

TMA 01 note
If you choose Task FM2 to include in TMA 01 then you must answer question 1 and at least three of the questions numbered 2 to 10. You will also need to explain why you chose these questions and rejected the others.

Task FM3

Four 4s

Can you make all the numbers from 1 to 50 using four 4s and any of the normal symbols used with numbers, fractions and decimals?

For example:

$1 = (4 + 4) \div (4 + 4)$

$2 = (4 + 4) \div (4 + 4)$

and so on.

TMA 01 note
If you choose Task FM3 for TMA 01 then you will need to explain which symbols you used. You might find it helpful to explore some of the keys on a scientific calculator before completing this task. In particular the factorial key, !.
Task FM4

Geoboard geometry

1 Using a 3 × 3 geoboard make as many ‘different’ triangles as possible. Find out all you can about each triangle. (‘Different’ is intended to mean non-congruent.) You could do this on a physical geoboard with pins and rubber bands, or by drawing on dotty squared paper or the interactive geoboard at Nrich.

2 Find the area for each of your triangles. What do you notice?

3 Using a 3 × 3 geoboard find as many different quadrilaterals as possible. Find their areas. What do you notice?

TMA 01 note
If you choose Task FM4 for TMA 01 then you will need to explain any patterns that you have spotted while exploring triangles and quadrilaterals areas on geoboards.

Task FM5

Troubling Triples

Start with a rectangular piece of paper.

Fold the paper to make a large square and cut off the extra piece.

Find the mid-point of the top and the left sides of the square.

Draw a straight line from the midpoint of the top to the bottom-left corner.

Draw another line from the bottom-right corner towards the midpoint of the left side but stop at the line that is already drawn.

You should have a square marked up as below.
1. Identify which sides, angles and areas of the three shapes will be equal. Are the two triangles congruent or similar? Now cut the card into three pieces.

2. Find (and draw) all the shapes you can make with two of the pieces, assuming that the touching edges are the same length.

3. Find (and draw) all the shapes you can make with all three pieces, again with touching edges equal.

**TMA 01 note**

If you choose Task FM5 for TMA 01 then alongside each shape, write its name and note whatever properties you know about it. Properties could include: equal angles, equal sides, parallel sides, right angles and symmetries.

**Task FM6**

11 squares

1. Draw a 3 × 3 square. Can you divide it up into smaller squares? How many ways can you do it?

2. Draw some more squares, maybe 4 × 4, 5 × 5, etc. and find out how many ways you can divide them into smaller squares.

3. Can you cut a square into exactly 11 squares with no scraps and no overlaps?
Task FM7

Counting
How many triangles are in this diagram?

![Diagram of triangles]

Explain the method you used to count and record all the triangles.
Extend the problem and find the number of triangles in your new diagram.

Task FM8

Shaking hands
1. If there were five people in a room and everyone shook hands with everyone else once and once only, how many handshakes would be required? Give reasons for your answer.
2. If one person came into the room, how many more handshakes would be needed?
3. Find a rule that tells us how many handshakes are needed for any number of people in the room.

TMA 01 note
If you choose Task FM6 for TMA 01 then you must include diagrams for your solutions.

TMA 01 note
If you choose Task FM7 in TMA 01 then you must include all diagrams and the way you counted the various triangles.

TMA 01 note
If you choose Task FM8 for TMA 01 then you must complete all parts of the task.
Task FM9

Polygon patterns

1. Draw a number of polygons. Draw in all the diagonals and count them.
2. Find a rule linking the number of vertices to the number of diagonals in your polygons.
3. Find a rule that links number of vertices to the number of diagonals in any polygon.

TMA 01 note
If you choose to include Task FM9 in TMA 01 then you must complete all parts.

Task FM10

A thought experiment

1. Look at these two triangle pictures made from counters. What is the least number of counters to be moved from one picture to make it into the other?

2. Try again with different sized triangle pictures. Is there a pattern in the number of moves?

TMA 01 note
If you choose to include Task FM10 in TMA 01 then you must complete both parts and explain your thinking.