Question 1: These patterns are made from sticks

(a) Draw pattern 4
(b) Draw pattern 5
(c) How many sticks will there be in pattern 6?
(d) How many sticks will there be in pattern 10?
(e) Which pattern will use 31 sticks?

Theo says that he has made a pattern with exactly 100 sticks.

(f) Explain why Theo must be wrong.

Question 2: Here are some patterns of dots

(a) Continue the pattern to show pattern 4
(b) How many dots will there be in pattern 6?
(c) Which pattern will use 28 dots?
(d) Which pattern will use 43 dots?

Pattern 800 has 2401 dots.

(e) How many dots will pattern 801 have?
(f) How many dots will pattern 799 have?
Question 3: The patterns below are made from sticks

(a) Complete the table for pattern 4.

<table>
<thead>
<tr>
<th>Pattern Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Sticks</td>
<td>8</td>
<td>14</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

(b) Sketch pattern 5.

Here is a rule for working out the number of sticks

**Multiply pattern number by 6 and add 2**

(c) How many sticks will be in pattern 30?
(d) How many sticks will be in pattern 120?
(e) Which pattern will have 80 sticks?
(f) Which pattern will have 482 sticks?

Question 4: The diagram shows a sequence of patterns

(a) Draw pattern 4.

(b) Work out the number of circles in pattern 5.

(c) Write down a rule for continuing the patterns.

(d) Explain why you **cannot** make a pattern with exactly 66 circles.

(e) Complete this rule

Number of circles = Pattern number x □ - □
Question 5: The patterns below are made from sticks.

(a) Write an expression, in terms of $n$, for the number of sticks in pattern $n$
(b) How many sticks will there be in pattern 55?
(c) Which pattern number will use exactly 100 sticks?

Question 6: These patterns are made from sticks.

(a) Write an expression, in terms of $n$, for the number of sticks in pattern $n$
(b) How many sticks will there be in pattern 220?
(c) Which pattern number will use exactly 139 sticks?

Question 7: The patterns below are made from squares and triangles.

(a) How many triangles are there in pattern 6?
(b) How many squares are there in pattern 7?
(c) Write an expression, in terms of $n$, for the number of squares in pattern $n$
(d) Write an expression, in terms of $n$, for the number of triangles in pattern $n$
Question 1: Here is a pattern made with circular discs.

(a) Find an expression, in terms of \( n \), for the number of discs in pattern number \( n \).

Olivia has 103 discs.

(b) Can Olivia make a pattern in this sequence using exactly 103 discs? Explain your answer.

Question 2: Here is a pattern of blue and yellow squares.

Which statements below are true?

A  Pattern 5 has 9 blue squares
B  The number of yellow squares is always even
C  Pattern 10 has 50 squares in total
D  Every pattern has more yellow than blue squares
E  Pattern 7 has 28 yellow squares
F  The number of blue squares in Pattern 16 is a prime number

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