



EQUIPATTERN

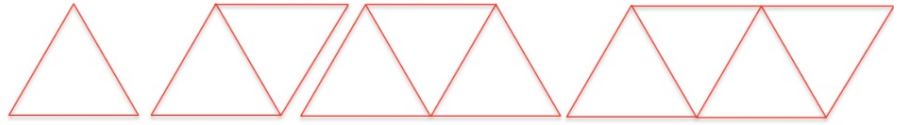
Copy this pattern.

You could use

toothpicks or

paper sticks or

draw the pattern on isometric paper (see page 2).



Make or draw the next 3 patterns in the sequence.

A friend can only see the 1st pattern.

How would you explain how to make or draw the next 2 patterns in the sequence?

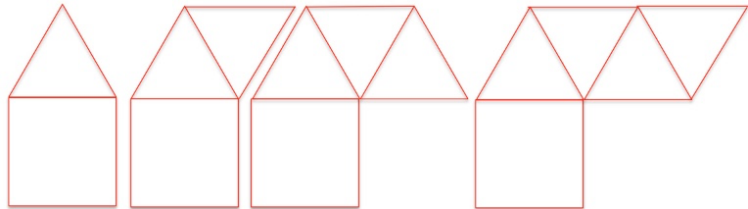
How many sticks would you need to make the 10th pattern?

What about the 100th pattern? How do you know?

What is the same and what is different about these four patterns?

Write down the numbers of sticks in these four patterns

and also in the next two patterns of the sequence.



What about the 10th and 100th terms in this sequence?

What about the n^{th} term in these sequences?

HELP

Use sticks and copy the patterns. How many sticks do you add to a pattern to make the next pattern? Draw the patterns on the isometric paper on page 2.

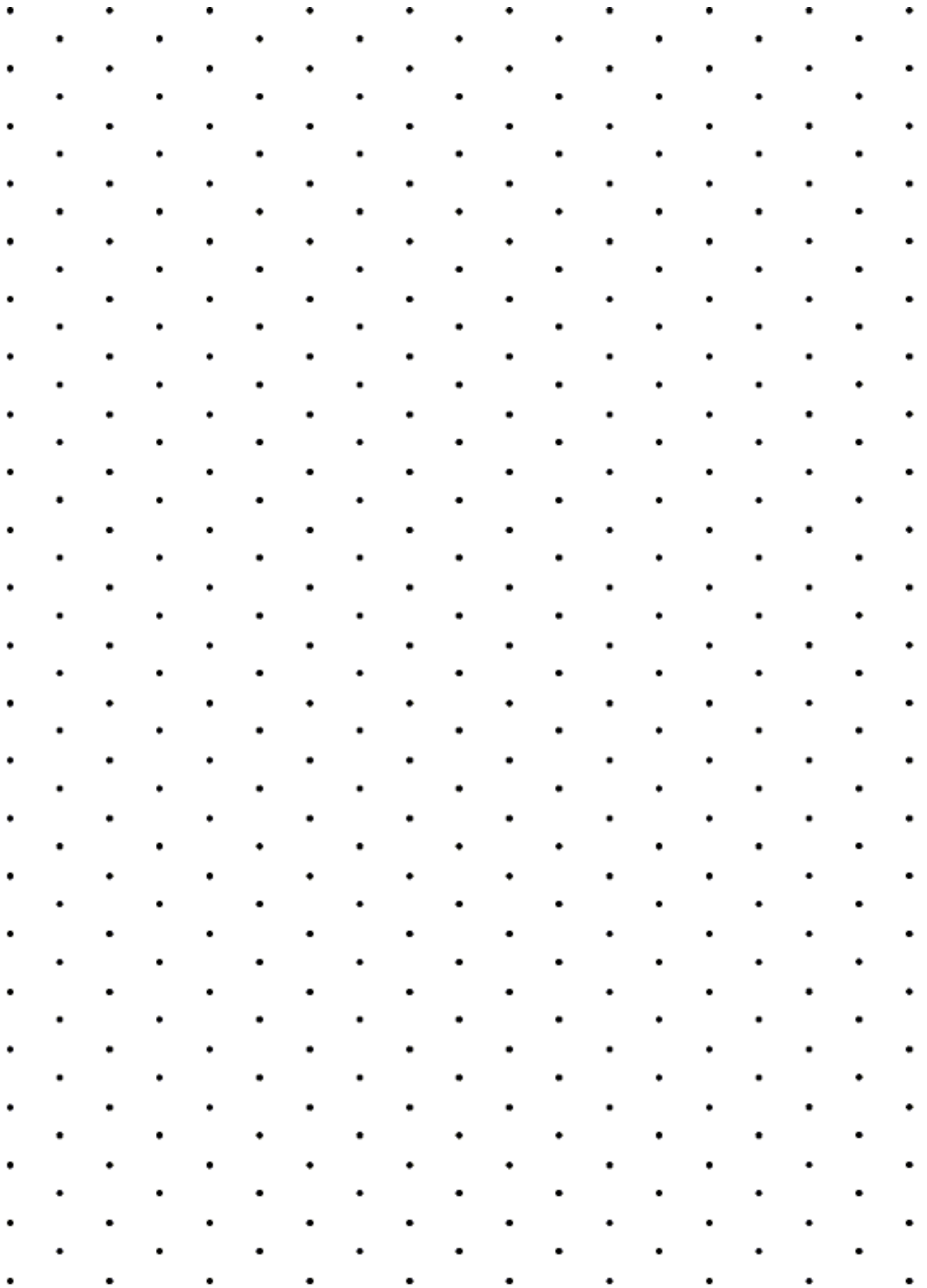
Write a list (sequence) of the number of sticks in each successive pattern.

Describe the pattern in these numbers. Describe in words how the pattern of numbers grows.

This should help you to find the number of sticks when you know the number of the pattern.


NEXT

Make a different sequence of patterns of your own. Describe how to find the number of sticks in the hundredth pattern.



NOTES FOR TEACHERS

SOLUTION

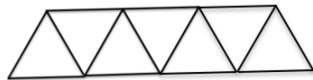
Starting from an equilateral triangle T_0  each pattern is made by adding 2 sticks to the previous pattern.

Sequence : $T_0 = 3$,

$T_1 = 5$, $T_2 = 7$, $T_3 = 9$, $T_4 = 11$, $T_5 = 13$,



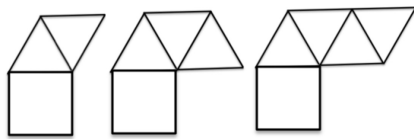
$T_6 = 15 \dots$




To make the 10th pattern you need 23 sticks.

To make the 100th pattern you need 203 sticks.

The next sequence has a line of equilateral triangles the same as the previous sequence but the difference is that each pattern has a square in it.



Starting from t_0  each pattern is made by adding 2 sticks to the previous pattern.

The sequence is $t_0 = 6$, $t_1 = 8$, $t_2 = 10$, $t_3 = 12$, ... $t_{10} = 26$, ... $t_{100} = 206$.

If the n^{th} term in the first sequence is T_n then **$T_n = 3 + 2n$**

If the n^{th} term in the second sequence is t_n then **$t_n = 6 + 2n$**

Why do this activity?

This activity enables learners to progress from the 'hands on' concrete situation via counting the number of sticks in each pattern to writing down the algebraic formula for the n^{th} term of the sequence. Learners are guided to think about a sequence of geometric patterns, to copy the patterns and to realise that, to get the next pattern in the sequence they must add two sticks each time. The activity is suitable for learners of all abilities as the slower learners can have success making the patterns and counting sticks while the ablest learners are challenged to find the formula.

Intended learning outcomes

- An introduction to the idea of sequences.
- Development of visualization skills and the ability to recognize geometric patterns.
- Development of mathematical thinking and progression on the track from the concrete operations stage (modeling sequences with concrete materials) to abstract thinking about sequences of numbers and algebraic formulae.

Generic competences

Development of visualization skills and the ability to recognize geometric patterns.

Suggestions for teaching

It is important for learners to get lots of practice in reading questions for themselves and answering the questions. So you could copy the question from page 1 on the board or photocopy it.

You could use the **One – Two – Four – More** teaching strategy. First the learners should read the question and work **individually** on it, then they should work **in pairs** so that they can compare findings and help each other. If they have different methods, or different results, they should explain their working to each other and try to find out if they have made any mistakes. Teachers should emphasise that it is good to find different methods because often that gives you a better understanding. When most learners have done all they can do, then the teacher should tell them to work in a **foursome** with the pair in front or behind them. Again they should compare findings and discuss different methods try to decide on the correct results.

Then in a class plenary learners should explain their working to the whole class and different approaches or methods should be discussed. Finally the teacher should summarise what has been learned.


In many classes some learners may only be able to work out the numbers of sticks in a short sequence of patterns while most learners will be able to work out the number of sticks in the 10th and 100th pattern. They should feel they have succeeded even though others have found the algebraic formulas.

Key questions

- Can you describe the pattern?
- Can you tell me how to make the next pattern in the sequence?
- How many sticks would you use to make the next pattern?
- What is the same about the two sequences? What is different?
- Could there be a pattern in the sequence before these 3 patterns? What would it look like?

Follow up

Shifting Times Tables <https://aiminghigh.aimssec.ac.za/grades-7-to-9-shifting-times-tables/>
Squares Pattern (harder) <https://aiminghigh.aimssec.ac.za/grades-9-to-12-squares-pattern/>

Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum
MATHS links: <http://aiminghigh.aimssec.ac.za>
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