Notes for parents (1).

The purpose of the activity is to help your child to:

- Recognise growing patterns
- Predict other members in the pattern

Here is what to do:

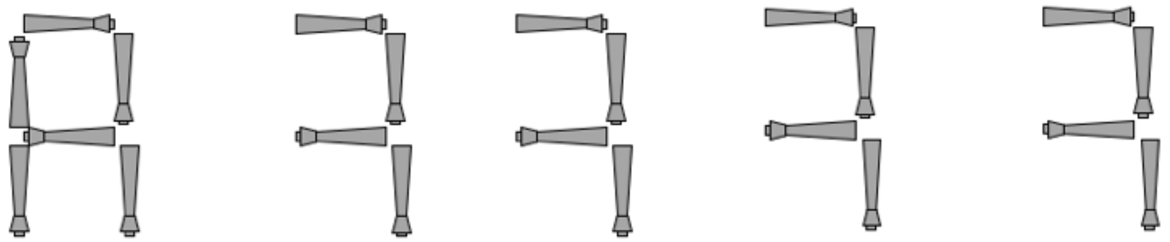
Read the problem with your child. Ask them to build the pattern with pens, spoons, pegs or similar objects.

Help them to clarify the meaning of the problem.

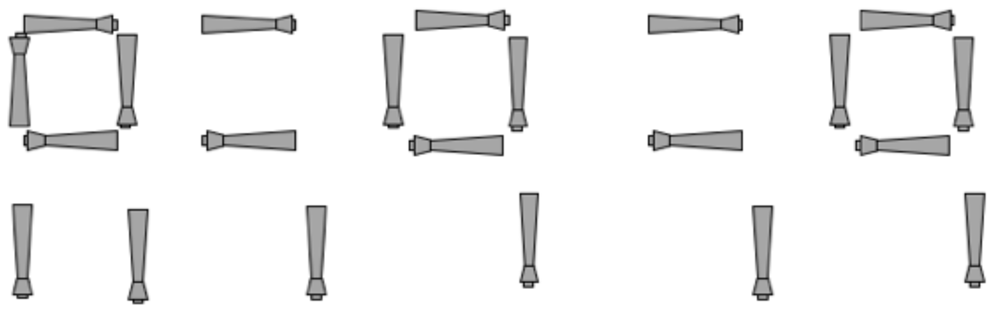
"What does 'section' mean? Show me the five sections"

Let them work out some ways to count the number of pens. There are many possibilities, such as:

Six for the first section and four for each section after that.

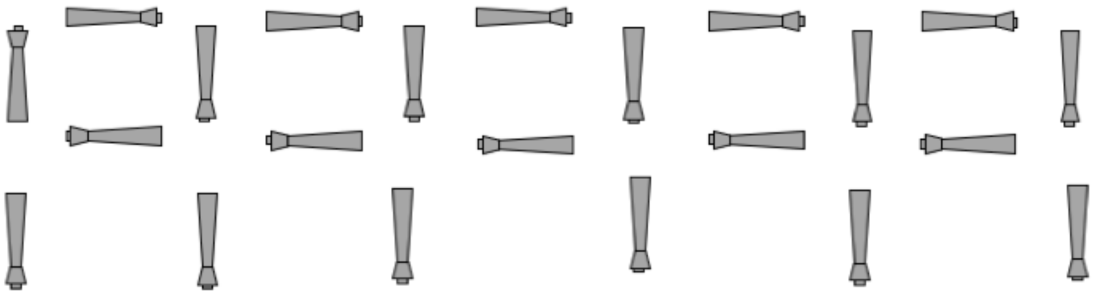


Three squares with four pens, two 'in-between' pairs, and six 'feet.'



Notes for parents (2).

Six up and down (vertical) pairs and five across (horizontal) pairs.



Each counting method should give the correct answer of 22 pens. Record the counting methods using numbers, such as:

6 + 4 + 4 + 4 + 4 or 6 + 4 x 4

3 x 4 + 2 x 2 + 6

6 x 2 + 5 x 2

Look for your child to notice that just multiplying 22 by four does not give the number of pens needed for a 20-section bridge (82). If they build four bridges of five sections, and joined them, there would be overlapping pens.

You might check that out by forming a bridge with ten sections. 42 pens are needed to do that which is not 2 x 22.

See if your child can adapt the method they used to count the pens for five sections and extend it to 20 sections. For example:

Method 1:

"You said for five sections it was six pens for the first section and four groups of four for the other sections. How many fours would you need to build 20 sections? (19) So six for the first section and 19 groups of four. How many pens is that? (82)

Method 3:

"Imagine the 20 sections in front of you. How many vertical pairs are there? (21) How many horizontal pairs are there (20). How many pairs is that? (41) How many pens is that altogether? (82)

Notes for parents (3).

Recording the methods as equations helps your child see the things that change and those that stay the same. Make sure you talk about what the numbers and operations are referring to. Underline the parts that change in one colour and the parts that stay the same in another. For example:

	5 sections	20 sections
First method	6 + 4 x 4	6 + 19 x 4
Second method	3 x 4 + 2 x 2 + 6	10 x 4 + 9 x 2 + 21 + 3
Third method	6 x 2 + 5 x 2	21 x 2 + 20 x 2

Some methods seem more stable when you do this. **Method 2** has a lot of changes while the first and third methods have few changes. The changes indicate variables.

Can your child extend the rules to predict how many pens are needed to form a bridge with 100 sections?

Using the first method they might write 6 + 99 x 4 = 402. *"Why did you write 99 x 4?"*

Using the third method they might write 101 x 2 + 100 x 2 = 402. *What part of the pen pattern does 101 x 2 refer to?* (Vertical pens).

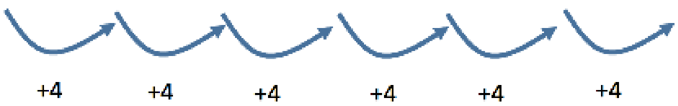
Points to note:

This activity involves a relation between two variables, the number of sections and the total number of pens. Relations develop into functions which is a very important idea in secondary maths.

Commonly children resort to inefficient counting and addition strategies that work for easy problems but not for hard problems. That is why the questions ask for 20 and 100 sections. Those bridges would take a long time to solve by adding but take little time by multiplying.

An example of an addition strategy is this:

Number of sections	1	2	3	4	5	6	7	...
Number of pens	6	10	14	18	22	26	30	...



Notes for parents (4). Activity next page.

If your child does something like encourage them to look for a more efficient method.

"What operation is the same as adding lots of four together?"
(Multiplying by four)

"How many time will you need to add four to six until you reach 20 sections?" (19)

"Is there an easier way to work out six plus nineteen lots of four?"
(6 + 19 x 4)

Make this pattern on a flat space using pens or other objects.

Can you see five sections of a pen bridge?
What ways can you find to count the number of pens?

Count in groups of pens, not one by one.

Imagine a bridge like that with **20 sections**.
Would it take four times the number of pens to build, or not?

How many pens would you need to build a bridge like this with 100 sections?