

SHQ: How can I record my observations in a maths investigation

GARDEN POND INVESTIGATION

In previous years, your secondary school maths teachers asked us to complete this investigation with you to give you an idea of some of the investigation work that you will be doing in your maths lessons at your next school.

You will need to read instructions, draw diagrams, fill in tables and write sentences about any patterns that you notice in the numbers you find.

We will be working on this over two lessons.

On this worksheet, you will read the problem and begin drawing some of the diagrams from which you can start making some conclusions.

Use the graph paper resource to draw your diagrams and if possible, use a ruler to draw the straight lines in the diagrams.

The following pages of this worksheet give you details about what you are to draw and what patterns you are to look for:

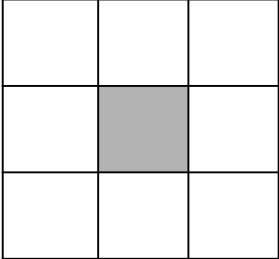
GARDEN POND INVESTIGATION

A man is planning a pond for his garden.

He is going to put paving slabs around it.

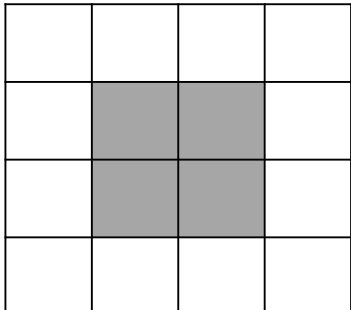
He draws his first ideas as squares which look like this:

1)



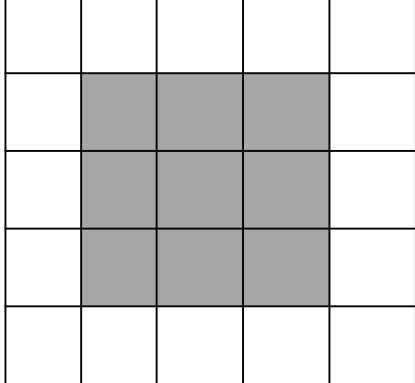
Pond size:
1m x 1m
Number of
slabs: 8

2)



Pond size:
2m x 2m
Number of
slabs: ?

3)



Pond size:
?m x ?m
Number of
slabs: ?

Draw these arrangements of ponds on the squared paper provided. Use one square on the paper to represent one square slab in the diagram.

Next to each diagram, complete the details showing pond size and number of slabs

4. When you have drawn all the above diagrams, you now need to draw a diagram showing a 4m x 4m pond.
5. Next to it, write the same information : how big is the pond and how many slabs will you need?
6. Next, you need to draw the following table on a new piece of graph paper (it is good practice to draw tables : decide how many squares you need for each row and column)

Size of pond	Number of slabs
1m x 1m	
2m x 2m	
3m x 3m	
4m x 4m	
5m x 5m	Do not fill in this box

7. Now you have completed the table, have a look to see if there is a pattern that you notice in the number of slabs that are required.

Can you predict the number of slabs required to make a 5m x 5m pond?

8. Make your prediction then draw your 5m x 5m pond with its slabs to check that you are correct.
9. Your final task is to see if you can work out what the relationship between the pond size and the number of slabs required is? Can you work out a formula?

Your completed table should look like this: You will have noticed that the number of slabs required increases by 4 each time.

Size of pond	Number of slabs
1m x 1m	8
2m x 2m	12
3m x 3m	16
4m x 4m	20
5m x 5m	24

But supposing I wanted to build a pond that is 10m x 10m. I don't want to draw diagrams for each pond size; I just want to work out how many slabs I need to build it.

Look at the size of the pond and see what you need to do to that number to make the number of slabs.

For example, this is my thought process for trying to work out the formula for the number of slabs required for a 1m x 1m pond $1 \times 8 = 8$

However, this does not work for a 2m pond because $2 \times 8 = 16$ and I need 12 slabs. Maybe I could multiply the number that represents the pond size, then multiply it by another number?

Try 1×2 and then multiply $\times 2$, that gives me 4 but I need 8 slabs

Perhaps I could multiply it by a different number and so on

This is the tricky bit, but have a go – there is a formula – see if you can work out what it is.