

Multiplication Assessment Questions 12 and 13:

Objective: I understand the meaning of squared and cubed signs and can calculate with these.

NC NMD8: recognise and use square numbers and cube numbers, and the notation

Teacher Input Ideas: (you may want to split squared and cubed over 2 or 3 lessons)

Children need to understand why we use squared and cubed signs and the meaning of these. Children should not just be taught how to work out sums when these symbols are used, but discover independently. Many teachers find it meaningful to introduce this concept alongside the teaching and learning of area and volume.

Learning for squared:

Place squared paper on the table for the children to explore. Ask the children to make a square that is 5 squares by 5 squares. Ask the children what they know about squares and what makes them special. Discuss what size squares the children have made. Ask the children for suggestions of how they can work out how many squares altogether they have inside the shape. Discuss that this is finding the area. So, if I had a 5 by 5 square there would be 25 squares inside as there are 5 rows of 5 squares to make a square. The children can be encouraged to count the individual squares they have in their square, count repeatedly in 5s for each row or use x table knowledge. Discuss with the children that all squares must have the same length and width, so if you see 3^2 it means to make a square. So, times 3 by itself (3×3).

Learning for cubed:

Ask the children to make a cube using 1cm cubes. Ask the children what they notice? How have they made a cube? How is a cube different to a cuboid? Children to share the models they have made and discuss how the children can find the volume of this using knowledge from the volume lesson. Show the children the cubed sign. What do you think this means? How will we be able to find 4 cubed? Ensure the children know that it is 4 cubes in length, 4 cubes in width and this square face is repeated 4 times again (depth). Repeat again exploring the calculation that is required ($4 \times 4 \times 4$) and ensuring that the children can explain why.

Practice Activities

Purple Practice: Most suited for children who made errors in Question 12 of the prior learning assessment.

The purple task sheet displays blocks with the numbers from 1 to 12 squared. These can remain as they are or be cut up for children to select. The children are to select a block and work out the answer. The children could work from 1 to 12 and record their answers down in a table to show what the answers are. The children could also include the sum they have used to work out the answer or use squared paper to draw the correct sized square to show how they have worked it out. You also may want to give children different cards dependent on which numbers are most suitable for them. The children will need to apply their knowledge of \times tables and mental strategies.

Green Practice: Most suited for children who made errors in Question 13 of the prior learning assessment.

The children are to select a block that has a number from 1 to 12 cubed and work out the answer for this. The children should be able to use the formula and their knowledge of \times table facts to work out the answers. The children should also be encouraged to apply written multiplication strategies to find out some of the trickier cubed answers (such as 49×7 , 144×12). You may want the children to make a model for 5 examples to help to explain to others the calculation they are using and why. Children could make models using 1 cm cubes to calculate the answer if they are unable to calculate with the use of the formula.

Yellow Practice Most suited for children who are ready to find answers to cubed and squared sums.

The children are presented with blocks that included a variety of cubed and squared sums where the children are to read the symbol carefully and work out the answer to the sum using the correct calculation.

Mastery: Problem Solving

The children are to apply their knowledge of squared numbers to work out which combinations will total 100. The children are provided with a 10 by 10 grid. The children are then colour in the grid using only squared numbers (see answers for suggestions).

Discuss with the children why all of the squared numbers will not be able to be drawn as squares in the 100 squared grid. There are a variety of ways for the children to find.

Answers:

Purple:

1 squared = 1

2 squared = 4

3 squared = 9

4 squared = 16

5 squared = 25

6 squared = 36

7 squared = 49

8 squared = 64

9 squared = 81

10 squared = 100

11 squared = 121

12 squared = 144

Green:

1 cubed: 1

2 cubed: 8

3 cubed: 27

4 cubed: 64

5 cubed: 125

6 cubed: 216

7 cubed: 343

8 cubed: 512

9 cubed: 729

10 cubed: 1000

11 cubed: 1331

12 cubed: 1728

Yellow:

3 squared : 9

1 squared: 1

6 cubed: 216

7 cubed: 343

8 cubed: 512

9 squared: 81

8 squared: 64

1 cubed : 1

2 squared: 4

4 cubed : 64

12 squared: 144

5 cubed: 125

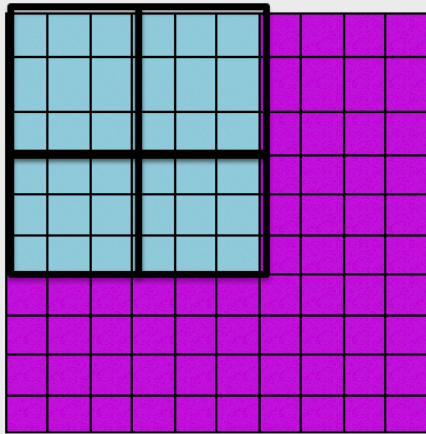
7 squared: 49

3 cubed : 27

2 cubed: 8

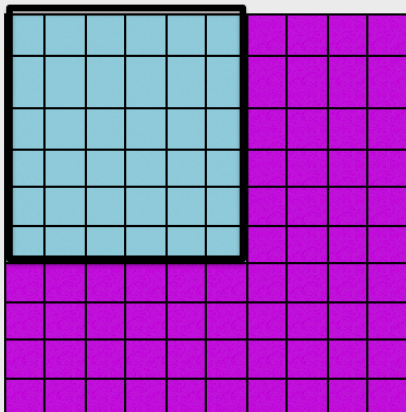
Mastery:

3 lots of 9 squared (36)



8 squared (64)

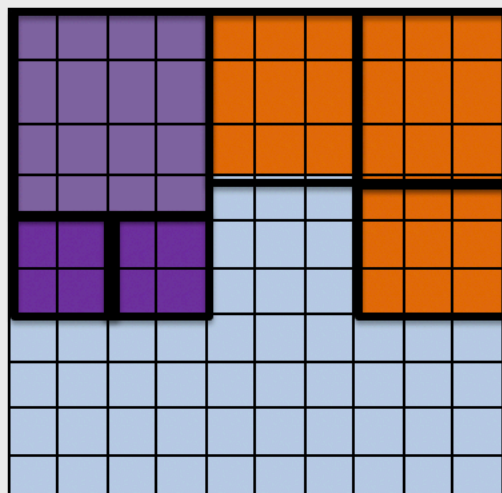
6 squared (36)



8 squared (64)

4 squared (16)

2 lots of 2 squared (8)



3 lots of 3 squared (27)

7 squared (49)

LO: I recognise the squared symbol and can find the answer to numbers squared.

1^2

2^2

3^2

4^2

5^2

6^2

7^2

8^2

9^2

10^2

11^2

12^2

LO: I recognise the cubed symbol and can find the answer to numbers cubed.

1^3

2^3

3^3

4^3

5^3

6^3

7^3

8^3

9^3

10^3


11^3

12^3

LO:: I can calculate the answer to the sum when I see the cubed or squared sign.

Choose a block to pick. Work out the answer.


$$3^2$$


$$1^2$$


$$6^3$$


$$7^3$$


$$8^3$$


$$9^2$$


$$8^2$$


$$1^3$$


$$2^2$$


$$4^3$$


$$12^2$$


$$5^3$$


$$7^2$$


$$3^3$$


$$2^3$$

Challenge: Pick 5 questions to prove the answer with an image or a model to a friend.

Below is a square to show 10 squared.

Using only squared numbers, fill all of the grid.

Challenge: can you find a different way to fill the grid?