Reasoning in the classroom

Pens

Support materials for teachers

Year 6

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Year 6 Reasoning in the classroom – Pens

These Year 6 activities start with an item that was included in the 2014 National Numeracy Tests (Reasoning). They continue with a linked activity that is number-based.

Activity 1

Pens

In this short activity, learners find different ways to buy a fixed number of pens.

Includes:

- Pens question
- Markscheme

Activity 2

Factors and multiples game

They play a game from NRICH, based on factors and multiples.

Includes:

- Explain and question – instructions for teachers

Reasoning skills required

Identify

Learners choose for themselves the steps needed to find solutions.

Communicate

They use mathematical language to explain their strategy and findings.

Review

They consider their strategy and find ways to improve.

Procedural skills

- **Multiples**
- **Factors**

Numerical language

- **Multiples**
- **Factors**

Activity 1

Pens

Activity 1 – Pens

Outline

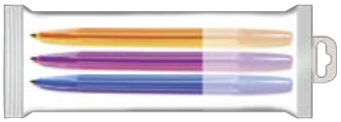
In this short Year 6 activity, learners are told that pens are sold in packs of 5 and 3. They use their reasoning skills to work out different ways to buy a total of 34 pens.

You will need

Pens question
A half-page for each learner

Markscheme

big pack, **5** pens



small pack, **3** pens

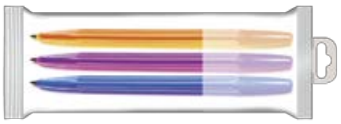
Give two **different** ways to buy exactly **34** pens.

_____ big packs and _____ small packs

or _____ big packs and _____ small packs

2m

big pack, **5** pens



small pack, **3** pens

Give two **different** ways to buy exactly **34** pens.

_____ big packs and _____ small packs

or _____ big packs and _____ small packs

2m

Activity 1 – Pens – Markscheme and exemplars

Marks	Answer
2m	Gives both correct solutions, in either order, i.e. **5** big, **3** small and **2** big, **8** small
Or 1m	Gives one of the correct solutions Or Gives both of the following, in either order: **25** big, **9** small and **10** big, **24** small

Common error

These are the numbers of pens not the numbers of packs

One correct solution; **1 mark**

- 2, 8 is correct but
  3, 5 is incorrect (it should be 5, 3).

Incorrect; **0 marks**

- This learner is clearly working with the numbers of pens not the numbers of packs but has made a mistake in their second response. Both 25, 9 and 10, 24 are needed for 1 mark.

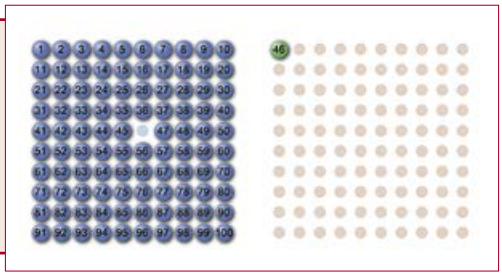
Activity 2

Factors and multiples game

Activity 2 – Factors and multiples game

Outline

This activity focuses on factors and multiples. It is based on a game from NRICH in which learners compete to make the longest chain of multiples and factors.



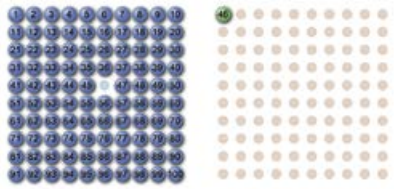
You will need

Teacher access to nrich.maths.org/5468
Each group/pair will also need access to this program

Activity 2 – Factors and multiples game

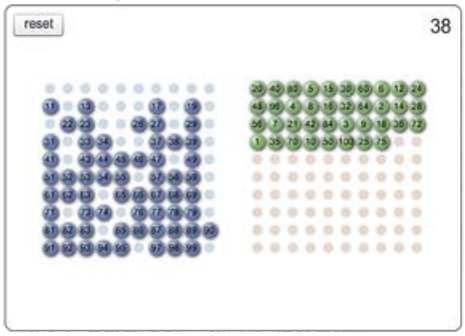
Explain

Load the 'Factors and Multiples Game' from nrich.maths.org/5468 and choose the 'Full screen' version. *(To maximise discussion, the game is slightly different from the NRICH game, so ignore the on-screen instructions given previously.)* Ask a volunteer to choose a number from 1 to 100 – click on that number and it will move to the right of the screen, e.g.



Tell learners that the next number must be a multiple or a factor of this number. What could they choose? *(In this instance, 92 is a multiple of 46. The factors of 46 are 1, 2, 23 and 46, but 46 has been used so learners could choose 1, 2, 23 or 92.)* Ask learners to choose one of these numbers and click on it – it will appear next to the 46 in the right-hand side. Then they must choose a multiple or factor of this new number, and so on.

Once the rules are understood, stop the game and say that they are going to play in their groups/pairs. The group that creates the longest chain wins! *(The game is self-checking in that if a number is not a multiple or factor, the colour changes – the incorrect number can be dragged back to the left-hand side. The length of the chain is shown on the top right of the board. Learners can use screen dumps to keep a record of their chains. For example, as shown below . . .)*



The game can be continued at home with parents/carers/siblings playing alongside – and any chains longer than the ones on the NRICH solution page can be submitted to NRICH for publication!

Question

- What is a factor? What is a multiple? How can you remember which is which? *('Factor' is a smaller word than 'multiple', so the numbers must be smaller. Also 'multiple' links to 'multiply'.)*
- If you are on a number greater than 50, why can't you use multiples of that number in this game? *(They would be greater than 100.)*
- Why is 1 a really useful number to use? *(It is a factor of everything.)* So why might you not want to use it early in your chain? *(As everything is a multiple of 1, it allows the chain to start again in a different 'direction'.)*
- What other number is really useful? Why? *(2, because it is a factor of all even numbers)*
- Tell me how you are certain that this number must be the end of your chain.