How to be Brilliant at Numbers

Beryl Webber
Jean Haigh
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Self-assessment sheet

Numbers resource sheet

Fractions resource sheet, 1

Fractions resource sheet, 2

Fractions resource sheet, 3
Introduction

*How to be Brilliant at Numbers* contains 42 photocopiable sheets for use with 7–11 year olds. The ideas are structured in line with the National Curriculum programmes of study. They can be used whenever the need arises for particular activities to support and supplement whatever core mathematics programme you use. The activities provide learning experiences which can be tailored to meet individual children’s needs.

The activities are addressed directly to the children. They are self-contained and many children will be able to work with very little additional support from you. You may have some children, however, who have the necessary mathematical concepts and skills, but require your help in reading the sheets.

The children will need pencils and should be encouraged to use the sheets for all of their working. Some activities require extra resources such as coloured pencils, scissors and a calculator. Some will require the use of additional resource sheets and these can be found at the back of the book. Where this is the case, it has been indicated by a small box, with the relevant page number in it, in the top right corner, eg 47.

*How to be Brilliant at Numbers* relates directly to the programmes of study for using and applying mathematics, number and data handling. The page opposite gives further details and on the contents page the activities are coded according to programme of study and difficulty. The level of difficulty is indicated by a letter code (A–C) and is provided to give you an indication of how the activities relate to mathematical progression within the key stage. Activities coded 'A' are the most challenging.

Page 44 provides a self-assessment sheet so that children can keep a record of their own progress.
Links to the revised National Curriculum

The activities in this book allow children to have opportunities to:

- use and apply mathematics in practical tasks, in real-life problems and within mathematics itself;
- take increasing responsibility for organizing and extending tasks;
- devise and refine their own ways of recording;
- ask questions and follow alternative suggestions to support the development of reasoning;
- develop flexible and effective methods of computation and recording, and use them with understanding;
- use calculators to enable work with realistic data;
- consider questions using statistical methods.

In particular these activities relate to the following sections of the Key Stage 2 programme of study.

Using and Applying Mathematics

2. Making and monitoring decisions to solve problems
   a. select and use the appropriate mathematics and use the appropriate materials;
   b. try different mathematical approaches; identify and obtain information needed to carry out their work;
   c. develop their own mathematical strategies and look for ways to overcome difficulties;
   d. check their results and consider whether they are reasonable.

3. Developing mathematical language and forms of communication
   a. understand the language of:
      • number
      • relationships, including ‘multiple of’, ‘factor of’ and ‘symmetrical to’;
   b. use diagrams, graphs and simple algebraic symbols;
   c. present information and results clearly.

4. Developing mathematical reasoning
   a. understand and investigate general statements;
   b. search for pattern in their results;
   c. make general statements of their own, based on evidence they have produced;
   d. explain their reasoning.

Number

2. Developing an understanding of place value and extending the number system
   a. read, write and order whole numbers, understanding that the position of the digit signifies its value, use their understanding of place value to develop methods of computation, to approximate numbers to the nearest 10 or 100, and to multiply and divide by powers of 10;
   b. extend their understanding of the number system to negative numbers, in context, and decimals, in the context of measurement and money;
   c. understand and use, in context, fractions and percentages to estimate, describe and compare proportions of a whole.
3. **Understanding relationships between numbers and developing methods of computation**
   a. explore number sequences, explaining pattern and using simple relationships; interpreting, generalizing and using simple mappings;
   b. recognize the number relationship between co-ordinates in the first quadrant of related points on a line;
   c. know addition, subtraction and multiplication facts; develop a range of mental methods; use some properties of numbers;
   d. develop a variety of mental methods of computation;
   e. understand multiplication and division; use associated language and recognize situations to which these operations apply;
   f. understand and use the relationships between the four operations, including inverses;
   g. extend methods of computation to include addition and subtraction of negative numbers, addition and multiplication of decimals, calculating fractions and percentages of quantities.

4. **Solving numerical problems**
   a. use the four operations to solve problems;
   c. check results by different methods.

**Handling Data**

2. **Collecting, representing and interpreting data**
   a. interpret tables used in everyday life; interpret frequency tables;
   c. understand and use measures of average, leading towards the mode, the median and the mean in relevant contexts, and the range as a measure of spread;
   d. draw conclusions from statistics and graphs, and recognize why some conclusions can be uncertain or misleading.

---

Each activity has been coded on the contents page to indicate its main relationship with the above aspects of the programme of study for Key Stage 2.

The coding operates as follows:

- **N** = Number
- **HD** = Handling Data

These letter codes are followed by a number and lower case letter to indicate the relevant sub-section and aspect.

For example:

- **HD2(c)** indicates Handling Data, sub-section 2 (Collecting, representing and interpreting data), c – ‘understand and use measures of average...’.

Each activity also relates to the Using and Applying Mathematics section of the programme of study in a variety of ways.

Each activity is also coded by an upper case letter (A-C) indicating the relative difficulty of the activity itself. Activities coded 'A' are the most challenging.
Ancient Greek numbers

The ancient Greeks used a different number system from ours.

They used these symbols for the numbers 1 to 10.

$$\begin{array}{cccccccccc}
A & B & G & \Delta & \Theta & E & F & Z & H & \Theta \\
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10
\end{array}$$

They had no symbol for zero and they had different symbols for the tens numbers. For example:

- \(\text{N} \) is the symbol for 50, and
- \(\text{TT} \) is the symbol for 80.

This made adding and subtracting very hard.

Write the Greek numbers for 11–19, 50–59 and 80–89.

Do you think the order of the symbols mattered?

It does matter for our symbols. 31 is not the same as 13.

EXTRA!
Investigate some facts about Greek, Roman or Egyptian numbers. Find out where the symbol for zero came from.
Make twenty

You will need two copies of the Numbers resource sheet (page 45) and two friends.

Cut out the number cards and shuffle them.

This is how to play:

- Deal all the cards to the three players.
- Each player secretly looks at his own cards and lays down any pairs that total 20 face up on the table.
- Player 1 holds up his remaining cards – keeping the numbers hidden.
- Player 2 takes one card. She looks to see if it makes a pair that totals 20 with any card in her own hand.

If it does, the two cards are placed face up on the table and Player 2 has another go (with Player 3).

- If it does not make a pair, Player 2 adds the card to her hand and then Player 3 chooses a card from Player 2’s hand.
- The winner is the first player to have no cards left.

EXTRA!
Find ways of making 20 with three cards.
What about four or five cards?
Coins, 1

You will need lots of 2p, 5p and 10p coins and seven different coloured pencils or felt-tip pens.

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- Choose one coloured pencil and circle all the amounts you can make using only 10p coins.
- Choose a different colour and do the same for 5p coins.
- Repeat for 2p coins with a different colour.
- Now investigate the amounts you can make using at least one 10p and one 5p coin, but no others. Circle these amounts using a fourth colour.
- Try with 2p and 10p coins. Circle the amounts using the fifth colour.
- Repeat for 2p and 5p coins. Circle the amounts with the sixth colour.
- Which amounts can you make using at least one 2p, 5p and 10p coin? Circle the amounts in your final colour.

Tip: Be careful when circling the numbers. Some will end up with five different circles!

EXTRA!
Which amounts can't you make?
Which amounts can be made in the greatest number of ways?

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Coins, 2

You will need lots of different coins.

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<tr>
<td>49p</td>
<td>36p</td>
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- Which item(s) can you buy using only one coin (without having any change)?
- Which can be bought using any two coins?
- Which can be bought using any three coins?
- Which item needs the biggest number of coins?

**EXTRA!**
Which items could you buy with a number of coins and receive only one coin as change?

For example:

Notebook: 45p → pay
and receive as change.