Contents

Introduction

This series of six photocopiable books provides additional challenges for more able children. The materials enable you to meet the needs of able mathematicians without developing completely separate topics.

Book 4 will provide challenges for children in Years 3–5.

You can use this book to:

- **provide alternative, and more demanding, tasks for more able children during the daily maths lesson;**
- **provide more challenging homework tasks for the more able mathematicians in your class;**
- **broaden the range of mathematical experience for a range of children.**

Many of the tasks in this book are of an investigative or puzzle-solving variety. In addition to mathematical knowledge, some logical thinking will often be required. The children should enjoy the level of challenge the activities provide, and also the opportunity to choose their own ways of working. This is fundamental to development in mathematics, and you should therefore allow children to decide what aids they will use to help them solve the problems. More able children are often comfortable with abstract tasks, but most of them will at some stage want to use practical apparatus, and this should be allowed.

The activity sheets

Photocopiable activity sheets for the children to work on are provided for the lessons and can be used to support group work. For some lessons a photocopiable resource sheet is also provided. It is assumed that all the children will take part in the whole-class introduction to the lesson before tackling the task from this book.

The teacher notes will guide you in introducing the tasks to the children and in effective ways of working, as well as providing the solutions. These notes will help you to support children appropriately as they work.

Place value and ordering

Learning objectives

- Read and write in figures and words, numbers to at least 10 000.
- Know what each digit represents.
- Partition numbers into Thousands, Hundreds, Tens and Ones.

Resources

'Make 10 000'

Teacher's notes

In this problem-solving activity children make two four-digit numbers from eight digits. The aim is to create numbers which, when added together, produce a sum close to 10 000.

With the digits 5 6 5 6 3 4 3 4 it is possible to produce a sum of 9999 in many ways. It is not possible to produce a sum of 10 000. The digits six and three pair up to make nine as do the digits five and four.

Examples are: **6644 + 3355; 3456 + 6543; 3344 + 6655; 5656 + 4343,** etc.

Penny is right. If any one digit out of the eight is increased by one then a sum of 10 000 can be produced.

Example: add one to a six to make seven. 5657 + 4343 = 10 000.

Once again, the sum 9999 can be made from the digits 1 2 3 4 5 6 7 8. For example: 5678 + 4321 = 9999

The smallest sum is made by making the two four-digit numbers in this way:
Use the smallest two digits to start each number. Then use the next two smallest digits as the second digits in these numbers. Go on in this way to produce two four-digit numbers.

1 3 5 7 + 2 4 6 8 = 3 8 2 5 *or* **1 4 6 8 + 2 3 5 7 = 3 8 2 5**

The largest sum is made by reversing this process. Use the largest digits first.

8 6 3 1 + 7 5 4 2 = 1 6 1 7 3 *or* **8 5 4 2 + 7 6 3 1 = 1 6 1 7 3**

Other interesting activities can be carried out with these eight digits.
For example, use the eight digits to make four two-digit numbers that, when added together, produce a sum close to 200.

82 + 17 + 46 + 53 = 99 + 99 = 198

As with 10 000 it is not possible to produce the required sum. The closest the pairs of numbers can get is to make 99 + 99 which is 198.

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Make 10 000

Here are eight digits: **5 6 5 6 3 4 3 4**.
The aim is to make two four-digit numbers which, when added together, produce a sum as close to 10 000 as possible.

Example: 3654 and 6345 are two four-digit numbers.
Add them together: 3654 + 6345 = 9999.

- Use the eight digits to make a different pair of four-digit numbers. Add them together to get a sum close to 10 000.

  My two four-digit numbers are: _____.

  Their sum is _____.

  Penny says 'I can get a sum of 10 000 by changing one digit out of the eight'.

  Is she right? Explain your answer. _____.

- Use the same method with these eight digits: **1 2 3 4 5 6 7 8**.

  My two four-digit numbers are: _____.

  Their sum is _____.

- Use the eight digits **1 2 3 4 5 6 7 8** again.
  This time make two four-digit numbers which have the smallest possible sum.

  My two four-digit numbers are: _____.

  Their sum is _____.

- Now make two four-digit numbers which have the largest possible sum.

  My two four-digit numbers are: _____.

  Their sum is _____.

- Write down eight digits and ask a friend to make a sum of 12 000 by adding two four-digit numbers.

Subtraction and addition

Learning objectives

- Consolidate understanding of '–' (subtraction) and the related vocabulary.
- Count back in hundreds and tens.
- Begin to understand that subtraction and addition are inverse operations.

Resources

'Missing digits'

Teacher's notes

In this activity children have to put a digit (3, 4 or 5) in each empty box to complete the equations.

This involves subtracting and adding numbers to find the missing digits.

The solutions are:

3 5 – 3 4 = 1 *or* 3 4 – 3 3 = 1

5 5 – 3 3 = 22

The two most obvious solutions are:

5 5 – 4 4 = 11 4 4 – 3 3 = 11

also:

5 4 – 4 3 = 11 4 5 – 3 4 = 11

The two solutions are:

5 4 – 5 = 49 5 3 – 4 = 49

The six solutions are:

4 3 – 3 3 = 10 4 4 – 3 4 = 10

4 5 – 3 5 = 10 5 3 – 4 3 = 10

5 4 – 4 4 = 10 5 5 – 4 5 = 10

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Missing digits

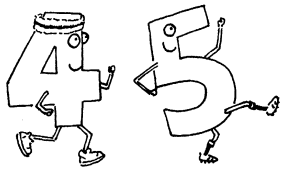
- These subtraction sentences have a digit missing from each empty box. Put one digit (**3**, **4** or **5**) in each box to complete the subtraction sentences. Each of the three digits can be used more than once in a subtraction sentence.

  Example: 4 ☐ – 2 = 43 Put 5 in the box so 45 – 2 = 43.

- Complete these subtraction sentences:

  3 ☐ – ☐ 4 = 1

  ☐ 5 – 3 ☐ = 22



- Find two solutions to this subtraction sentence.

  ☐☐ – ☐☐ = 11 ☐☐ – ☐☐ = 11

- This subtraction sentence has two solutions.

  ☐☐ – ☐ = 49 ☐☐ – ☐ = 49

- This subtraction sentence has six solutions.

  ☐☐ – ☐☐ = 10 ☐☐ – ☐☐ = 10

  ☐☐ – ☐☐ = 10 ☐☐ – ☐☐ = 10

  ☐☐ – ☐☐ = 10 ☐☐ – ☐☐ = 10

- Write a subtraction sentence of your own. Ask a friend to solve it.