Contents

Introduction

About the series

Cosmic Maths is a series written by teachers to develop core mathematical knowledge and skills using a guided three-step process to help children understand, apply and practise mathematical concepts.

The series covers the Key Objectives set out in the *National Curriculum* for each year group and focuses on Place value, Number, Fractions and Statistics and the use and practical application of the four operations: adding, subtracting, multiplying and dividing.

Intended for Key Stage 2 children, with many activities also suitable for lower Key Stage 3, the series comprises four books and CDs:

Cosmic Maths – *Year 3 (Ages 7-8)*

Cosmic Maths – *Year 4 (Ages 8-9)*

Cosmic Maths – *Year 5 (Ages 9-10)*

Cosmic Maths – *Year 6 (Ages 10-11)*

About the books

Each book contains at least 18 lesson plans with teachers' notes and a definition of key vocabulary and mathematical terms. Each lesson plan uses a guided three-step process as follows:

Prepare to launch

A **short mental activity** is given to help prepare your learners launch into the guided activity.

Lift off

The **guided activity** then supports and encourages the children as they explore numbers through a range of exciting and fun activities.*

Into orbit and safe landing

This is then followed up with an **independent** and an **assessment activity** that allow children to practise what they have learnt, as well as providing evidence of the level of each pupil's understanding. They also offer an opportunity for teacher-pupil assessment to take place.

A further **extension activity** for use in class or as homework is also included, in order to give essential practice when embedding core mathematical skills and knowledge associated with each lesson. This provides a valuable stimulus for further discussion and class work in the future.

It is important to note that a wide range of practical problem solving activities is covered, many of which are cross-curricular, in order to give learners a wider view of how maths, especially number, can be used and applied in the 'real' world.

Answers *to all activities are given in full at the back of each book.*

The CD

Each book includes a CD that contains **differentiated** lessons and activities for higher and lower abilities as well as an **assessment test** (also in the book) and a **skills report**.

Cosmic Maths helps make the teaching and learning of mathematics both meaningful and fun, allowing each and every learner to rocket towards success!

Work it out

National Curriculum Objective:

Perform mental calculations including mixed operations and large numbers.

Teachers' notes:

Children should be able to perform basic calculations mentally, however they need to learn a range of strategies to assist with this and be able to apply them appropriately. They should undertake mental calculations with increasingly large numbers and more complex calculations, and should be able to double and halve quickly and apply multiplication facts. Children also need to be taught to manipulate numbers in order to help them calculate mentally. They should be encouraged to use jottings to support their calculations. Children will vary in the approaches they take to calculate mentally depending upon how they manipulate numbers. Encourage them to discuss their methods.

Key vocabulary

Complementary addition is also known as the **jump strategy**: it helps children to visualise subtraction using a number line.

Prepare to launch: (Warm up activity)

Ask the children to double the following numbers: 125, 340, 16.5, and 178.

Halve the following numbers: 466, 942, and 16.8. Ask them to add a series of one and two-digit numbers, such as 23 +14 + 5 + 16 = 58.

Give the children a one-minute challenge such as: start with 15, double it, add 6, divide by 3, subtract 4, multiply by 10 (80).

Lift off: (Guided activity)

Tell the children that they will be looking at different strategies to help them perform mental calculations. Explain that they need to be able to manipulate numbers and use all four operations.

Start with using addition and subtraction. Given the problem of finding the difference between 23.35m and 16.48m, how would the children approach this? Suggest they use complementary addition: 16.48 + 0.52 (to reach 17) + 6.35 (to reach 23.35). Hence the difference is 0.52 + 6.35 = 6.87. Encourage them to use jottings. Then ask the children to use this strategy to find the difference between £14.76 and £34.39. Difference: £0.24 + £19.39 = £19.63.

Remind them that they can use multiplication facts to perform other calculations. Ask how they could work out 25 x 37. Suggest that they multiply by 100 and then divide by 4 by halving and halving again, (3700 halved to 1850, halved to 925). Then suggest they try 25 x 83 using the same method (2075).

Ask them how they could work out 24 x 12. Suggest they use their knowledge of the 6 times tables, so multiply 12 by 6 to get 72 then double the answer and double it again (288).

Ask 'How could we multiply 18 by 51?'. Encourage children to first multiply by 50 (multiply by 100 and halve the result) and then add 18 (918). Remind them that they can use jottings to help them. Let them try: 23 x 51 (2300/2 + 23 =1173); 46 x 49 (4600/2 -46 = 2254).

Into orbit: (Independent activity)

Explain to the children that they can work out the 17 times table by adding the 10 times tables facts to the 7 times tables facts.

Ask them to use this strategy to find:

17 x 12 = 10 x 12 + 7 x 12 = 120 + 84 = 204

17 x 11 = 10 x 11 + 7 x 11 = 110 + 77 = 184

Can they think of a different way to calculate these mentally?

Ask them how they would multiply 30 x 40. Point out that this is the same as 3 x 4 x 10 x 10.

★ Lead into and complete the independent activity ***Into orbit: Work it out*** on page 33.

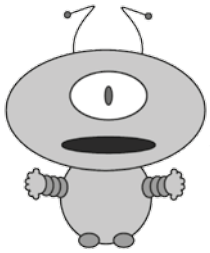
Safe landing: (Assessment activity)

Remind the children that one of the benefits of using mental calculations is to help them with day to day tasks such as shopping. Remind them to think about the variety of different strategies that they can use and then to choose the most appropriate.

★ Lead into and complete assessment activity ***Safe landing: Work it out*** on page 34.

Work it out

Name: _____ Date: _____



Remember to use jottings if you need to.

Use your times tables knowledge to break down the calculation.

1. 13 x 96

2. 12 x 84

3. 17 x 58

4. 15 x 72

Solve these problems using mental calculation strategies. Remember to show your working and check your answer.

5. Ben works in a fruit market. He was given 3560 apples and had to put them in bags of five. How many bags did he fill?

6. Sofia had a collection of 1240 beads, her friend had four times as many. How many beads did her friend have?

7. One day at the supermarket, Joe counted 3558 people entering the store. In the afternoon he counted 998. How many people did he count in the morning?

8. Grace works in a sports shop. A delivery of 2750 tennis balls arrived and another of 2775 golf balls. How many balls were delivered to the shop? How many more golf balls were delivered than tennis balls?

Work it out

Name: _____ Date: _____

Jaycee has saved £100. She wants to buy some jeans, a T-shirt and a pair of trainers. She has found out the prices at four different shops.

Use mental calculation methods to work out:
a) how much the clothes would cost at each shop;
b) how much change she would have left over at each shop.
Remember to show your workings.

Shop	Jeans	T-shirt	Trainers	Total	Change
Cool Kids	£32.97	£10.05	£43.50		
Top Gear	£39.50	£9.98	£38.02		
Smart Look	£41.25	£8.10	£29.98		
Trend Setters	£29.99	£12.99	£42.01		

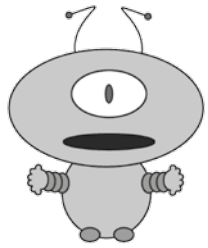
Work it out

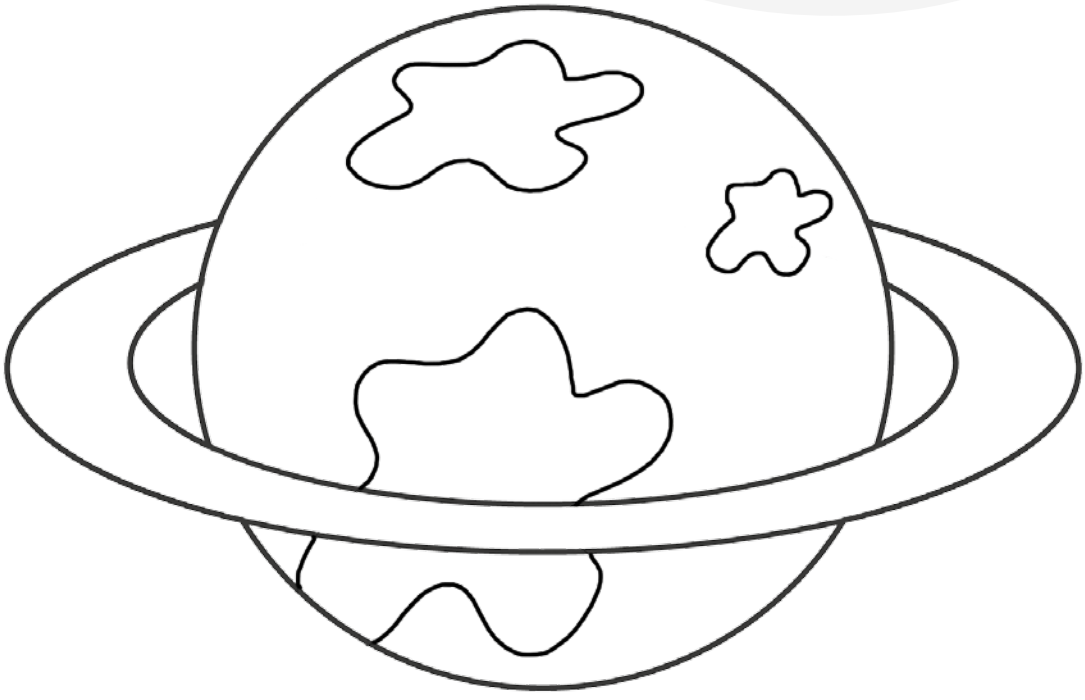
Name: _____ Date: _____

Learning objectives:
Perform mental calculations including mixed operations and large numbers.

Self assessment

- ☐ I found this hard and would like help. (red)
- ☐ I could do some of this but would like more practice. (yellow)
- ☐ I found this easy and am ready to go to the next step. (green)





Teacher's notes: