

score

Mathematics

SATS Revision

Trevor Dixon & Sarah-Anne Fernandes

ear



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Welcome to Achieve Mathematics: The Higher Score – Revision

In this book you will find lots of practice and information to help you achieve the higher score in the Key Stage 2 Mathematics tests. You will look again at some of the same key knowledge that was in Achieve Mathematics: The Expected Score, but you will use it to tackle trickier questions and apply it in more complex ways.

About the Key Stage 2 Mathematics National Tests

The tests will take place in the summer term in Year 6. They will be done in your school and will be marked by examiners – not by your teacher.

There are three papers to the tests:

Paper 1: Arithmetic – 30 minutes (40 marks)

- These questions assess confidence with a range of mathematical operations.
- Most questions are worth 1 mark. However, 2 marks will be available for long multiplication and long division questions.
- It is important to show your working this may gain you a mark in questions worth 2 marks, even if you get the answer wrong.

Papers 2 and 3: Reasoning – 40 minutes (35 marks) per paper

- These questions test mathematical fluency, solving mathematical problems and mathematical reasoning.
- Most questions are worth 1 or 2 marks. However, there may be one question with 3 marks.
- There will be a mixture of question types, including multiple-choice, true/ false or yes/no questions, matching questions, short responses such as completing a chart or table or drawing a shape, or longer responses where you need to explain your answer.
- In questions that have a method box it is important to show your method this may gain you a mark, even if you get the answer wrong.

You will be allowed to use: a pencil/black pen, an eraser, a ruler, an angle measurer/protractor and a mirror. You are not allowed to use a calculator in any of the test papers.

Test techniques

Before the tests • Try to revise little and often, rather than in long sessions.

- Choose a time of day when you are not tired or hungry.
- Choose somewhere quiet so you can focus.
- Revise with a friend. You can encourage and learn from each other.
- Read the 'Top tips' throughout this book to remind you of important points in answering test questions.
- Make sure that you know what the bold key words mean.

During the tests • READ THE QUESTION AND READ IT AGAIN.

- If you find a question difficult to answer, move on; you can always come back to it later.
- Always answer a multiple-choice question. If you really can't work out an answer, try to think of the most sensible response and read the question again.
- Check to see how many marks a question is worth. Have you written enough to 'earn' those marks in your answer?
- Read the question again after you have answered it. Make sure you have given the correct number of answers within a question, e.g. if there are two boxes for two missing numbers.
- If you have any time left at the end, go back to the questions you have missed.

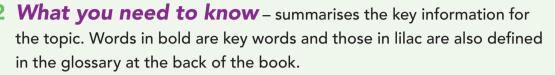
Where to get help

- Pages 8–9 practise number and place value.
- Pages 10–19 practise number addition, subtraction, multiplication and division.
- Pages 20–28 practise number fractions, decimals and percentages.
- Pages 29–32 practise ratio and proportion.
- Pages 33–36 practise algebra.
- Pages 37–45 practise measurement.
- Pages 46–47 practise geometry properties of shapes.
- Pages 48–53 practise geometry position and direction.
- Pages 54–61 practise statistics.
- Pages 62–63 provide definitions of all the key words.
- Pages 64–65 provide the answers to the 'Try this' questions.

How to use this book

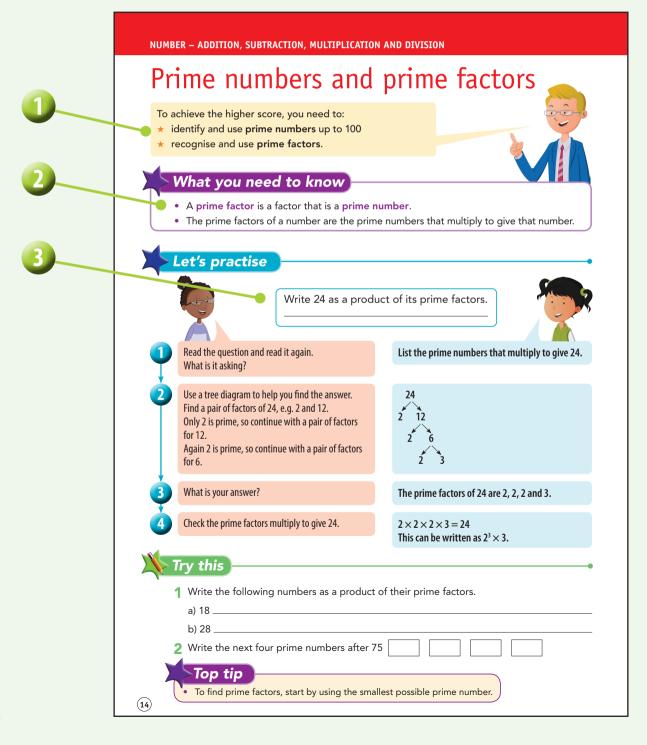


 Introduction – each content strand in the mathematics National Curriculum has been broken down into smaller topics. This introduction tells you what you need to be able to do for this topic.





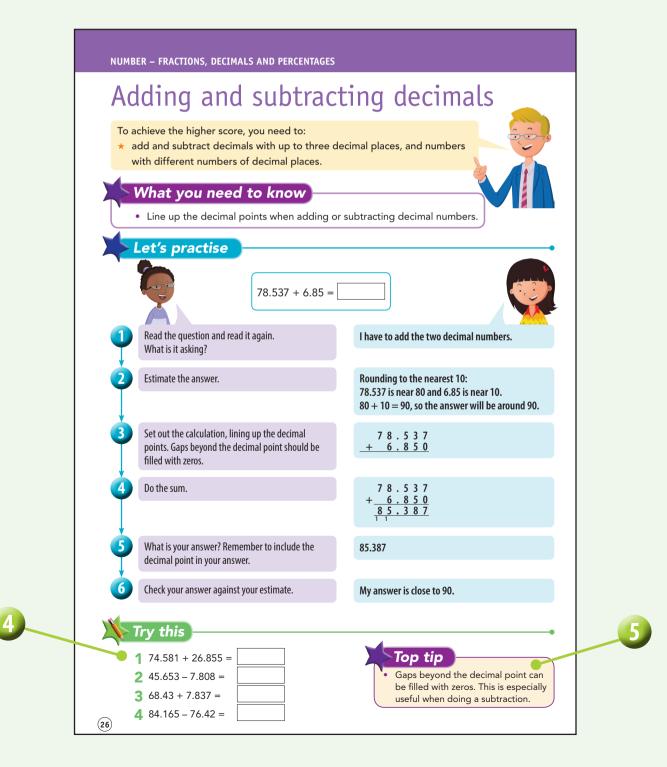
Let's practise – a practice question is broken down in a stepby-step way to help you to understand how to approach answering a question and get the best marks that you can.





4 Try this – this is where you get the chance to practise answering questions for yourself. There are a different number of questions for each topic.

Top tips – these give you further reminders about answering test questions or help you to understand a tricky topic.



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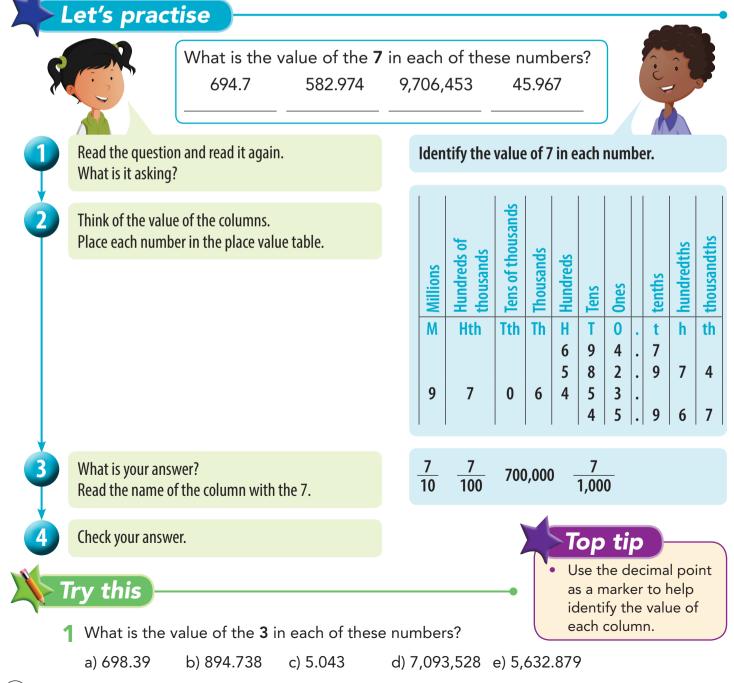
Place value

To achieve the higher score, you need to:

 know the place value of numbers up to 10,000,000 with up to three decimal places.

What you need to know

- The **place value** of each digit in a number depends on its position.
- One million has six zeros: 1,000,000.
- Ten million has seven zeros: 10,000,000.
- Numbers following the decimal point are fractions, showing tenths, hundredths and thousandths.



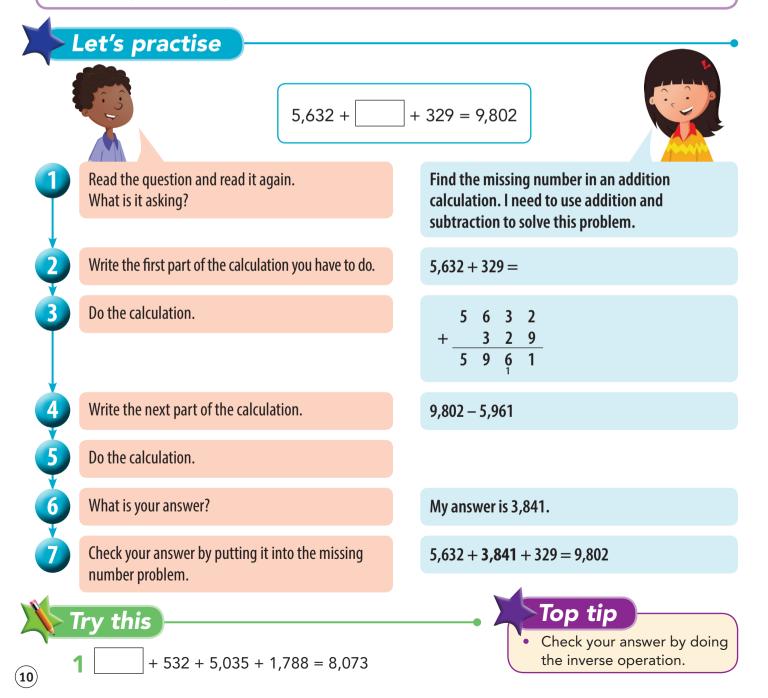
Addition and subtraction

To achieve the higher score, you need to:

★ solve multi-step addition and subtraction problems, deciding which operations and methods to use and why.

What you need to know

- Key words in a problem help you to make sense of the operations that have been used or that you will need to use:
 - The words total of, increase by, plus or altogether relate to addition.
 - The words difference between, reduce by, minus or less relate to subtraction.
 - Think carefully about *more than* and *less than* questions as the operation will depend on the problem.



Ordering fractions

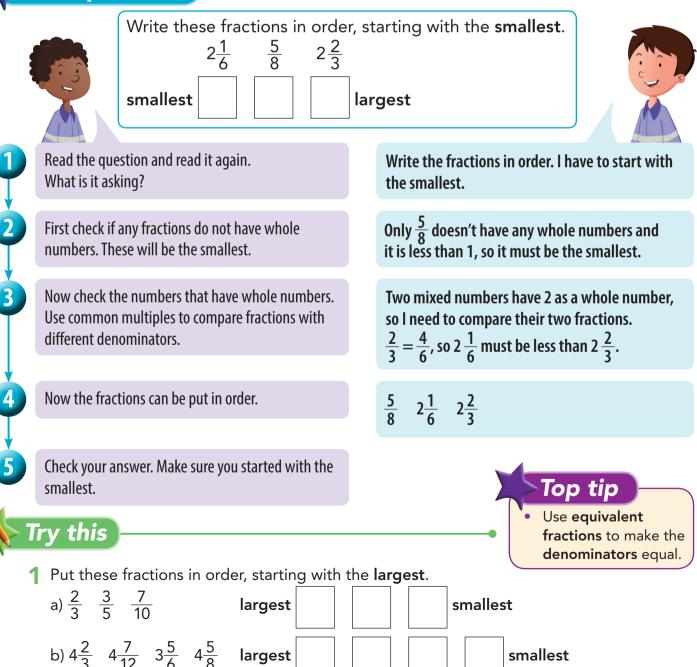
To achieve the higher score, you need to:

★ compare and order **fractions**, including fractions greater than 1.

What you need to know

- A fraction is used to express part of a whole. Unit fractions (e.g. $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$) all have a **numerator** of 1. Proper fractions (e.g. $\frac{3}{4}$ and $\frac{5}{6}$) are less than or equal to 1 whole.
- Fractions greater than 1 are called **improper fractions** and can also be written as a **mixed number** (e.g. $\frac{9}{8} = 1\frac{1}{8}$).

Let's practise



Ratio

To achieve the higher score, you need to:

 solve ratio problems where missing values can be found by using multiplication and division facts.

What you need to know

Read the question and read it again.

2 (packed lunch) : 7 (school dinner)

Packed lunches are 2 shares.

Add the two numbers together.

School dinners are 7 shares because the ratio is

• Ratio compares the relative sizes of quantities or numbers.

Let's practise

What is it asking?

Think of ratio as shares.

At school, children can have a packed lunch or a school dinner. The ratio of children who have a packed lunch to those who have a school dinner is **2:7**

168 children have a school dinner.

How many children eat at school altogether?

Work out how many children have a packed lunch and add it to the number of children who have a school dinner.

168 children have a school dinner. 168 \div 7 = 24 Each share is worth 24.

 $24 \times 2 = 48$

children

168 + 48 = 216

216 children eat at school altogether.

Check your answer.

What is your answer?



4

1 The ratio of boys to girls at a school is **5:4** There are 165 boys.

How many children are in the school?

2 The ratio of dogs to cats in an animal shelter is 4:3 There are 23 more dogs than cats. How many cats are there? Top tip

7:2 is not the same as **2:7**. Read the question twice to make sure you are using the correct numbers in your calculation and providing the answer in the order required.



Algebra

To achieve the higher score, you need to:

express missing number problems using algebra.

What you need to know

- In algebra, words or symbols are used to represent the amounts in a problem, instead of actual numbers.
- An equation with letters can help to solve a missing number problem (e.g. x + 5 = 9, so x = 4).

Let's practise

Jessica thinks of a number. She multiplies it by 4 and adds 7; her answer is 31

Write an algebraic equation that shows this.



Read the question and read it again. What is it asking?

Write an equation for Jessica's missing number calculation.

Use *y* for the number Jessica thought of. (Any letter can be used.)

In algebra, write $y \times 4$ as 4y.

Try this

2

Check the equation you have written matches the question.

 $y \times 4 + 7 = 31$

4y + 7 = 31

a number is multiplied by 4 $4 \times y = 4y$ 7 is added4y + 7the answer is 314y + 7 = 31

Top tip

To solve algebra problems, work backwards and use inverse operations.

1 Georgie thinks of a number.

For each of these problems, write an equation and solve it.

She multiplies it by 2, then subtracts 7 and gets 51

- a) Write an algebraic equation that shows this.
- b) What was her number?
- **2** Lottie thinks of a number.

She divides it by 2, then multiplies by 3 and gets 27

a) Write an algebraic equation that shows this.

b) What was her number?

Measures

To achieve the higher score, you need to:

 solve problems involving the calculation and conversion of units of measure, using up to three decimal places.

What you need to know

Metric conversion facts are useful when solving measures problems (e.g. 1km = 1,000m, 1m = 1,000mm, 1l = 100cl, 1l = 1,000ml, 1kg = 1,000g).

A

-2

___3 litres

Let's practise

Jug B is empty and jug A has some water in it.

Jug A is used to fill jug B to the top of its measure.

How much is left in jug A?

Read the question and read it again. What is it asking?

Be systematic. Start with jug A. How much water is in it?

Now read jug B.

Change the units to be the same.

Do the calculation.

What is your answer?

Check your answer.

Try this

I have to work our how much is left in jug A after filling up jug B.

B

-1,500 ml

-1,000

-500

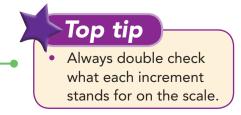
The level in jug A shows 2.25 litres.

Jug B can hold 1,500 ml.

Jug A: 2.25 l = 2,250 ml Jug B: 1,500 ml

2,250 - 1,500 = 750

My answer is 750 ml.



Look at the jugs on this page.

1 Jug A already has 2.25 litres in it. If 625 ml of water is added to jug A, how much **more** water can jug A hold? ml

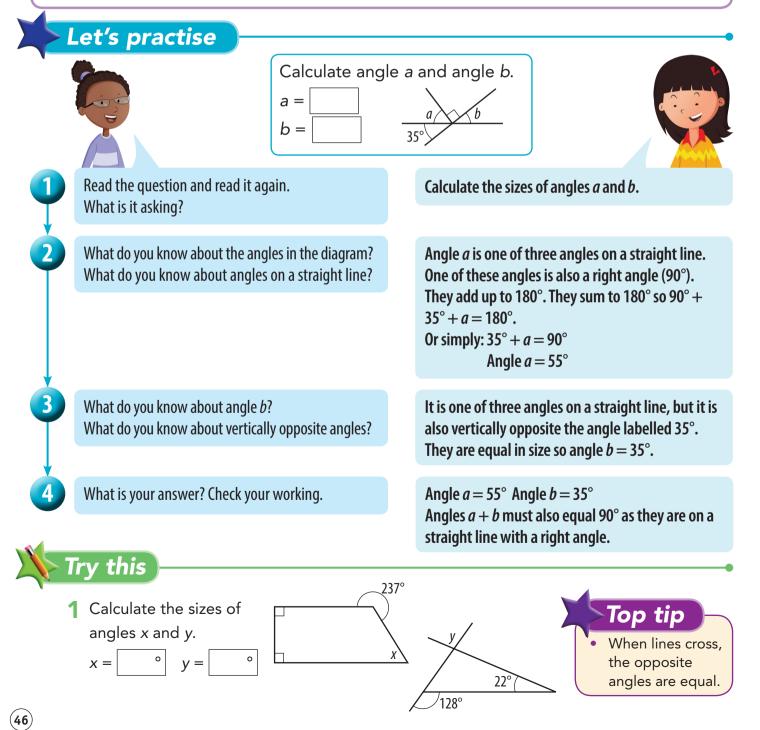
Angles and degrees

To achieve the higher score, you need to:

- recognise angles and find missing angles where they meet at a point or are on a straight line or are vertically opposite
- ★ find unknown angles in any triangle, quadrilateral or **regular polygon**.

What you need to know

- Angles that meet at a point add to 360°.
- Angles on a straight line add to 180°.
- Angles within a triangle add to 180°.
- Angles within a quadrilateral add to 360°.
- Angles that are vertically opposite are equal in size.



Reflections

To achieve the higher score, you need to: ★ reflect shapes in different orientations.

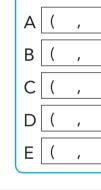
What you need to know

- **Reflections** change the position of a shape but don't change its size.
- With reflections, the **mirror line** shows where the shape is reflected.

Let's practise

Using the y axis as the mirror line, draw a reflection of the pentagon.

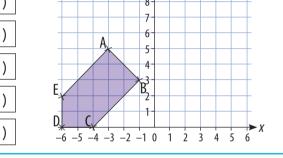
Write the new coordinates in the boxes below.



)

)

)





Read the question and read it again. What is it asking?

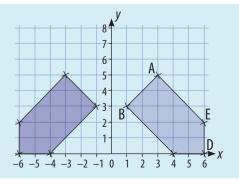
Notice where each corner is positioned. In the reflected shape, each corner will be the same distance from the y axis but on the other side of it. When reflecting in the y axis, the x coordinate changes sign.

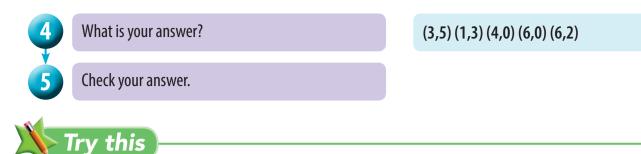
Use a ruler to join the corners. Check that the sides are all the same length as in the original shape.

Reflect the shape using the y axis as the mirror line.

Corner A is at (-3,5). The reflected point A will be at (3,5).

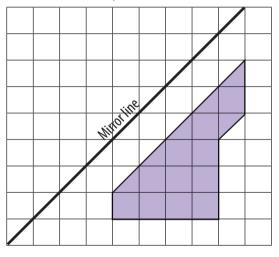
Corner B is at (-1,3). Its reflection will be (1,3). Corner C is at (-4,0). Its reflection will be (4,0). Corner D is at (-6,0). Its reflection will be (6,0). Corner E is at (-6,2). Its reflection will be (6,2).



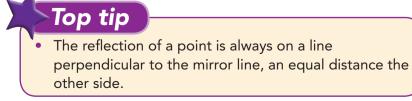


1 Shade two more squares to make shape 2 a reflection of shape 1 in the mirror line.

2 Reflect the shape in the mirror line.



3 Reflecting in the y axis has the effect of changing the sign of the x coordinate.How does reflection in the x axis affect the coordinates?



Tables

To achieve the higher score, you need to:

★ complete missing data in tables using problem-solving skills.

What you need to know

• Tables provide a way of presenting data, in rows and columns.

Let's practise

There are 380 children at Park School. They can choose from four types of lunch.

8	1232	2
ą	نَ بَ بَ	
	X	

Meal	Hot meal	Salad	Vegetarian	Sandwich	Total
Girls	72	15		23	175
Boys			26	20	
Total	105				
Complet	e the mis	sing dat	a in the ta	ble.	



Read the question and read it again. What is it asking?

Which can you complete with the data already given? Be systematic — look for columns or rows that have one missing number.

Do your calculations help you to work out more numbers?

Read the question again. Note that the total number of children is 380.

Check your answers by adding up the rows and columns.

Fill in the missing numbers in the table.

The number of boys having a hot meal = 105 - 72 = 33. The number of girls having vegetarian lunch = 175 - 72 - 15 - 23 = 65. The total having a sandwich is 23 + 20 = 43.

Yes, I can now work out the total for vegetarian. 65 + 26 = 91

Now I can complete the rest of the numbers.

•					
Meal	Hot meal	Salad	Vegetarian	Sandwich	Total
Girls	72	15	65	23	175
Boys	33	126	26	20	205
Total	105	141	91	43	380

Try this

The table below shows the sizes and colours of T-shirts sold in a shop. Complete the table.

Size Colou	White	Blue	Red	Green	Yellow	Total
Small		6	3		9	43
Medium	12		7	11		
Large	5	14		3		45
Total		33	28	24	19	

