THIRD SPACE LEARNING

Specialist 1-to-1 maths interventions and curriculum resources

Rapid Reasoning

Year 5 | Week 6

This week, the new Year 5 objectives that are introduced focus on **statistics** for the first time, with children being encouraged to use and apply their addition and subtraction skills in a statistical context.

Year 5 objectives introduced in a reasoning context for the first time this week include:

- complete, read and interpret information presented in tables, including time tables. This will include solving problems based on the information presented in these tables.

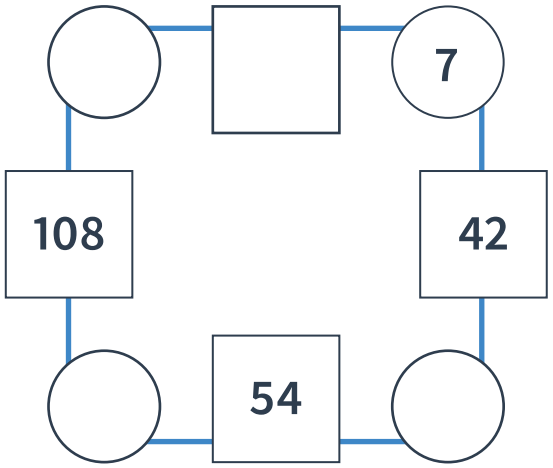
Objectives from *Fluent in Five* that are also tested in a reasoning context this week include:

- adding and subtracting numbers with more than four digits, including using formal written methods where they are appropriate
- using rounding to check answers to calculations and make estimations.

Please note that some questions are worth two marks, and by their very nature, answers to these questions are never clear-cut. For a full breakdown of how marks would be awarded for these questions, please refer to the mark schemes provided.

Q1 In this diagram, the number in each square is the **product** of the numbers in the two circles either side of it.

Complete the missing numbers.



2 marks

Q2 A construction firm is building a football stadium.

The building work has taken 499 days so far.

It should take another 199 days.

How many days will the building work take in total?

1 mark

Q3 A number is added to 658,284.

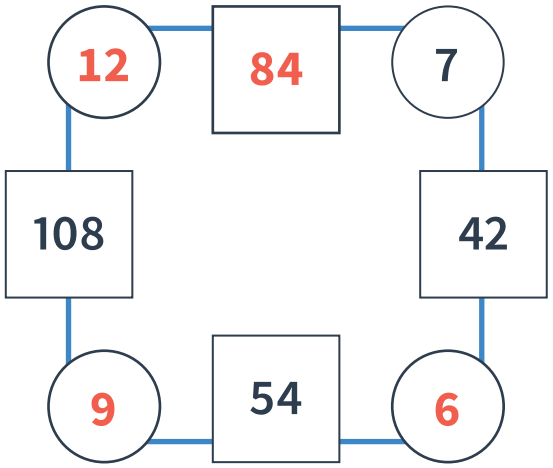
The total is 831,057.

What number was added?

1 mark

Q1 In this diagram, the number in each square is the **product** of the numbers in the two circles either side of it.

Complete the missing numbers.



2 marks

Q2 A construction firm is building a football stadium.

The building work has taken 499 days so far.

It should take another 199 days.

How many days will the building work take in total?

698 days

1 mark

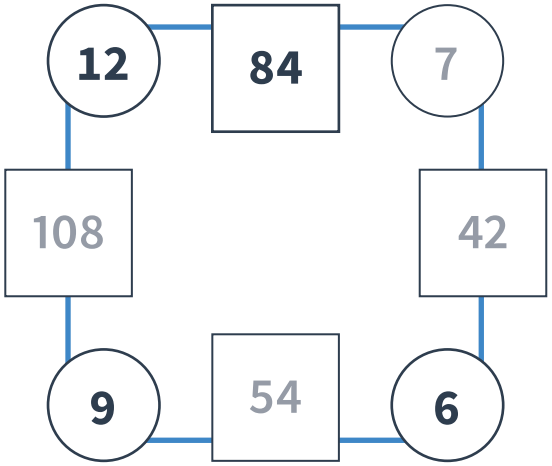
Q3 A number is added to 658,284.

The total is 831,057.

What number was added?

172,773

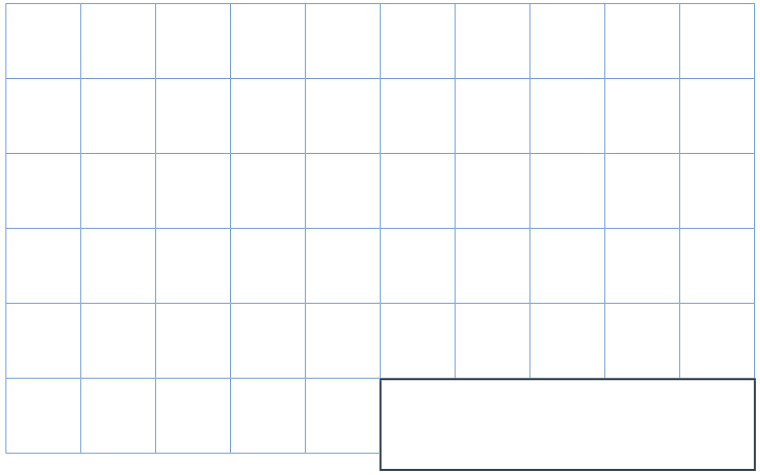
1 mark

	Requirement	Mark	Additional guidance
Q1	 Award **TWO** marks for all four numbers completed correctly. Award **ONE** mark for three numbers completed correctly.	2	
Q2	698 days	1	
Q3	172,773	1	

Q1

$$\square\square\square\square\square - 550{,}255 = 170{,}788$$

Work out the missing number.



1 mark

Q2

Exercise books are sold in packets of 6.

The Junior Department at a school buys 38 **packets.**

The Infant Department buys 19 **packets.**

How many **exercise books** does the school buy altogether?

2 marks

Q3 This table shows how the number of tins of soup in a shop changes over two days as the tins are sold.

Flavour of soup	Number of tins to begin with	Number sold on Day 1	Number sold on Day 2	Number of tins left at the end
Tomato	259	83	58	118
Carrot and coriander	234	67		112
Cream of chicken	245	94	51	100

a How many tins of soup are left **altogether** after everything has been sold?

1 mark

b Complete the table to show the number of tins of carrot and coriander soup that were sold on day 2.

1 mark

Q1

$$\square - 550{,}255 = 170{,}788$$

Work out the missing number.

721,043

1 mark

Q2

Exercise books are sold in packets of 6.

The Junior Department at a school buys 38 **packets.**

The Infant Department buys 19 **packets.**

How many **exercise books** does the school buy altogether?

342 books

2 marks

Q3 This table shows how the number of tins of soup in a shop changes over two days as the tins are sold.

Flavour of soup	Number of tins to begin with	Number sold on Day 1	Number sold on Day 2	Number of tins left at the end
Tomato	259	83	58	118
Carrot and coriander	234	67	55	112
Cream of chicken	245	94	51	100

a How many tins of soup are left **altogether** after everything has been sold?

330 tins

1 mark

b Complete the table to show the number of tins of carrot and coriander soup that were sold on day 2.

1 mark

	Requirement	Mark	Additional guidance
Q1	721,043	1	
Q2	342 books Award **TWO** marks for a correct answer. Award **ONE** mark for correct method shown, but with one arithmetic error. An example of a correct method might be adding 38 and 19 to find the total number of packets that the school buys (57) then multiplying this by 6 to find the total number of books (342).	2	
Q3a	330 tins	1	
Q3b	55	1	

What are examiners looking for?

Q1

$$\square - 550{,}255 = 170{,}788$$

Work out the missing number.

721,043

1 mark

Why are we asking this question?

This question is designed to test children's ability to add and subtract whole numbers with more than four digits. Specifically, it has been written to assess whether they can apply this knowledge when solving missing number problems. The question has been formatted as a vertical subtraction, so it can act as an assessment of whether children understand this strategy (although they can solve the problem without this).

What common errors do we expect to see?

Some children may misinterpret the format and think that they need to subtract 170,788 from 550,255. These children will give the answer 379,467 or may give alternative answers if they also make errors subtracting the two numbers.

Some children may realise that the question requires them to find a missing first number in a subtraction, but not know how to derive it. This may be because the calculation itself involves regrouping and they may not understand how, for example, 5 ones can be subtracted from a single digit to leave 8 ones.

How to encourage children to solve this question

This is a standard 'missing number' problem of the type ? − a = b and some children may benefit from being encouraged to consider how they might use the inverse operation to find the answer. Using this strategy means that children do not need to apply any particular knowledge of column subtraction (except, perhaps, to check their answer at the end). Encourage them to sketch a bar model to illustrate what the problem is asking. They should recognise that they can find the starting number in a subtraction by adding the total of the number being subtracted and the difference ($a + b = ?$).

A second strategy is for children to apply their knowledge of column subtraction to derive each missing digit. Encourage them to sketch a place-value grid to help recognise how the subtraction involves regrouping. They should then be able to work backwards to identify each digit before the regrouping occurred.

Q1 Harry is playing a computer game.

Every time he collects a golden coin, 1,246 points are added to his score.

Every time he drops a golden coin, 2,000 points are taken away from his score.

Harry collects six golden coins and drops three of them.

What is Harry's total score?

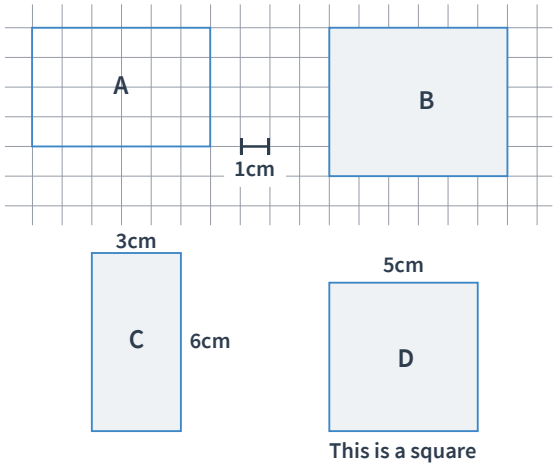
2 marks

Q2 A school library has 399 fiction books and 836 non-fiction books.

How many more non-fiction than fiction books are there?

1 mark

Q3 Write the letters A to D in order of size, from largest to smallest area.



Largest

Smallest

1 mark

Q1 Harry is playing a computer game.

Every time he collects a golden coin, 1,246 points are added to his score.

Every time he drops a golden coin, 2,000 points are taken away from his score.

Harry collects six golden coins and drops three of them.

What is Harry's total score?

1,476 points

2 marks

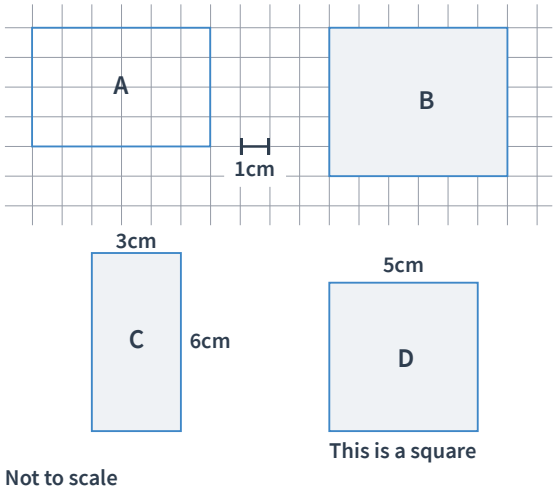
Q2 A school library has 399 fiction books and 836 non-fiction books.

How many more non-fiction than fiction books are there?

437 more books

1 mark

Q3 Write the letters A to D in order of size, from largest to smallest area.



B Largest — **D** — **A** — **C** Smallest

1 mark

	Requirement	Mark	Additional guidance
Q1	1,476 points Award **TWO** marks for a correct answer. Award **ONE** mark for correct method shown, but with one arithmetic error. An example of a correct method is to multiply 1,246 by 6 to find the total number of points won by collecting coins (7,476), to multiply 2,000 by 3 to find the total number of points lost by dropping coins (6,000) and to find the difference by subtracting the two (1,476).	2	
Q2	437 more books	1	
Q3	B D A C	1	

Q1 A and B are two six-digit numbers.

B is 354,763 more than A.

B is 638,241.

Calculate the value of A.

1 mark

Q2 Mara is 9 years old today.

In her lifetime, there have been 2 leap years.

How old is Mara in days?

2 marks

Q3 Complete these statements with the words **always**, **sometimes** or **never**.

An octagon is ☐ a regular shape.

A square is ☐ a regular shape.

An equilateral triangle is ☐ an irregular shape.

A rhombus is ☐ an irregular shape.

2 marks

Q1 A and B are two six-digit numbers.

B is 354,763 more than A.

B is 638,241.

Calculate the value of A.

283,478

1 mark

Q2 Mara is 9 years old today.

In her lifetime, there have been 2 leap years.

How old is Mara in days?

3,287 days

2 marks

Q3 Complete these statements with the words **always, sometimes** or **never.**

An octagon is [sometimes] a regular shape.

A square is [always] a regular shape.

An equilateral triangle is [never] an irregular shape.

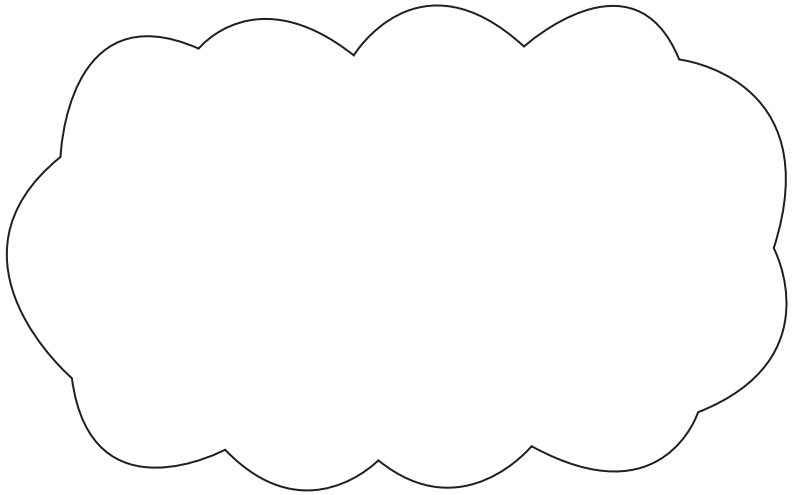
A rhombus is [never] an irregular shape.

2 marks

	Requirement	Mark	Additional guidance
Q1	283,478	1	
Q2	3,287 days Award **TWO** marks for correct answer. Award **ONE** mark for an incorrect answer, but correct identification in the working of the number of days in a year (365) **AND** in leap year (366).	2	
Q3	sometimes, always, never, never Award **ONE** mark for 2 or 3 correct answers and **BOTH** marks for all correct answers.	2	

Q1 Megan says, "If I can work out the total of 534 and 275 in my head, I can work out the total of 5,340 and 2,750 in my head."

Explain why Megan is correct.



1 mark

Q2 A number of adults and children were asked whether they prefer chocolate chip cookies or fudge.

The total number of children asked was double the number of adults.

60 people were asked altogether.

17 children prefer chocolate chip cookies to fudge.

The number of adults that prefer fudge to chocolate chip is 9 fewer than the number of children who prefer it.

Use the information above to complete the table.

	Number of adults	Number of children	TOTAL
Chocolate Chip			
Fudge			
TOTAL			

2 marks

Q3 Caroline uses the short multiplication method to work out the answer to 462 × 4.

Anisa says, "That looks like the column method I sometimes use to add large numbers together!"

What is the **same** and what is **different** about both methods? Write two answers for each.

	Similarities	Differences
1		
2		

2 marks

Q1 Megan says, "If I can work out the total of 534 and 275 in my head, I can work out the total of 5,340 and 2,750 in my head."

Explain why Megan is correct.

1 mark

Q2 A number of adults and children were asked whether they prefer chocolate chip cookies or fudge.

The total number of children asked was double the number of adults.

60 people were asked altogether.

17 children prefer chocolate chip cookies to fudge.

The number of adults that prefer fudge to chocolate chip is 9 fewer than the number of children who prefer it.

Use the information above to complete the table.

	Number of adults	Number of children	TOTAL
Chocolate Chip	6	17	23
Fudge	14	23	37
TOTAL	20	40	60

2 marks

Q3 Caroline uses the short multiplication method to work out the answer to 462 × 4.

Anisa says, "That looks like the column method I sometimes use to add large numbers together!"

What is the **same** and what is **different** about both methods? Write two answers for each.

	Similarities	Differences
1		
2	*See mark scheme for examples*	

2 marks

<table>
<tr><th></th><th>Requirement</th><th>Mark</th><th>Additional guidance</th></tr>
<tr><td>Q1</td><td>Accept any answer that explains that 534 + 275 = 809 and that 5,340 + 2,750 must be the same answer multiplied by 10 (8,090).</td><td>1</td><td></td></tr>
<tr><td>Q2</td><td><table><tr><th></th><th>Number of adults</th><th>Number of children</th><th>TOTAL</th></tr><tr><td>Chocolate Chip</td><td>6</td><td>17</td><td>23</td></tr><tr><td>Fudge</td><td>14</td><td>23</td><td>37</td></tr><tr><td>TOTAL</td><td>20</td><td>40</td><td>60</td></tr></table>Award ONE mark for 5 or more correct numbers.</td><td>2</td><td></td></tr>
<tr><td>Q3</td><td>Accept any TWO statements for each heading.
Award ONE mark for two or three distinct comparisons and both marks for four.
For example:
Similarities:
– They both need to be written vertically with the digits in the right columns.
We work from right to left when working out the answer in both.</td><td></td><td></td></tr>
</table>

	Requirement	Mark	Additional guidance
Q3	– If an answer is two digits, we write the tens digit underneath the next column and add it to the next answer. **Differences:** – The operations are different (one is multiplication, one is addition). – With addition each column is added separately (ones added to ones, tens added to tens and so on), with multiplication each column is multiplied by the same digit. – With addition of two numbers, the largest total a column will make will be 18 (9 + 9) or 19 if there has been 1 ten carried over. With multiplication the largest total a column will make depends on the multiplication involved (and the number of tens carried over can vary).	2	

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Rapid Reasoning

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