THIRD SPACE
LEARNING

**Specialist 1-to-1 maths interventions
and curriculum resources**

Rapid Reasoning

Year 5 | Week 3

As this is the third week of *Rapid Reasoning* in Year 5, hopefully children will be increasingly confident and able to answer all three questions in the time given.

This is the last week that the Year 5 objectives introduced will focus on **place value**, with children focusing on negative numbers for the first time in Year 5.

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

- interpreting negative numbers in context, including counting and forward and backwards with positive and negative integers through zero.

The following Year 5 objective continues to be a focus from week 2:

- rounding any number to up 1,000,000 to any degree of accuracy.

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

- mental addition and subtraction

- more complex written addition and subtraction, including the crossing of place value boundaries.

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 Write the temperatures in order on the thermometer, from the highest temperature at the top to the lowest temperature at the bottom

3°C   −14°C   12°C   −7°C
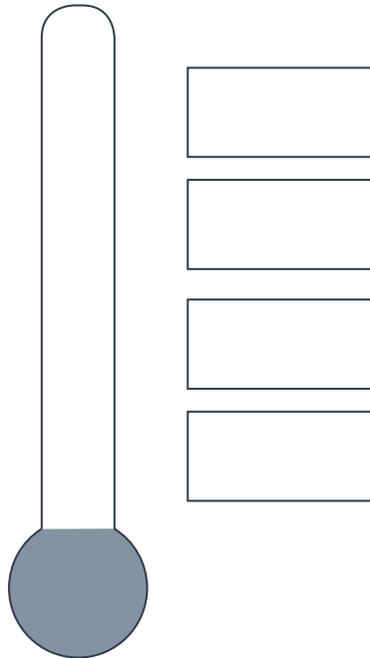
1 mark

Q2 Maryam picks any two cards and adds them together.

She can make three different totals using these cards.

560   630   750

What are the three totals she can make?

☐ or ☐ or ☐

2 marks

Q3 Two of these numbers multiply together to make 2700.

90   20   50   30   10

Write the multiplication as a number sentence.

1 mark

Q1 Write the temperatures in order on the thermometer, from the highest temperature at the top to the lowest temperature at the bottom

3°C   −14°C   12°C   −7°C

12°C

3°C

−7°C

−14°C
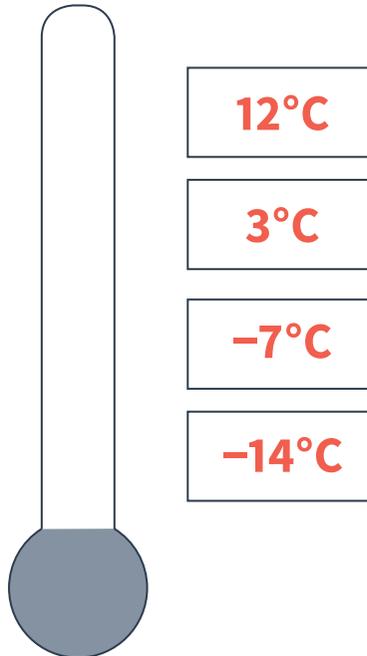
1 mark

Q2 Maryam picks any two cards and adds them together.

She can make three different totals using these cards.

560   630   750

What are the three totals she can make?

1,190 or **1,310** or **1,380**

2 marks

Q3 Two of these numbers multiply together to make 2700.

90   20   50   30   10

Write the multiplication as a number sentence.

90 × 30 = 2700

1 mark

	Requirement	Mark	Additional guidance
Q1	**In order from top to bottom:** **12°C, 3°C, −7°C, −14°C**	1	
Q2	560 + 630 = **1,190** 560 + 750 = **1,310** 630 + 750 = **1,380** **Award ONE mark for two correct totals.**	2	**Accept totals in any order and also totals given without the number sentences.**
Q3	90 × 30 = 2700	1	

Q1 There are 810 people watching a concert.

640 of them are adults.

How many are children?

1 mark

Q2 A number becomes 317,000 when rounded to the nearest thousand.

The number is made from these digits.

| 8 | 7 | 4 | 3 | 1 | 0 |

Write **two** possible numbers that it could be.

1 mark

Q3 A rectangular sticky label has a width of 7cm and length of 12cm.

12cm   Not to scale

7cm
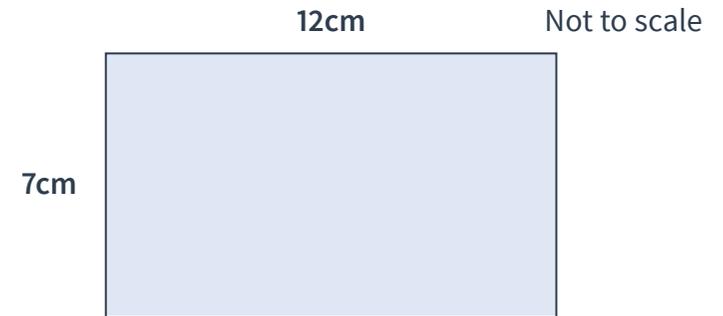
What is the perimeter of the label?

cm

1 mark

Q1 There are 810 people watching a concert.

640 of them are adults.

How many are children?

170

1 mark

Q2 A number becomes 317,000 when rounded to the nearest thousand.

The number is made from these digits.

| 8 | 7 | 4 | 3 | 1 | 0 |

Write **two** possible numbers that it could be.

317,084

317,408

1 mark

Q3 A rectangular sticky label has a width of 7cm and length of 12cm.

12cm   Not to scale

7cm
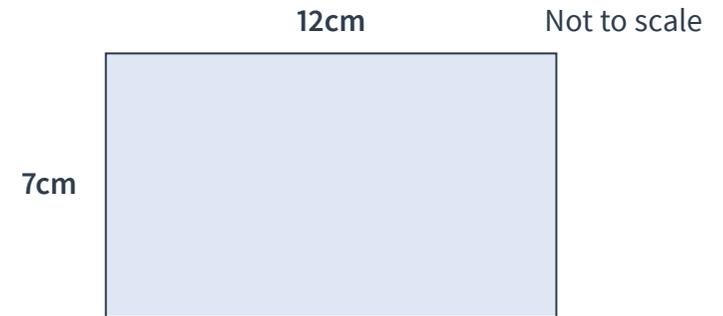
What is the perimeter of the label?

38   cm

1 mark

	Requirement	Mark	Additional guidance
Q1	170	1	
Q2	**Any two from the following:** **317,084 317,048** **317,480 317,408**	1	
Q3	38cm	1	

Q1 Harry calculates four different amounts.

A $\frac{1}{5}$ of 60

B 90 shared into three equal groups

C $\frac{2}{3}$ of 18

D A quarter of 100

Which of the four calculations is the odd one out? Explain your answer.

_____

_____

_____

_____

1 mark

Q2 Emily throws two plastic balls at a target.

She multiplies the two numbers together to get her final score.
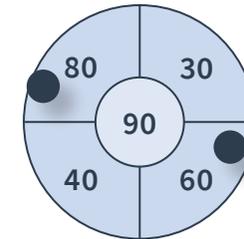
Is Emily's final score more or less than 5,000? Explain your answer.

_____

_____

_____

_____

1 mark

Q3 Muhammad and Ethan are counting along a number line.

If they need to, the children count across zero.

Muhammad counts forwards in twos from −15. He counts six numbers, not including −15.

Ethan counts backwards in threes from 9. He counts five numbers, not including 9.

What numbers do they end on?

Muhammed ends on [   ]

Ethan ends on [   ]

2 marks

Q1 Harry calculates four different amounts.

A $\frac{1}{5}$ of 60

B 90 shared into three equal groups

C $\frac{2}{3}$ of 18

D A quarter of 100

Which of the four calculations is the odd one out? Explain your answer.

See mark scheme for examples

1 mark

Q2 Emily throws two plastic balls at a target.

She multiplies the two numbers together to get her final score.
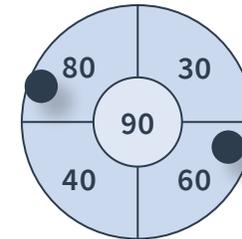
Is Emily's final score more or less than 5,000? Explain your answer.

Yes

See mark scheme for examples

1 mark

Q3 Muhammad and Ethan are counting along a number line.

If they need to, the children count across zero.

Muhammad counts forwards in twos from −15. He counts six numbers, not including −15.

Ethan counts backwards in threes from 9. He counts five numbers, not including 9.

What numbers do they end on?

Muhammed ends on | −3 |

Ethan ends on | −6 |

2 marks

	Requirement	Mark	Additional guidance
Q1	Accept any reasonable answers, for example: **C** because multiplication is needed as well as division to find the answer. **D** because all the other answers are multiples of 6.	1	This question is open-ended, but has been designed to encourage children to use reasoning to explain their answers. Although several answers are possible, children should be able to recognise that calculation C involves two distinct steps (division and multiplication) and the others only involve one (division).
Q2	**Emily's score is less than 5,000 because 80 × 60 = 4,800.**	1	
Q3	**−3, −6** Award **ONE** mark per correct answer.	2	

What are examiners looking for?

Q1 Harry calculates four different amounts.

A $\frac{1}{5}$ of 60

B 90 shared into three equal groups

C $\frac{2}{3}$ of 18

D A quarter of 100

Which of the four calculations is the odd one out? Explain your answer.

Accept any reasonable answers.
For example:

C because multiplication is needed as well as division to find the answer.

D because all the other answers are multiples of 6.

_____
1 mark

Why are we asking this question?

This question has been designed to assess children's ability to find fractions of numbers. It is an open-ended question in the sense that, if children use appropriate reasoning, there are several possible answers.

What common errors do we expect to see?

Some children may attempt to answer the question without finding any of the answers. For example, they may suggest that calculation B is the odd one out because all the others involve fractions, or that calculation C is the odd one out because the others involve multiples of 10. Whilst this is not necessarily a wrong answer, it does not display a depth of reasoning.

Some children may struggle to find fractions of quantities. They may be able to solve calculation B by using division, but not be aware how to solve the others. For instance, they may attempt to find out the number of $\frac{1}{5}$s that there are in 60 ($60 \div \frac{1}{5}$ is different from $\frac{1}{5}$ of 60).

How to encourage children to solve this question

Begin by encouraging children to find the answer to each problem, rather than attempting to give an answer without calculating anything.

Perhaps the clearest way to visualise each calculation is through the use of bar models, supporting children as needed to construct a bar model.

Encourage children to sketch quick bar models to represent what is being asked in each question. They should be able to see that the way to find each problem is through division (and, in the case of calculation C, addition or multiplication too).

18		
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

?

100			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

?
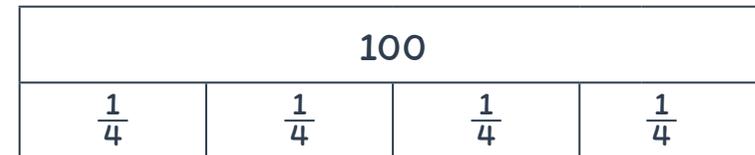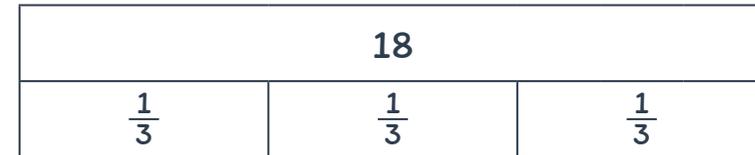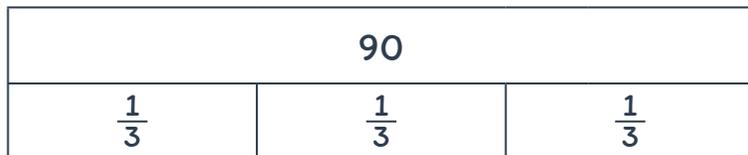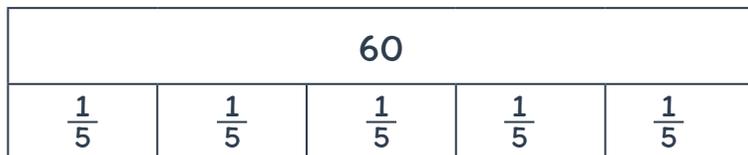
Once children have calculated each answer, encourage them to compare their answers, their methods and so on to decide on an 'odd one out' based on mathematical reasoning.

60				
$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$

?

90		
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

?

Q1

30	80	10
40	20	40

Erin takes two cards and multiplies them together.

Daniel takes two different cards and multiplies them together.

Both Erin and Daniel's answers are the same four-digit number.

What is the four-digit number?

1 mark

Q2

Ellie's Granddad has a square lawn in his garden.

He wants to buy a fence to go all the way around the edge of the lawn.

He says, "I need to measure all four sides to know what length of fence to buy."

Ellie says, "There's a quicker way, Granddad!"

Explain why Ellie is right.

1 mark

Q3 This table shows the goal difference for four football teams.

Some are positive, some are negative.

	Team	Goal difference
A	Ashthorpe Athletic	10
B	Brimley Borough	−11
C	Coppington City	−9
D	Dartbury	6

Put the teams in order from smallest to largest goal difference by writing the letters A, B, C and D in the boxes below.

Smallest ⟵——————————⟶ Largest

☐ ☐ ☐ ☐

_____
1 mark

Q1

30	80	10
40	20	40

Erin takes two cards and multiplies them together.

Daniel takes two different cards and multiplies them together.

Both Erin and Daniel's answers are the same four-digit number.

What is the four-digit number?

1600

1 mark

Q2

Ellie's Granddad has a square lawn in his garden.

He wants to buy a fence to go all the way around the edge of the lawn.

He says, "I need to measure all four sides to know what length of fence to buy."

Ellie says, "There's a quicker way, Granddad!"

Explain why Ellie is right.

See mark scheme for examples

1 mark

Q3 This table shows the goal difference for four football teams.

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	Team	Goal difference
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D	Dartbury	6

Put the teams in order from smallest to largest goal difference by writing the letters A, B, C and D in the boxes below.

Smallest ⟷ Largest

| B | C | D | A |

1 mark

	Requirement	Mark	Additional guidance
Q1	1600 (40 × 40 and 80 × 20)	1	Children may answer 800 (80 × 10 and 40 × 20), but note that this is not a four-digit number as specified in the question.
Q2	Ellie is correct because a square has sides of equal length, so Granddad only needs to measure one side length and then multiply it by 4.	1	Accept any other answers that mention the property that squares have sides of equal length and the effect this has on calculating perimeter.
Q3	B C D A	1	

Q1 A number is made from these digits.

| 5 | 0 | 2 | 9 | 8 | 7 |

It is a multiple of 10.

The digit in the ten thousands place is even.

It rounds up when rounded to the nearest 100,000.

It rounds down when rounded to the nearest 1,000.

What could the number be? Give **two** possible answers.

_____

_____

_____

1 mark

Q2 The difference between two numbers is 470.

The larger number is double 460.

What is the smaller number?

1 mark

Q3 Aaron has 60g of sugar.

He **uses** $\frac{5}{6}$ of the sugar.

How many grams of the sugar does Aaron have **left**?

1 mark

Q1 A number is made from these digits.

| 5 | 0 | 2 | 9 | 8 | 7 |

It is a multiple of 10.

The digit in the ten thousands place is even.

It rounds up when rounded to the nearest 100,000.

It rounds down when rounded to the nearest 1,000.

What could the number be? Give **two** possible answers.

589,270

985,270

1 mark

Q2 The difference between two numbers is 470.

The larger number is double 460.

What is the smaller number?

450

1 mark

Q3 Aaron has 60g of sugar.

He **uses** $\frac{5}{6}$ of the sugar.

How many grams of the sugar does Aaron have **left**?

10g

1 mark

	Requirement	Mark	Additional guidance
Q1	Accept any **two** of the following: 587,290 589,270 785,290 789, 250 985,270 987,250	1	
Q2	450	1	
Q3	10g	1	
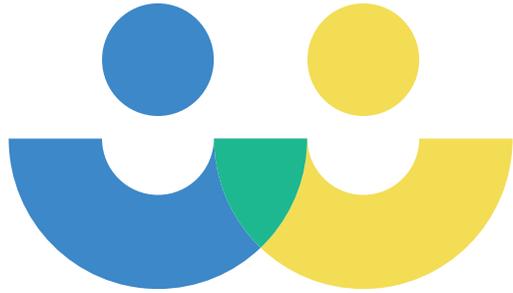
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Rapid Reasoning

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