



THIRD SPACE LEARNING

Specialist 1-to-1 maths interventions
and curriculum resources

Rapid Reasoning

Year 6 | Week 6

This week, the new Year 6 objectives that are introduced continue to focus on **calculations with all four operations**, including **properties of number**.

Year 6 objectives introduced in a reasoning context for the first time this week focus on:

- using knowledge of order of operations to carry out calculations involving all four operations
- identifying and using multiples and factors, including prime numbers and common multiples/factors.

Children continue to be exposed to the following objectives from weeks 4 and 5:

- dividing numbers with up to four digits by a two-digit whole number, including interpreting remainders based on the context of the question.
- performing a range of mental calculations, including with mixed operations and whole numbers
- multiplying numbers with up to four digits by a two-digit whole number
- addition and subtraction questions from the Year 5 curriculum, involving adding and subtracting numbers with more than four digits
- multi-step problems, involving a range of calculation skills.

Note that, unlike questions from the arithmetic paper, in reasoning questions the formal method for multiplication/division is **not** required for the award of method marks.

Q1

Write all the factors of 30 that are also factors of 45.

1 mark

Q2

Look at these calculations.

$$1301 + 287 = ?$$

$$1499 + 287 = ?$$

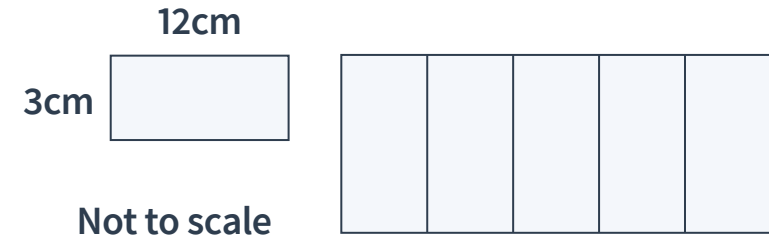
$$1545 + 287 = ?$$

Which calculation is the odd one out? Why?

2 marks

Q3

A large rectangle is made up of five smaller rectangles.



What is the perimeter of the large rectangle?



2 marks

Q1

Write all the factors of 30 that are also factors of 45.

1, 3, 5, 15

1 mark

Q2

Look at these calculations.

$$1301 + 287 = ?$$

$$1499 + 287 = ?$$

$$1545 + 287 = ?$$

Which calculation is the odd one out? Why?

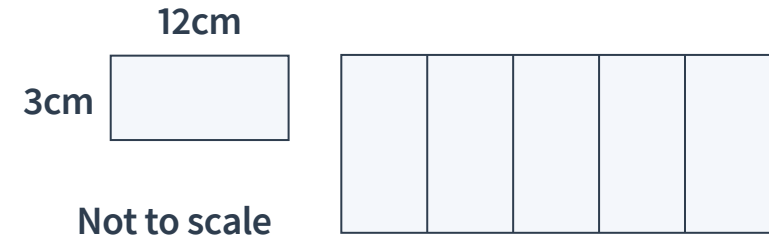
1535 + 287 = ?

See mark scheme for examples

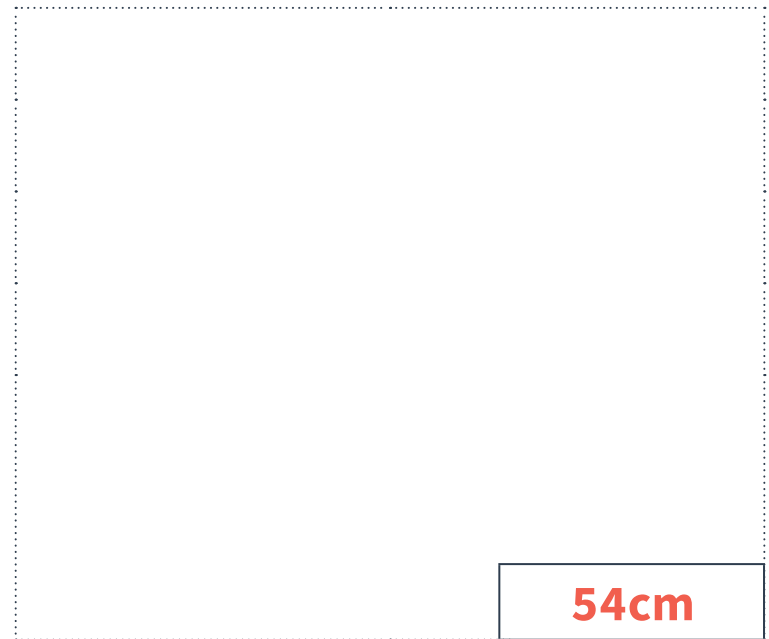
2 marks

Q3

A large rectangle is made up of five smaller rectangles.



What is the perimeter of the large rectangle?



2 marks

	Requirement	Mark	Additional guidance
Q1	1, 3, 5, 15	1	Accept in any order
Q2	<p>Award TWO marks for the answer of $1535 + 287 = ?$ accompanied by an explanation that refers to the other two calculations being close to a multiple of 100, and therefore they can be carried out mentally.</p> <p>For example: $1545 + 287 = ?$ is the odd one out, as it does not contain a near multiple of 100 like the others, and therefore would be more difficult to carry out mentally.</p> $1301 - 1 = 1,300$ $1499 + 1 = 1,500$ <p>The first two calculations contain numbers that are close to multiples of 100. 1545 is not close to a multiple of 100.</p> <p>Award ONE mark for the correct identification of $1545 + 287 = ?$ as the odd one out, but without any explanation,</p> <p>OR</p> <p>for any other mathematically feasible explanation explaining why one of the calculations is the odd one out.</p>	2	

	Requirement	Mark	Additional guidance
Q3	<p>Award TWO marks for the correct answer of 54cm.</p> <p>Award ONE mark for either:</p> <p>54 or 54m or 54cm²</p> <p>OR</p> <p>a full, feasible method, with no more than one arithmetic error, e.g.</p> <p>$3 \times 5 = 15$</p> <p>$15 \times 2 = 30.$</p> <p>$30 + 12 + 12 =$ wrong answer.</p>	2	<p>Correct units must be given for the award of TWO marks.</p> <p>For the award of ONE mark, the correct side lengths must be used.</p> <p>Do NOT accept:</p> <p>$15 \times 5 = 75$</p> <p>$75 \times 2 = 150$</p> <p>$150 \times 3 \times 3 = 156$</p>

- Q1** There are 5,000 leaflets in a box.
Priya delivers 3,420 leaflets.
James delivers 1,380 leaflets.

How many leaflets are left in the box?

leaflets

1 mark

- Q2** Put one of the following symbols in each box to make these statements correct.

	<	=	>
$5 \times 4 + 2 \div 2$	<input style="width: 40px; height: 30px;" type="text"/>	11	
$3 \times (4 + 5)$	<input style="width: 40px; height: 30px;" type="text"/>	$3 \times 4 + 5$	
$20 + 3 \times 4 \div 2$	<input style="width: 40px; height: 30px;" type="text"/>	$(20 + 3) \times 4 \div 2$	

2 marks

- Q3** Circle the number closest to 5,000.

5,321 5,201 4,893 6,795 483

1 mark

- Q1** There are 5,000 leaflets in a box.
Priya delivers 3,420 leaflets.
James delivers 1,380 leaflets.

How many leaflets are left in the box?

200 leaflets

1 mark

- Q2** Put one of the following symbols in each box to make these statements correct.

	<	=	>
$5 \times 4 + 2 \div 2$	>		11
$3 \times (4 + 5)$	>		$3 \times 4 + 5$
$20 + 3 \times 4 \div 2$	<		$(20 + 3) \times 4 \div 2$

2 marks

- Q3** Circle the number closest to 5,000.

5,321 5,201 4,893 6,795 483

1 mark

	Requirement	Mark	Additional guidance
Q1	200	1	
Q2	Award TWO marks for all symbols being correct. Award ONE mark for two correct symbols. $5 \times 4 + 2 \div 2 > 11$ $3 \times (4 + 5) > 3 \times 4 + 5$ $20 + 3 \times 4 \div 2 < (20 + 3) \times 4 \div 2$	2	
Q3	4,893	1	

What are examiners looking for?

Q2

Put one of the following symbols in each box to make these statements correct.

$<$	$=$	$>$
$5 \times 4 + 2 \div 2$	<input style="width: 40px; height: 30px; border: 1px solid black;" type="text" value=">"/>	11
$3 \times (4 + 5)$	<input style="width: 40px; height: 30px; border: 1px solid black;" type="text" value=">"/>	$3 \times 4 + 5$
$20 + 3 \times 4 \div 2$	<input style="width: 40px; height: 30px; border: 1px solid black;" type="text" value="<"/>	$(20 + 3) \times 4 \div 2$

2 marks

Why are we asking this question?

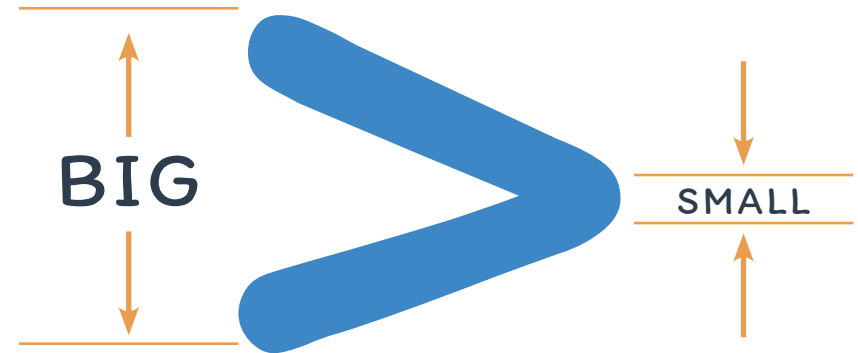
This question is designed to assess children's understanding of the order of operations, together with their understanding of the use of the inequality signs (which is knowledge that was first introduced in Year 2).

What common errors do we expect to see?

Children incorrectly apply the order of operations.

This indicates that children do not have a true conceptual understanding of how to apply the order of operations.

Children reverse the inequality symbols. This indicates that children do not understand that $<$ means less than and $>$ means more than. Children should remember that the 'big' end of the symbol always faces the biggest number.



How to encourage children to solve this question

Children should first be encouraged to recall, and if needed, write down, the correct order of operations. When doing so, it is important that they recall that division and multiplication have the same priority as each other, as do addition and subtraction. Therefore, if using the commonly used BODMADS/BIDMAS acronym, it is important that it is recorded as follows, which helps to show this equal priority:

B

O

DM

AS

They should then work out the value of each statement, recording this above or around the question, and then place the correct inequality symbol.

Q1 Wicked Washes car wash processes 54 cars per day.
They charge £13 per car.

How much money will they have made in three days?

2 marks

Q2

a

Write down all the common multiples of 3 and 4 under 50.

1 mark

b

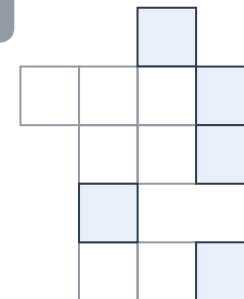
Write down all the common factors of 30 and 40 under 50.

1 mark

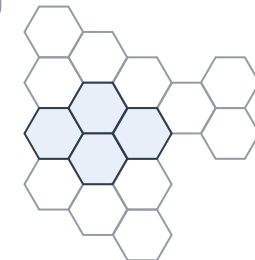
Q3

Complete these diagrams so that $\frac{2}{3}$ of each diagram is shaded.

a



b



1 mark

1 mark

Q1 Wicked Washes car wash processes 54 cars per day.
They charge £13 per car.

How much money will they have made in three days?

£2,106

2 marks

Q2

a

Write down all the common multiples of 3 and 4 under 50.

12, 24, 36, 48

1 mark

b

Write down all the common factors of 30 and 40 under 50.

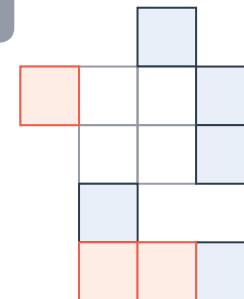
1, 2, 5, 10

1 mark

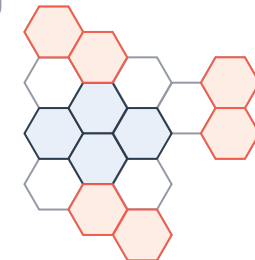
Q3

Complete these diagrams so that $\frac{2}{3}$ of each diagram is shaded.

a



b



1 mark

1 mark

	Requirement	Mark	Additional guidance
Q1	Award TWO marks for the correct answer of £2,106. Award ONE mark for 2,106 2,106p or £2,106p OR ONE mark for a complete method, with no more than one arithmetic error, e.g. $54 \times 13 = 702$ $702 \times 3 = \text{wrong answer.}$	2	Correct money notation must be used for the award of TWO marks. Commas are not required.
Q2a	12, 24, 36, 48	1	
Q2b	1, 2, 5, 10	1	
Q3a	3 additional squares shaded	1	
Q3b	6 additional hexagons shaded	1	

Q1 Wicked Washes car wash has an extremely busy weekend, and it washes more cars than usual. During the weekend, it takes £1,898.

It charges £13 per car.

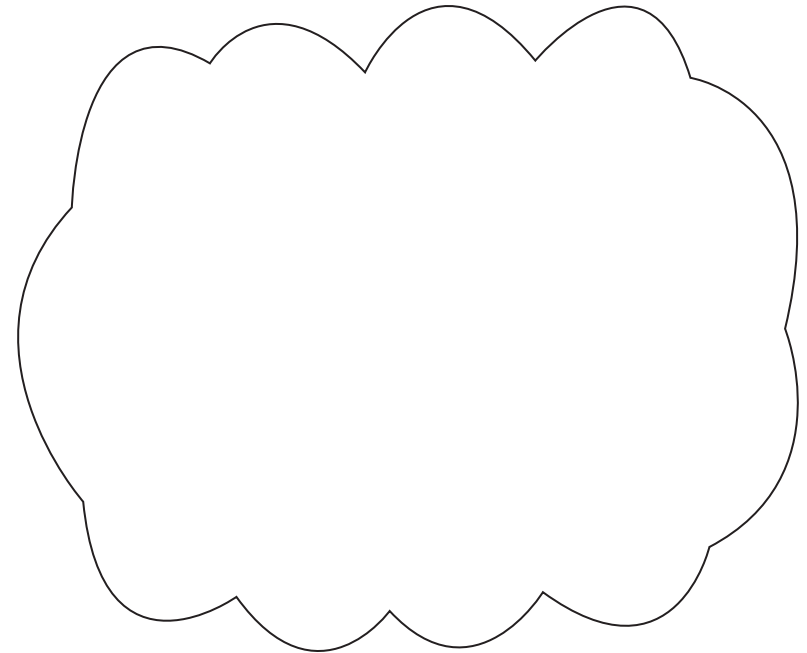
How many cars did were washed over the weekend?

cars

2 marks

Q2 Mia says, “I can work out $3497 + 676$ without using a formal written method.”
Mia is correct.

Explain why Mia is correct.

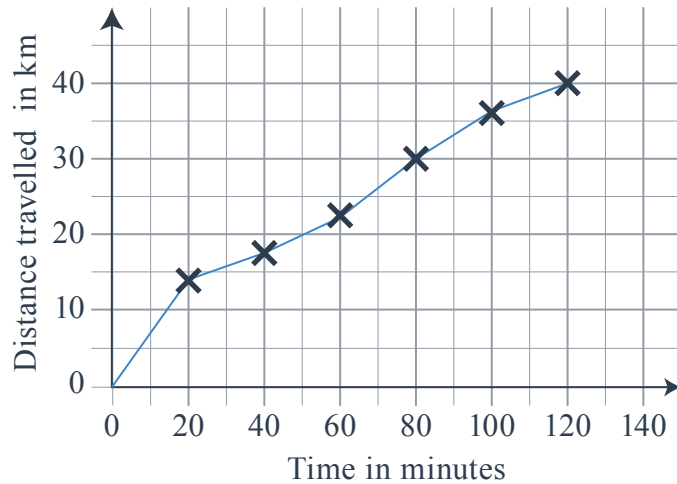


1 mark

Q3

Mikey went on a bike ride.

This graph shows how far he travelled at different times.



a

How long did it take him to complete the ride?

minutes

1 mark

b

After how many minutes had he travelled 30km?

minutes

1 mark

Q1 Wicked Washes car wash has an extremely busy weekend, and it washes more cars than usual. During the weekend, it takes £1,898.

It charges £13 per car.

How many cars did were washed over the weekend?

146 cars

2 marks

Q2 Mia says, “I can work out $3497 + 676$ without using a formal written method.”

Mia is correct.

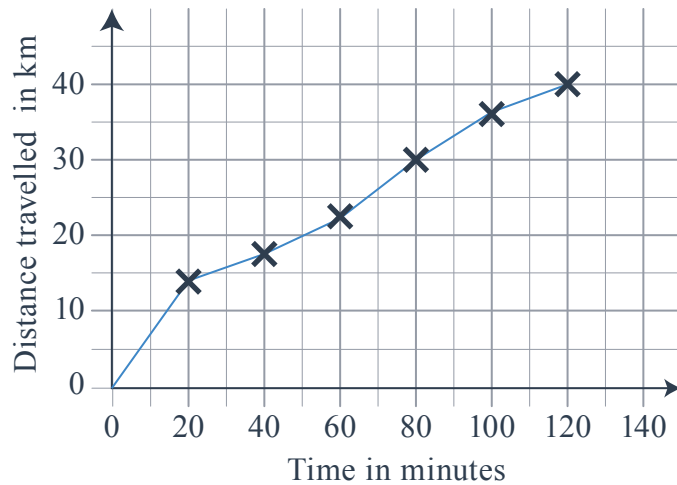
Explain why Mia is correct.

*See mark scheme
for examples*

1 mark

Q3 Mikey went on a bike ride.

This graph shows how far he travelled at different times.



a

How long did it take him to complete the ride?

120 minutes

1 mark

b

After how many minutes had he travelled 30km?

80 minutes

1 mark

	Requirement	Mark	Additional guidance
Q1	Accept TWO marks for the correct answer of 146. Accept ONE mark for evidence of $1898 \div 13$ being completed using an appropriate long division method, with up to one error.	2	
Q2b	Award ONE mark for an explanation that explains that either: 3497 is close to 3500 (or a near multiple of 100) and that therefore you can carry out $3500 + 673$ mentally to work out the answer to $3497 + 676$ OR 3497 is close to 3500 (or a near multiple of 100) and that therefore you can carry out $3500 + 676$ mentally and then take away 3 (i.e adjust) your answer to carry out $3497 + 676$.	1	
Q3a	120	1	
Q3b	80	1	

Q1 Sofia chooses a prime number.
She multiplies it by 10 and then rounds it to the nearest hundred.
Her answer is 500.

Write all the possible prime numbers Sofia could have chosen.

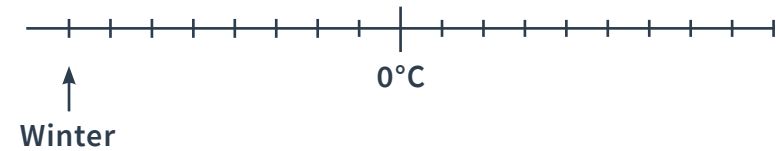
1 mark

Q2 Tick the correct box to show if each calculation below is correct.

	Correct	Incorrect
$4 + 32 \times 2 = 22$		
$8 \div 2 \times 4 = 1$		
$3 \times 2 + 1 + 10 \times 5 = 85$		

2 marks

Q3 This temperature scale shows the average temperature in a city.



a Look at the arrow. What is the average temperature in winter?

 °C

1 mark

The average temperature in summer is 23°C **higher** than in winter.

a What is the average temperature in summer?

 °C

1 mark

Q1 Sofia chooses a prime number.
She multiplies it by 10 and then rounds it to the nearest hundred.
Her answer is 500.

Write all the possible prime numbers Sofia could have chosen.

47, 53

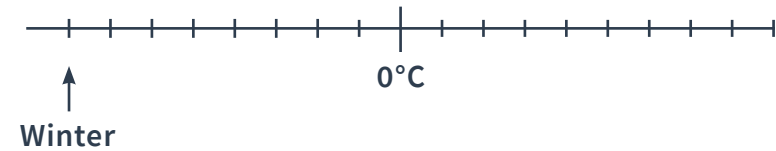
1 mark

Q2 Tick the correct box to show if each calculation below is correct.

	Correct	Incorrect
$4 + 32 \times 2 = 22$	✓	
$8 \div 2 \times 4 = 1$		✓
$3 \times 2 + 1 + 10 \times 5 = 85$		✓

2 marks

Q3 This temperature scale shows the average temperature in a city.



a Look at the arrow. What is the average temperature in winter?

-8 °C

1 mark

The average temperature in summer is 23°C **higher** than in winter.

a What is the average temperature in summer?

15 °C

1 mark

	Requirement	Mark	Additional guidance												
Q1	47, 53	1	Accept in any order.												
Q2	<p>Award TWO marks for all three rows correctly completed.</p> <p>Award ONE mark for two rows correctly completed.</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Correct</th> <th>Incorrect</th> </tr> </thead> <tbody> <tr> <td>$4 + 32 \times 2 = 22$</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>$8 \div 2 \times 4 = 1$</td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>$3 \times 2 + 1 + 10 \times 5 = 85$</td> <td></td> <td style="text-align: center;">✓</td> </tr> </tbody> </table>		Correct	Incorrect	$4 + 32 \times 2 = 22$	✓		$8 \div 2 \times 4 = 1$		✓	$3 \times 2 + 1 + 10 \times 5 = 85$		✓	2	
	Correct	Incorrect													
$4 + 32 \times 2 = 22$	✓														
$8 \div 2 \times 4 = 1$		✓													
$3 \times 2 + 1 + 10 \times 5 = 85$		✓													
Q3a	-8	1	Do not accept 8.												
Q3b	15	1	Do not accept -15 or 23.												



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Rapid Reasoning


Do you have a group of pupils who need a boost in maths this term?

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- Raise attainment
- Plug any gaps or misconceptions
- Boost confidence

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