



### Autumn 1 Year 6

<p><b>Links to prior learning/ objectives:</b> Reading, writing and ordering numbers to 1 000 000 Rounding Written method calculations for all 4 operations Solving multi-step problems Prime numbers</p>	<p><b>Resources:</b> Place value counters, place value grids, number lines including negative numbers</p> <p><b>Mastery:</b> (where to find some resources)</p> <ul style="list-style-type: none"><li>• Teaching for Mastery</li><li>• White Rose <b>New and old documents</b></li><li>• Mastery maths stickers</li><li>• Nrich (curriculum mapping)</li></ul>	<p><b>Vocabulary:</b> Compare, order, value, digit, round, multiple, negative, intervals, multiply, divide, add, subtract, operation, calculation, estimate, factor, multiple, prime number, order of operations, BIDMAS Multiply, divide, multiplication, division, product, share, decimal, two decimal places, tenths, hundredths, estimation, accuracy, calculation, whole numbers, common factors, multiples, factorise Division, divide, share, decimal, remainder, two decimal places, degree of accuracy, rounding, whole number Dividing, multiplying, scale factor, scaling, relationships, integer, multiplication, division,</p>
<b>Objectives and Teaching</b>		
<p><b>Week 1</b> <b>Barriers to ARE (misconceptions):</b> Place value understanding – inability to see numbers as digits within a larger number. Recall/understanding of place value headings Number recognition.</p>	<p>Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit</p> <ul style="list-style-type: none"><li>• To know the place value of digits in numbers up to ten million</li><li>• To understand place value in numbers up to ten million</li><li>• To develop my understanding of place value in numbers up to ten million</li><li>• To develop the skill of comparing numbers up to ten million</li><li>• To develop the skill of ordering numbers up to ten million</li></ul>	



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#### Fluency

Match the representation to the numbers in digits.

One million, four hundred and one thousand, three hundred and twelve

M	HTh	TTh	Th	H	T	O
●		●●●●	●	●●●	●	●●

430,000

○

1,000,312

○

1,041,312

1,410,312

1,401,312

#### Problem Solving

Put a digit in the missing space below to make the sentence correct.

4,62\_,645 < 4,623,64\_

Is there more than one option?  
Can you find them all?

Lola has ordered eight 6-digit numbers.  
The smallest number is 345,900  
The greatest number is 347,000  
All the other numbers have digit totals of 20 and have no repeating digits.  
What are the other six numbers?

Can you order all eight numbers from smallest to greatest?

#### Reasoning

Miley has this number:  
824,650

She takes forty thousand away.  
Her answer is 820,650

Is this correct?  
Explain how you know.

Kayleigh draws bar model A.  
Her teacher asks her to draw another where the total is 30,000

A

B

Explain how you know bar B is inaccurate.

**Week 2**  
**Barriers to ARE (misconceptions):**  
Place value understanding – inability to see numbers as digits within a larger number.  
Recall/understanding of place value headings  
Number recognition.  
Knowledge of multiples of powers of 10.

Round any whole number to a required degree of accuracy  
Use negative numbers in context  
Perform mental calculations, including with mixed operations and large numbers

- To know how to round whole numbers up to ten million
- To develop the skill of rounding
- To understand negative numbers
- To develop the skill of calculating with negative numbers

Fluency

Problem Solving

Reasoning

100,000s	10,000s	1,000s	100s	10s	1s
4		3	4	5	6

Round the number in the place value chart to:

- The nearest 10,000
- The nearest 100,000
- The nearest 1,000,000

Write five numbers that round to the following numbers when rounding to the nearest hundred thousand.

- 200,000
- 600,000
- 1,900,000

Complete the missing digits so that each number rounds to one hundred and thirty thousand when rounded to the nearest ten thousand.

12[ ] [ ], 657	1[ ] [ ], 999	13[ ] [ ], 001
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Use sandcastles (+1) and holes (-1) to calculate.



Here is an example.

$$-2 + 5 = \text{[hole]} \text{ [hole]} \text{ [sandcastle]} \text{ [sandcastle]} \text{ [sandcastle]}$$

Two sandcastles will fill two holes.

There are three sandcastles left to make positive three.

Use this method to solve:

- $3 - 6$
- $-7 + 8$
- $5 - 9$

Use the number line to answer the following:



- What is 6 less than 4?
- What is 5 more than -2?
- What is the difference between 3 and -3?

Filip has £17.50 in his bank account. He pays for a jumper costing £30. How much does he have in his bank account now?



My number is 1,350 when rounded to the nearest 10

Ed

My number is 1,400 when rounded to the nearest 100



Joe

Both numbers are whole numbers.

What is the greatest possible difference between the two numbers?

Miss Grogan gives out the following four cards: 15,987, 15,813, 15,101, 16,101

Four children each take a card and give a clue to what their number is:

Marc says, "My number rounds to 16,000 when rounded to the nearest 1,000"

Daryl says, "My number has one hundred."

Tom says, "My number is 15,990 when rounded to the nearest 10"

Adam says, "My number is 15,000 rounded to the nearest 1,000"

Can you work out which child has which card?

Explain your choices.

Order the flashcards from what you think will be coldest to hottest areas.

After you have ordered them, take the temperature and compare the results with your estimates.

Were you correct? Why?

Playground	Kitchen
Cloakroom	Classroom
Hall	

Kiera rounded 2,215,678 to the nearest million and wrote 2,215,000

Can you explain to Kiera what mistake she has made and why she has done it?

A company decided to build offices over ground and underground.

If we build from 20 to -20, we will have 40 floors.



Do you agree?

Explain how you know.

When counting in tens from any single digit, the last number never changes.

When counting back in tens from any single digit, the last number does change.


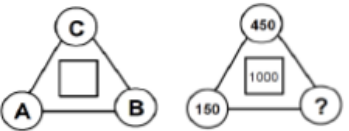

e.g.

9, 19, 29, 39  
9, -1, -11, -21

Explain why this happens.



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<p><b>Week 3</b> <b>Barriers to ARE (misconceptions):</b> Place value understanding – inability to see numbers as digits within a larger number. Recall/understanding of place value headings Number recognition. Knowledge of multiples of powers of 10. Place value – setting out calculations Multi-step problems – language involved.</p>	<p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy (Recap written calculation methods for addition and subtraction)</p> <ul style="list-style-type: none"> <li>To develop the skill of using a formal written method for addition</li> <li>To develop the skill of using a formal written method for subtraction</li> <li>To develop the skill of solving problems involving...</li> </ul>	
<p style="text-align: center;"><b>Fluency</b></p> <p>Calculate</p> $\begin{array}{r} 34621 \\ + 25734 \\ \hline \end{array}$ $\begin{array}{r} 4761325 \\ - 938052 \\ \hline \end{array}$ <p>67,832 + 5,258 = 834,501 - 193,642 =</p> <p>A four-bedroom house costs £450,000 A three-bedroom house costs £199,000 less. How much does the three-bedroom house cost? What method did you use to find the answer?</p> <p>All the missing digits are the same. Find the missing digits</p> $\begin{array}{r} 52247\textcircled{0} \\ + 3\textcircled{0}5904 \\ \hline 90\textcircled{0}3\textcircled{0}2 \end{array}$	<p style="text-align: center;"><b>Problem Solving</b></p> <p>Three pandas are eating bamboo sticks. There are 51 altogether. They all eat an odd number of sticks. How many bamboo sticks did they each eat? How many different ways can you do it?</p>  <ul style="list-style-type: none"> <li>The number in the square in the middle is calculated using the following rule <math>A + B - C</math> Work out the value of the question mark.</li> </ul> 	<p style="text-align: center;"><b>Reasoning</b></p> <p>Abdul says "If I add any two 4 digit numbers together it will make a 5 digit number." Do you agree? Explain why.</p> <p>Three numbers are marked on a number line.</p>  <p>The difference between A and B is 28 The difference between A and C is 19 D is 10 less than C What is the value of D? How do you know?</p>
<p><b>Week 4</b> <b>Barriers to ARE (misconceptions):</b></p>	<p>Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</p>	

Place value understanding – inability to see numbers as digits within a larger number.  
Recall/understanding of place value headings  
Number recognition.  
Knowledge of multiples of powers of 10.  
Place value – setting out calculations  
Forgetting/not understanding the zero when multiplying by a multiple of 10.  
Slow recall of times table facts.

Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context

- To develop the skill of using the formal written method of multiplication (This may need more than one lesson)
- To develop the skill of solving problems involving...
- To develop the skill of using short division to divide up to 4-digit numbers by 1-digit numbers
- To know how to use short division to divide up to 4-digit numbers by 2-digit numbers
- To know how divide using factors

**Fluency**

Calculate

$$\begin{array}{r} 4267 \\ \times 34 \\ \hline \end{array} \quad \begin{array}{r} 3046 \\ \times 73 \\ \hline \end{array}$$

$5734 \times 26 =$

Lauren made cookies for a bake sale. She made 345 cookies. The recipes stated that she should have 17 chocolate chips in each cookie. How many chocolate chips will there be altogether?

Work out the missing number.

$6 \times 35 = \square \times 5$

Solve the divisions using short division.

$5 \overline{)725} \quad 3 \overline{)1938} \quad 12 \overline{)6036} \quad 3,612 \div 14 =$

List the multiples of the number to help you calculate.

**Problem Solving**

$2,190 \times 14 = 30,660$

Are there any other 4-digit numbers when multiplied by a 2-digit number less than 20 give the answer 30,660?

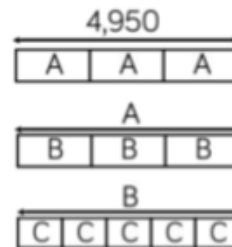
Here are two calculation cards

$A = 396 \div 11$

$B = 832 \div 13$

Find the difference between A and B

Work out the value of C  
(The bar models are not drawn to scale)



**Reasoning**

True or false.

- a)  $5,463 \times 18$  is the same as  $18 \times 5,463$
- b) I can find the answer to  $1,100 \times 28$  by using  $1,100 \times 30$
- c)  $70 \div 10 = 700 \div 100$

Find the missing digits

$$\begin{array}{r} 041\Box r3 \\ 4 \overline{)1\Box 59} \end{array}$$

Ivan



To work out  $4,320 \div 15$  I will first divide 4,320 by 5 then divide the answer by 10

Is Ivan correct?  
Explain why.

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<p><b>Week 5</b>  <b>Barriers to ARE (misconceptions):</b>          Place value understanding – inability to see numbers as digits within a larger number.          Recall/understanding of place value headings          Number recognition.          Knowledge of multiples of powers of 10.          Place value – setting out calculations          Remainders in context.          Slow recall of times table facts.</p>	<p>Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context          Use written division methods in cases where the answer has up to two decimal places          Solve problems which require answers to be rounded to specified degrees of accuracy</p> <ul style="list-style-type: none"> <li>• To know how to use the long division method</li> <li>• To develop the skill of using the long division method</li> </ul>	
<p style="text-align: center;"><b><u>Fluency</u></b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <math display="block">  \begin{array}{r}  \phantom{12} \phantom{036} \\  12 \overline{) 432} \\  \underline{- 360} \quad (\times 30) \\  72 \\  \underline{- 72} \quad (\times 6) \\  0  \end{array}  </math> </div> <div style="width: 45%;"> <p>Multiples to help</p> <p><math>12 \times 1 = 12</math></p> <p><math>12 \times 2 = 24</math></p> <p><math>12 \times 5 = 60</math></p> <p><math>12 \times 10 = 120</math></p> </div> </div> <p>Solve the following divisions using Sam's method. Write out your multiples that may help you.</p> <p><math>765 \div 17 =</math>    <math>450 \div 15 =</math>    <math>702 \div 18 =</math></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <math display="block">  \begin{array}{r}  \phantom{12} \phantom{036} \\  12 \overline{) 432} \\  \underline{- 36} \quad \downarrow \\  72 \\  \underline{- 72} \\  0  \end{array}  </math> </div> <div style="width: 45%;"> <p>Use the long division method to solve the following calculations. One has been done for you as an example.</p> <p><math>836 \div 11 =</math></p> <p><math>798 \div 14 =</math></p> <p><math>608 \div 19 =</math></p> </div> </div>	<p style="text-align: center;"><b><u>Problem Solving</u></b></p> <p>Here are six 4-digit numbers.</p> <div style="display: flex; justify-content: center; gap: 20px;"> <div style="border: 1px solid black; border-radius: 10px; padding: 2px 10px;">4,455</div> <div style="border: 1px solid black; border-radius: 10px; padding: 2px 10px;">4,545</div> <div style="border: 1px solid black; border-radius: 10px; padding: 2px 10px;">4,554</div> <div style="border: 1px solid black; border-radius: 10px; padding: 2px 10px;">5,445</div> <div style="border: 1px solid black; border-radius: 10px; padding: 2px 10px;">5,454</div> <div style="border: 1px solid black; border-radius: 10px; padding: 2px 10px;">5,544</div> </div> <p>Which number fits the clues below?</p> <ul style="list-style-type: none"> <li>• When divided by 5, there is a remainder of 4</li> <li>• When divided by 3, the digit total of the answer is the same as the digit total of the number being divided</li> </ul>	<p style="text-align: center;"><b><u>Reasoning</u></b></p> <p>Explain the mistake</p> $  \begin{array}{r}  746 \div 16 = \\  16 \overline{) 746} \\  \underline{- 64} \quad   \quad (\times 4) \\  106 \\  \underline{- 106} \quad (\times 10) \\  0  \end{array}  $ <p>Which calculation could be the odd one out below?</p> <ul style="list-style-type: none"> <li>• <math>512 \div 16 =</math></li> <li>• <math>672 \div 21 =</math></li> <li>• <math>928 \div 29 =</math></li> <li>• <math>792 \div 24 =</math></li> </ul> <p>Explain why.</p>
<p><b>Week 6</b>  <b>Barriers to ARE (misconceptions):</b>          Confusing multiples and factors – difficulty in seeing relationship between them.          Slow recall of times table facts.</p>	<p>Identify common factors, common multiples and prime numbers</p> <ul style="list-style-type: none"> <li>• To develop my understanding of factors and multiples.</li> <li>• To know how to find common factors.</li> <li>• To know how to find common multiples.</li> </ul>	

- To develop my understanding of prime numbers.
- To develop my understanding of square and cube numbers.

**Fluency**

What are the common factors of these pairs of numbers?

24 and 36  
20 and 30  
28 and 45

Which number is the odd one out?

12, 30, 54, 42, 32, 48

Can you explain why?

On a 100 square, shade the first 5 multiples of 7 and then the first 8 multiples of 5  
What do you notice?  
Choose 2 other times tables which you think will have more than 3 common multiples.

List 5 common multiples of 4 and 3

**Problem Solving**

Tahil has 32 football cards that he is giving away to his friends.

He shares them evenly.

How many friends could Tahil have?

Nancy is double her sister's age.

They are both older than 20 and younger than 50

They are both multiples of 7

Work out their ages.

**Reasoning**

There are 49 apples and 56 pears.



They need to be put into baskets with an equal number in each basket.

Jamil



I think there will be baskets with 8 pieces of fruit in each

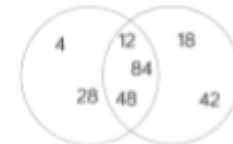
I think there will be baskets with 7 pieces of fruit in each



Who is correct?

Explain how you know.

Work out the headings for the Venn diagram.



Add in one more number to each section.

Can you think of a multiple of 6 and 8 that is a square number?

**Week 7**

**Barriers to ARE (misconceptions):**

Understanding of commutativity.  
Knowledge of inverse, particularly when it is appropriate for division and subtraction.  
Slow recall of times table facts.

Use their knowledge of the order of operations to carry out calculations involving the four operations  
Solve problems involving addition, subtraction, multiplication and division  
Perform mental calculations, including with mixed operations and large numbers



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- To understand the order of operations.
- To develop the skill of performing calculations using the order of operations.
- To know how to use estimation when performing mental calculations.
- To develop the skill of mental calculation.
- To develop the skill of reasoning from known facts.

#### Fluency

Sarah had 7 bags with 5 sweets in each. She added one more to each bag. Circle the calculation below that shows the correct working out.

$$7(5 + 1) = 42$$

$$7 \times 5 + 1 = 36$$

$$7 \times 5 + 1 = 42$$

Daniel completed the following calculation and got the answer 168

$$2(30 \div 5) + 14 = 168$$

Can you explain what he did and where he made the mistake?

Add brackets and the missing numbers to complete

$$3 + \square \times 5 =$$

$$25 - 6 \times \square =$$

How could you change the order of these calculations to be able to perform them mentally?

$$50 \times 16 \times 2 =$$

$$30 \times 12 \times 2 =$$

$$25 \times 17 \times 4 =$$

Jamie buys a t shirt for £9.99, socks for £1.49 and a belt for £8.99

He was charged £23.47

How could he quickly check if he was overcharged?

#### Problem Solving

Write different number sentences using the digits 3, 4, 5 and 8 before the equals sign that use:

- One operation
- Two operations, no brackets
- Two operations with brackets

Use this fact

$$3,565 + 2,250 = 5,815$$

To work out which statements are true or false.

- $4,565 + 1,250 = 5,815$
- $5,815 - 2,250 = 3,565$
- $4,815 - 2,565 = 2,250$
- $4,065 + 2,750 = 6,315$

Write three more statements.

#### Reasoning

Class 6 are solving this calculation:

$$2,000 - 1,287 =$$



I used the column method and exchanged in the tens, hundreds and thousands columns

I used my number bonds from 87 to 100 and then 1,300 to 2,000



I subtracted 1 from 2,000 and 1 from 1,287 then I did a column subtraction

Class 6 are solving this calculation:

$$3,912 + 3,889 =$$

Claire



To solve this I will double 3,900

Explain why Claire has done this.



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