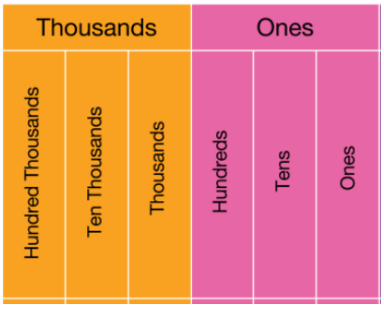
Planning Overview
Year 5 Place Value

Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit
Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000
Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000
Solve number problems and practical problems that involve all of the above
Read Roman numerals to 1,000 (m) and recognise years written in roman numerals.

5NPV–1 Know that 10 tenths are equivalent to 1 one, and that 1 is 10 times the size of 0.1. Know that 100 hundredths are equivalent to 1 one, and that 1 is 100 times the size of 0.01. Know that 10 hundredths are equivalent to 1 tenth, and that 0.1 is 10 times the size of 0.01.
5NPV–2 Recognise the place value of each digit in numbers with up to 2 decimal places, and compose and decompose numbers with up to 2 decimal places using standard and non-standard partitioning.
5NPV–3 Reason about the location of any number with up to 2 decimals places in the linear number system, including identifying the previous and next multiple of 1 and 0.1 and rounding to the nearest of each.

	Teaching and Learning
Read and write numbers to a million	Children have worked with numbers up to 10,000 in Year 4.  Ask children to record the following numbers in the place value chart. 4,635 27,492 234,629 When do we say the word thousand in each of these numbers? Look at the pattern of 3 digits in each of the two sections of the place value chart, we say thousand when we have finished saying all of the digits in the orange. Show the children a place value chart and discuss how to read the numbers up to one million. Discuss the value of digits in different columns. Look at a number and consider what individual digits are worth. Make with Place Value counters as appropriate. Add counters to columns and discuss what the calculation is e.g. 345,670 + 2 counters to the 1,000 column 345,670 + 2,000

What happens when we get 9 counters in a column?
Complete sequences/tables counting forwards and backwards in powers of 10. Reinforce through starters/mental work

Give the children a number and ask them what 30,000 more would be. How do you know? What would 700 less be?

Sometimes/Always/Never or True or False
When I add counters to one column on a place value chart, it is only that column that changes.

What happens when we get to 999,999?

Introduce the millions column and practise saying numbers with 1 in the million column.

Mastery

Explore 1 million:

- Write 1 million in digits.
- Write down the number that is 1 more than 1 million.
- Write down the number that is 10 more than 1 million.
- Write down the number that is 100 more than 1 million.

Play the Place Value game.
2 children play competitively. Each child has a set of digit cards from 0-9 in a pile face down. Child A chooses a card at random and decides where on their template to place this number. Child B will do the same thing.

Child A

	3			

Child B

9				

Each child will repeat this 5 times to ultimately create a 5-digit number. Children will be aiming for their number to meet a certain criteria e.g. Largest number, an even number in both hundreds and thousands etc. What numbers can the children make, and can they make their own criteria. What's the same and what's different about the numbers?

Mastery with Greater Depth

Using all of the digits from 0 to 9, write down a 10-digit number.

What is the largest number you can write?
What is the smallest number you can write?

Write down the number that is one less than the largest number.
Write down the number that is one more than the smallest number.

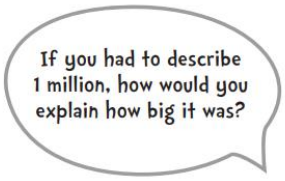
Captain Conjecture says, 'Using the digits 0 to 9 we can write any number, no matter how large or small.'

Do you agree?
Explain your reasoning.

How big is a million? – First4Maths Digging Deeper activity.

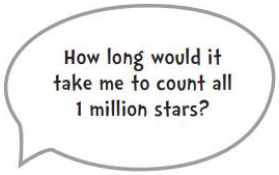
SETTING THE SCENE

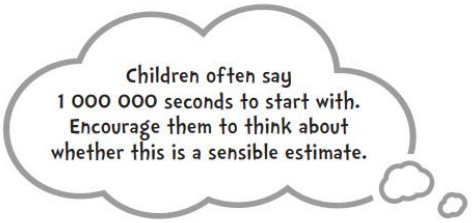
Show children a range of images to represent a million. Consider the size of 1 000 000.



EXPLORE

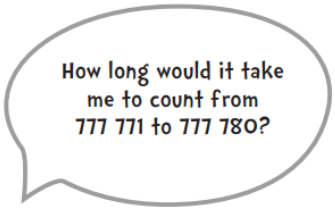
Read the book – How big is a million? by Anna Milbourne. As you read the book tell the children that you have counted the 100 penguins but not the 1000 snowflakes. When you get to the poster representing 1 000 000 tell the children that you intend to count all of the 1 000 000 stars and begin to count the first 10 stars.



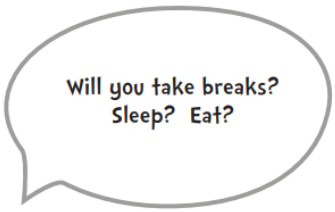


TAKING IT FURTHER

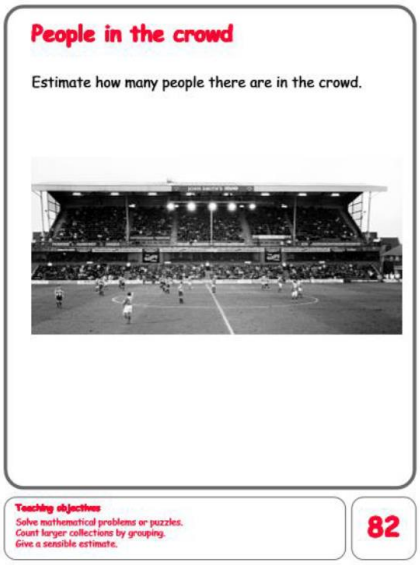
Encourage the children to consider how long a set of 10 numbers take to say and make predictions based on the timings e.g. 1 – 10 may take 3 seconds – can you predict how long it will take to say 1 – 100. How close was your prediction? Will it take more or less time to say 771 – 780 than it took to say 1 – 10?

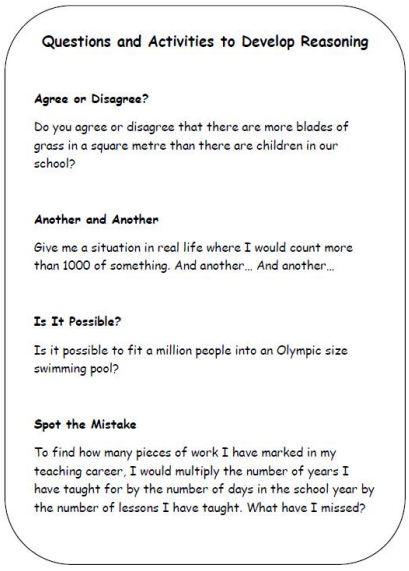


Can children consider how many 1, 2, 3, 4, 5 and 6 digit numbers there are and how long it will take to say different sets of numbers?



Ask the children what other ways they can think of to explore 1 000 000. E.g. Will my teacher ever mark 1 000 000 books in their lifetime? Will the school cook prepare 1 000 000 meals? Will I sleep for 1 000 000 hours? How far is 1 000 000 miles?

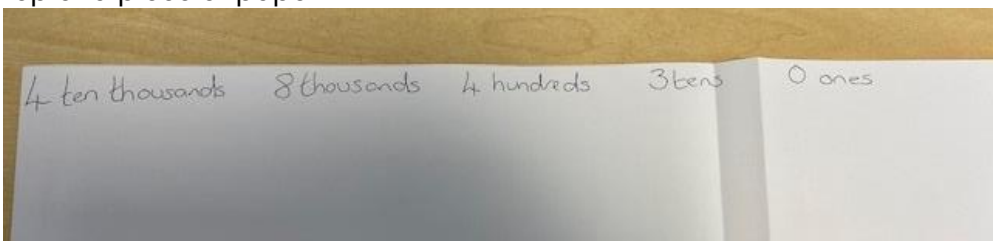
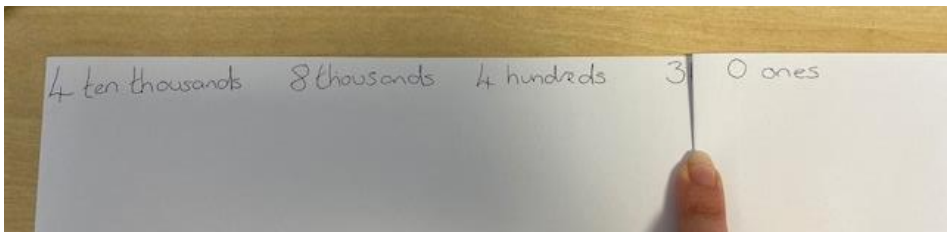




Mastery with Greater Depth

Explore 1 million:

- How large would a stadium need to be to hold one million people?
- How much would a million grains of rice weigh?

Partitioning in standard and non-standard forms	Look at how numbers can be partitioned into different ways. Use the part/part/whole model to record children's findings. What's the same, What's different? Show two different charts with the same value but arranged differently. Look at the link with multiplication and division alongside dienes if needed 1 hundred is 10 tens, 100 ones 1 thousand is 10 hundreds, 100 tens, 1,000 ones How would you work out what 35 thousands are in tens? **Mastery** What can we say about 48 000? It is ☐ less than 50 000. It is made of 40 000 and ☐ together. It is made of ☐ thousands. It is made of ☐ hundreds. It is made of ☐ tens. Can you partition 48,430 in different ways Show children how to do this systematically with folded paper. Start by writing each digit followed by its place value column along the top of a piece of paper  Starting at the lowest value column pick up that whole column and fold it over the next place value column. You are aiming to hide the next column name but be able to see the digit.  Repeat this for each place value column. This will allow the children to see the number being represented in a range of ways.

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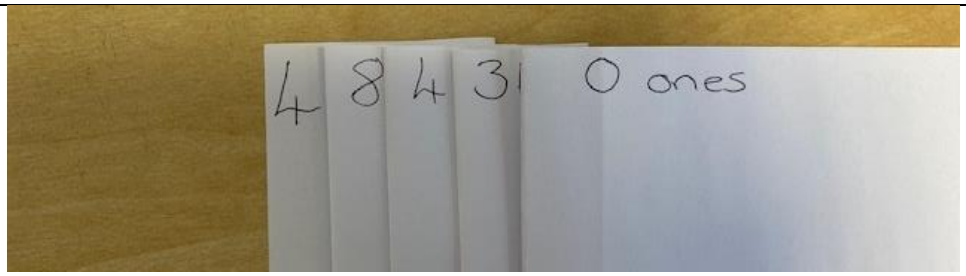
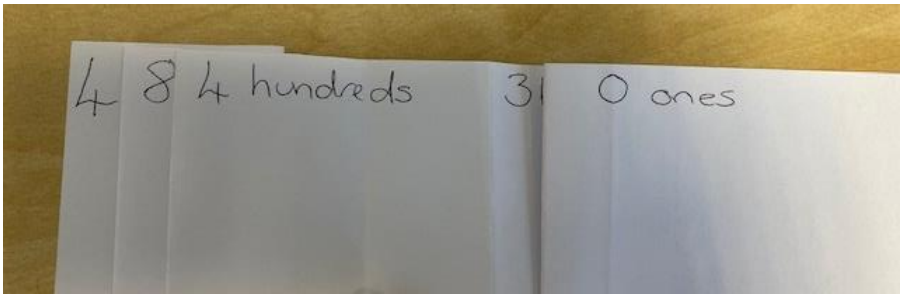
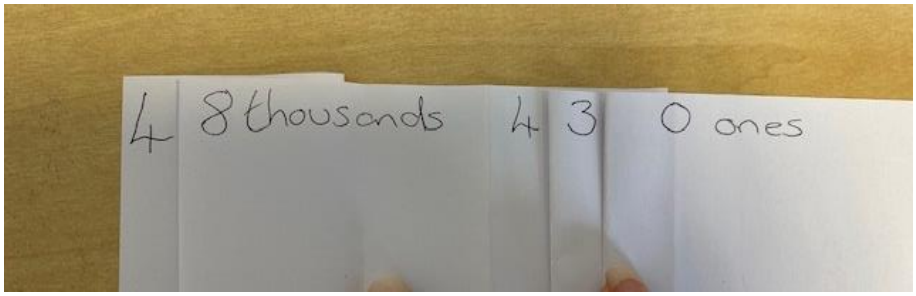
<tr><td></td><td> 




</td></tr>
<tr><td>Compare and order numbers to 1,000,000</td><td>Compare 2 numbers
Show two numbers with greater than and less than signs. How can you explain which is bigger?

Compare 15,463 with the following numbers
5, 23, 463, 4,622, 10,455, 15,572, 15,472, 15,468.
When does it get more difficult to decide which is bigger? Why?

‘To compare 5 to 15,463 I notice that on is a single digit number and one is a 5-digit number. One only has a digit in the ones column and one digits in each column up to the ten thousands column.’

‘To compare 23 to 15,463 I notice that …’

‘To compare 10,455 to 15,463 I notice that each number has a 1 in the ten thousands column. I can’t decide which is the bigger number based on this so I need to look at the value of the next column to the right. One number has 0 thousands and one has 5 thousands. 5 thousands is bigger than 0 thousands so 15,463 is bigger than 10,455’

‘To compare 15,472 to 15,463 I notice that ….’</td></tr>
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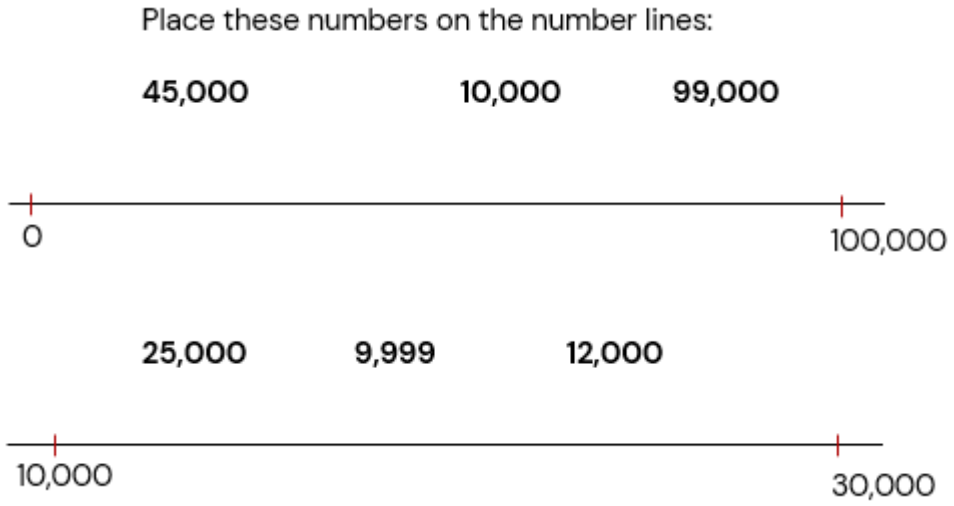
	Can children consider the missing digits in problems in this problem? 1, _34,5_2 > 1, 46_,53_ Is there more than one possibility? What numbers can you put in the spaces to get the biggest difference between the numbers? Explain how you know you have found the biggest difference. **Order a range of numbers** Order 5 numbers with a mix of 5 and 6-digit numbers. Order 5 with the same amount of digits with similar digits repeated. Ensure that all 5 numbers are 5-digit and all 5 numbers are 6-digit. Can you create a set of 5 numbers that would be tricky for your partner to order? **Always/Sometimes/Never** When comparing two numbers, you only need to look at the largest place holder to order them.
Positioning numbers on a number line **Ordering numbers on a number line**	Recap teaching of number lines from previous year groups if necessary. Children need to be confident with positioning numbers on a blank number line by finding the mid-point of that number line and then the quarter and three-quarter points. Make sure that the children know why they do this – now they have 5 pieces of information on their number lines to help them to accurately position their numbers. 

Children also need to be able to position numbers on a number line that has 10, 5, 4 and 2 equal parts.

4NPV–4 Teaching guidance

By the end of year 4, pupils must be able to divide 1,000 into 2, 4, 5 or 10 equal parts. This is important because these are the intervals commonly found on measuring instruments and graph scales.

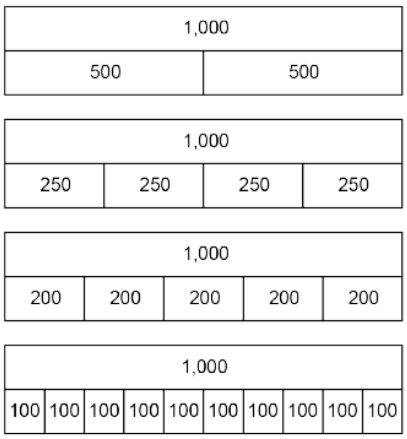


Figure 10: bar models showing 1,000 partitioned into 2, 4, 5 and 10 equal parts

5NPV–4 Teaching guidance

By the end of year 5, pupils must be able to divide 1 into 2, 4, 5 or 10 equal parts. This is important because these are the intervals commonly found on measuring instruments and graph scales.

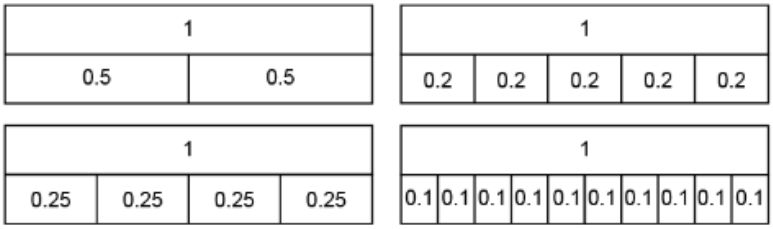


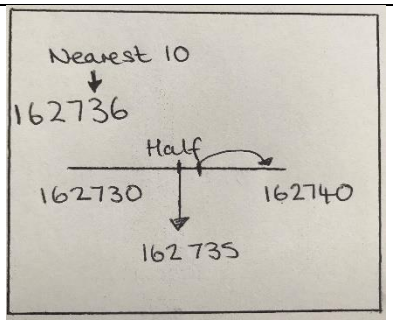
Figure 17: bar models showing 1 partitioned into 2, 4, 5 and 10 equal parts

Their work on blank number lines will help them with the lines with 2 and 4 sections.

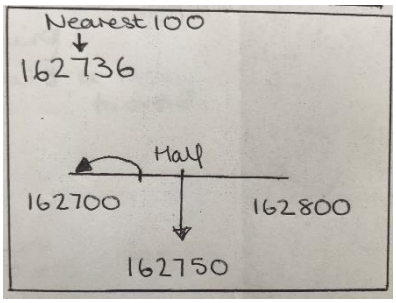
For number lines with 10 equal parts children need to look at the start and the end number, work out what the total size of the number line is and divide that by 10.

Once you think you know what a number lines intervals are, continue the count to make sure the next numbered interval is correct.

For number lines that have 5 equal parts children could look at the start and end points of the number line, work out the total size of the number line and divide that by 5. If children are more confident dividing by 10 then they could mark on each interval in between the 5 equal parts and create a number line with 10 equal parts.

	Place a range of numbers on the same number line in order to order and compare them. Children use this as a way to help them to solve reasoning questions around ordering and comparing questions. Place the same number on number lines with different start and end points. Place 36467 on these number lines – explain your steps. 30.000 — 40,000 36,000 — 37,000 20,000 — 40,000 0 — 50,000 Reason about the start and end points of a number line when given one of the positioned numbers 36,000 is placed ¼ of the way along this number line. What could the start and end points be? Find 4 possibilities. ? — ?
Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000	 Look at 6 digit numbers and explore the rules that we follow when rounding. To round to the nearest 10 we use the ones as the determiner To round to the nearest 100 we use the tens as the determiner To round to the nearest 1,000 we use the 100 as the determiner Model on a number line. What is the 10 before and after the number? These are the 2 possible answers. What is the middle number? Position the number that needs rounding. Which is the closest multiple of 10? Where does the number we are rounding go? Remind 1, 2, 3, 4 round down. 5, 6, 7, 8, 9 up.

Repeat for rounding to 100 with the same number.



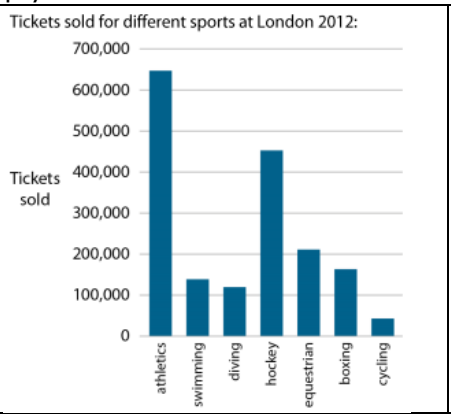
What is 100 before and after? These are the 2 possible answers.

Apply these rules to rounding to the nearest 1,000, 10,000 and 100,000 – children can explain using the number line if needed.

Give children the opportunity to practise rounding to different amounts.

Number	Nearest 100	Nearest 1000	Nearest 10,000	Nearest 100,00
134,645				
256,309				
703,458				
930,042				

Apply to other contexts

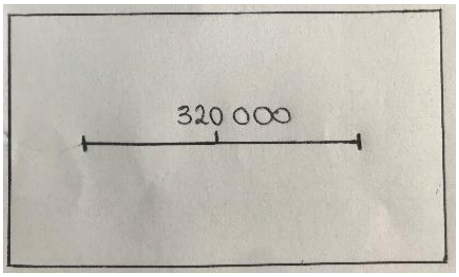


Previous multiple of 100,000	Sport	Next multiple of 100,000
600,000	Athletics	700,000
100,000	Swimming	200,000

- *'The number of tickets sold for athletics is between six hundred thousand and seven hundred thousand.'*
- *'The number of tickets sold for swimming is between one hundred thousand and two hundred thousand.'*

NCETM PD Documents

If 320,000 is the answer, what number might have been rounded if rounded to the nearest 10? 100? 1,000? Etc



What would be the smallest and largest number that could have rounded to this number?

True or False

45,004 rounded to the nearest 10, 100 and 1,000 gives me the same answer? Can you find more examples where this happens?

Interpret negative numbers

Count forwards and backwards with positive and negative numbers

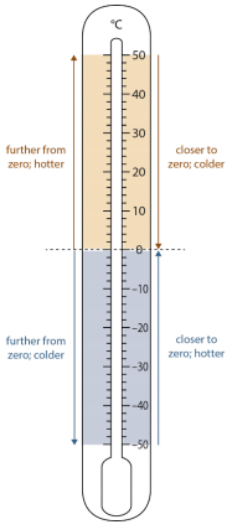
Discuss when we see negative numbers in a real-life context.

Language focus from NCETM

- *'For negative temperatures, the further the number is from zero, the colder it is.'*
- *'For positive temperatures, the further the number is from zero, the warmer it is.'*

- *'When an object is below sea level, the further the number is from zero, the deeper the object.'*
- *'When an object is above sea level, the further the number is from zero, the higher the object.'*

Generalisation:



Number pair		Positive number further from zero	Negative number further from zero	Both numbers same distance from zero
-6	12			
-12	6			
-6	6			
10	-1			
10	-10			
10	-100			

NCETM PD Materials

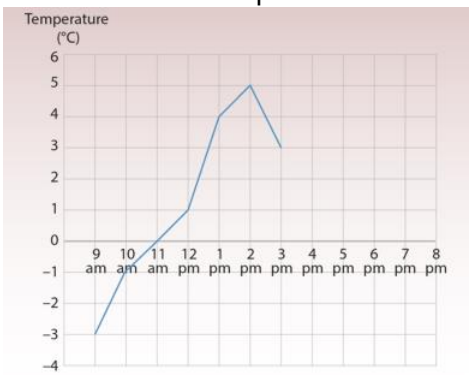
Read temperatures on a thermometer. Position the numbers on a number line.

Using temperature discuss the difference between the temperature and 0°C e.g. if it -5°C how much would the temperature need to rise to get to 0°C. Show this on a number line.

If it was 10°C how much would the temperature need to fall to get to 0°C. Show this on a number line.

What is the difference between -5°C and 10°C? Show this on a number line.

Look at this concept in different contexts



NCETM PD Materials

Give children a range of one-step problems linked to a range of contexts involving negative numbers e.g. bank balances etc?

Date	Paid in	Paid out	Amount in account
31 December			£150
5 January		£30	
10 January		£50	£70
11 January		£100	
12 January	£10		−£20
16 January	£20	£130	

NCETM PD Materials

Mastery

The temperature at 6 a.m. was recorded each day for one week.

Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Temp (°C)	1	−1	0	3	2	−2	−3

What was the coldest morning?

What was the warmest morning?

What is the difference in temperature between Monday and Tuesday?

Place the recorded temperatures in order from smallest to largest.

Mastery with Greater Depth

The temperature at 6 a.m. was recorded each day for one week.

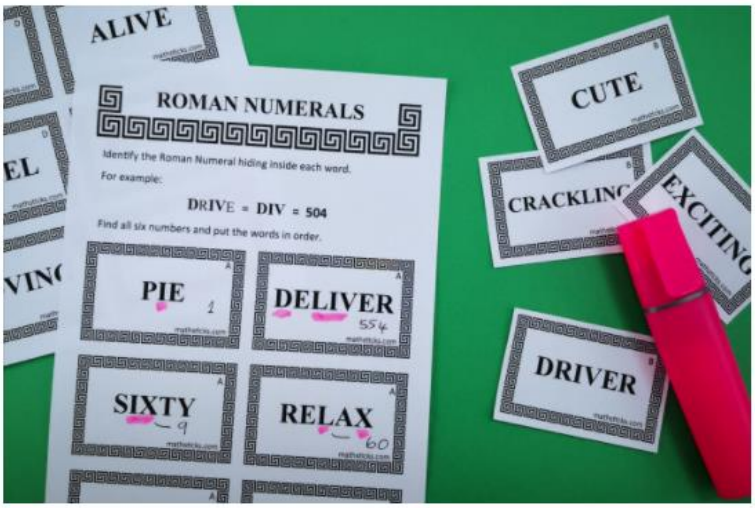
Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Temp (°C)	1	−1	0	3	2	−2	−3

What is the difference in temperature between the coldest day and the warmest day?

At what time of year do you think these temperatures were recorded?

Do you think it might have snowed during the week?

Explain your reasoning.

Read Roman numerals to 1,000 (m) and recognise years written in roman numerals.	Sometimes/Always/Never A multiple of 10 is made of less Roman Numerals than digits e.g. 10 = X, 100 = C, 1,000 = M Find opportunities to consolidate Roman Numerals e.g. writing the date, links to topic. Range of resources to support with teaching Roman Numerals on the Mathsticks website. Here is one example of an activity from the website  This Roman Numerals activity gives children the chance to focus on the different letters used by the Roman's to create numbers. The activity consists of a series of word labels. Each word contains letters that make specific numbers. For example, in the word 'drive', the letters DIV would make the number 504: The challenge is […] https://mathsticks.com/my/?s=roman+numerals
Problem solving	Problem solving can be built into the unit now to look at comparing, ordering, reading scales (application of number line work) and rounding or this problem solving can be used within measures unit to consolidate these areas of mathematics later on in the year. Measures questions are integrated into the ready to progress NPV objectives and the number spine in the NCETM PD documents.