Autumn Scheme of Learning

Year 6

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

2020 will go down in history. The world has changed for all of us.

We want to do as much as we can to support children, teachers, parents and carers in these very uncertain times.

We have amended our schemes for 2020/21 to:

- ★ highlight key teaching points
- ★ recap essential content that children may have forgotten
- ★ flag any content that you might not have covered during the school closures period.

We hope these changes will add further value to the schemes and save you time.
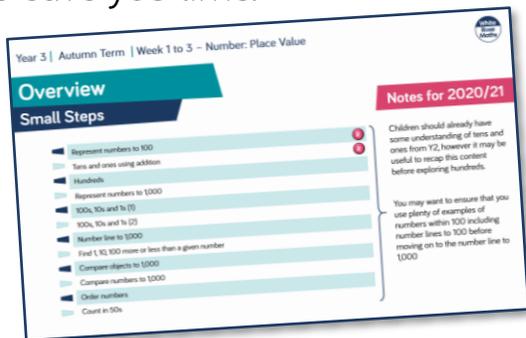
Lesson-by-lesson overviews

We've always been reluctant to produce lesson-by-lesson overviews as every class is individual and has different needs. However, many of you have said that if blended learning becomes a key feature of school life next year, a weekly plan with linked content and videos could be really useful.

As always, we've listened! We've now produced a complete lesson-by-lesson overview for Y1 to Y9 that schools can use or adapt as they choose. Each lesson will be linked to a free-to-use home learning video, and for premium subscribers, a worksheet. This means that you can easily assign work to your class, whether they are working at home or in school.

Inevitably, this lesson-by-lesson structure won't suit everyone, but if it works for you, then please do make use of this resource as much as you wish.

Teaching for Mastery

These overviews are designed to support a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum.

The overviews:

- have number at their heart. A large proportion of time is spent reinforcing number to build competency

- ensure teachers stay in the required key stage and support the ideal of depth before breadth.

- ensure students have the opportunity to stay together as they work through the schemes as a whole group

- provide plenty of opportunities to build reasoning and problem solving elements into the curriculum.

For more guidance on teaching for mastery, visit the NCETM website:

https://www.ncetm.org.uk/resources/47230

Concrete - Pictorial - Abstract

We believe that all children, when introduced to a new concept, should have the opportunity to build competency by taking this approach.

Concrete – children should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – alongside this children should use pictorial representations. These representations can then be used to help reason and solve problems.

Abstract – both concrete and pictorial representations should support children's understanding of abstract methods.

Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

Supporting resources

We have produced supporting resources for every small step from Year 1 to Year 11.

The worksheets are provided in three different formats:

- Write on worksheet – ideal for children to use the ready made models, images and stem sentences.

- Display version – great for schools who want to cut down on photocopying.

- PowerPoint version – one question per slide. Perfect for whole class teaching or mixing questions to make your own bespoke lesson.

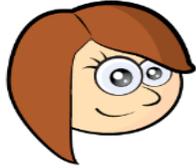For more information visit our online training and resources centre resources.whiterosemaths.com or email us directly at support@whiterosemaths.com

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Meet the Characters

Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?

Teddy

Rosie

Mo
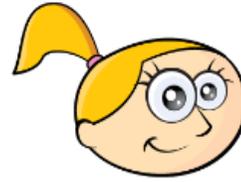
Eva
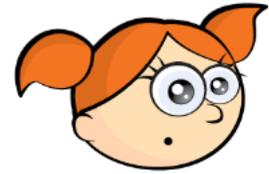
Alex

Jack

Whitney

Amir

Dora
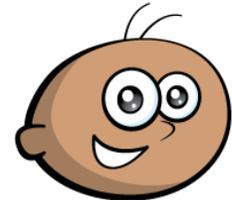
Tommy

Dexter

Ron

Annie

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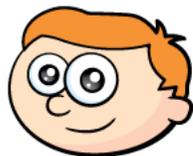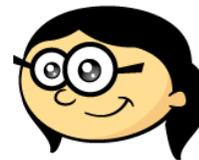
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value		Number: Addition, Subtraction, Multiplication and Division					Number: Fractions				Geometry: Position and Direction
Spring	Number: Decimals		Number: Percentages		Number: Algebra		Measurement: Converting Units	Measurement: Perimeter, Area and Volume		Number: Ratio		Statistics
Summer	Geometry: Properties of Shape			Consolidation or SATs preparation		Consolidation, investigations and preparations for KS3						

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Autumn - Block 1

Place Value

Overview

Small Steps

Notes for 2020/21

Numbers to 10,000 **R**

Numbers to 100,000 **R**

Numbers to a million **R**

Numbers to ten million

Compare and order any number

Round numbers to 10, 100 and 1,000 **R**

Round any number

Negative numbers

Many children may struggle to work immediately with numbers to 10,000,000 so we are suggesting that this might build up from smaller numbers.

It's vital that children have that understanding/recap of place value to ensure they are going to be successful with later number work.

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Numbers to 10,000

Notes and Guidance

Children use concrete manipulatives and pictorial representations to recap representing numbers up to 10,000

Within this step, children must revise adding and subtracting 10, 100 and 1,000

They discuss what is happening to the place value columns, when carrying out each addition or subtraction.

Mathematical Talk

Can you show me 8,045 (any number) in three different ways?

Which representation is the odd one out? Explain your reasoning.

What number could the arrow be pointing to?

Which column(s) change when adding 10, 100, 1,000 to 2,506?

Varied Fluency

Match the diagram to the number.
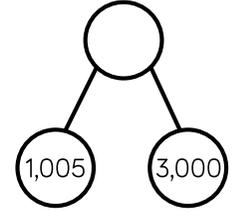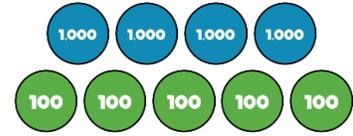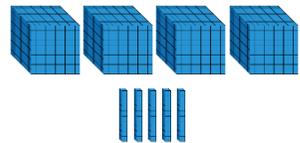
4,005   4,500   4,050

Which diagram is the odd one out?

5,000   6,000
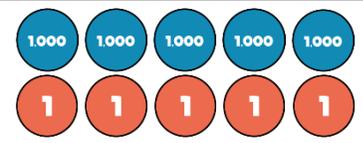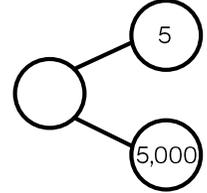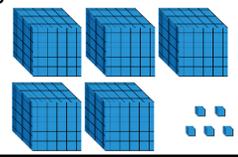
Complete the table.

	Add 10	Add 100	Add 1,000
2,506			
7,999			
		6,070	

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Numbers to 10,000

Reasoning and Problem Solving

Dora has made five numbers, using the digits 1, 2, 3 and 4

She has changed each number into a letter.

Her numbers are

aabcd
acdbc
dcaba
cdadc
bdaab

Here are three clues to work out her numbers:

- The first number in her list is the greatest number.
- The digits in the fourth number total 12
- The third number in the list is the smallest number.

44,213
43,123
13,424
31,413
21,442

Tommy says he can order the following numbers by only looking at the first three digits.

12,516   12,832

12,679

12,538   12,794

Is he correct?

Explain your answer.

He is incorrect because two of the numbers start with twelve thousand, five hundred therefore you need to look at the tens to compare and order.

Numbers to 100,000

Notes and Guidance

Children focus on numbers up to 100,000
They represent numbers on a place value grid, read and write numbers and place them on a number line to 100,000

Using a number line, they find numbers between two points, place a number and estimate where larger numbers will be.

Mathematical Talk

How can the place value grid help you to add 10, 100 or 1,000 to any number?
How many digits change when you add 10, 100 or 1,000? Is it always the same number of digits that change?
How can we represent 65,048 on a number line?
How can we estimate a number on a number line if there are no divisions?
Do you need to count forwards and backwards to find out if a number is in a number sequence? Explain.

Varied Fluency

A number is shown in the place value grid.

10,000s	1,000s	100s	10s	1s

Write the number in figures and in words.
- Alex adds 10 to this number
- Tommy adds 100 to this number
- Eva adds 1,000 to this number

Write each of their new numbers in figures and in words.

Complete the grid to show the same number in different ways.

Counters		Part-whole model
	65,048	
Bar model		Number line

Complete the missing numbers.

$59,000 = 50,000 + \underline{\quad\quad}$

$\underline{\quad\quad} = 30,000 + 1,700 + 230$

$75,480 = \underline{\quad\quad} + 300 + \underline{\quad\quad}$

Numbers to 100,000

Reasoning and Problem Solving

Here is a number line.

2000 ——————— 3000

What is the value of A?

B is 40 less than A.
What is the value of B?

C is 500 less than B.
Add C to the number line.

A = 2,800

B = 2,760

Here are three ways of partitioning 27,650

27 thousands and 650 ones
27 thousands, 5 hundreds and 150 ones
27 thousands and 65 tens

Write three more ways

Possible answers:

2 ten thousands, 6 hundreds and 5 tens

20 thousands, 7 thousands and 650 ones

Rosie counts forwards and backwards in 10s from 317

Circle the numbers Rosie will count.

427	997	−7
1,666	3,210	5,627
−23	7	−3

Explain why Rosie will not say the other numbers.

427
997
5,627
7
−3
−23

Any positive number will have to end in a 7

Any negative number will have to end in a 3

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Numbers to One Million

Notes and Guidance

Children read, write and represent numbers to 1,000,000

They will recognise large numbers represented in a part-whole model, when they are partitioned in unfamiliar ways.

Children need to see numbers represented with counters on a place value grid, as well as drawing the counters.

Mathematical Talk

If one million is the whole, what could the parts be?

Show me 800,500 represented in three different ways.
Can 575,400 be partitioned into 4 parts in a different way?

Where do the commas go in the numbers?
How does the place value grid help you to represent large numbers?
Which columns will change in value when Eva adds 4 counters to the hundreds column?

Varied Fluency

R

Thousands			Ones		
H	T	O	H	T	O

Use counters to make these numbers on the place value chart.

32,651   456,301   50,030

Can you say the numbers out loud?

Complete the following part-whole diagrams.

575,400
450,000   400
5,000

962
5,000
250,000
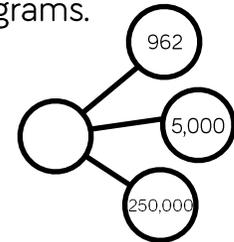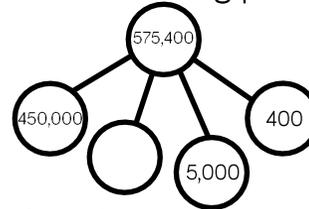
Eva has the following number.

Thousands			Ones		
H	T	O	H	T	O
	●●● ●●●	●●●● ●●●●	●●● ●●●	●● ●●	● ●

She adds 4 counters to the hundreds column.
What is her new number?

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Numbers to One Million

Reasoning and Problem Solving

Describe the value of the digit 7 in each of the following numbers. How do you know?

407,338

700,491

25,571

407,338: the value is 7 thousand. It is to the left of the hundreds column.

700,491: the value is 7 hundred thousand. It is a 6-digit number and there are 5 other numbers in place value columns to the right of this number.

25,571: the value is 7 tens. It is one column to the left of the ones column.

The bar models are showing a pattern.

40,000

| 25,000 | 15,000 |

40,000

| 20,000 | 20,000 |

40,000

| 15,000 | 25,000 |
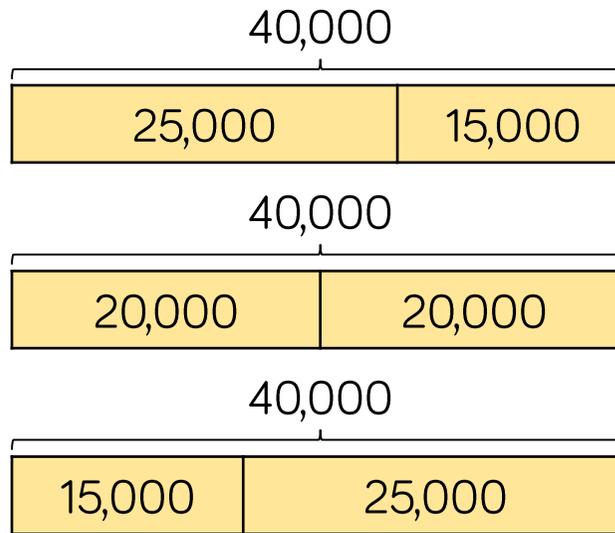
Draw the next three.

Create your own pattern of bar models for a partner to continue.

40,000

| 10,000 | 30,000 |

40,000

| 5000 | 35,000 |

40,000

| 40,000 |

14
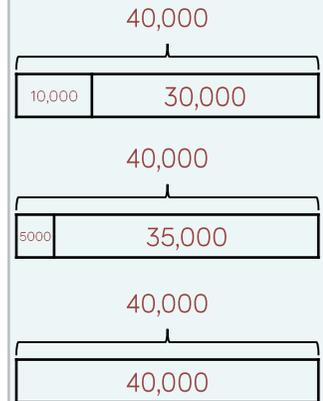
Numbers to Ten Million

Notes and Guidance

Children need to read, write and represent numbers to ten million in different ways.

Numbers do not always have to be in the millions – they should see a mixture of smaller and larger numbers, with up to seven digits. The repeating patterns of ones, tens, hundreds, ones of thousands, tens of thousands, hundreds of thousands could be discussed and linked to the placement of commas or other separators.

Mathematical Talk

Why is the zero in a number important when representing large numbers?

What strategies can you use to match the representation to the correct number?

How many ways can you complete the partitioned number?

What strategy can you use to work out Teddy's new number?

Varied Fluency

Match the representations to the numbers in digits.

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

M	HTh	TTh	Th	H	T	O
•		•••	•	•••	•	••

410,000   1,000,312
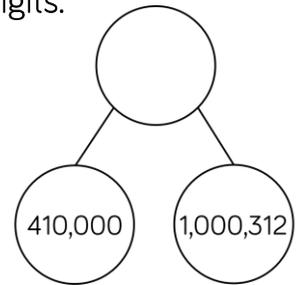
1,401,312   1,041,312   1,410,312

Complete the missing numbers.

$6{,}305{,}400 = \underline{\hspace{1.5cm}} + 300{,}000 + \underline{\hspace{1.5cm}} + 400$

$7{,}001{,}001 = 7{,}000{,}000 + \underline{\hspace{1.5cm}} + \underline{\hspace{1.5cm}}$

$42{,}550 = \underline{\hspace{1.5cm}} + \underline{\hspace{1.5cm}} + \underline{\hspace{1.5cm}} + 50$

Teddy's number is 306,042
He adds 5,000 to his number.
What is his new number?

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Numbers to Ten Million

Reasoning and Problem Solving

Put a digit in the missing spaces to make the statement correct.

$$4,62\,\underline{},645 < 4,623,64\,\underline{}$$

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

The first digit can be 0, 1, 2 or 3
When the first digit is 0, 1 or 2, the second digit can be any.
When the first digit is 3, the second digit can be 6 or above.

Dora has the number 824,650

She subtracts forty thousand from her number.

She thinks her new number is 820,650

Is she correct?

Explain how you know.

Dora is incorrect because she has subtracted 4,000 not 40,000
Her answer should be 784,650

Use the digit cards and statements to work out my number.

| 0 | 3 | 3 | 5 | 5 | 6 | 7 |

- The ten thousands and hundreds have the same digit.

- The hundred thousand digit is double the tens digit.

- It is a six-digit number.

- It is less than six hundred and fifty-five thousand.

Is this the only possible solution?

Possible solutions:

653,530
653,537
650,537
650,533

Compare and Order

Notes and Guidance

Children will compare and order whole numbers up to ten million using numbers presented in different ways.

They should use the correct mathematical vocabulary (greater than/less than) alongside inequality symbols.

Mathematical Talk

What is the value of each digit in the number?
What is the value of _____ in this number?

What is the value of the whole? Can you suggest other parts that make the whole?

What do you know about the covered number?
What could the number be? What must the number be? What can't the number be?

Varied Fluency

Complete the statements to make them true.

M	HTh	TTh	Th	H	T	O

$\bigcirc$

M	HTh	TTh	Th	H	T	O

M	HTh	TTh	Th	H	T	O

>

M	HTh	TTh	Th	H	T	O

What number could the splat be covering?

Three hundred and thirteen thousand and thirty-three

250,000

53,033

Greatest ⟶ Smallest

A house costs £250,000
A motorised home costs £100,000
A bungalow is priced halfway between the two.
Work out the price of the bungalow.

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Compare and Order

Reasoning and Problem Solving

Eva has ordered eight 6-digit numbers.

The smallest number is 345,900

The greatest number is 347,000

All the other numbers have a digit total of 20 and have no repeating digits.

What are the other six numbers?

Can you place all eight numbers in ascending order?

The other six numbers have to have a digit total of 20 and so must start with 346, _ _ _ because anything between 345,900 and 346,000 has a larger digit total. The final three digits have to add up to 7 so the solution is:
345,900
346,025
346,052
346,205
346,250
346,502
346,520
347,000

Jack draws bar model A.
His teacher asks him to draw another where the total is 30,000

50,000

A

10,000

B

30,000
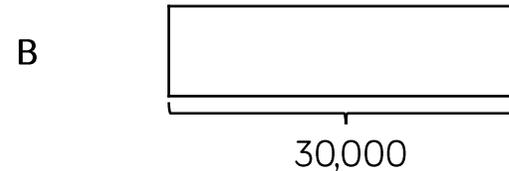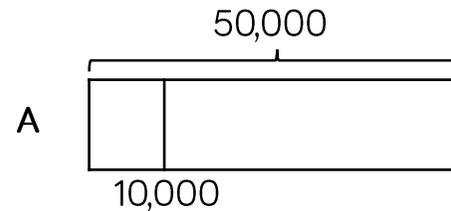
Explain how you know bar B is inaccurate.

Bar B is inaccurate because it starts at 10,000 and finishes after 50,000 therefore it is longer than 40,000

Round to 10, 100 and 1,000

Notes and Guidance

Children build on their knowledge of rounding to 10, 100 and 1,000 from Year 4. They need to experience rounding up to and within 10,000

Children must understand that the column from the question and the column to the right of it are used e.g. when rounding 1,450 to the nearest hundred – look at the hundreds and tens columns. Number lines are a useful support.

Mathematical Talk

Which place value column do we need to look at when we round to the nearest 1,000?

When is it best to round to the nearest 10? 100? 1,000?
Can you give an example of this?
Can you justify your reasoning?

Is there more than one solution?
Will the answers to the nearest 100 and 1,000 be the same or different for the different start numbers?

Varied Fluency

Complete the table.

Start Number	Rounded to the nearest 10	Rounded to the nearest 100	Rounded to the nearest 1,000
(place value counters: 1000, 100, 10, 100, 100, 1)			
(base ten blocks)			
DCCLXIX			

For each number, find five numbers that round to it when rounding to the nearest 100

300	10,000	8,900

Complete the table.

Start Number	Nearest 10	Nearest 100	Nearest 1,000
365			
1,242			
	4,770		

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Rounding to 10, 100 and 1,000

Reasoning and Problem Solving

My number rounded to the nearest 10 is 1,150
Rounded to the nearest 100 it is 1,200
Rounded to the nearest 1,000 it is 1,000

Jack

1,150
1,151
1,152
1,153
1,154

What could Jack's number be?

Can you find all of the possibilities?

2,567 to the nearest 100 is 2,500

Whitney

Do you agree with Whitney?
Explain why.

Teddy

4,725 to the nearest 1,000 is 5,025

Explain the mistake Teddy has made.

I do not agree with Whitney because 2,567 rounded to the nearest 100 is 2,600. I know this because if the tens digit is 5, 6, 7, 8 or 9 we round up to the next hundred.

Teddy has correctly changed four thousand to five thousand but has added the tens and the ones back on. When rounding to the nearest thousand, the answer is always a multiple of 1,000

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Round within Ten Million

Notes and Guidance

Children build on their prior knowledge of rounding.

They will learn to round any number within ten million.

They use their knowledge of multiples and place value columns to work out which two numbers the number they are rounding sits between.

Mathematical Talk

Why do we round up when the following digit is 5 or above?
Which place value column do we need to look at when we round to the nearest 100,000?
What is the purpose of rounding?
When is it best to round to 1,000? 10,000?
Can you justify your reasoning?

What could/must/can't the missing digit be?
Explain how you know.

Varied Fluency

HTh	TTh	Th	H	T	O
●●●●●		●●●●●●●	●●●●●●●●●	●●●●●●	●●●●●●●●●

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 rounded 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 __ 1,999   13 __ ,001

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Round within Ten Million

Reasoning and Problem Solving

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

Mo

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

Rosie

Both numbers are whole numbers.

What is the greatest possible difference between the two numbers?

The greatest possible difference is 104 (1,345 and 1,449)

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

Can you explain to Whitney what mistake she has made?

There should be no non-zero digits in the columns after the millions column.

Miss Grogan gives out four number cards.

| 15,987 | 15,813 | 15,101 | 16,101 |

Four children each have a card and give a clue to what their number is.

Tommy says, "My number rounds to 16,000 to the nearest 1,000"

Alex says, "My number has one hundred."

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

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

Can you work out which child has which card?

Tommy: 15,813

Alex: 16,101

Jack: 15,987

Dora: 15,101

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Negative Numbers

Notes and Guidance

Children continue their work on negative numbers from year 5 by counting forwards and backwards through zero.

They extend their learning by finding intervals across zero. Number lines, both vertical and horizontal are useful to support this, as these emphasise the position of zero. Children need to see negative numbers in relevant contexts.

Mathematical Talk

Are all negative numbers whole numbers?
Why do the numbers on a number line mirror each other from 0?

Why does positive one add negative one equal zero?
Can you use a number line to show this?

Draw me a picture to show 5 subtract 8
Show 5 more than -2 on a number line.
Could Mo really afford the jumper? How do you know?

Varied Fluency

Use sandcastles (+1) and holes (−1) to calculate.
Here is an example.

$$-2 + 5 =$$

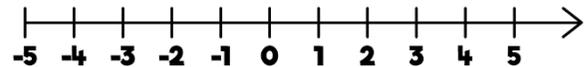Two sandcastles will fill two holes. There are three sandcastles left, therefore negative two add five is equal to three.

Use this method to solve:

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

Use the number line to answer the questions.

-5 -4 -3 -2 -1 0 1 2 3 4 5

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

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

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Negative Numbers

Reasoning and Problem Solving

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 why.

No, there would be 41 floors because you need to count floor 0

When counting forwards in tens from any positive one-digit number, the last digit never changes.

When counting backwards in tens from any positive one-digit number, the last digit does change.

Can you find examples to show this?

Explain why this happens.

Possible examples:

9, 19, 29, 39 etc.

9, −1, −11, −21

This happens because when you cross 0, the numbers mirror the positive side of the number line. Therefore, the final digit in the number changes and will make the number bond to 10