Addition and Subtraction: Subtract Two 4-Digit Numbers with One Exchange

Aim:	**Success Criteria:**	**Resources:**
To add and subtract whole numbers with more than 4 digits, including using formal written methods. To subtract numbers with up to 4 digits using a written method, including one exchange.	I can use column subtraction. I can subtract numbers with up to 4 digits.	Lesson Pack Whiteboards and pens - class set
	Key/New Words: Subtract, take, difference, how many less, less, take away, minus, remove, fewer, decrease, column subtraction, exchanging.	**Preparation:** Differentiated Everest Challenge Activity Sheets – one per child/pair Diving into Mastery Activity Sheets – one per child

Prior Learning: It will be helpful if children have a secure understanding of place value. Children may have added four-digit numbers with multiple regroupings.

Learning Sequence

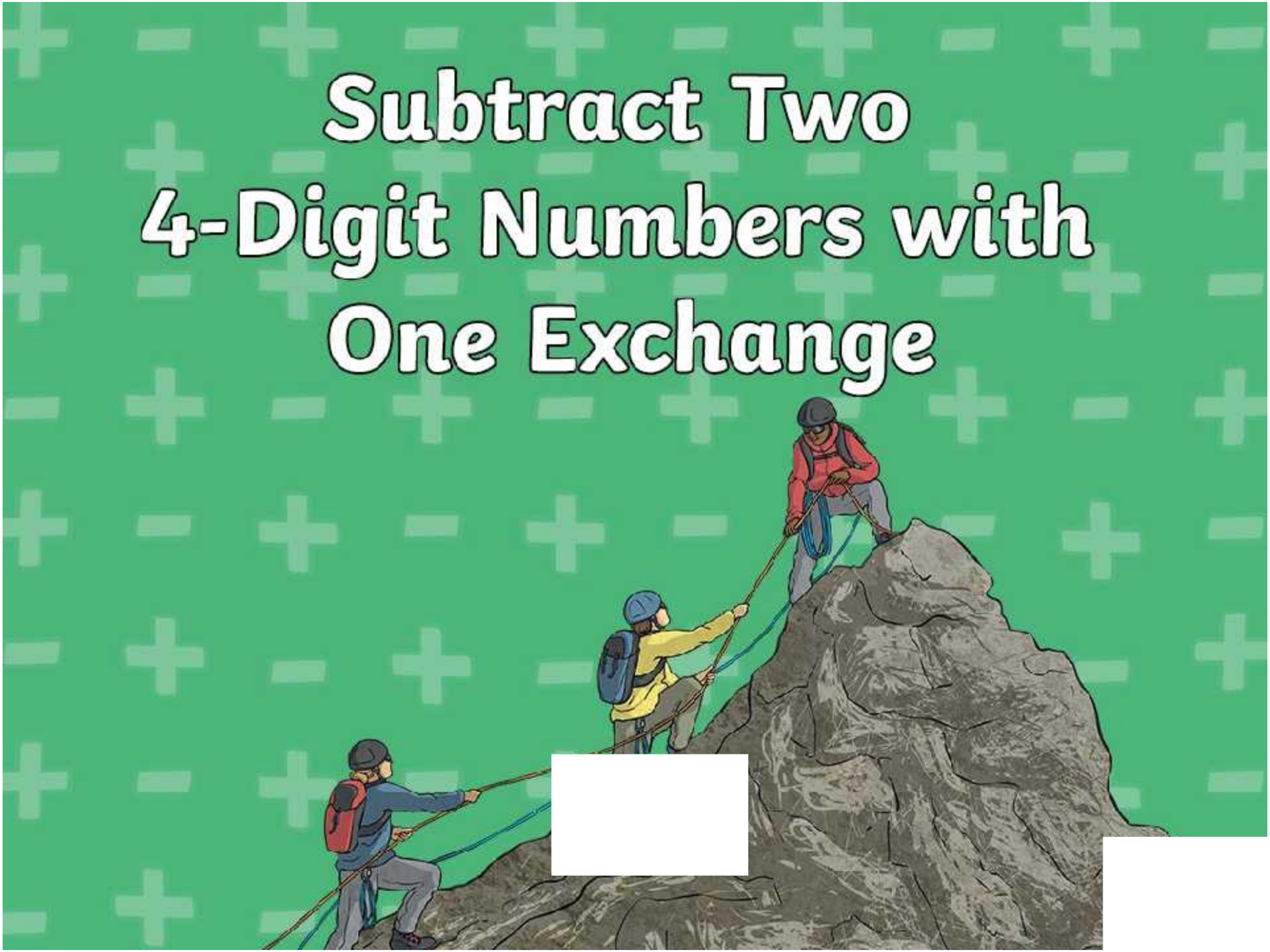
	Remember It: Children match the calculations shown on the Lesson Presentation to the visual representations.	
Whole Class	**Subtraction:** Show the '-' sign on the Lesson Presentation. What do we call this operation? Discuss the various words used to describe the operation of subtraction, ensuring children understand the terminology.	
Whole Class	**Subtracting and Exchanging:** Children explore how to subtract four-digit numbers with up to one exchange using formal written methods. They further understand the exchanging process using the visual representations that are simultaneously modelled on the Lesson Presentation with each calculation.	
	Everest: Introduce children to the theme of the lesson, showing the heights of the different camps on Mount Everest. Their task is to find the difference in heights above sea level between different camps on the mountain. Model using column subtraction to find the difference.	
	Breathe: Referring to the Lesson Presentation, children use column subtraction to find the amount of oxygen remaining in the tanks for the expedition. Children work in pairs on whiteboards. Discuss answers and address errors.	
	Everest Challenge: Using the differentiated Everest Challenge Activity Sheets, children plan a route that shows the path they took from the start to the summit of Mount Everest. Children use column subtraction to find the difference between two 4-digit numbers with up to one exchange, showing they can subtract two 4-digit numbers with one exchange.	
	Diving into Mastery: Schools using a mastery approach may prefer to use the following as an alternative activity. These sheets might not necessarily be used in a linear way. Some children might begin at the 'Deeper' section and in fact, others may 'dive straight in' to the 'Deepest' section if they have already mastered the skill and are applying this to show their depth of understanding. Children subtract four digit numbers with one exchange using visual representations. They answer fluency questions using their knowledge of subtraction. Children answer reasoning questions where one exchange is required within subtraction calculations. Children problem-solve and offer multiple solutions to possible subtraction calculations where one exchange is necessary.	
Whole Class	**Back to Base Camp:** Review the task. What did the children find easy? What did they find hard? Ask children to jot down a word or number problem that involves subtracting four-digit numbers, and swap these with another child to solve.	

ExploreIt	
MakeIt:	Children make a scaled model of Everest. Label the different points on the model. How many cm/mm is it between the different points on the model Everest?
LearnIt:	Children will find this visually exciting a useful tool to visualise subtraction.
RoleplayIt:	Children organise their own expedition to Everest, with a set budget for equipment needed. What can they purchase for the exact amount?

Maths

Addition and Subtraction

Subtract Two 4-Digit Numbers with One Exchange



Aim

- To subtract numbers with up to 4 digits using a written method, including one exchange.

Success Criteria

- I can use column subtraction.
- I can subtract numbers with up to 4 digits.

Remember It

Match each visual representation of an answer to its calculation.

	3	9	8	7
+	3	0	2	4
	7	**0**	**1**	**1**

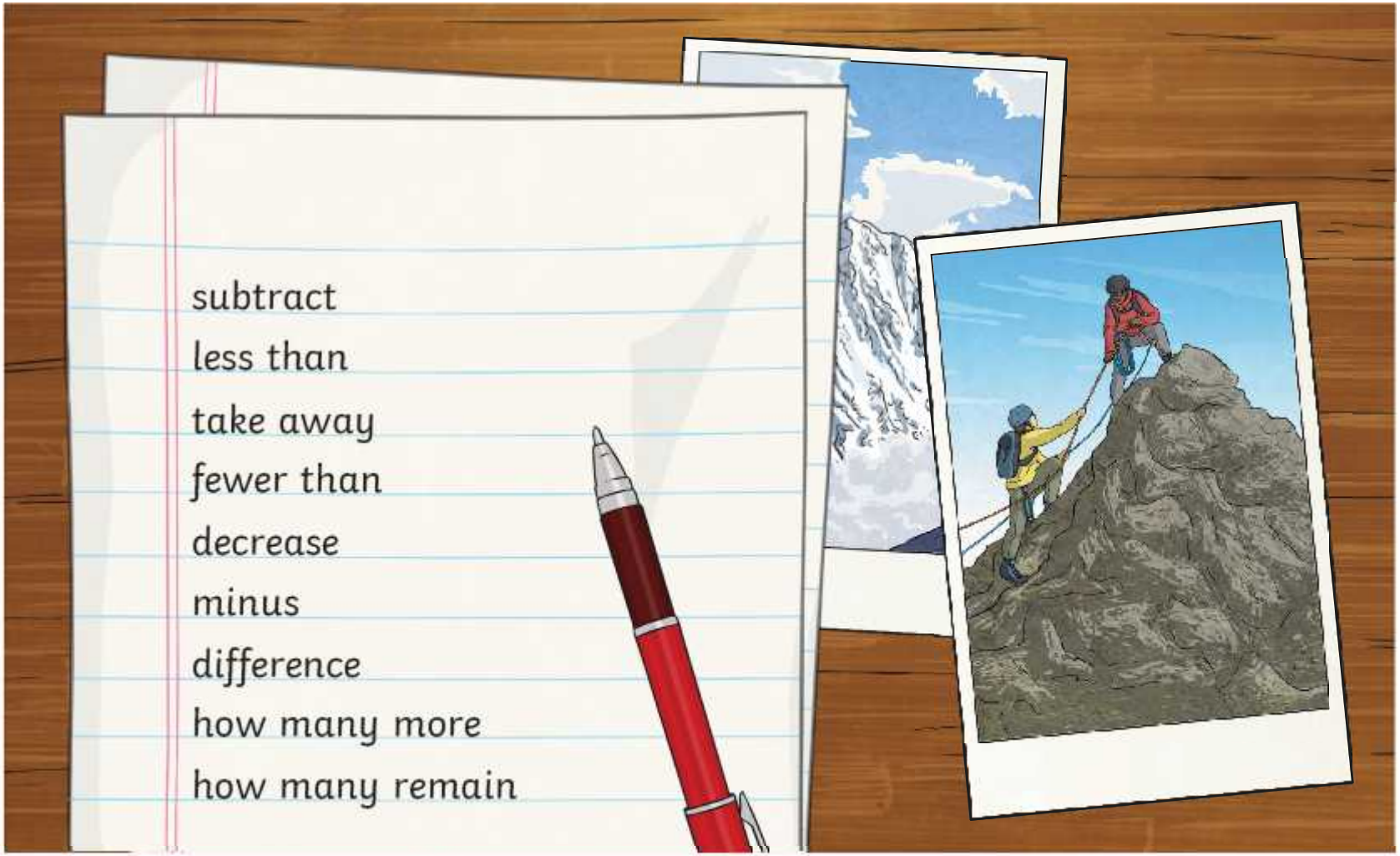
2732 + 1399
= **4131**

	2	7	3	2
+	1	1	0	7
	3	**8**	**3**	**9**

999 + 1039 + 4078
= **6116**

4131	
2732	**1399**

Subtraction



Subtracting and Exchanging

The model and calculation show how exchanges are made when subtracting four-digit numbers.

	9	$^{7}\not{8}$	$^{1}6$	4
-	1	3	7	2
	8	**4**	**9**	**2**

9 thousands subtract 1 thousand leaves 8 thousands.

Thousands	Hundreds	Tens	Ones
1000 1000 1000 1000 1000 1000 1000 1000 ~~1000~~	100 100 100 100 ~~100~~ ~~100~~ ~~100~~ ~~100~~	10 10 10 10 10 10 10 10 10 ~~10~~ ~~10~~ ~~10~~ ~~10~~ ~~10~~ ~~10~~ ~~10~~	1 1 ~~1~~ ~~1~~

Subtracting and Exchanging

In this calculation, an exchange is needed in a different place.

	$^{6}\not{7}$	$^{1}4$	7	2
-	5	9	7	1
	1	**5**	**0**	**1**

6 thousands subtract 5 thousands leaves 1 thousand.

s
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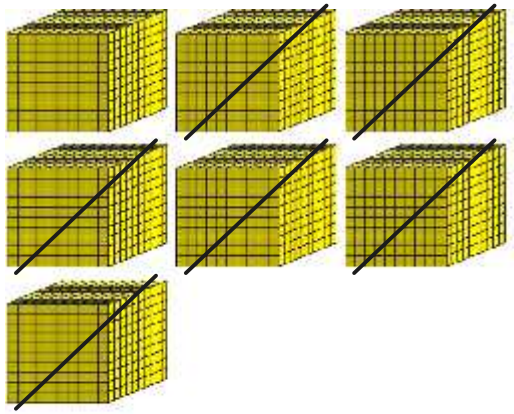
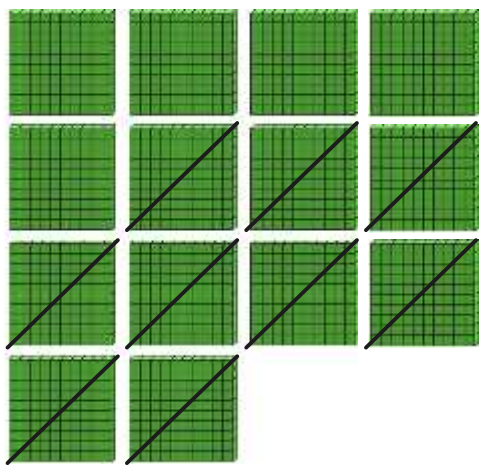
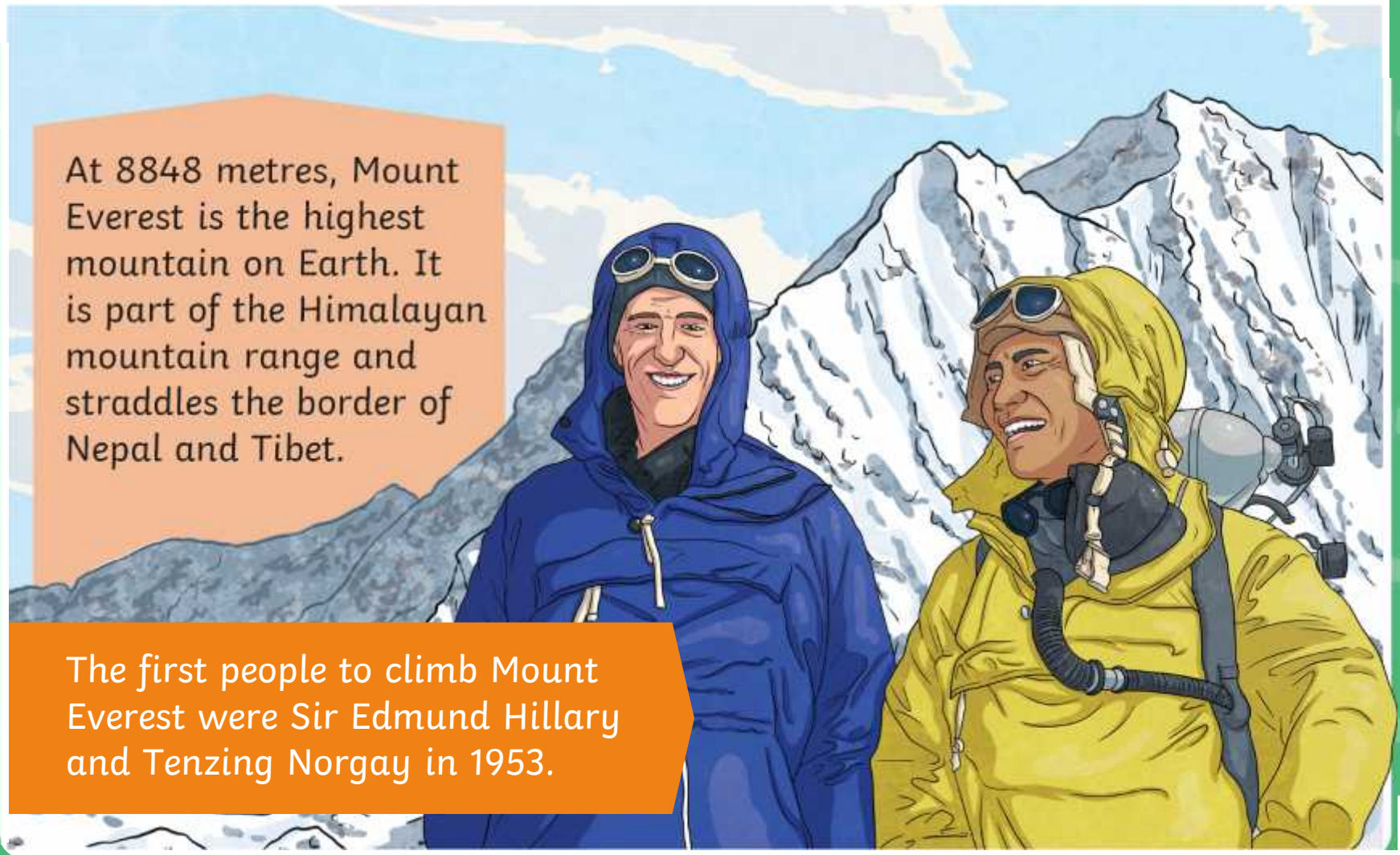
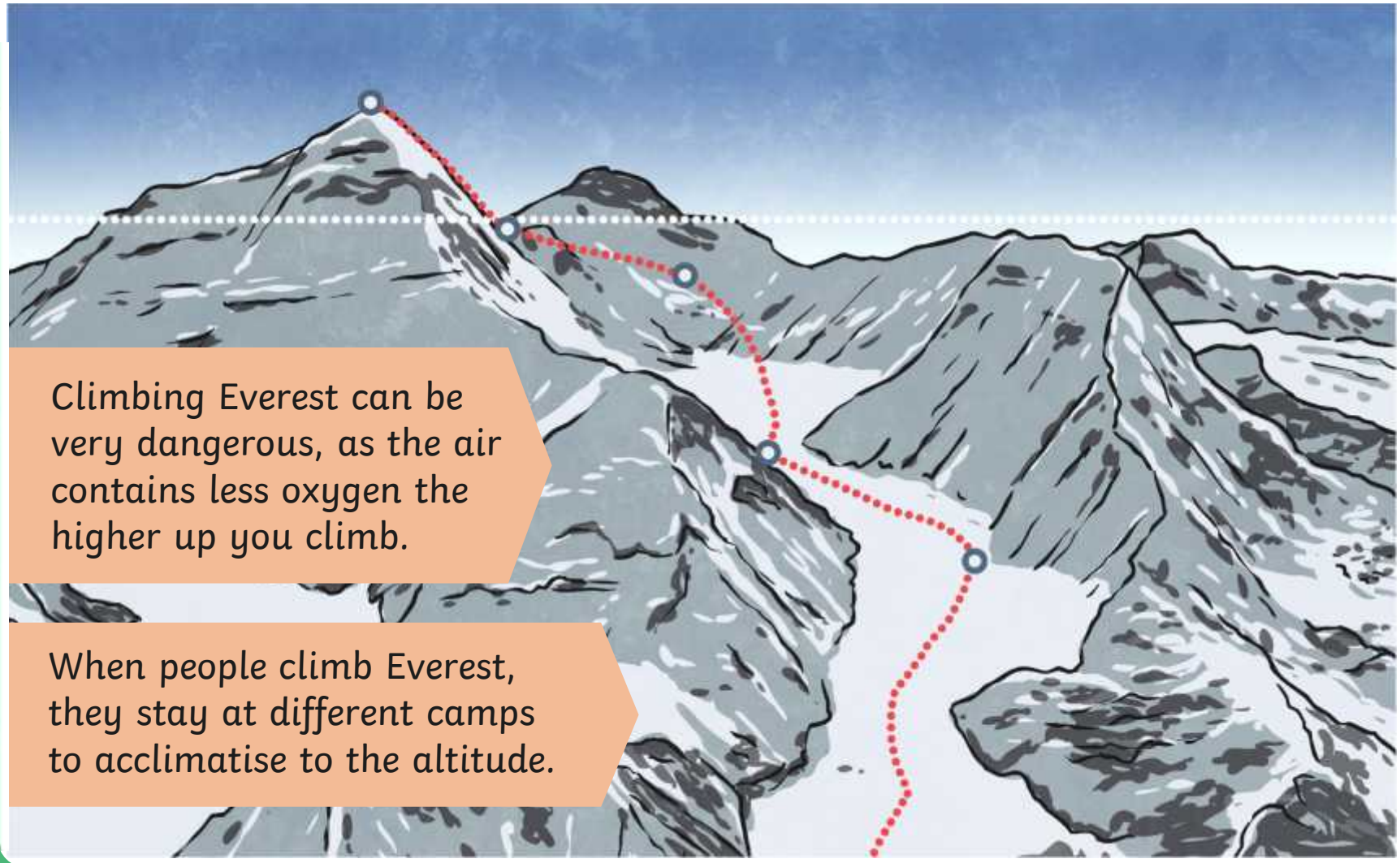
eds.

Thousands	Hundreds	Tens	Ones
			

Everest


At 8848 metres, Mount Everest is the highest mountain on Earth. It is part of the Himalayan mountain range and straddles the border of Nepal and Tibet.
The first people to climb Mount Everest were Sir Edmund Hillary and Tenzing Norgay in 1953.

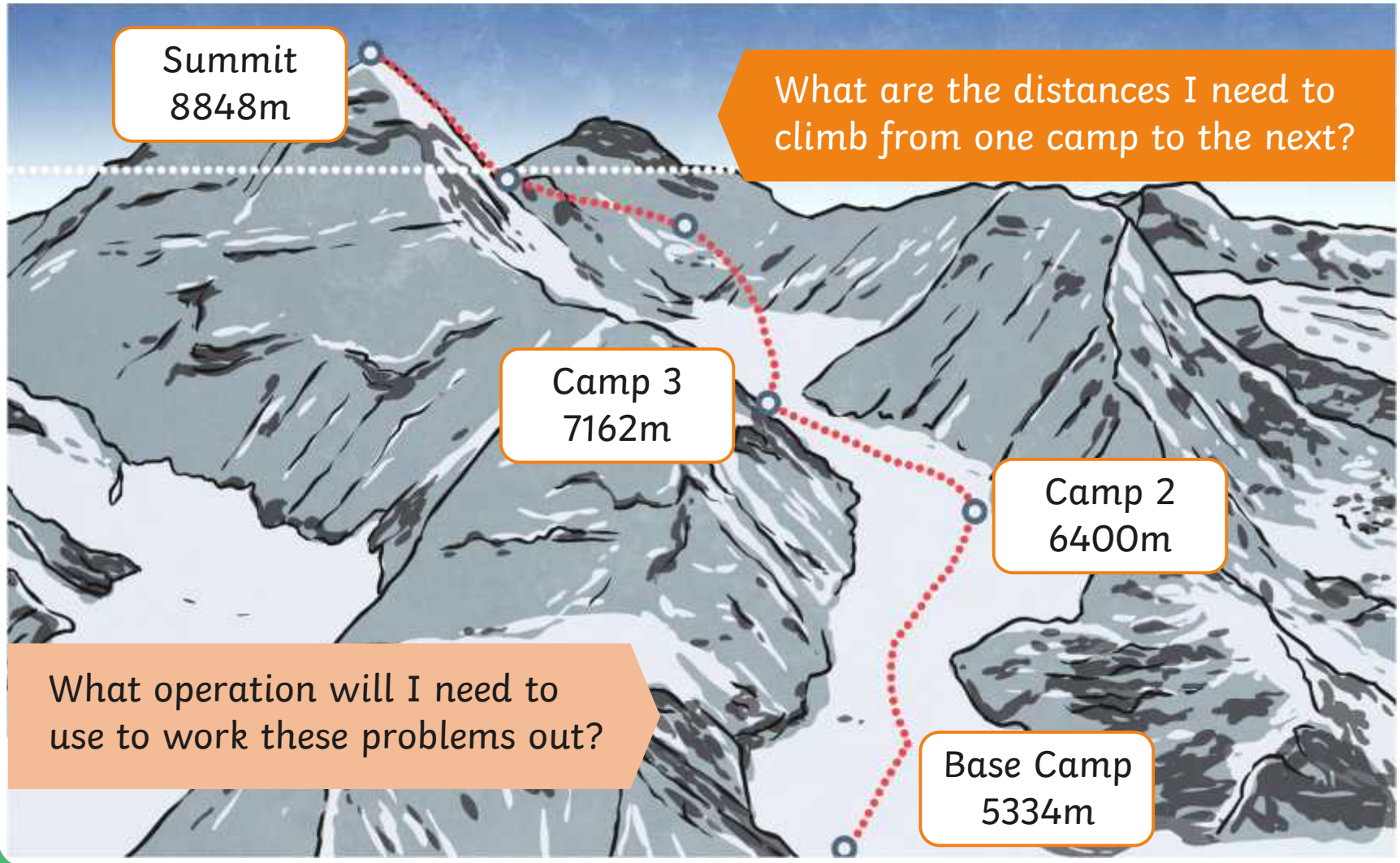
Everest



Climbing Everest can be very dangerous, as the air contains less oxygen the higher up you climb.

When people climb Everest, they stay at different camps to acclimatise to the altitude.

Everest


Summit
8848m
What are the distances I need to climb from one camp to the next?
Camp 3
7162m
Camp 2
6400m
What operation will I need to use to work these problems out?
Base Camp
5334m

Everest

We can use column subtraction to find the difference between Camp 3 and the summit of Mount Everest.

	8	$^{7}\not{8}$	$^{1}4$	8
-	7	1	6	2
	1	**6**	**8**	**6**

From Camp 3 to the summit, there are 1686 metres.

Thousands	Hundreds	Tens	Ones
1000 1000 1000 1000 1000 1000 1000 1000	100 100 100 100 100 100 100 100	10 10 10 10 10 10 10 10 10 10 10 10 10 10	1 1 1 1 1 1 1 1

Everest

From Camp 2, how far is it to Camp 3?

	$^{6}\not{7}$	$^{1}1$	6	2
-	6	4	0	0
		7	6	2

The distance I need to climb from Camp 2 to Camp 3 is 762 metres.

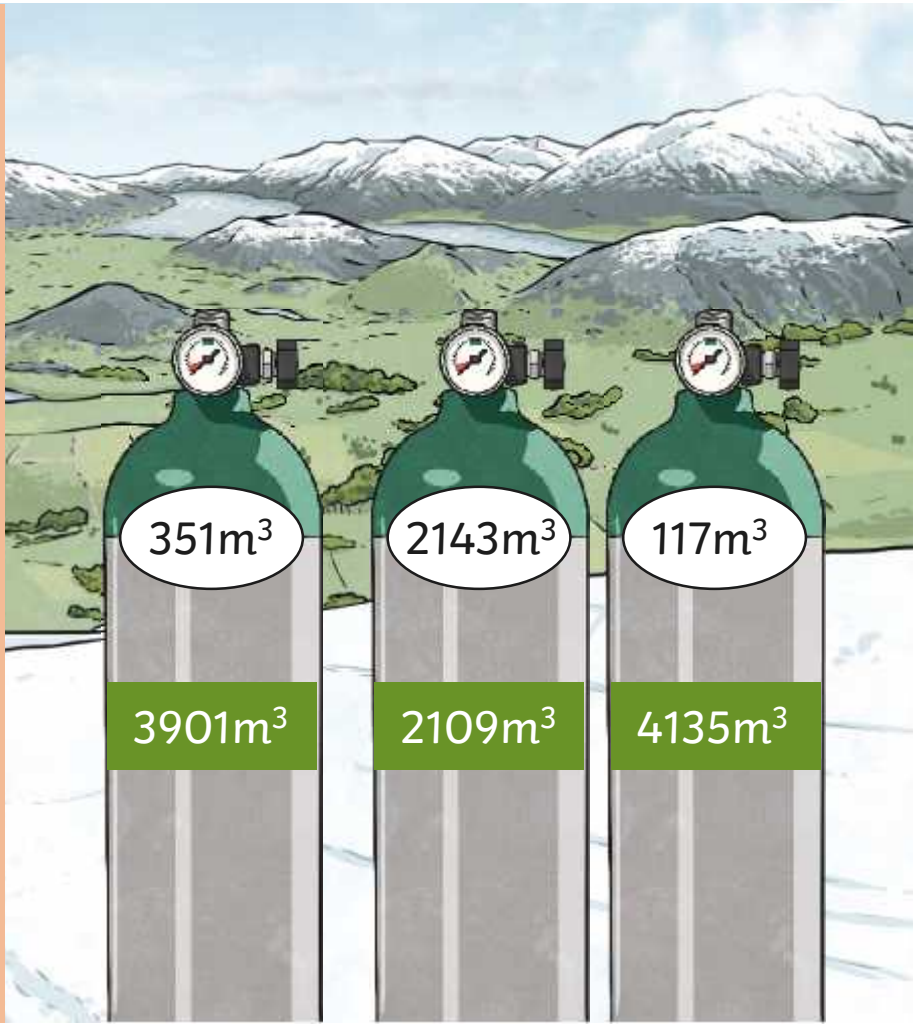
Thousands	Hundreds	Tens	Ones
1000 1000 1000 1000 1000 1000 1000	100 100 100 100 100 100 100 100 100 100	10 10 10 10 10 10	1 1

Breathe

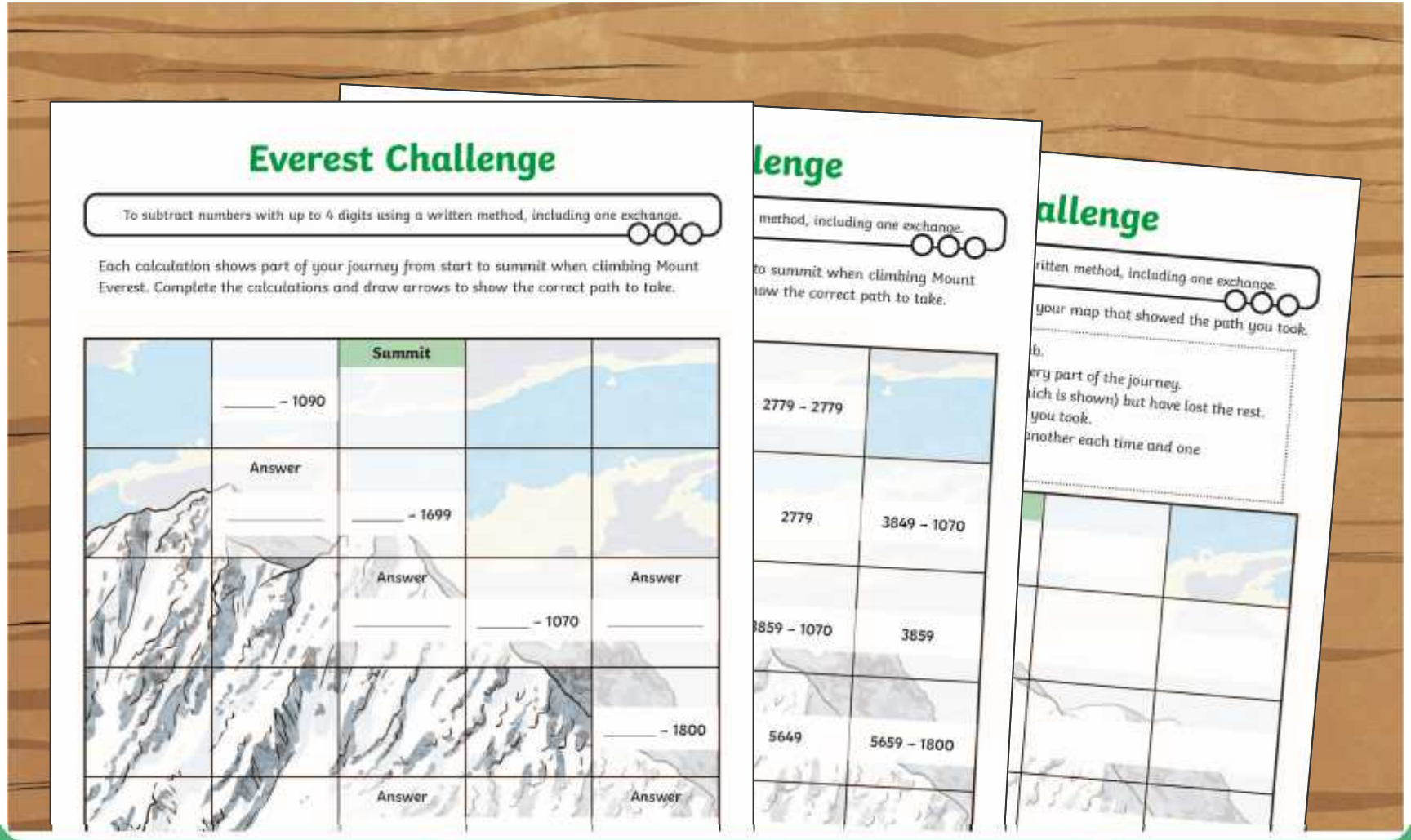
At the top of Everest, the oxygen level in the air drops by two thirds. Therefore, most climbers need an oxygen tank.

Each oxygen tank normally holds 4252 cubic metres of oxygen.

This image shows how much oxygen is left in each tank. Find out how much oxygen has been used. Use column subtraction to help you.

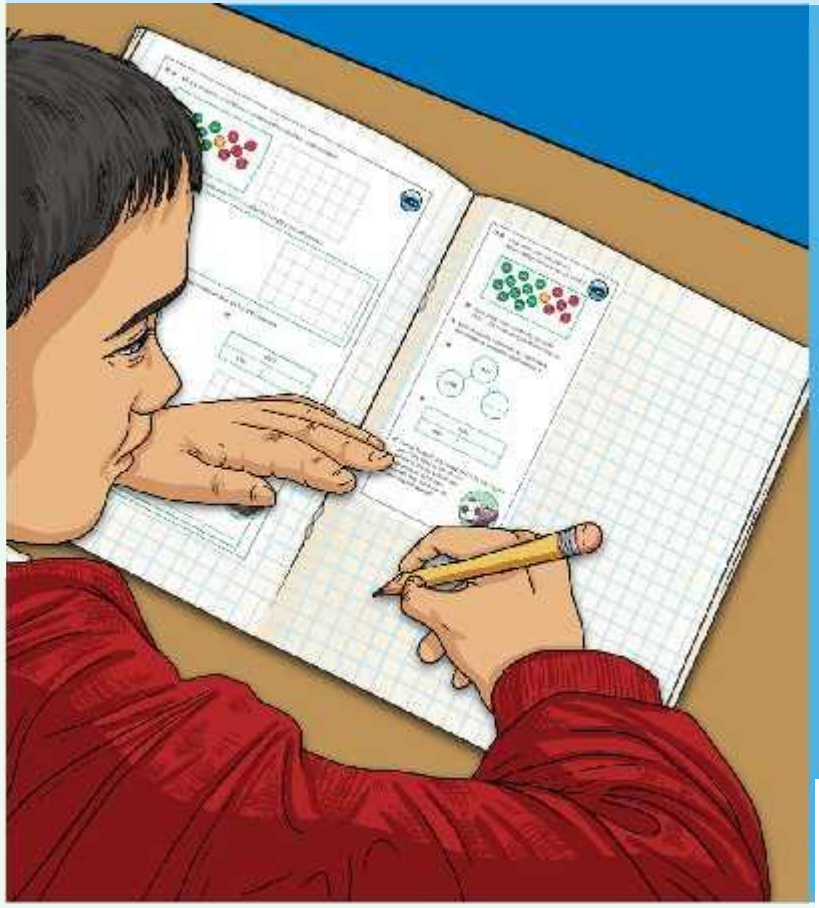


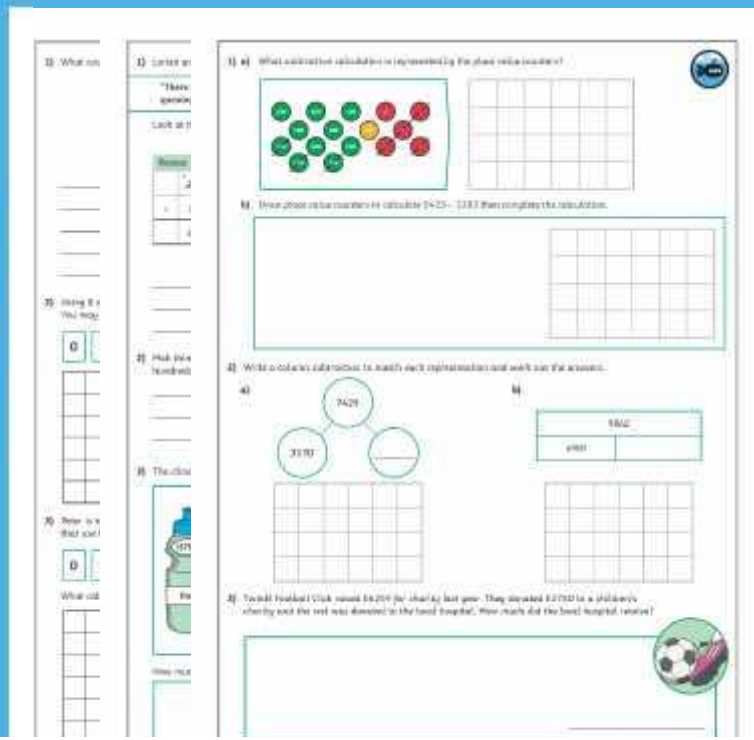
Everest Challenge



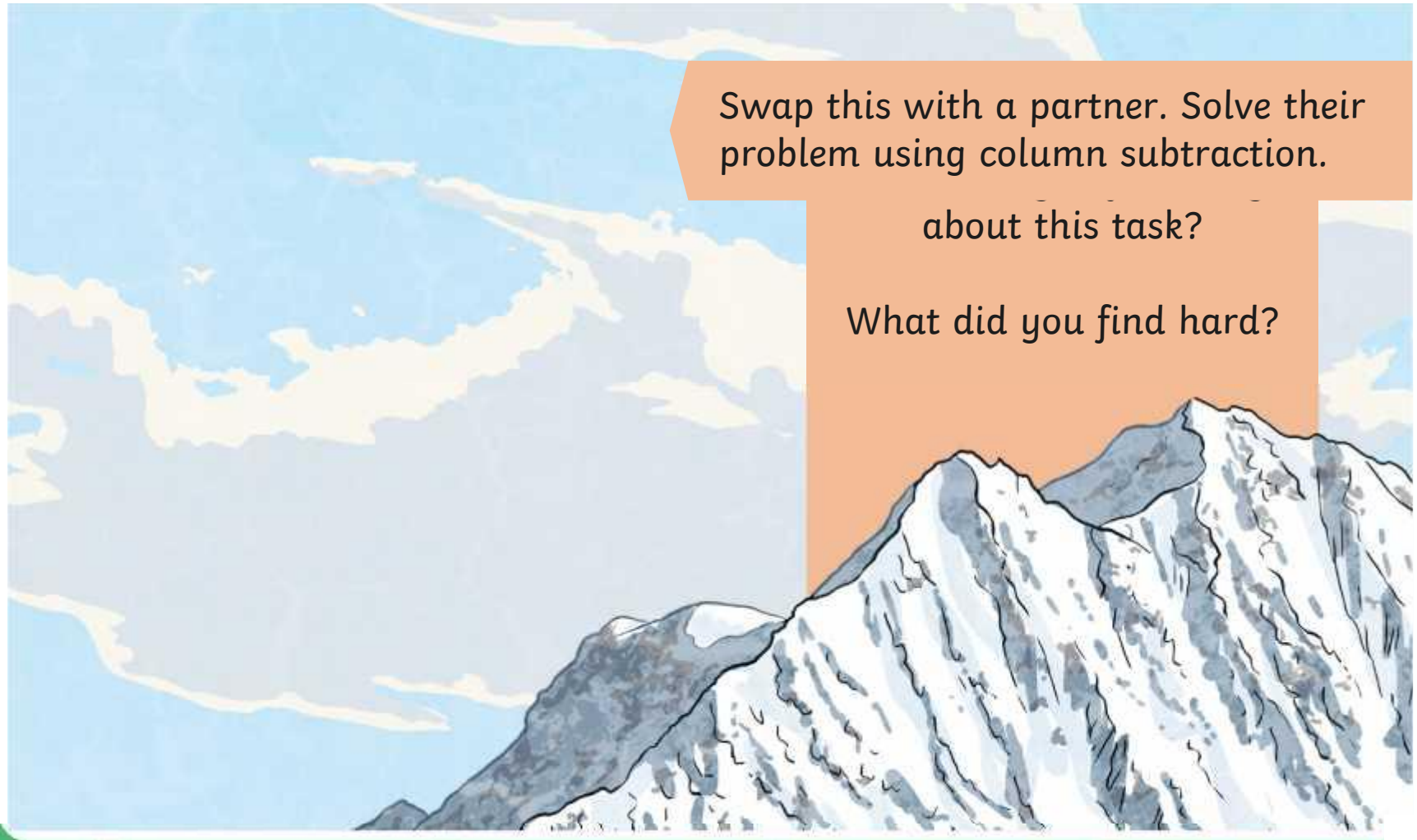
Diving into Mastery

Dive in by completing your own activity!





Back to Base Camp



Swap this with a partner. Solve their problem using column subtraction.

about this task?

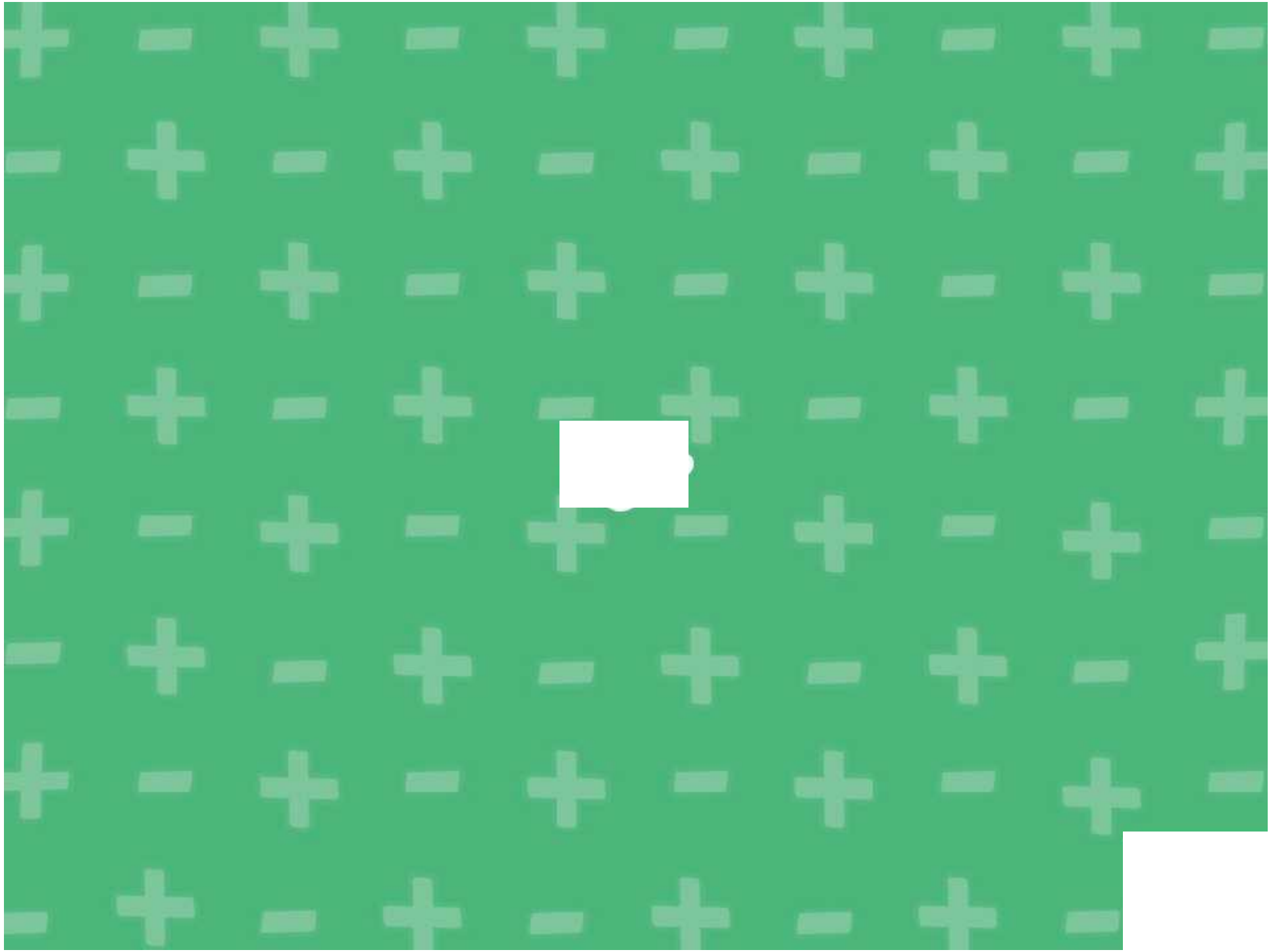
What did you find hard?

Aim

- To subtract numbers with up to 4 digits using a written method, including one exchange.

Success Criteria

- I can use column subtraction.
- I can subtract numbers with up to 4 digits.



Aim: To subtract numbers with up to 4 digits using a written method, including one exchange.				**Date:**					
				Delivered By:			**Support:**		
Success Criteria	**Me**	**Friend**	**Teacher**	**T**	**PPA**	**S**	**I**	**AL**	**GP**
I can use column subtraction.				**Notes/Evidence**					
I can subtract numbers with up to 4 digits.									
Next Steps) _____) _____									

T	Teacher	**I**	Independent
PPA	Planning, Preparation and Assessment	**AL**	Adult Led
S	Supply	**GP**	Guided Practice

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Next Steps) _____) _____									

T	Teacher	**I**	Independent
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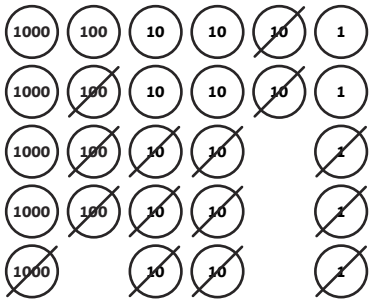
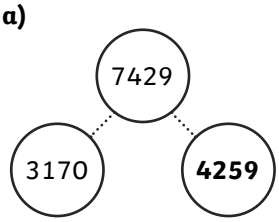
1) a) 1015 – 304 = 711

b) 5425 – 1283 = 4142



2) a)



	7	~~4~~ 3	12 1	9
–	3	1	7	0
	4	2	5	9

b)

9862	
4901	**4961**

	~~9~~ 8	18 1	6	2
–	4	9	0	1
	4	9	6	1

3) £3509

1) Loriea has not exchanged within her visual representation. She should have exchanged one thousand for ten hundreds, subtracting 8 hundreds from 14 hundreds.

Rowan has presented his calculation correctly but he has added 4 ones to 1 one, giving 5 ones. He should have subtracted.

The correct answer is 663.

	~~2~~ 1	14 1	9	4
–	1	8	3	1
	0	6	6	3

2) Mak is not correct: 9 – 6, 8 – 5, 7 – 4, 6 – 3, 5 – 2, 4 – 1 and 3 – 0 in the hundreds column would all give 3 hundreds. If 1 hundred had been exchanged from the hundreds to the tens column, then this could give a 3 digit in the hundreds column answer (for example, 4921 – 1570). Also, if 1 thousand is exchanged from the thousands to the hundreds column, the resulting hundreds digit could be a 3 (for example, 4157 – 1842).

3) Dave has 81ml left, Hermine has 300ml left and Laura has 445ml left.

1) There are 6 possible answers:

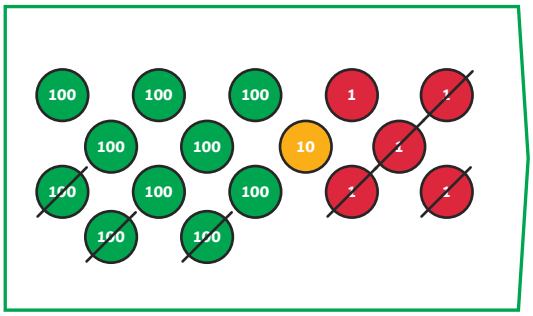
9996 – 4278 = 5718
8996 – 4278 = 4718
7996 – 4278 = 3718
6996 – 4278 = 2718
5996 – 4278 = 1718
4996 – 4278 = 718

2) Various possible answers. Examples include
9084 – 7261 = 1823
or 9384 – 6027 = 3357

3) Working systematically shows that there are 24 different possible calculations in total. 16 of Peter's calculations will have exactly one exchange:

9629 – 0179
9629 – 0197
9629 – 0719
~~9629 – 0791~~ (this has two exchanges)
9629 – 0917
~~9629 – 0971~~ (two exchanges)
9629 – 1079
9629 – 1097
9629 – 1709
~~9629 – 1790~~ (two exchanges)
9629 – 1907
~~9629 – 1970~~ (two exchanges)
~~9629 – 7019~~ (this has no exchanges)
9629 – 7091
~~9629 – 7109~~ (no exchanges)
9629 – 7190
9629 – 7901
9629 – 7910
~~9629 – 9017~~ (no exchanges)
9629 – 9071
~~9629 – 9107~~ (no exchanges)
9629 – 9170
9629 – 9701
9629 - 9710

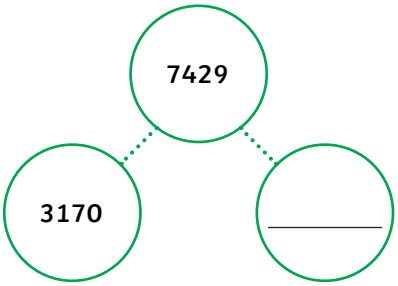
1) a) What subtraction calculation is represented by the place value counters?



b) Draw place value counters to calculate 5425 – 1283 then complete the calculation.

2) Write a column subtraction to match each representation and work out the answers.

a)



b)

9862	
4901	

3) Twinkl Football Club raised £6259 for charity last year. They donated £2750 to a children's charity and the rest was donated to the local hospital. How much did the local hospital receive?

1) Loriea and Rowan are working out the answer to this word problem:

There were 2494 children at a music concert. 1831 of them queuing to get in. How many were already inside the venue?

Look at their methods. Explain and correct any mistakes each child has made.

Rowan

	$^{1}\not{2}$	$^{1}4$	9	4
−	1	8	3	1
	0	6	6	5

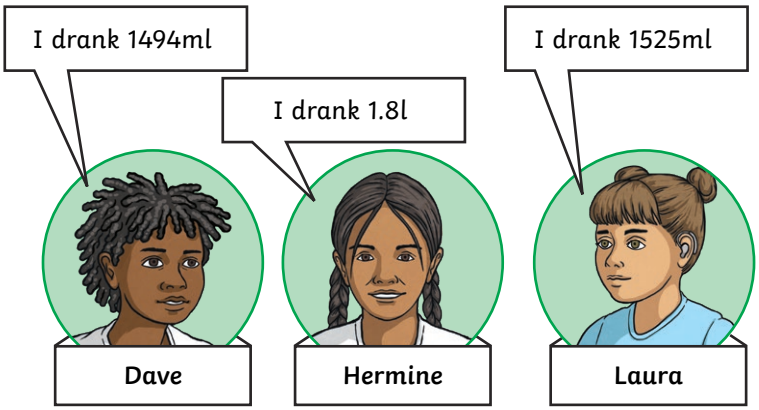
Loriea

Thousands	Hundreds	Tens	Ones
●●	●●●●	●●●●● ●●●●	●●●●
●	●●●●● ●●●	●●●	●
●	●●●●	●●●●● ●	●●●

2) Mak thinks that only calculations with 7 − 4 in the hundreds column will have an answer with 3 in the hundreds column. Is he correct? Prove your answer.

3) The climbers filled their water bottles at the start of the day.

During the day, they've been drinking their water.



How much water has each person got left in their bottle?

1) What could the missing numbers be? Find all the possibilities.

	□	9	□	6
−	4	□	7	8
	□	7	1	□

2) Using 8 of the 10 cards shown, can you create different subtraction calculations where one exchange is required? You may only use each digit card once in each calculation.

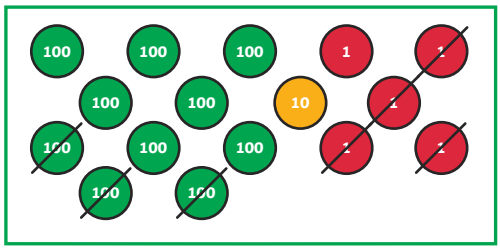
0	1	2	3	4	5	6	7	8	9

3) Peter is trying to find all the possible subtraction calculations from 9629 that use the four digits shown below in any order (for example, 9629 – 1790).

0	7	9	1

What calculations can Peter do that need exactly one exchange? Try to find all possibilities.

1) a) What subtraction calculation is represented by the place value counters?



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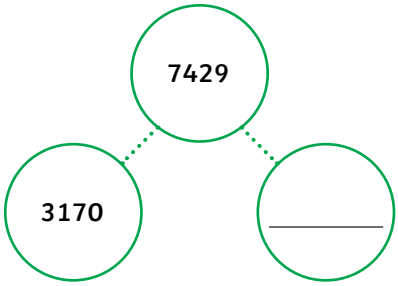

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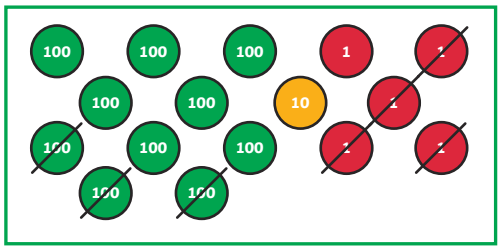

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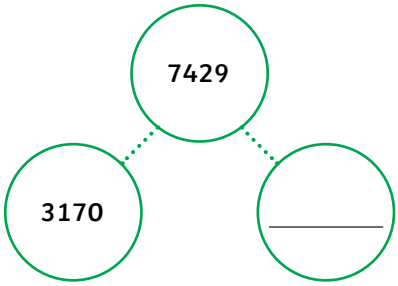

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−	1	8	3	1
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Loriea

Thousands	Hundreds	Tens	Ones
○○	○○○○	○○○○ ○○○○ ○	○○○○
○	○○○○ ○○○○	○○○	○
○	○○○○	○○○○ ○○	○○○

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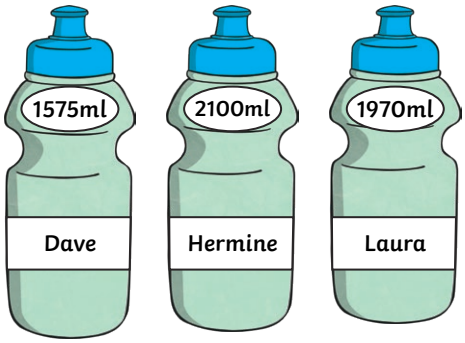
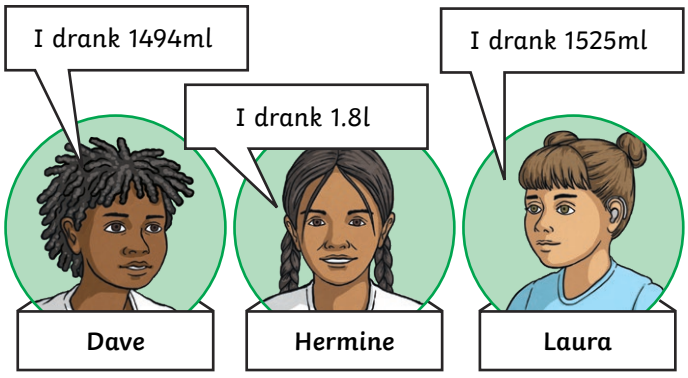
3) The climbers filled their water bottles at the start of the day.



During the day, they've been drinking their water.



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○	○○○○ ○○○○	○○○	○
○	○○○○	○○○○ ○○	○○○

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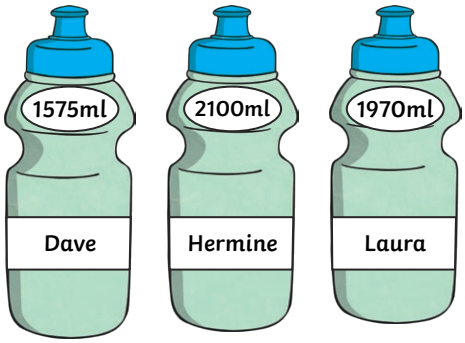

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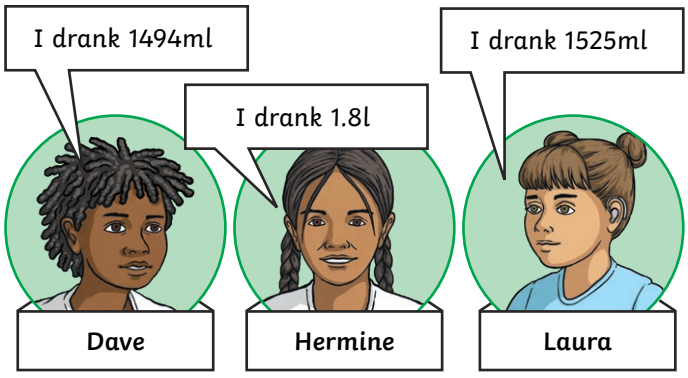

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	□	9	□	6
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7	8	9

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What calculations can Peter do that need exactly one exchange? Try to find all possibilities.

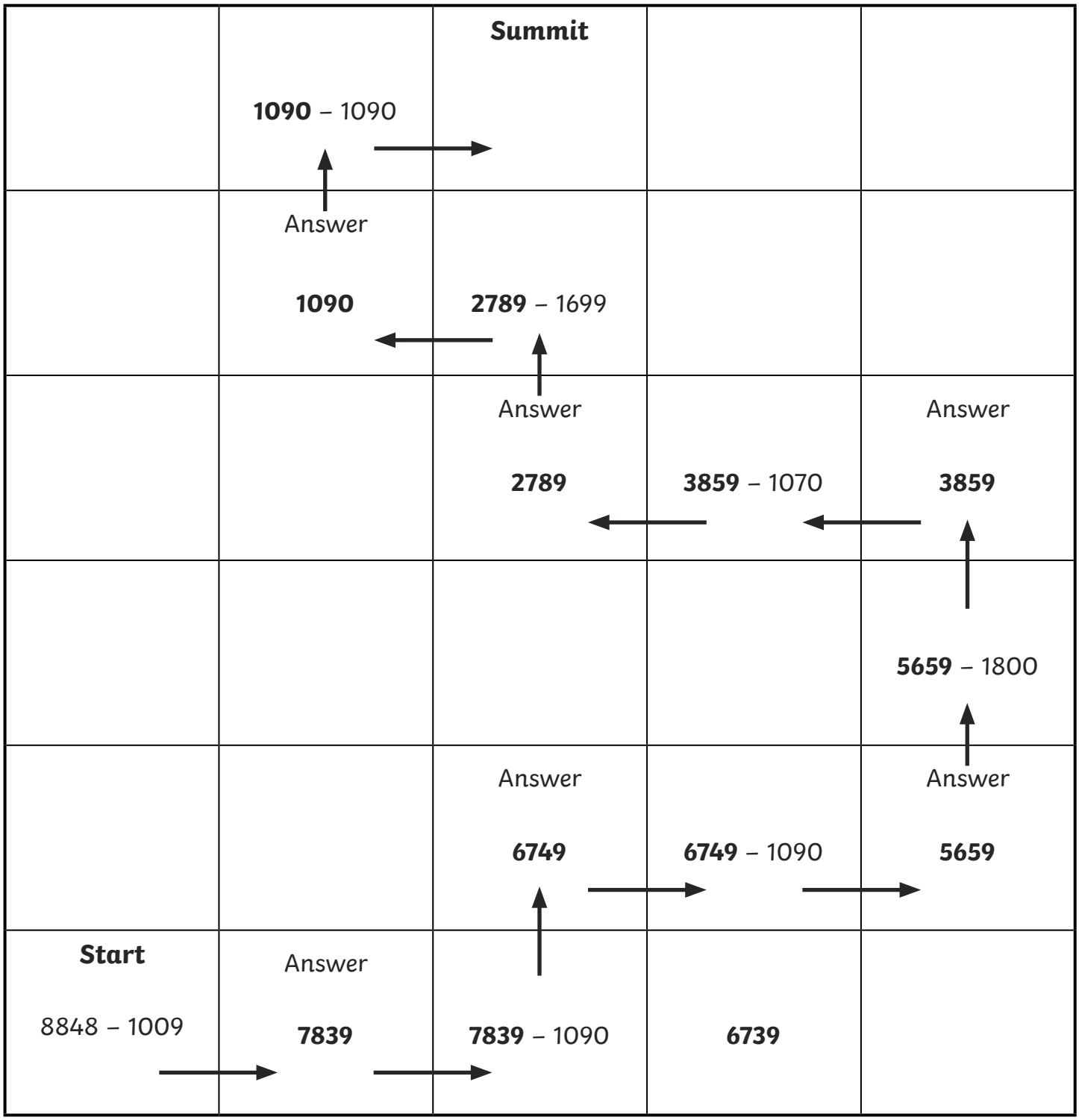
Everest Challenge

To subtract numbers with up to 4 digits using a written method, including one exchange.

Each calculation shows part of your journey from start to summit when climbing Mount Everest. Complete the calculations and draw arrows to show the correct path to take.

	_____ – 1090	**Summit**		
	Answer _____	_____ – 1699		
		Answer _____	_____ – 1070	Answer _____
				_____ – 1800
		Answer _____	_____ – 1090	Answer _____
Start 8848 – 1009	Answer _____	_____ – 1090	6739	

Everest Challenge **Answers**



Everest Challenge

To subtract numbers with up to 4 digits using a written method, including one exchange.

Each calculation shows part of your journey from start to summit when climbing Mount Everest. Complete the calculations and draw arrows to show the correct path to take.

3849	1090 – 1090	**Summit**	2779 – 2779	
5649 – 1800	1090	2789 – 1699	2779	3849 – 1070
5649	6739 – 1090	2789	3859 – 1070	3859
	6739	6739 – 1090	5649	5659 – 1800
7829	7829 – 1090	6749	6749 – 1090	5659
Start				
8848 – 1009	7839	7839 – 1090	6739	

Everest Challenge **Answers**

3849	1090 – 1090	**Summit**	2779 – 2779	
5649 – 1800	1090	2789 – 1699	2779	3849 – 1070
5649	6739 – 1090	2789	3859 – 1070	3859
	6739	6739 – 1090	5649	5659 – 1800
7829	7829 – 1090	6749	6749 – 1090	5659
Start 8848 – 1009	7839	7839 – 1090	6739	

Everest Challenge

To subtract numbers with up to 4 digits using a written method, including one exchange.

You climbed Everest from start to summit, but lost your map that showed the path you took.

- You know you started with 8848m left to climb.
- You know that you climbed over 1000m for every part of the journey.
- You remember the first part of the journey (which is shown) but have lost the rest.
- Use column subtraction to help show the path you took.
- You should subtract one 4-digit number from another each time and one exchange should be seen in every calculation.

		Summit **0m left to climb**		
Start **8848 – 1009** →	**7839**	**7839 – _____**		

Avery Template: Name Badge Label, 8 per sheet | **Compatible Products**: 15395, 25395, 42395, 45395, 48395, 5395, 8395, 88395, 85395.

Addition and Subtraction | Subtract Two 4-Digit Numbers with One Exchange

To subtract numbers with up to 4 digits using a written method, including one exchange.		
I can use column subtraction.		
I can subtract numbers with up to 4 digits.		

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