

# Week 9, Day 3

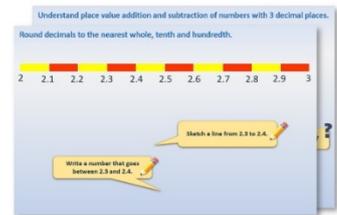
## Use column addition to add pairs of 4-digit numbers

Each day covers one maths topic. It should take you about 1 hour or just a little more.

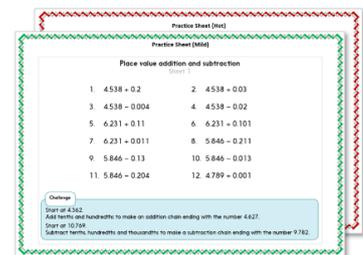
1. If possible, watch the **PowerPoint presentation** with a teacher or another grown-up.



OR start by carefully reading through the **Learning Reminders**.



2. Tackle the questions on the **Practice Sheet**. There might be a choice of either **Mild** (easier) or **Hot** (harder)! Check the answers.



3. Finding it tricky? That's OK... have a go with a grown-up at **A Bit Stuck?**



4. Think you've cracked it? Whizzed through the Practice Sheets? Have a go at the **Investigation**...

## Learning Reminders

Add any pair of 4-digit numbers using compact addition.

$$2454 + 1327$$

We can use the same **expanded** method for adding 4-digit numbers as we did when we started adding 3-digit numbers.

$$\begin{array}{r} 2000 \quad 400 \quad 50 \quad 4 \\ + 1000 \quad 300 \quad 20 \quad 7 \\ \hline 3000 \quad 700 \quad 80 \quad 1 \\ \underline{\hspace{1.5cm}} \\ 3781 \end{array}$$

We can use also use the **compact** layout.

$$\begin{array}{r} 2 \quad 4 \quad 5 \quad 4 \\ + 1 \quad 3 \quad 2 \quad 7 \\ \hline 1 \\ \underline{\hspace{1.5cm}} \\ 3 \quad 7 \quad 8 \quad 1 \end{array}$$

## Learning Reminders

Add any pair of 4-digit numbers using compact addition.

Let's use the **expanded** layout first.

$$2458 + 1377$$

$$\begin{array}{r} 2000 \quad 400 \quad 50 \quad 8 \\ + 1000 \quad 300 \quad 70 \quad 7 \\ \hline 3000 \quad 800 \quad 30 \quad 5 \\ \hline 3835 \end{array}$$

We need to remember to leave space under the second number so that any extra 10s, 100s or 1000s can be written, waiting to be added to the other 10s, 100s or 1000s.

Now let's use the **compact** layout.

$$\begin{array}{r} 2 \quad 4 \quad 5 \quad 8 \\ + 1 \quad 3 \quad 7 \quad 7 \\ \hline 1 \quad 1 \\ \hline 3 \quad 8 \quad 3 \quad 5 \end{array}$$

## Learning Reminders

Add any pair of 4-digit numbers using compact addition.

$$2451 + 1827 = 4278 \quad 8451 + 4327 = 12,778$$

Choose the expanded or compact layout for these two additions.



2000	400	50	1
1000	800	20	7
<hr/>			
4000	200	70	8

Total = **4278**

8451
+ 4327
<hr/>
12778

Total = **12,778**

## Practice Sheet Mild

### Column addition

Watch out for any additions that could be solved mentally!

1.  $5246 + 2138$

2.  $4621 + 2734$

3.  $3284 + 2372$

4.  $5827 + 2434$

5.  $4582 + 2005$

6.  $6287 + 1458$

7.  $4843 + 2682$

8.  $3465 + 2999$

## Practice Sheet Hot

### Column addition

1.  $8422 + 5274$

2.  $6439 + 5248$

3.  $9372 + 4253$

4.  $4789 + 2654$

5.  $5624 + 4831$

6.  $8467 + 4285$

7.  $7895 + 1568$

8.  $6738 + 4694$

#### Challenge

Find two 4-digit numbers with a total of 10,000. No zeros allowed!

## Practice Sheets Answers

### Column addition (mild)

1.  $5246 + 2138 = 7384$
2.  $4621 + 2734 = 7355$
3.  $3284 + 2372 = 5656$
4.  $5827 + 2434 = 8261$
5.  $4582 + 2005 = 6587$
6.  $6287 + 1458 = 7745$
7.  $4843 + 2682 = 7525$
8.  $3465 + 2999 = 6464$

### Column addition (hot)

1.  $8422 + 5274 = 13,696$
2.  $6439 + 5248 = 11,687$
3.  $9372 + 4253 = 13,625$
4.  $4789 + 2654 = 7443$
5.  $5624 + 4831 = 10,455$
6.  $8467 + 4285 = 12,752$
7.  $7895 + 1568 = 9463$
8.  $6738 + 4694 = 11,432$

### Challenge

Accept any pair of numbers adding to 10,000 using no zeros, e.g.  $4529 + 5471$

## A Bit Stuck? Digit twist

Work in pairs

### Things you will need:

- A pencil



### What to do:

- Use expanded column addition to work out the answer to  $427 + 345$ .
- Now swap the last two digits in each number. Work out the answer to the new sum  $472 + 354$ .
- Work out  $348 + 225$ .
- Swap the last two digits to give  $384 + 252$ . Work out the answer.
- Compare the 1s digit in your first answer with the 10s digit in your second answer.
- Work out  $538 + 224$ .
- Swap the last two digits to give  $583 + 242$ .
- Compare the 1s digit in your first answer with the 10s digit in your second answer. Did the same thing happen?
- Work out  $152 + 364$ .
- Swap the digits to give  $125 + 346$ .
- Did the same thing happen?

	400	20	7	
+	300	40	5	
		10		
	700	70	2	772
	400	70	2	
+	300	50	4	

### *S-t-r-e-t-c-h:*

Work out the answer to  $378 + 245$ . Now swap the last two digits in each number to give  $387 + 254$ . Does the same thing happen as before? What's different about this sum?

### Learning outcomes:

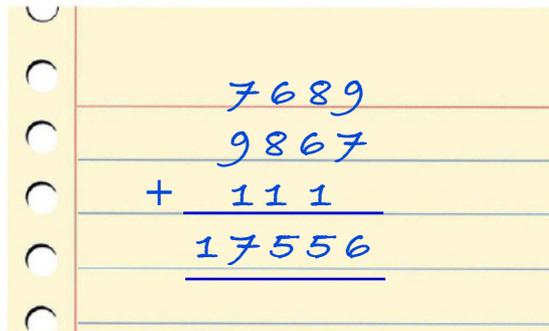
- I can use expanded column addition to add pairs of three-digit numbers where the 1s are greater than 10, or the 10s are greater than 100.
- I am beginning to use expanded column addition to add pairs of three-digit numbers where the 1s are greater than 10 and the 10s are greater than 100.

## Investigation

### Digit sums



- Use the digits 6, 7, 8 and 9 to make a 4-digit number, e.g. 7689.
- Reverse the digits and find the total using compact column addition, e.g.  $7689 + 9867$ .


$$\begin{array}{r} 7689 \\ 9867 \\ + \quad 111 \\ \hline 17556 \end{array}$$

- Then find the digit sum (or digital root) of the answer.

#### Digital Root

Add the digits...  
 $1 + 7 + 5 + 6 + 5 = 24$   
Add the digits again...  
 $2 + 4 = 6$   
The digital root is 6.

- Repeat, using the same digits to make different numbers.
- What do you notice?

Can you explain why this might be happening?

#### Challenge

Can you predict the outcome if you change the cards you start with, e.g. using 1 2 3 4?

What might happen if the digits are not consecutive, e.g. 1 3 5 7 or 2 4 6 8...?