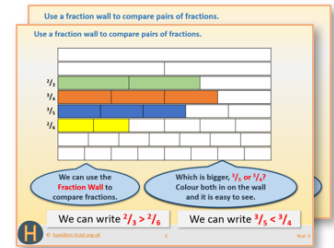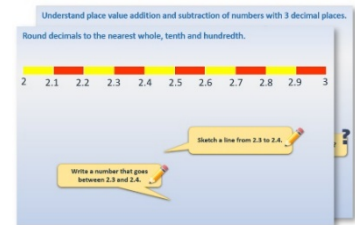# Week 8, Day 3
Expanded and compact addition

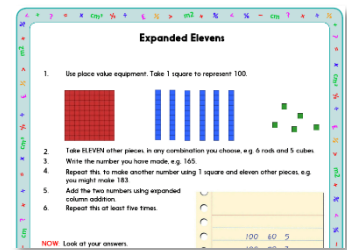**Each day covers one maths topic. It should take you about 1 hour or just a little more.**

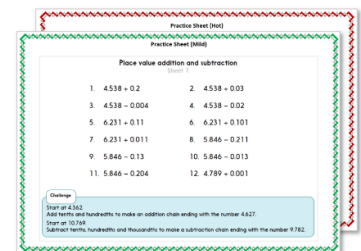1. If possible, watch the **PowerPoint presentation** with a teacher or another grown-up.

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

2. Have a go at the **Investigation**…. This gives lots of addition practice and is REALLY intriguing…

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

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

Learning Reminders

Use expanded and compact addition to add two 3-digit numbers.

Estimate:
700 + 200
is 900

What would be a good **estimate** for 654 + 218?

Let's go through that using **expanded addition**.

When we are confident we can try this **compact** method.

```
  600  50  4
+ 200  10  8
          10
---------------
  800  70  2
```

800 + 70 + 2 = 872

```
  654
+ 218
    1
------
  872
```

Learning Reminders

Use expanded and compact addition to add two 3-digit numbers.

Estimate
600 + 300
is **900**

What would be a good **estimate** for 631 + 296?

Try it using either **expanded** or **compact** addition.

Let's check using **expanded** addition.

And with **compact** addition…

```
    600  30  1
 +  200  90  6
    100
  ─────────────
    900  20  7
```

900 + 20 + 7 = 927

```
   631
 + 296
     1
  ─────
   927
```

Learning Reminders

Use expanded and compact addition to add two 3-digit numbers.

Estimate
500 and 350
is **850**

What would be a good **estimate** for 489 + 363?

Choose either the **expanded** or **compact** layout.

Let's check using **expanded** addition.

And with the **compact** method...

```
   400  80  9
+  300  60  3
   100  10
   ─────────
   800  50  2
```

800 + 50 + 2 = 852

```
   489
+  363
    11
  ─────
   852
```

Which layout do you prefer?

Explore more Hamilton Trust Learning Materials at https://wrht.org.uk/hamilton

Investigation
Next door additions

1. Use expanded or column addition to work out 123 + 234.

2. Add the digits together from your answer. Then add the digits again so that you get a single-digit answer.
This is called finding the digital root.

3. Repeat with 234 + 345 and then 345 + 456 and so on. What is special about each pair of numbers?

4. What do you notice about the digital roots of the answers?

   What happens if you try pairs of numbers like 987 + 876 and 654 + 543?

```
     100    20    3
+    200    30    4
     _____
     300    50    7      357

     3 + 5 + 7 =
     1 + 5 =
```

```
      1 2 3
+     2 3 4
      _____
      3 5 7

     3 + 5 + 7 =
     1 + 5 =
```

Practice Sheet Mild
Written addition

Use expanded and compact column addition to calculate the answer to the first addition.
Did you get the same answer?
Repeat for the second addition.

Now *choose* which strategy you prefer to calculate the answers to the other questions.

1.   328 + 147

2.   473 + 241

3.   528 + 239

4.   616 + 325

5.   481 + 273

6.   573 + 362

7.   345 + 235

8.   670 + 342

Practice Sheet Hot
Written addition

Use expanded and compact column addition to calculate the answer to the first addition.
Did you get the same answer?
Repeat for the second addition.

Now *choose* which strategy you prefer to calculate the answers to the other questions.

1. 429 + 347

2. 553 + 281

3. 623 + 195

4. 308 + 433

5. 456 + 356

6. 784 + 147

7. 372 + 379

8. 584 + 356

Challenge

Write an addition of two 3-digit numbers with a total of 1000. No zeroes allowed!

Practice Sheets Answers

Written addition (mild)

1.   328 + 147 = 475
2.   473 + 241 = 714
3.   528 + 239 = 767
4.   616 + 325 = 941
5.   481 + 273 = 754
6.   573 + 362 = 935
7.   345 + 235 = 580
8.   470 + 342 = 812

Written addition (hot)

1.   429 + 347 = 776
2.   553 + 281 = 834
3.   623 + 195 = 818
4.   308 + 433 = 741
5.   456 + 356 = 812
6.   784 + 147 = 931
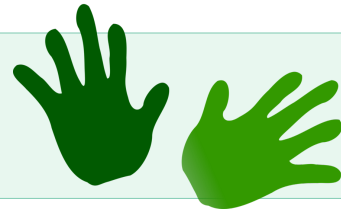7.   372 + 379 = 751
8.   584 + 356 = 940

Challenge

Accept any pair of 3-digit numbers with no zeros, with a total of 1000, e.g. 647 + 353.
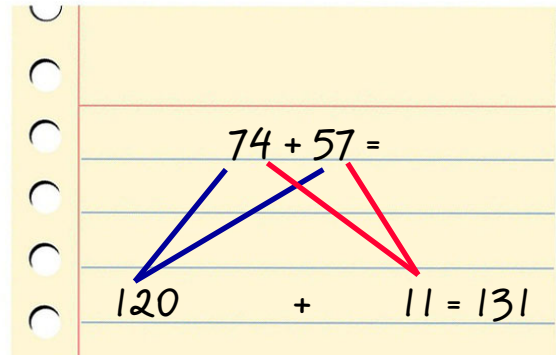
Work in pairs

Things you will need:
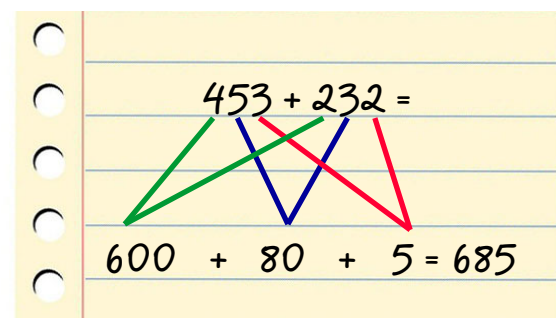• A set of 100s, 10s and 1s place value cards

What to do:

• Shuffle the 50 to 90 cards.
  Place them face down.

• Shuffle the 1s cards and place face down.

• Each take the top card from each pile and
  put them together to make a 2-digit number.

7 4   5 7

$74 + 57 =$

$120 \quad + \quad 11 = 131$

• Record the addition of your two numbers
  – not the answer yet!

• One person collects the 10s cards, and the other collects the 1s cards.

• Add the 10s. Add the 1s. Find the combined total.

• Record the addition in your books.

• Repeat at least three more times.

• Repeat, but this time shuffle the 100 to 400 cards, 10 to 40 cards and 1 to 9 cards.

• Each take the top card from each pile and
  put them together to make a 3-digit number.
  Record the addition.

• Collect the 100s, 10s and 1s.
  Find the combined total.
  Record the addition in your books.

  Repeat at least two more times.

$453 + 232 =$

$600 \quad + \quad 80 \quad + \quad 5 = 685$

S-t-r-e-t-c-h:
Shuffle ALL the 10s cards not just 10 to 50. Use them all!

Learning outcomes:
• I can add any pair of 2-digit numbers.
• I am beginning to add pairs of 3-digit numbers.
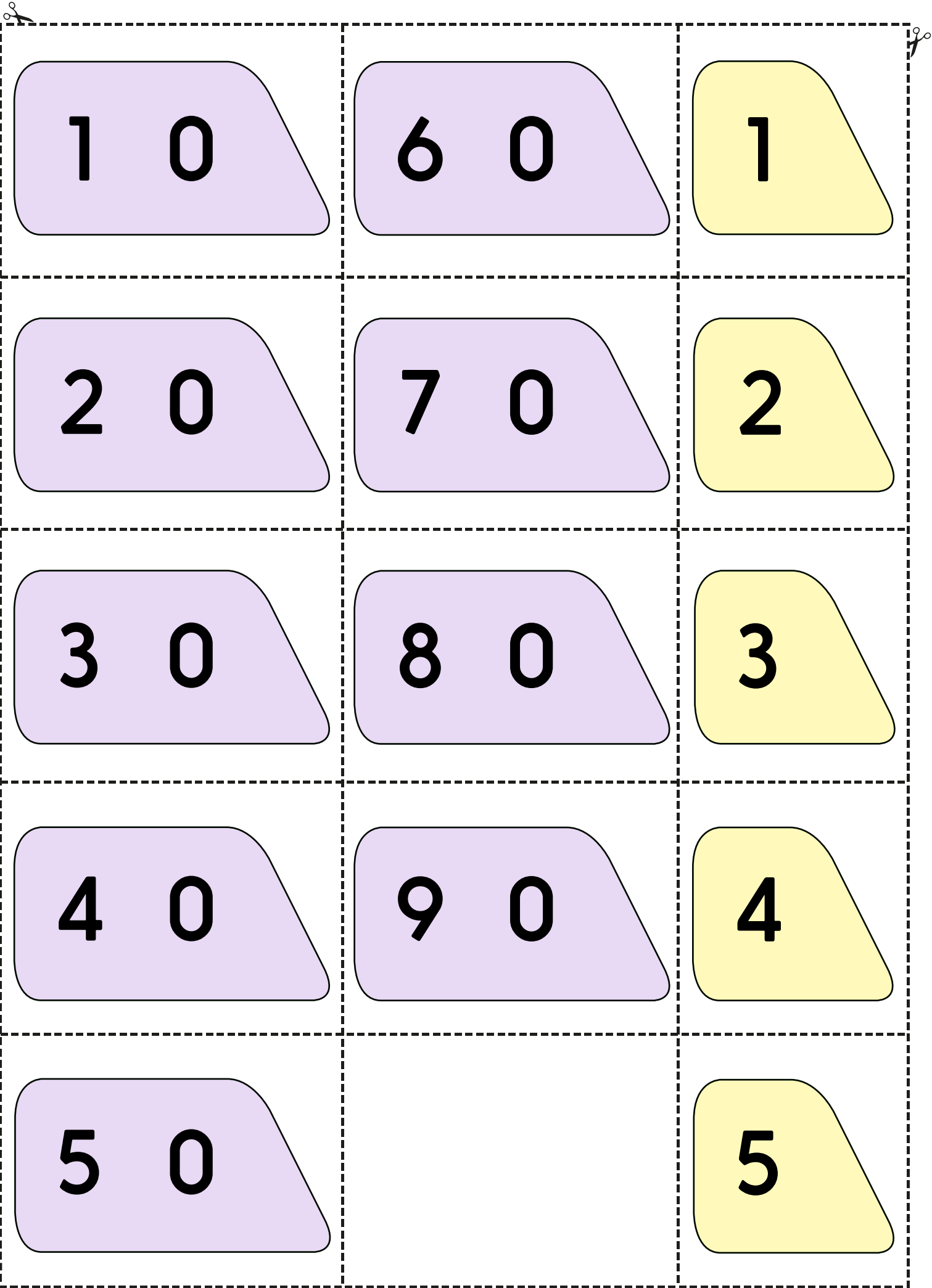
1 0 0	6 0 0
2 0 0	7 0 0
3 0 0	8 0 0
4 0 0	9 0 0
5 0 0	

1 0	6 0	1
2 0	7 0	2
3 0	8 0	3
4 0	9 0	4
5 0		5

6

7

8

9