# Splitting Numbers for Addition & Multiplication

## Overview

This activity explores an alternative, common sense method for in the head addition which relies on the technique of 'splitting numbers' into tens and units, used in *Doubling Up*, and *The Power of Halving*. This method can also be extended to make sense of multiplication of larger numbers.

## Skills and Knowledge

Addition using in the head techniques

## Preparation and Materials

Photocopy Practice Sheet 1

## Suggested Procedure

**Introducing the activity**

Put the question in context with a scenario.
For example:

- *My friend Stephanie does odd jobs for people. She always does her calculations in her head. On Monday she earned $51 and on Tuesday she earned $37.*
- *How might she have calculated it without writing it down like she was taught in school?*

Follow up on any alternate strategies suggested by students before demonstrating the splitting up method, as follows:
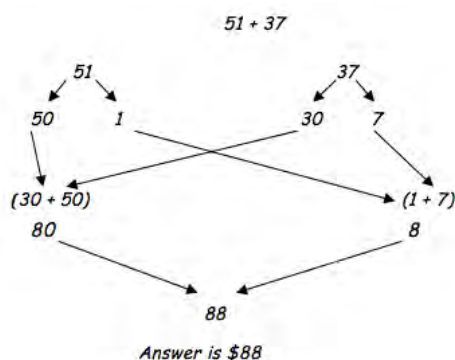
*In her head she splits the numbers into tens and units:*
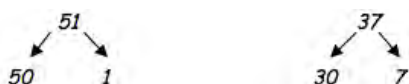


*Then she combines the tens: 50 + 30 and the ones: 1 + 7.*
*Then she puts the split number back together again.*

The process can be clarified on the board with a rough diagram. For example:

Explain to students that it is not necessary to draw all of the arrows. In fact, they can probably imagine the whole process in their heads, but sometimes it is safer to jot down some of the intermediate steps on a scrap of paper.

Try another example together:

*On Wednesday Stephanie earned another $63. Work out how much she has earned so far?*

Encourage students to use the process, first by themselves, then compare on the board. Clarify the process again using a diagram.

$88 + $63

88                63
80      8        60      3

140                      11

140 + 10 + 1

Answer is $151
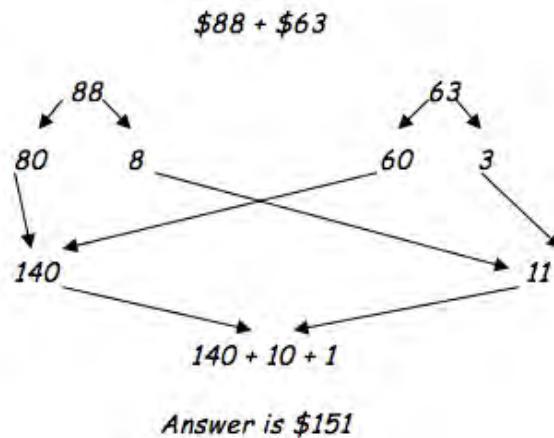
**Extending into hundreds**

Try another example to demonstrate that sometimes the numbers can also be split into three parts. Use the odd job earnings again to demonstrate.

Ask: *For the rest of the week Stephanie earned $89. What's her total now?*

Break the 151 into three parts and proceed as before. Some students may need more steps written than others:

151 + 89

151                 89
100   50   1      80   9

100      130      10

200          40

Total is $240
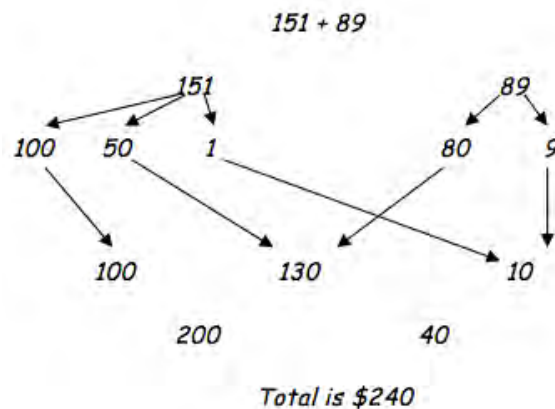
Give students plenty of time in class to practice this technique. Some graded examples (in groups of 4) are provided as models in *Practice Sheet 1.*

To boost their confidence make sure students get plenty of practice at each of the levels, by creating further examples yourself, rather than letting them try more difficult examples too soon.

**Splitting the number for multiplication**

This splitting the number technique is a way that students might make more sense of multiplication that using the traditional school rote method.
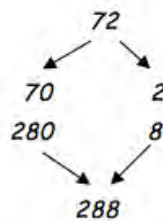
One example can be used to demonstrate, followed by opportunities for further practice together.

Example:
- *4 people pay $72 each to help pay for a birthday party for their mother.*
- *How much to they have altogether?*

On the board:          *$72 x 4 = ?*

*First split the 72:*          72

        70          2          *Multiply by 4*
        280         8

                288          *Put it back together*

*They have $288 altogether*

Together try another example, this one with hundreds in it, to be split into three parts. For example:

*3 people win $156 each how much do they have altogether?*

The number of steps involved will depend on how easily students can 'see' the split numbers. The diagram below represents one version only.

*156 x 3:*          156

    100      50      6          *x 3*
    300      150     18
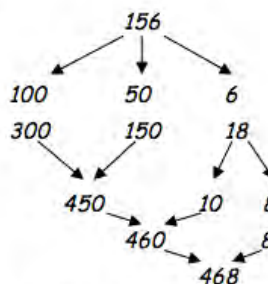
        450      10    8          *Put back together in stages*
          460         8
                468
*They have $468 altogether*

Practice several more examples together, encouraging students to jot down only the in between numbers that they need to.

Then discuss with them whether this method is any clearer or quicker for them than standard multiplication methods.

Further examples are provided in *Practice Sheet 1.*

# Splitting numbers

Do these additions by splitting the numbers

*1.* 43 + 56

*2.* 35 + 24

*3.* 25 +73

*4.* 17 + 22 + 30

*5.* 62 + 18

*6.* 74 + 26

*7.* 87 + 62

*8.* 58 + 32

*9.* 175 + 214

*10.* 329 + 143

Illustration by Elise Gueyne

# Splitting numbers

Do these additions by splitting the numbers

*11.* 436 + 183

*12.* 209 + 152 + 30

Try these harder additions by splitting the numbers

*13.* 384 + 981

*14.* 411 + 659

*15.* 413 + 794

*16.* 805 + 1,106

Try these multiplications by splitting the numbers

*17.* 54 x 3

*18.* 217 x 4

19. 207 x 5

20. 126 x 6