Flippin' Sums!

This is yet another way of getting that all-important practice done in working with single-digit numbers, by generating activities around a simple and easily-made artifact.

Acknowledgement

The material offered here is based on an idea which was published in
Mathematics in School, March 1994
in an article written by Peter Patilla, of the
Mathematics Education Centre, Sheffield Hallam University.
who gave the credit for the original idea to
an unamed 'Australian colleague'.

First of all a little 'gizmo' here called the **Digit Flipper** has to be made. Written instructions (in some detail) are given with the first one. When that one has been made, the very simple principles behind it are easily carried forward. However, be warned, the first one is not easy for most people.Make sure you have done at least one before attempting to 'go public'. This not only makes sure important experience has been gained, but will also supply a model that can be shown. The work is a little easier if it is known what the end product looks like. Some drawings are given at the end of this unit as additional help, including a large version suitable for an ohp.

Clearly, multiple copies have to be produced. One economy is to cut and paste two on a sheet. A single instruction-sheet can be shared between two users - and re-cycled.

It needs to be made clear that, in use, none of the four 'flaps' may be in the vertical position. They must all be laid flat so that there are only ever four digits on display.

So what do we do with this gadget once we have it?

Well, there are many things that can be done, and only some are given here as 'starters'. Patience and novelty will be exhausted (usually) long before the ideas are.

Probably the simplest investigation is to consider totals - what do the four digits on display add up to?

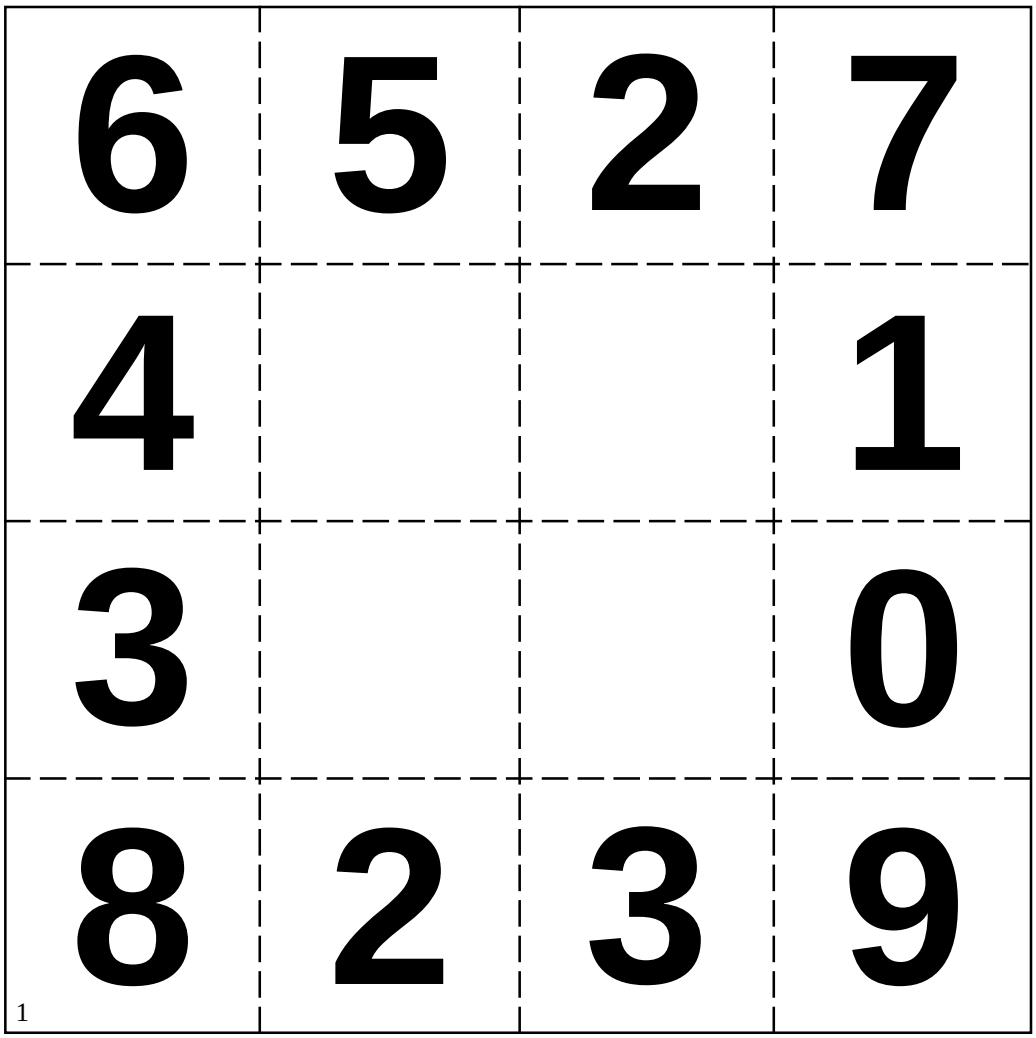
- What is the largest total possible?
- What is the smallest total possible?
- How can a total of (whatever) be made?
- How many different ways can a total of (whatever) be made?
- How many different totals less/greater than (whatever) can be found?
- How many different two-digit numbers can be found?
- Find all the two-digit numbers having a certain property (prime, square etc.)
- How many different four-digit displays can be made?
- What is the largest/smallest (non-zero) product of all four numbers?
- How many different ways can a zero product of all four numbers be made?

All of these can be run as general class activities, either cooperatively or competitively, according to what is being sought.

Two others versions of the Digit Flipper are provided. Having made one and worked through some of the activities as a class, a new one (together with a list of questions) could be tackled by individuals or in groups. Notice they are numbered in the bottom left-hand corner, just to keep track of which version is being used.

An unnumbered Digit Flipper is provided for making yet another version, or for any other activity that can be devised. Having pupils make their own is not a great idea, at least, not if any marking is contemplated!

Digit Flipper 1



To make

Cut out around the outside line of the square.

Using the dotted lines as guides -

1. Fold in the left-hand strip (6 4 3 8) so that **6** goes on **5** and **8** goes on **2**
2. Fold in the right-hand strip (7 1 0 9) so that **7** goes on **2** and **9** goes on **3**
3. Open out.
4. Fold in the top strip (6 5 2 7) so that **6** goes on **4** and **7** goes on **1**
5. Fold in the bottom strip (8 2 3 9) so that **8** goes on **3** and **9** goes on **0**
6. Open out.
7. Fold **backwards** on the horizontal middle line so that the **backs** of (6 5 2 7) match up to the **backs** of (8 2 3 9).
8. Open out.
9. Fold **backwards** on the vertical middle line so that the **backs** of (6 4 3 8) match up to the **backs** of (7 1 0 9).
10. Open out.
11. Cut out the middle four squares which have no numbers on them.
12. Glue the **backs** of **2** and **3** (in the bottom strip) together.
13. Glue the **backs** of **5** and **2** (in the top strip) together.
14. Glue the **backs** of **4** and **3** (in the left-hand strip) together.
15. Glue the **backs** of **1** and **0** (in the right-hand strip) together.

The final result should be a 2 by 2 grid of cells with 4 flaps sticking up that can be folded either way.

Digit Flipper 2

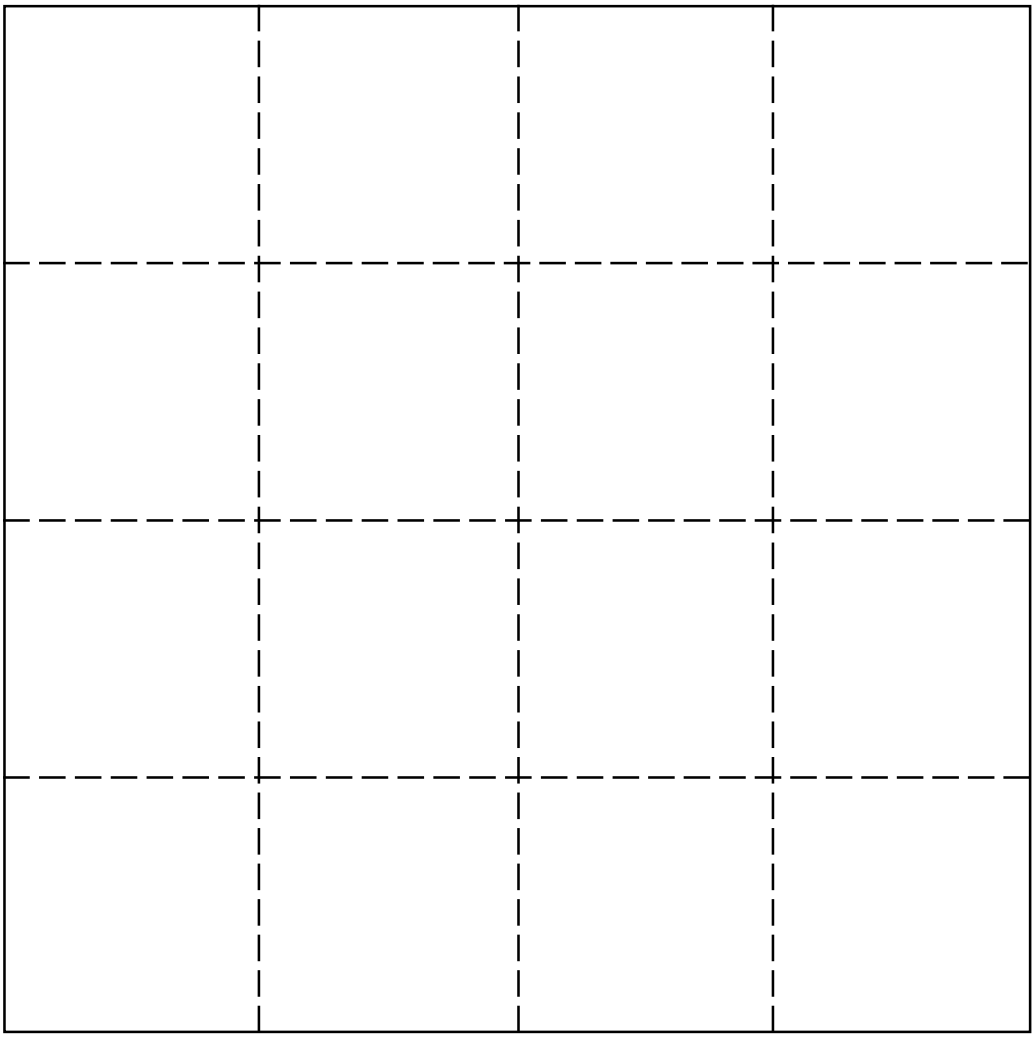
3	1	5	8
0			2
4			6
7	9	4	5

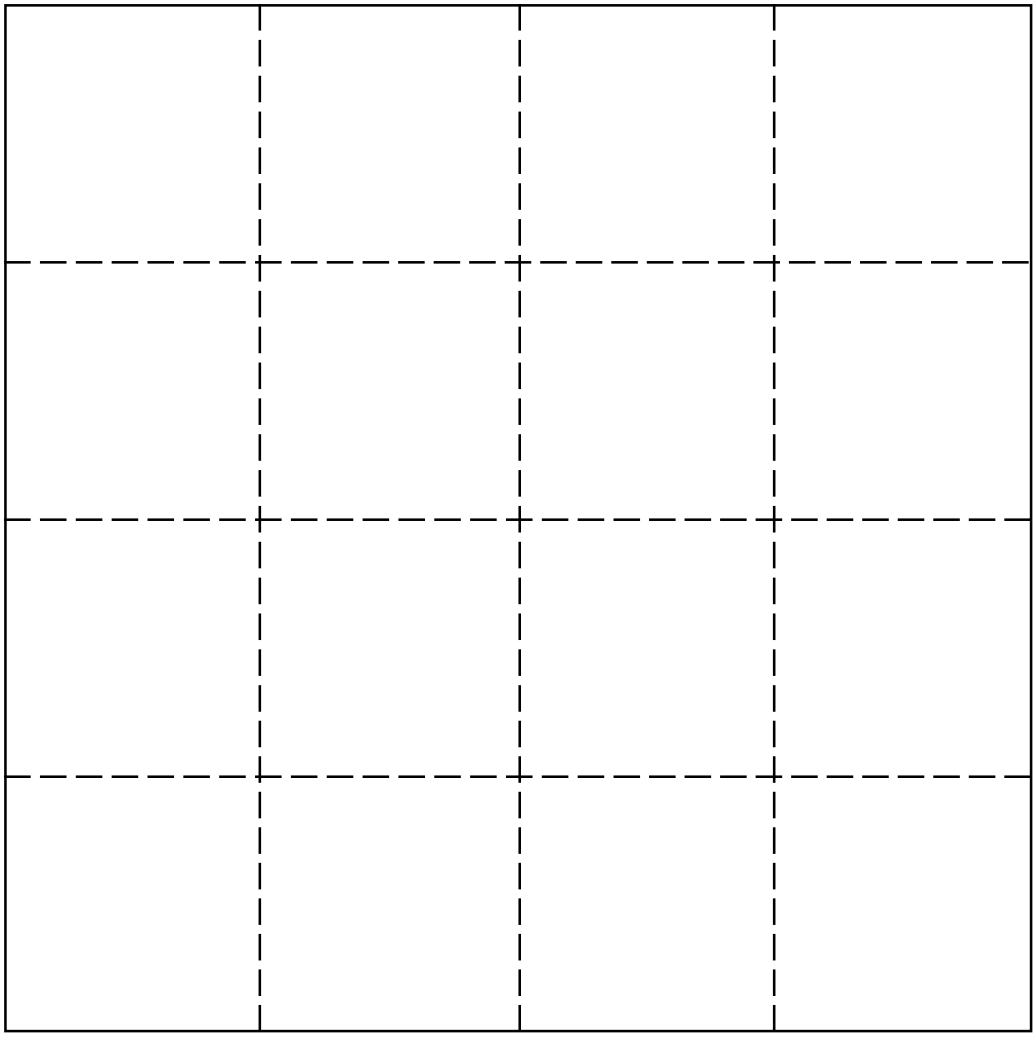
2

Digit Flipper 3

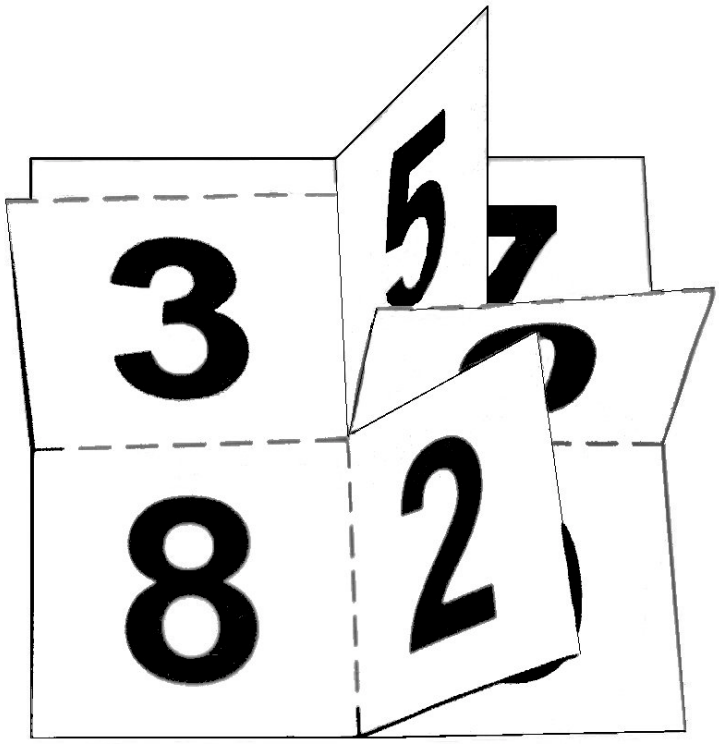
5	7	6	2
3			1
0			4
2	9	8	3

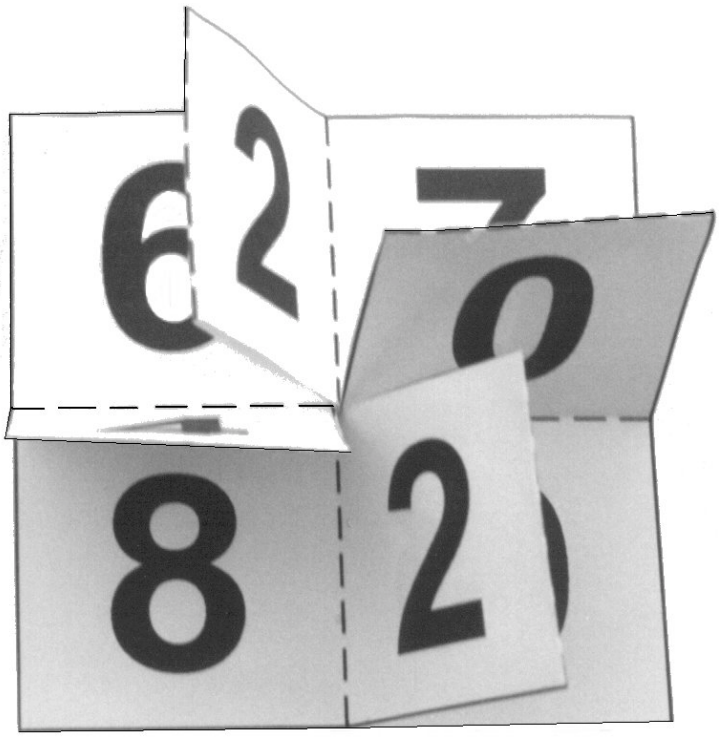
3





Digit Flipper 1 ~ Assembled





Digit Flipper 1 ~ Assembled