

A Word on Language

These last points bring up a topic of interest to be looked at in another Tutor Tips - the precision required in language use when working with mathematical learning.

Conclusion

Numbers are symbols. Behind the symbol is the idea. As Pengelly (1991:78) points out "it is these (ideas) which are important. Gaining an understanding of them will bring life to the subject and meaning to the symbols." Users of numbers need to understand the ideas behind the symbols. We need to make sure our students can recognise and solve problems in practical situations – not just solve formal problems learnt by rote.

Research by Thompson (2000:291) has concluded that the concept of place value is too sophisticated for many young children to grasp. As educators working with adults we are in a position to revisit the concept when students may be able to "get it".

What is so sophisticated about the concept of place value? Academic language talks about the problem of the "pseudomultiplicity of value" inherent in the concept. The differentiation between face value and complete value. In the written place value system there is a multiplicity of value as contrasted to using concrete manipulatives (e.g. blocks) where there is no multiplicity of value. The activities suggested in this and the former Tutor Tips on place value using manipulative symbols (numbers on bits of paper) attempt to make this more understandable in a practical way.

Acknowledgements

I would like to acknowledge the vital role of Anita Steinerts, who generously tutored me in this approach to developing an understanding of our number system.

References

A comment on these references. As literacy tutors and teachers we have to alert our students to the concept of currency of texts. It is, in my opinion, a pity that these mostly 'old' references lack currency, but are still valid and valuable references. We see in our adult classroom evidence of the fact that teaching practices, in many cases, still fail to develop an effective understanding of place value despite the research that has been done.

- Ball, D.L., (2003), "What mathematical knowledge is needed for teaching mathematics", Remarks prepared for the Secretary's Summit on Mathematics
- MacGregor, M., (1989) "Reading and Writing Mathematics", Australian Journal of Reading, Vol. 12, No. 2, 2 June 1989
- Pengelly, H., (1991) "Behind the language: mathematics", Selected Papers, 16th Australian Reading Association National Conference, 7 – 11 July 1991
- Thompson, I (2000) "Teaching Place Value in the UK: time for a reappraisal", Educational Review Vol 52, Issue 3, Nov
- Valeras, M. and Becker, J., (1997) "Children's Developing Understanding of Place Value", Cognition and Instruction, Vol 15 Issue 2

8

3



TUTOR TIPS

Funded under the Department of Employment and Industrial Relations
'Skilling Queenslanders for Work' initiative.

PLACE VALUE – A CRUCIAL BUILDING BLOCK (Part 2)

*What can I do if I think my student
doesn't have a grasp of place value?*

Author: Sue Feeney

Many of our students are comfortable with numbers of two digits 0 - 99, and are able to operate with numbers in the hundreds 100 – 999, but the tenuous hold they have on a concept of number becomes apparent when they have to move into the thousands. Additionally, their understanding of "bits of numbers" (those on the right hand side of the decimal point) can be fairly limited.

For them to have success in their future work in many aspects of numeracy, this core underpinning skill needs to be developed.

Consolidation Activities

Materials required

Place Value Chart (A3 size) (Refer Tutor Tips, Write On Vol.26 No.3) for each student and many small squares numbered from 1 – 9, whiteboard or other display medium.

IDEA NUMBER 1

A good activity to start with is to write a number on the whiteboard, or have a student write a number and challenge the class to read it.

Use the concrete support of the Place Value Chart to allow students to establish what the number is. Repeat this activity as long as you feel it is useful. Return to the activity when you start to deal with even larger numbers.

Remember to return to the chart when introducing decimal fractions.

5

8

1

6

2

7

IDEA NUMBER 2

Below is a useful format for worksheets. Simply change the numbers to have a new worksheet.

Place Value Worksheet

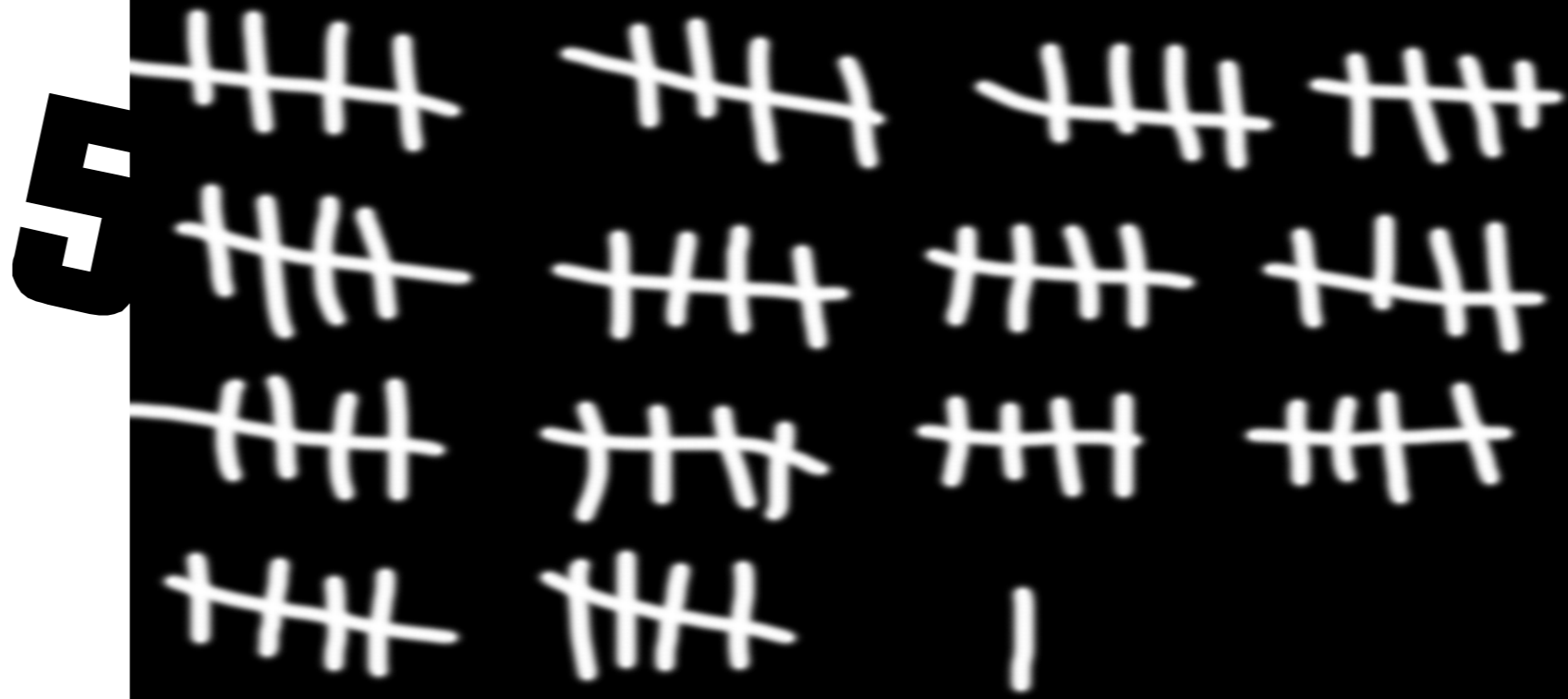
658,804

Place this number on your Place Value Chart. What is this number?

1. Write out the number in words. (Six hundred and fifty eight thousand, eight hundred and four.)
2. What is the value of the 4 in the number? 4 (or four ones)
3. What is the significance of the 0? Nothing in the tens column.
4. What is the value of the first 8 in the number? 8,000 (8 thousands)
5. What is the value of the second 8 in the number? 800 (8 hundreds)
6. What is the value of the 5 in the number? 50,000 (5 ten thousands)
7. What would be the number if we added 3 tens? 658,834
8. What would be the number if we added 1 thousand? 659,804
9. What would be the number if we added 2 thousand? (Here you are moving towards considering a core learning about place value – you can only have one piece of numbered cardboard in each column.)

3

1
6



To play the most basic version of the game, the student rolls two dice, adds the numbers shown and collects that quantity of sticks to add to their game board, which is ruled up into place value columns. The only rule of the game is that there can be no more than nine items in any one column. * * Once there are more than nine sticks in the units column then sticks are combined to make a bundle of ten sticks which is then placed in the tens column. The remaining sticks are left in the unit's column. When there are more than nine bundles of ten in the tens column, these are combined to make a bundle of ten tens. Rubber bands can be used to hold the bundles of sticks together.

The game can be used by those just beginning to count and write numerals to those learning about decimal numbers. In the latter case extend the playing board to allow for the decimal point and tenths, hundredths to the right of the decimal point.

* When working with adults different words for this process that tends now to be referred to as 'regrouping' will be used, depending on the time or place of original education. Once the commonality of meaning is discussed it is probably worthwhile to remember that the existence of different words for the same thing is a potential area of confusion and the teacher should work out which words to use and maintain some consistency.

** It is interesting to consider the importance of this rule. In the literacy classroom such precision and rule governance are less common. Students when reading can alter, omit or add words and the meaning may not be compromised. However, as pointed out by MacGregor (1989:154) in a mathematical text [such as this game] each word, numeral, sign, and the order in which they are written, are significant.

In fact, as an illustration, the use of the word significant in a numeracy context can be problematic if we think of the mathematical concept of significant numbers. This is often another area of confusion for some of our adult learners.

This approach to teaching about Place Value is 'adult friendly'. The Place Value Chart looks sophisticated and contains much useful information. The activity looks as if it is something adults might do. The game below is also very good for learning but you need to use your judgement about whether the student would feel it too childish. The aim of the game is to allow the student to build a structural understanding of our number system that is meaningful, rather than just learn the symbols.

IDEA NUMBER 3

The Base Ten Game

The Base Ten Game is game to develop the understanding of the structure of the number system and to learn to operate on numbers using this structure. This activity assists in introducing, in a concrete form, concepts of "carrying", "trading", "borrowing" numbers*.

Requirements: Game Board (simplified place value chart - Fig 2), several dice, matchsticks or other sticks that can easily be bundled into groups of ten e.g. with rubber bands.

8

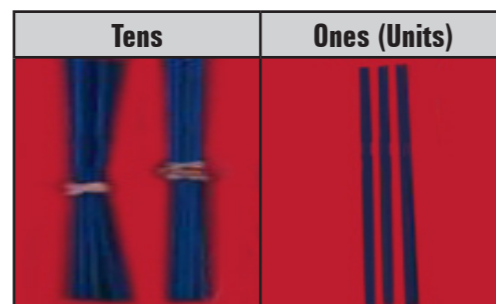


Fig 1: Game Board Base Ten Game

Hundreds	Tens	Ones (Units)	Decimal •	Tenths	Hundredths
	2	3	•	3	

Fig 2: Place Value Chart

23.3

4

8