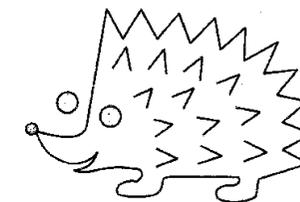


Teacher Notes 6801 Puzzles



Hedgehog Mathematical Sheets

- Objectives:** Follow instructions to reach a repeating answer; consider why answer repeats.
[Solve puzzle using algebra; follow more complex instructions in differing bases]
- Key Words:** subtraction, place value, show, proof, [general term, base]
- Prior Learning:** Secure subtraction in three columns. [use of algebraic representation of general terms, awareness of different bases, awareness of pre-decimal coinage]
- Resources:** Sheets from singinghedgehog [envelope, pre-decimal coins]
- Lesson Notes:** There are many versions of this which is more commonly called the 1089 puzzle (but that gives the game away!) Magicians call this sort of thing a force: you can for example get a pupil to find the 9th word on page 108 in the textbook and have it prepared in a sealed envelope. 6801 is just the answer rotated.

Sheet 1 - Depending on the age and ability of your pupils, it can be worth doing an example for the first part up to and including the subtraction. Alternatively, you can use it as an example of the need to follow instructions carefully. It is of course easy to check that pupils are correct so you can quickly prompt those who have erred. If you want to do some 'magic' pick a successful child quite early so that the others are suitably amazed! Even with pre-algebra pupils you can have good discussion re show and/or proof. Pupils with an awareness of algebra can solve the puzzle; difficult part is realising the need for recognising place value and sorting the process of subtraction.

Sheet 2 - As with sheet 1 you may wish to show how to do the first part especially if your class have not done work in other bases. The solution is a bit trickier but if they have an algebraic solution for the decimal version, they should be able to correlate one to the other.

Follow-ups - any who have done the second sheet can find written or visual examples of pre-decimal coinage; In the past I have used The Machine Gunners by Robert Westall and Just William series. Can do some shopping tasks and old 'O' level papers have nice money problems. Good if you can bring a set of coins in. Show other examples of Carroll's puzzles such as the Butcher in The Hunting of the Snark.

- Extensions:** Consider the case of 4 or 5 digit decimal numbers: just a few values are repeated for each. They could use Excel or similar to force the values then prove algebraically. Consider the first version but in different bases and establish a rule for any base.