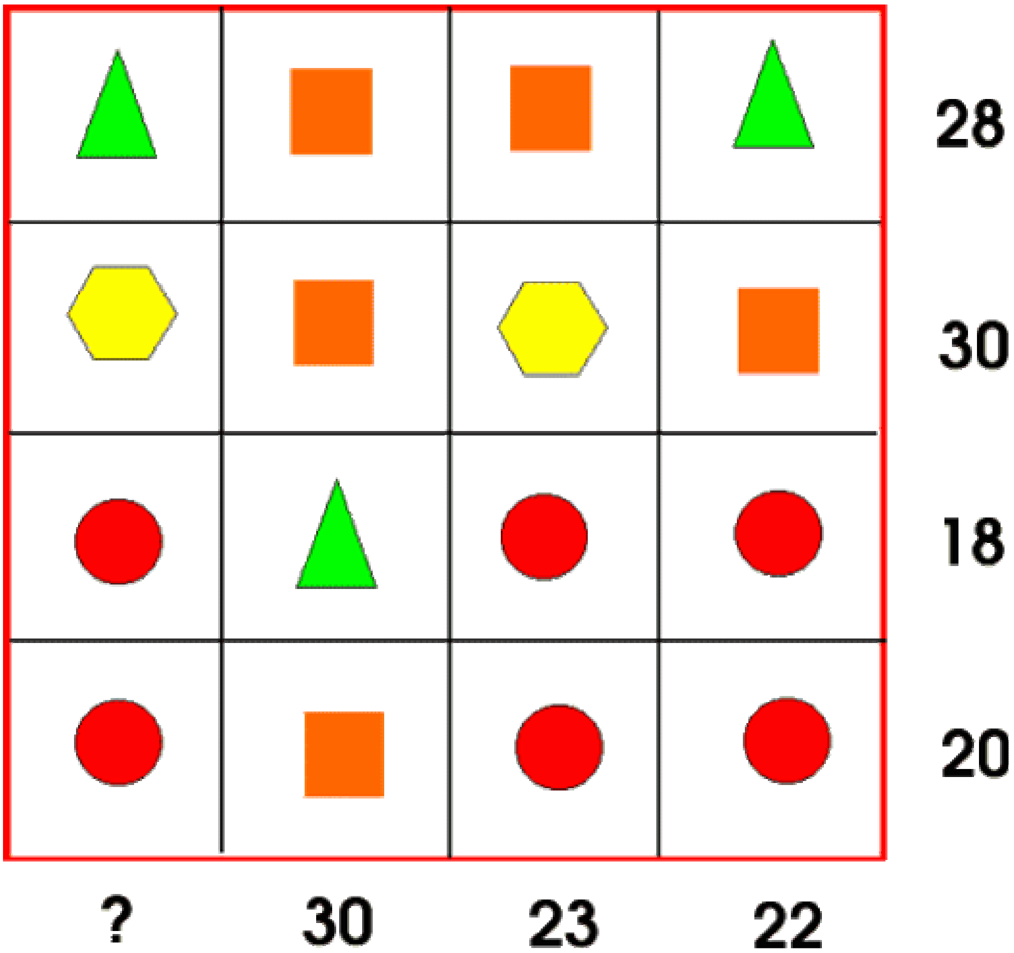
What's It Worth?

http://nrich.maths.org/1053

Each symbol has a numerical value. The total for the symbols is written at the end of each row and column. Can you find the missing total that should go where the question mark has been put?



You Will Need:

- Pen and paper to record thought processes

This activity is taken from the NRICH website and features on the Hands On Maths Roadshow: http://www.mmp.maths.org/roadshow. It also appears on the curriculum mapping document: http://nrich.maths.org/curriculum

Teachers' Notes

Why do this problem?

This problem provides a good challenge in reasoning working with multiple unknowns. There are issues of redundancy to think about in the provision of too much information. Seen as a logic problem, it could be a good introduction to simultaneous equations.

Possible approach

Present the problem and give some thinking time. If students get the answer quickly, ask them to investigate different ways of finding it out from what is given.

This spreadsheet changes the numbers and usually provides fewer totals - so students can explore how much information is necessary for solving the problem. (A practical note - you could print off a variety of versions, or let students go to the computer, generate their next problem, and then work on it on paper.)

Throughout the lesson, encourage the use of different strategies. Too automatic a descent into standard simultaneous equations will miss some of the valuable features in this problem. It's interesting to try to find the answer without finding any of the individual unknowns. Encourage reasoning based on combinations or differences between the row and column totals.

Key questions

What have we got to find?
What can we find out?
Can it always be solved?
Is there anything here you didn't need to know?

Possible extension

For abler students there is plenty to extend into. Making their own questions, perhaps in pairs, to exchange with others in the group is a good starting place. Can they see that extra rows or columns can be created as multiples, combinations, or differences using the given rows or columns and that this can make the problem structurally different?

What if students invent some row and column totals, if they invent 4 at 'random' can they solve the problem they have generated (and deal with the fractions and negatives that may be needed)? What if they invent fewer or more, how does this affect the problem?

Discussing how this problem compares and differs from the simultaneous equations tasks they are familiar with can be fruitful.

Possible support

For less able students create similar arrangements using fewer symbols (unknowns), perhaps giving the values for some of the symbols.