

# A mixed-up clock

## Interpretation

### Prerequisite knowledge

- Understanding of number concepts such as odd, even and consecutive
- Mental arithmetic that enables pupils to undertake simple calculations using the four operations

### Why do this problem?

This problem offers a good example of the need to be systematic as the solution can only be approached by systematically interpreting information given in the clues.

### Time

Up to one lesson

### Resources

CD-ROM: problem sheet, resource sheet

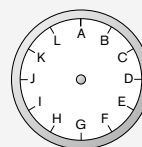
NRICH website (optional):

[www.nrich.maths.org](http://www.nrich.maths.org), July 2002, 'A mixed-up clock'

### A mixed-up clock

#### Interpretation

There is a clock-face where the numbers have become mixed up. Can you find out where the numbers have got to from the ten statements below?



- No even number is between two odd numbers.
- No consecutive numbers are next to each other.
- The numbers on the vertical axis, A and G, add to 13.
- The numbers on the horizontal axis, D and J, also add to 13.
- The first set of six numbers (A to F) add to the same total as the second set of six numbers (G to L).
- The number at position F is in the correct position on the clock-face.
- The number at position D is double the number at position H.
- There is a difference of six between the number at position G and the number at position F.
- The number at position L is twice the number at position A, one third of the number at position D and half of the number at position E.
- The number at position D is four times one of the numbers next to it.

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## Introducing the problem

Begin the lesson with some mental warm-ups which remind the class of number properties such as odd, even and consecutive. For example, invite pupils to suggest:

- three consecutive odd numbers greater than 50 but less than 70;
- two numbers whose sum is an even number less than 100;
- two numbers whose product is an odd number less than 100.

Other questions:

- How many different sets of three consecutive odd numbers are there between 50 and 70?
- What are the largest and smallest totals you can make using three consecutive odd numbers between 50 and 70?

Show the resource sheet and briefly describe what the problem entails, without reading the

text out. Ask pupils to suggest how they might begin to tackle the problem. Reading the information given might be the most appropriate thing to do, and some pupils may have already begun!

- Is this like an ordinary mathematics exercise? Can you start at the top and work your way through to the end?

## Main part of the lesson

Read through the first few clues given underneath the clock-face. Stop after each and discuss with the pupils what exactly can be learnt from it. Some clues might lend themselves to writing equations if pupils are happy with this and others may be redundant at this stage. It might be important to emphasise that clues which appear useless at first may prove useful later. Encourage pupils to keep track of what they have learnt and what they have, or have not, used.

Suggest that the pupils look through each clue and decide what can be filled in immediately. It will become obvious that the sixth clue is immediately helpful and discussion could ensue about what the pupils might do next (carry on checking down the list) and what to do after that (go back to the top!).

Ask the pupils to complete the clock-face, either individually or in pairs. It would be appropriate to ask them to suggest ways of recording their work.

It may be useful to stop occasionally to discuss progress and strategies with the class.

## Plenary

A suitable plenary would consist of requesting pairs or individuals to explain the steps they

took to solve the problem. Prompts might include:

- Is this the only clue that is useful now? Why?
- What other information will we need before being able to use this clue?
- Are any of the clues completely redundant?
- How do you think this problem was created?

It will be interesting to discuss with the pupils the point at which there is an element of choice in the order the clues are utilised. Making it explicit that this ordering of the information constitutes a *systematic approach* will help pupils begin to understand a meaning of being systematic so that they can apply this in future problems.

## Solution notes

