

Teacher Notes

Introduction

Pupils can work on this problem individually or with others.

- They can discuss what strategies they should use to divide the clock into the three required designs.
- They can compare their approaches and adapt their own strategy.

This problem deals with a pupil's ability to develop a strategy to find summations while dividing a clock face into separate parts.

What I know (think)

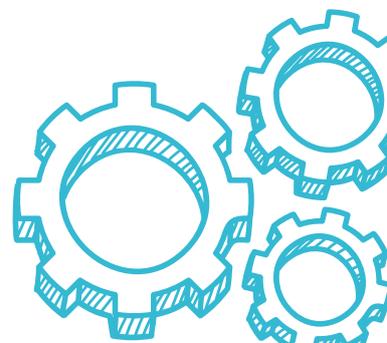
The pupils should know from the given problem:

- A company makes clocks and they want to design a clock face that uses the 12 numbers of a clock in special ways.
- Design 1 requires dividing the clock using one straight line so that the numbers in each part add up to the same total.
- Design 2 requires dividing the clock using two straight lines so that the numbers in each part add up to the same total.
- Design 3 requires dividing the clock into six parts so that in each part there are two numbers that add up to the same number.

What I need to know (identify)

Pupils need to identify:

- which strategy they will use;
- if there is any pattern(s) that can be found using 12 numbers of a clock face and their position on the clock face;
- if adding particular groups of numbers give the same total; and
- where to place the lines as required for each design.



Dividing a Clock Face (Continued)

What I need to do (employ)

This problem can be approached through trial and error:

- Pupils can place the required line(s) on the clock face and add up the numbers in each part.
- If the total in each part is not the same, they can try again until they do get the same total.
- Pupils should, however, start to notice a pattern as they work on each design, and use it to help them with the third design.

The pupils could also approach each of the three designs as follows:

Design 1

- Add up all 12 numbers to get the total for the whole clock face (78).
- Divide this by two to get a total for each separate part if the clock face is divided into two parts using one straight line (39).
- Use this total to work out the two sets of numbers that add up to 39 and place the straight line on the clock face so that it splits the two sets of numbers.

Design 2

- Dividing the total for the 12 numbers by three will give a total for each separate part if the clock face is divided into three parts using two straight lines (26).
- Check to see if there a connection to Design 1.
- Work out the three sets of numbers that will add up to 26, making sure the numbers can be separated using two straight lines.
- Place the two straight lines on the clock face so that they split the three sets of numbers.

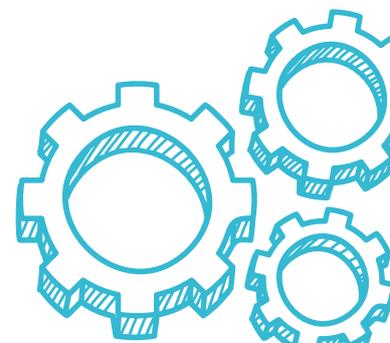
Design 3

- Dividing the total for the 12 numbers by six will give a total for each separate part if the clock face is divided into six parts using five lines (13).
- Check to see if there a connection to Design 1 and Design 2.
- Place five lines on the clock face so that they split the 12 numbers into six sets that add up to 13.

What I did (review)

Pupils will use self-assessment, peer assessment or teacher feedback to decide whether they have approached the problem as intended.

- How did they approach the problem and what strategy did they use?
- Did they see any patterns between the numbers on the clock face and their position?
- Did they see any patterns from one design to the next?
- Were they able to place the lines for each design?
- Do they think there is a better strategy or did they use the most effective strategy?



Dividing a Clock Face (Continued)

Curriculum Objectives

This problem should enable pupils to demonstrate their knowledge, understanding and skills through:

Developing pupils as individuals

Demonstrate an ability and willingness to develop logical arguments

- Pupils explain how they have solved the problem by developing a strategy to place the lines on the clock face.

Thinking Skills and Personal Capabilities

This problem can provide an opportunity for pupils to demonstrate a variety of the following Thinking Skills and Personal Capabilities:

Managing Information

- Plan and set goals and break a task into sub-tasks

Thinking, Problem-Solving and Decision Making

- Sequence, order, classify and make comparisons
- Justify methods, opinions and conclusions
- Generate possible solutions, try out alternative approaches and evaluate outcomes

Being Creative

- Seek out questions to explore and problems to solve
- Experiment with ideas and questions
- Make ideas real by experimenting with different designs, actions and outcomes
- See opportunities in mistakes and failures

Working with Others

- Listen actively and share opinions
- Suggest ways of improving their approach to working collaboratively

Self-Management

- Seek advice when necessary
- Organise and plan how to go about a task
- Focus, sustain attention and persist with tasks

Cross-Curricular Skills

This problem should enable pupils to demonstrate a variety of the following Cross-Curriculum Skills:



Using Mathematics

