Travelling With Numbers 1

Teacher Notes

Introduction

Pupils can work on this problem individually or with others.

- They can discuss how to use the information provided to determine what advice they would give Justine and her friends.
- They can discuss how to approach the problem or compare approaches.

This problem deals with a pupil's ability to read background information and use the required detail along with common multiples to suggest a solution.

What I know (think)

The pupils should know from the given problem:

- Justine and her friends are on a motorway driving to a music concert and they pass a sign that says that the concert is 100 miles away, but the car only has 86 miles of petrol left.
- Justine and her friends need to get petrol, hot food and cash before reaching the concert.
- There are service stations that sell petrol and hot food every 30 miles, and service stations that sell petrol with a bank machine every 18 miles.
- They passed a service station that had petrol, hot food and a bank machine 13 miles ago.
- They need to advise Justine and friends on what they should do if they want to make as few stops as possible.

What I need to know (identify)

Pupils need to identify:

- the detail they need from the information provided;
- how many stops they will need to make for petrol, hot food and cash;
- the distance to each of the next service stations;
- whether there will be another service station similar to the one they passed 13 miles ago that provides all three needs (which would mean that they only need to make one stop);
- whether they can make the required stop(s) within the 86 miles of petrol they have left or the 98 miles of motorway that is left; and
- what the best advice would be.
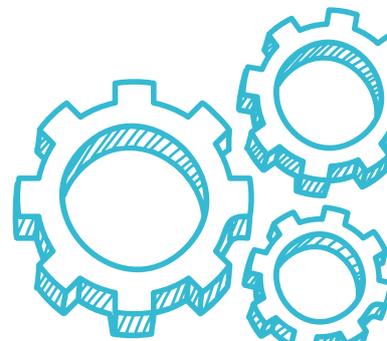
What I need to do (employ)

Pupils could read the background information and approach the problem in a way that they find appropriate. Here are two possible approaches:

Common multiples:

- Pupils recognise that 18 and 30 have a lowest common multiple of 90, which is less than the 98 miles of motorway that is left.
- Pupils should therefore understand that there will be a service station that has petrol, hot food, and a bank machine 90 miles after the previous one on the motorway.
- However, 90 miles is longer than the 86 miles that is left in Justine's car, so they should use the information regarding the previous service station they passed.
- Justine and her friends passed a similar service station 13 miles before the sign indicating that the concert is 100 miles away, so pupils should take 13 away from 90 to find out how many miles there will be before they get to the required service station.
- As 77 miles is less than the 86 miles of petrol Justine's car has left, the pupils should advise Justine and her friends to stop at the service station which requires only one stop. This is the service station 77 miles from where they were.
- They may also suggest that Justine and her friends stop at the service station 21 miles before the end of the motorway as $98 - 77 = 21$

Counting on:

- Pupils count on in steps of 30 for hot food and 18 for a bank machine from the last service station that was passed as this had petrol, hot food and a bank machine.
- Pupils recognise that they are counting on from -13 as the service station was passed 13 miles ago.
- Counting on for hot food pupils will get: -13, 17, 47 and 77. They can't have 107 as the motorway ends in 98 miles.
- Counting on for a bank machine pupils will get: -13, 5, 23, 41, 59, 77 and 95. They can't have 113 as the motorway ends in 98 miles.
- Pupils should recognise that at 77 miles from the sign there will be a service station that has petrol, hot food and a bank machine.
- As 77 miles is less than the 86 miles of petrol that Justine's car has left, pupils should advise Justine and her friends to stop at the service station 77 miles from where they were as this will require only one stop.
- They may also suggest that they stop at the second last service station before the motorway ends.
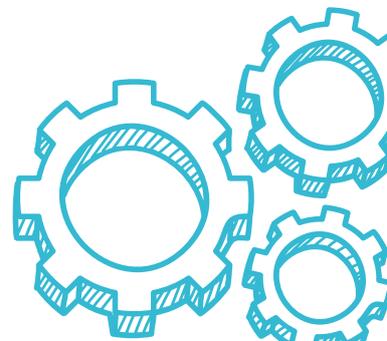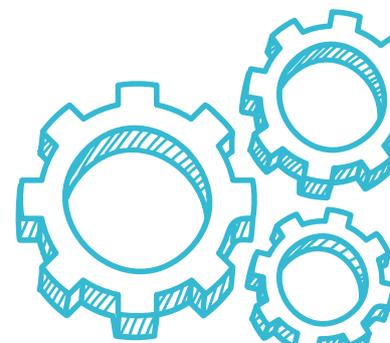
Travelling With Numbers 1 (Continued)

What I did (review)

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

- Did they correctly identify how many miles of motorway are left?
- Did their chosen strategy use the lowest common multiple of 30 and 18, or did they count on in steps of 30 and 18?
- Did they find a service station that has petrol, hot food and a bank machine within the 86 miles of petrol left or the 98 miles of motorway left?
- Did they use the information about the previous service station to help them?
- Did they find a possible solution to help advise Justine and her friends?

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 will base their advice for Justine and her friends on their chosen strategy, either using lowest common multiples or counting on to find a possible solution.

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	• Ask focused questions • Select the most appropriate method for a task
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	• Experiment with ideas and questions • Challenge the routine method • 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 • Compare their own approach with others' and in different contexts • Organise and plan how to go about a task

Images © thinkstock.com

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

Using Mathematics