

## Teacher Notes

### Introduction

Pupils can work on this problem individually or with others.

- They can discuss what a Venn diagram is.
- They can discuss how to calculate the different numbers of customers that choose each of the toppings.
- They can compare their approaches and adapt their own strategy if needed.

This problem deals with a pupil's ability to use their Handling Data skills to produce a Venn diagram, and use their Number skills to calculate percentages and fractions of quantities.

### What I know (think)

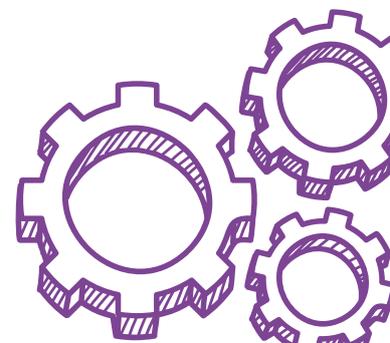
The pupils should know the following from the given problem:

- Tony has three very popular toppings.
- He wants to find out which is the most popular.
- He carries out a survey of two hundred customers.
- Some customers had only one topping (45%).
  - $\frac{2}{5}$  of the 45% have **only** pepperoni.
  - $\frac{2}{5}$  of the 45% have **only** bacon.
  - $\frac{1}{5}$  of the 45% have **only** chicken.
- Some customers had two toppings of bacon and chicken (13%).
- Some customers had two toppings of pepperoni and bacon (14%).
- $\frac{3}{50}$  of the customers had all three toppings.
- 25 customers did not have any of the toppings.
- They need to complete a Venn diagram and work out which topping is the most popular.

### What I need to know (identify)

Pupils need to identify:

- how to calculate percentages and fractions of quantities;
- how many customers had only one topping for each of the three different toppings;
- how many customers had the two different two topping combinations given;
- how many customers had all three toppings;
- if all the 200 customers have been accounted for;
- what a Venn diagram is and how to construct it;
- how to represent all the customers, depending on what toppings they had, within the Venn diagram; and
- what the most popular topping is.



# Top Choice! (Continued)

## What I need to do (employ)

Pupils should use the information they have been given and come up with appropriate steps to help them solve the problem. The construction of a Venn diagram will be pretty similar for all pupils that solve the problem; however, their labelling of each circle within the diagram may differ and therefore the position of the numbers may vary. How pupils systematically work through the problem may vary as well. They may choose to draw a Venn diagram first, then work through the calculations, completing the Venn diagram as they go. Alternatively, they decide to work through all the calculations first, before drawing and completing the Venn diagram.

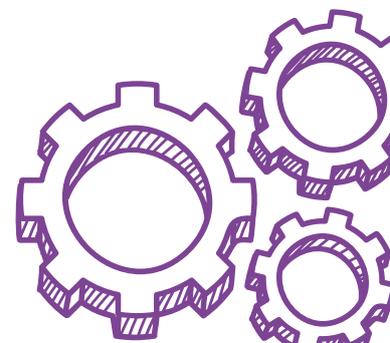
The following approach reflects the one provided in the Solution:

- Pupils calculate how many customers had only one topping by finding 45% of 200 = 90.
- They find out how many of those 90 customers only had pepperoni. This can be done by working out  $\frac{2}{5}$  of 90 using a suitable method. Note, pupils may not find 45% of 200: they might instead choose to work out  $\frac{2}{5}$  of 45% to get 18%, and then work out 18% of 200 to get 36 customers.
- Pupils should recognise that they don't need to repeat the calculations for bacon as they will be the same for pepperoni, with 36 customers choosing to have only bacon.
- For customers that had only chicken, pupils should recognise that they simply need to halve 36 to get 18 customers.
- At this stage, pupils start drawing a Venn diagram.
- They draw a rectangle to represent the universal set that contains all 200 customers.
- They draw three circular sets within the rectangle to represent each topping, with each circle labelled with one of the three topping names. As a pizza can have all three toppings, they draw three intersecting circles.
- They include 36, 36 and 18 in their diagram in the correct places.
- They calculate how many customers had each of the two topping combinations given by finding 13% of 200 = 26 and 14% of 200 = 28. Pupils may recognise that they simply need to double each percentage to get the number of customers.
- They include 26 and 28 in their diagram in the correct places.
- They calculate  $\frac{3}{50}$  of 200. Pupils may use equivalence and recognise that  $\frac{3}{50}$  is the same as  $\frac{12}{200}$  to get 12 customers.
- They include the 25 customers that did not have any of the three toppings within the diagram.
- They add together all the numbers and calculate that there are 19 customers not accounted for.
- They include 19 in their diagram (chicken and pepperoni two topping combination) to complete it.
- They add up all the numbers within each circular set to find the totals for each of the three different toppings (pepperoni 95, bacon 102 and chicken 75), and conclude that bacon is the most popular.

## 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 produce an appropriate Venn diagram?
- Did they correctly calculate how many customers had only one topping and hence how many had each type of topping?
- Did they correctly calculate how many customers had the two topping combinations?
- How did they perform each calculation?
- Did they correctly identify the missing information?
- Did they put the calculated information in the correct places on their diagram?
- Did they complete the final Venn diagram correctly?
- Did they find the most popular topping?
- Did they check any of their answers by using a reverse calculation, or using equivalences?



# Top Choice! (Continued)

## Curriculum Objectives

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

### Developing pupils as Individuals

Work collaboratively in problem-solving, taking account of others' viewpoints to reach consensus:

- Pupils take part in any initial group discussions on Venn diagrams, giving their own opinions and listening to the opinions of others.

## 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
- Plan and set goals and break task into sub-tasks
- Select, classify, compare and evaluate information
- Select the most appropriate method for a task
- Communicate with a sense of audience and purpose

### Thinking, Problem-Solving and Decision Making

- Sequence, order, classify and make comparisons
- Justify methods, opinions and conclusions
- Make connections between learning in different contexts
- Generate possible solutions, try out alternative approaches and evaluate outcomes

### Being Creative

- Experiment with ideas and questions
- Make new connections between ideas/information
- Learn from and value other people's ideas

### Working with Others

- Listen actively and share opinions
- Give and respond to feedback
- Take personal responsibility for work with others and evaluate their own contributions to the group
- Suggest ways of improving their approach and working collaboratively

### Self-Management

- Seek advice when necessary
- Review learning and some aspect that might be improved
- Compare their own approach with others' and in different contexts
- Organise and plan how to go about a task

## Cross-Curricular Skills

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



Using Mathematics

