

Chapter 2 Fractions, decimals and percentages

Specification

FS coverage and range	Understand and use equivalences between common fractions, decimals and percentages Add and subtract decimals up to two decimal places
FS exemplification	Understand equivalent fractions Convert between fractions, decimals and percentages Shade a fraction on a grid Order common fractions Add decimals Subtract decimals Addition and subtraction with money

GCSE

GCSE specification	N a Add, subtract, multiply and divide any number N b Order rational numbers N h Understand equivalent fractions, simplifying a fraction by cancelling all common factors N j Use decimal notation and recognise that each terminating decimal is a fraction N l Understand that 'percentage' means 'number of parts per 100' and use this to compare proportions
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Edexcel GCSE course	Specification A: Foundation Chapter 1, 5.1–5.2, 8.2–8.4, 8.8, 10.1, 19.1 Higher Chapter 1, 3.1, 4.1, Chapter 14, 25.2 Specification B: Foundation Unit 1: 1.1, 3.1, 5.1; Unit 2: 1.2–1.5, 1.7–1.9, 3.1–3.4, 3.6, 4.2–4.8, 5.1; Unit 3: 1.2–1.4, 2.1 Higher Unit 1: 2.1, 5.1; Unit 2: Chapter 1, Chapter 2, 3.1–3.2, 4.1, 5.2; Unit 3: 1.1–1.2, 1.4
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Resources

General resources	Details of special offers from shops
Resource sheets	2.1
Links	http://www.supermarketspecialoffers.com http://www.bbc.co.uk/apprentice
ActiveTeach resources	Video ResultsPlus Knowledge Check ResultsPlus Problem Solving Question Audio Animations

Lesson 1

Objectives

- Find fractions of quantities
- Add or subtract decimals with up to two decimal places
- Round decimals or amounts of money
- Use common decimal, fraction and percentage equivalences to find solutions to practical problems

Starter

- Display a number line split into ten sections. Ask students to label the line to show: percentages ranging from 0% to 100%; decimals ranging from 0 to 1; fractions ranging from 0 to 1 (discuss the numerators and denominators for the fractions).
- Repeat using number lines split into five and then four sections. Students should see the connection between, for example, 0.2, 20% and $\frac{1}{5}$.

Main teaching and learning

- Review the relationships between fractions, decimals and percentages. Ask: *How do we find a half? A quarter? How much will I pay for half a kilo if 1 kilo costs £1.36?*
- Relate this activity to *Take a look: Shopping* (p25).
- Discuss percentages. Ask: *Is there an easy way to find 50%? 20%? 25%?* Make sure students understand that, for instance, to find 20% they can divide by 5.
- Consider calculating $\frac{1}{3}$ of an amount and discuss the need for only two decimal places.
- Pose a question that involves comparing fractions and percentages (e.g. two shops with special offers, real or made up); ask students to calculate and compare the savings.
- Ask students to complete *Have a go* Q1–5.

Issues and misconceptions

- Ensure students round answers appropriately. Some may truncate answers for simplicity, for example, writing the answer to $\text{£}20 \div 3$ as £6 or £7 rather than £6.67.
- Some students may have difficulty finding the cost when the price given is per kilogram.

Support

- Students often find it helpful to make the connection between fractions, decimals and percentages before doing calculations. Shading fractions on a grid can help with this.
- Ensure that, when comparing, students use the same quantities (see, for example, Q2).
- Ensure students know they should place a zero at the end of a calculation involving money if necessary (e.g. $\text{£}24 \div 5 = \text{£}4.80$ but would appear as 4.8 on a calculator).

Extension

- Ask students how they would calculate fractions of amounts when the fraction has a numerator other than 1.

Plenary

- Look at comparisons between fractions, decimals and percentages, e.g. $\frac{3}{5}$, 61%, 0.58.

Formative assessment

- Allow students to work on Q1–5 in pairs; encourage discussion and peer assessment.

Homework

- Ask students to research special offers either at the shops or online. They should make a list of offers using fractions, decimals and percentages.

Lesson 2

Objectives

- Use equivalent fractions, decimals and percentages to solve practical problems
- Find common fractions or percentages of quantities to solve practical problems
- Use working to explain and interpret solutions

Starter

- Play a memory game using the equivalent fraction, decimal and percentage cards from Resource sheet 2.1. Lay the cards face down and turn over two at a time. The aim is to collect matching pairs by remembering where the cards are. This could be done as a teacher-led activity, in pairs or in larger groups.

Main teaching and learning

- Look at an 'Apprentice' type situation where teams slash prices on selling tasks just to get rid of their stock. Decide which team makes more money in the following situation:
- *Team A plans to sell 400 cakes at £2.50 each. They run out of time and must sell the last 100 cakes for $\frac{1}{5}$ of the price.*
- *Team B has 400 cakes to sell. They sell 300 at £2.00, 50 cakes for 50% and give the last 50 cakes away for free.*
- Ask students to complete *Have a go* Q6–11 (pp27–9).

Issues and misconceptions

- Students may not spot the underlying relevant features of a question.
- Students may find it difficult to write a sentence commenting correctly on their decisions. Often the calculations are correct but not interpreted correctly when making a decision.

Support

- Support the students in beginning the tasks, prompting them on how to access the information. For example, for the cake-selling activity, ask: *How much money did each team make by selling at full price? Are we finding $\frac{1}{5}$ of 100 or $\frac{1}{5}$ of £2.50?*
- Students may need prompting in order to remember how to find $\frac{1}{5}$ and so on.

Extension

- Revisit the cake-selling activity but use harder fractions and percentages. For example:
- *Team A plans to sell 400 cakes at £2.50 each. They run out of time and must sell the last 100 cakes for $\frac{3}{10}$ of the price.*
- *Team B has 400 cakes to sell. They sell 300 at £2.00, 50 cakes for 60% and sell the last 50 cakes for $\frac{2}{5}$ of the price.*

Plenary

- Discuss the answers to Q6–11 as a class. Ensure that students lead the discussion on any incorrect answers.

Formative assessment

- Encourage students to peer-assess answers to Q6–11 during the Plenary. Pick one of the questions and go through it in detail as a whole class.

Homework

- Ask students to look through the daily newspapers or the internet and find the results of a survey that has been carried out to bring to Lesson 3.

Lesson 3

Objectives

- Find out how fractions, decimals and percentages can be used to find solutions to practical problems
- Apply a range of calculation techniques using fractions, decimals and percentages
- Use checking techniques to confirm that solutions are right
- Interpret and communicate solutions to practical problems, using calculations to justify any statements made
- Round to an appropriate number of decimal places to solve practical problems

Starter

- Look at some of the surveys that the students collected as Homework from Lesson 2. Choose one of these and look at different ways of writing the results.
- Alternatively, ask 20 students their favourite colours or method of travel to school. Write each of the frequencies as a fraction of the total surveyed. Ask:
 - *Could these fractions be simplified?*
 - *Can any of the fractions be easily converted to percentages?*
 - *Which is the favourite colour of 20% of the class?*

Main teaching and learning

- Remind students of the tasks in the previous lessons in which they were prompted to select necessary information before beginning to solve the problem.
- Refer students to *Take a look: Cake stall* (pp29–30). Ask them to spend ten minutes in pairs or groups devising an effective way to tackle this problem. Discuss ideas as a class.
- Ask students to complete *Have a go* Q12–14.

Issues and misconceptions

- Students may not reflect appropriately when processing their answers.
- Stress that it is essential to identify the key features necessary to answer the question.

Support

- Prompt students to retrieve relevant information. Some may still need help with this before they can begin.

Extension

- Ask students to answer Q14 based on the following numbers:
 - *The average number of customers each day Monday to Friday is 40.*
 - *The average number of customers each day at the weekend is 60.*
 - *During the week, about 15% of customers order lunch.*
 - *At the weekend, about 35% of customers order lunch.*

Plenary

- Use the *Now you can* section on page 31 as a revision and self-assessment tool. Ask: *Can you do everything from the chapter?*

Formative assessment

- Students should peer-assess each other's suggestions when discussing possible methods for solving *Take a look: Cake stall*.
- Ask students to peer-assess the methods used to answer Q12–14.

Homework

- Ask students to keep a list of situations in the next week where they need to calculate using a fraction, decimal or percentage (e.g. in a shop).