Teaching and Learning
Move On with your learners – numeracy

Module 4
Decimals, fractions and
percentages 2

Session plan

Module 4: Fractions, decimals and percentages 2

Group: _____

Teacher: _____

Location: _____

Aim

- To introduce approaches for solving problems involving fractions, decimals and percentages and consider support strategies for learners for N2.

Outcomes

Participants will be able to:

- evaluate one number as a fraction and percentage of another
- identify equivalencies between fractions, decimals and percentages
- order and compare percentages and understand percentage increase and decrease
- explore support strategies for learners.

Activity and time	Teacher activity	Learner activity
Introduction 10 mins	- Introduce session aim and objectives by showing **module 4 presentation slides 1–3**. - Mental maths: Fizz Buzz	- Listen and respond. - Learners shout 'fizz' for numbers with multiples of 3 and 'buzz' for 5 and 'fizz buzz' for both.
Fractions: introduction 10 mins	- Establish prior knowledge by Q and A: What is a fraction? Examples? - Draw attention to progression charts for N2 in the *ANCC*.	- Listen and respond. - Track progression of N2 skills through the levels, considering their skills, and their learners'.
Fractions: equivalent, mixed and improper 10 mins	Review different types of fraction, using Q and A. Elicit examples.	Listen and respond.

Activity and time	Teacher activity	Learner activity
Fractions: addition and subtraction 10 mins	• Review addition and subtraction of fractions, asking participants to provide examples, and identify strategies for introducing the concepts with learners. • Show **module 4 presentation slide 4** and ask participants to complete problems in small groups.	• Provide examples. • Identify strategies. • Completion of addition/subtraction problems in small groups.
Fractions: recipe activity 10 mins	• Distribute the **Recipe** activity sheet. • Take feedback on resources that could support a range of learning styles.	• Work in pairs. • Contribute to discussion.
Fractions: error analysis 10 mins	• Show **module 4 presentation slide 5**. Invite participants to identify the error. • Take feedback.	• Paired/small group work
The chocolate challenge 15 mins	• Distribute the **Chocolate challenge!** activity sheet and explain the task. • Take feedback. Each group to demonstrate how they used the resources to solve the challenge.	• Small group work. • Spokesperson from each group to explain their solution.
Fractions: Individual work 15 mins	• Distribute resources for individual work, signposting participants to activities appropriate to their needs.	• Begin work on individual fraction activities.
Break 15 mins		

Activity and time	Teacher activity	Learner activity
Fractions, decimals and percentage equivalencies 45 mins	• Explain card-matching activity and distribute sets of **Fractions, decimals and percentages** cards. • After completion of activity, invite participants to generalise and devise formula for calculating percentages, using Q and A and **module 4 presentation slides 6 and 7**.	• Small group work: • match the equivalencies • devise or review method for calculating a percentage, and thus calculate percentage increase and decrease.
Individual work on percentages 15 mins	• Distribute resources for individual work, signposting participants to activities appropriate to their needs.	• Begin work on individual percentage activities.
Summary 15 mins	• Show **module 4 presentation slide 8** to summarise support tips for learners. • Revisit session aims and objectives using **module 4 presentation slides 2 and 3**. • Take feedback and questions. • Distribute **Test questions for modules 3 and 4: N2** and demonstrate how to locate questions to assess a specific skill using the review pages. • Negotiate independent learning activities. • Give out **Journal** sheet for module 4.	• Listen and respond. • Check understanding of the handout and how to use the CD-ROM. • Agree independent work to be completed before next session.

Resources/aids

- Module 4 PowerPoint presentation/OHP slides
- Handouts: Test questions for modules 3 and 4: N2; Journal
- Activity sheets: Fractions: recipe; Chocolate challenge; Fractions, decimals and percentages cards
- Supplementary materials: Practice Test CD-ROM to demo review pages; copies of *ANCC*
- Personal whiteboards and markers
- Flipchart and markers.

Assessment evaluation

Individual learning planning

Learner	Skills	Activity/ Resources	Evaluation (where next?)

Teacher's notes

Module 4: Fractions, decimals and percentages 2

Introduction

Recap on previous session, using Q and A to assess understanding. Introduce module 4 aims and objectives using **slides 1–3**.

Mental maths: Fizz buzz
Explain the rules of the game: participants count from 1 to 100 in turns. (This activity comes from the Move On Maths Methods Module (File 2 Part 8), distributed to learners in module 1.)

Fractions: introduction

Ask participants to examine the progression of skills within the N2 section of the *Adult Numeracy Core Curriculum* progression charts, to identify what skills are needed at Level 2 and the skills needed by their learners for achievement at the different levels.

Assess prior knowledge of fractions using Q and A. What's half of £1.58? How did you work it out? What's one-third of £3.20. What is two-thirds? Ask for volunteers to model their methods using either personal whiteboards or the flipchart.

Fractions: equivalent, mixed and improper

Equivalent fractions
Why does $\frac{4}{12} = \frac{1}{3}$? How would you demonstrate this to your learners? Elicit answers which include the use of visual aids or practical examples, such as pizza portions or the shading in of shapes.

Mixed and improper fractions
Ask participants to suggest ways of extending the above strategies to explain mixed fractions to their learners (2½ pizzas) and then use the same example to demonstrate what an improper fraction means in reality ($\frac{5}{2}$ = how many slices of pizza?).

Fractions: addition and subtraction

Review 'lowest common multiple'. What does it mean? Ask participants to provide examples of real-life problems involving the addition and subtraction of fractions. Model the method for an example of each on the flipchart, and again demonstrate how the

understanding of the concepts can be supported by visual and concrete models for lower-level learners.

Show **slide 4**, and ask participants to work out the answers, working in pairs or small groups (of no more than three). Encourage participants to talk through their methods with their partners for clarification.

Fractions: recipe activity

Distribute the **Recipe** activity sheet and, with the whole group, establish how to approach the first part of the task: scaling down the recipe. Take feedback from the small group discussions resulting from the questions on the second half of the activity sheet. Difficulties presented by this task may include the combination of capacity, number and weight of the ingredients, understanding of direct proportion, equivalent fractions, understanding that to work out $\frac{6}{8}$ (or $\frac{3}{4}$) you need to divide by 4 and multiply by 3. Accept any useful suggestions of resources that may aid understanding of the concepts and support the task, but include:
- the real items (a kinaesthetic learner)
- the real items or pictures of them (a visual learner)
- a Q and A session to assist understanding.

Fractions: error analysis

Review the purpose of analysing learners' errors, which was introduced in module 3. Using **slide 5**, set the participants the challenge of identifying the learner's error. Take feedback, ensuring that the participants have spotted that:
- the learner understands that they need to find a common denominator, and knows how to do this
- they have not adjusted the numerator, but merely added together the original ones
- this may indicate that they do not understand the concept of equivalent fractions.

Invite participants to check whether their analyses are correct by providing 'answers' to the last two problems on the slide, using the learner's method.

The chocolate challenge

Participants work in groups of between three and five. Distribute the **Chocolate challenge!** activity sheet. Explain the challenge: to produce a way of demonstrating the equivalence between the given fractions and percentages using the resources provided, for example a large bar of chocolate divided into squares or cubes, and scissors and paper.

If participants are struggling, suggest they start by deciding what is going to represent the 'whole'. Would a ten-cube section of the chocolate bar work as well or better than

a twelve-cube section? For which question? If using card, is A4 size the best choice for the 'whole'? Why/why not?

Depending on time, ask for volunteers from each group to demonstrate the solution to one or both challenges. Draw out the different solutions and key points for working with learners in this area of the curriculum.

Fractions: individual work

From your own teaching resources, set individual tasks according to ILPs. There are many worksheet-based materials available for this section of the curriculum.

Fractions, decimals and percentage equivalencies

Before the session you will need to have printed out the **Percentages, decimals and fractions** card-matching game onto card and cut up a set of cards for each group.

Participants work in pairs or groups of no more than three. Set the following ground rules: there are no 'leaders'; everyone shares the responsibility for ensuring that all group members participate; play each section of the game through before trying to generalise; be prepared to share your conclusions and justify your reasoning.

Give a set of decimal cards to each group. Ask them to arrange them in ascending or descending order on the table.

Now hand out the percentage cards and ask participants to match them to the decimal cards. Suggest they start with ones they know, such as 50% = 0.5. Ask participants to discuss their results in their groups. Can they see a connection? Can they deduce how to convert between percentages and decimals? Feedback conclusions to whole group.

Now hand out the fraction cards and ask participants to match them to the decimals and percentages. This may prove difficult, even for Level 2 learners, but should provide a useful opportunity to consolidate understanding of equivalent fractions and simplifying fractions.

When all three columns are matched, invite participants to generalise and devise a formula for calculating percentages. Use **slide 6** to support the process and, if required, use the concept of 'whole' = 100%.

Before setting individual work, conclude with a short Q and A session to ensure participants' understanding of how to calculate percentage increase and decrease.

Use **slide 7** to emphasise the benefit of learning through the explorative methods: skills are much more likely to be transferable.

Summary

Use **slide 8** to summarise support tips for learners. Distribute the **Test questions for modules 3 and 4: N2** sheet.

Revisit session aims and objectives, using **slides 2 and 3**.

Encourage ownership of learning, and reinforce the fact that this is a blended learning delivery model, by showcasing the review pages of the Practice Test CD-ROM to show how the participants can find questions which will assess their understanding of the parts of the curriculum they have been working on. Relate to the **Test questions for modules 3 and 4: N2**.

Agree independent learning activities to be completed before the next session, including any that have not been completed during this session.

Module 4 PowerPoint presentation

The National Certificate in Adult Numeracy

Level 2 Skills for Life Support Strategies

Module 4:
Fractions, decimals and percentages 2

department for
education and skills
creating opportunity, releasing potential, achieving excellence

move on

Aim

→ To introduce approaches for solving problems involving fractions, decimals and percentages.

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Outcomes

→ Participants will be able to:

- evaluate one number as a fraction and percentage of another

- identify equivalencies between fractions, decimals and percentages

- order and compare percentages, and understand percentage increase and decrease

- explore support strategies for learners.

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Addition and subtraction of fractions

→ $^2/_5 + {}^3/_8$ $\qquad$ $^3/_4 + {}^2/_5$

$^4/_5 - {}^1/_2$ $\qquad$ $^2/_3 - {}^8/_9$

→ Five training providers tendered a bid for a *Skills for Life* project.

Provider A receives $^1/_4$ of the funds available, B receives $^1/_8$, C receives $^1/_{10}$ and D receives $^1/_5$.

What fraction of the total is received by charity E?

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Diagnosing the errors: fractions

This learner has some knowledge of fractions gained from school and can remember how to cancel them down. He thinks he can remember how to add fractions together, but he is making mistakes like these:

$\frac{1}{2} + \frac{1}{3} = \frac{1}{3}$ $\qquad$ $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$

$\frac{2}{3} + \frac{1}{6} = \frac{1}{2}$ $\qquad$ $\frac{2}{5} + \frac{1}{6} = \frac{1}{10}$

Check to see if you have identified his error correctly by working through these examples using his method:

$\frac{1}{6} + \frac{1}{4} =$ $\qquad$ $\frac{3}{4} + \frac{1}{2} =$

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How to work out a percentage of something

→ What's 50 % of £3.50? How do you know?

→ Write out the sum you need to perform 'in full'. Hint: there's a 100 in there somewhere!

→ Talk through your reasoning with your partner. Does he or she agree?

→ Test out your method with another percentage you know the answer to.
Does it work?

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Warning!

→ Beware of teaching techniques which learners attempt to copy but don't understand!

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Summary

→ Encourage learners to think about fractions and percentages as part of a whole.

→ Relate to a context to aid understanding.

→ When comparing fractions, decimals and percentages, start with commonly known examples.

→ Use a range of activities to accommodate learning styles.

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Activity: Recipe

In the test you may need to scale down a recipe for eight people to make an amount suitable for six: you need to show how you can make the recipe proportionally smaller.

First, decide what fraction of each quantity you will need to work out.

Then work out how much of each ingredient you will need for six people.

The recipe calls for:
- 12 oz flour
- 4 eggs
- 8 oz butter
- 1 cup milk
- 6 oz sugar.

Work through this example. Discuss any difficulties you think a learner might encounter. What resources might help:
- a kinaesthetic learner?
- a visual learner?
- an auditory learner?

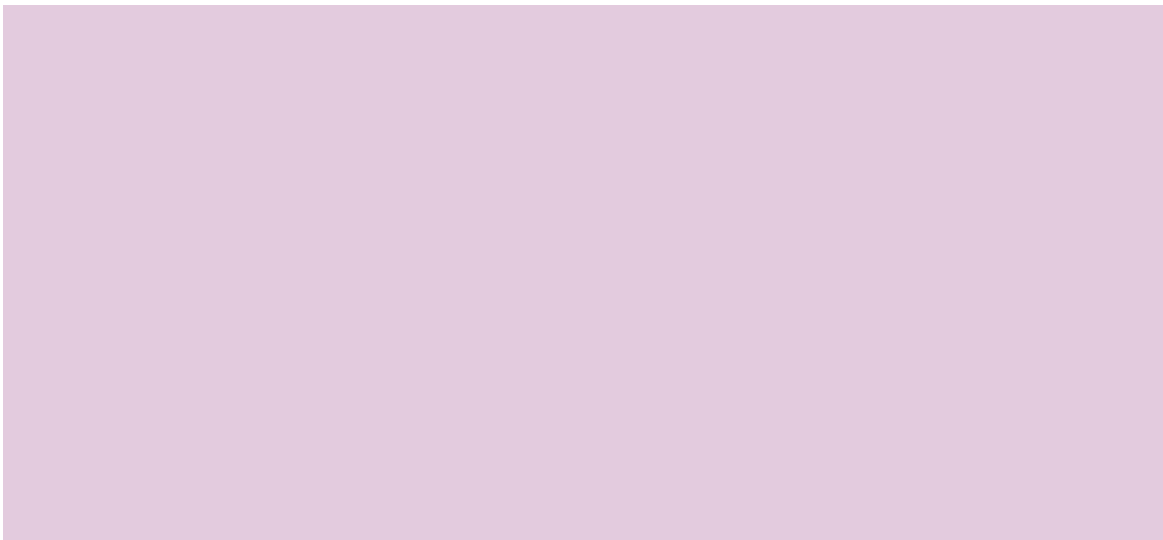Based on an activity from the *Link Up* materials.

Activity: Chocolate challenge!

In groups, devise a way to solve these problems:

1 What decimal is equivalent to $\frac{3}{4}$?

2 What fraction has the same value as 0.8?

You can use the chocolate, or card and scissors, or both to work out and demonstrate decimal/fraction equivalence. Be prepared to talk through your solutions to these problems!

Based on an activity from the Link Up materials.

Activity: Fractions, decimals and percentages card-matching game

1%	0.01	$\frac{1}{100}$
2%	0.02	$\frac{1}{50}$
4%	0.04	$\frac{1}{25}$
5%	0.05	$\frac{1}{20}$
10%	0.1	$\frac{1}{10}$
12.5%	0.125	$\frac{1}{8}$

15%	0.15	$\frac{3}{20}$
20%	0.2	$\frac{1}{5}$
25%	0.25	$\frac{1}{4}$
30%	0.3	$\frac{3}{10}$
$33\frac{1}{3}\%$	0.33	$\frac{1}{3}$
40%	0.4	$\frac{2}{5}$
45%	0.45	$\frac{9}{20}$

50%	0.5	$\frac{1}{2}$
60%	0.6	$\frac{3}{5}$
61%	0.61	$\frac{61}{100}$
75%	0.75	$\frac{3}{4}$
80%	0.8	$\frac{4}{5}$
99%	0.99	$\frac{99}{100}$
100%	1.0	$\frac{1}{1}$

Handout: Test questions for modules 3 and 4: N2

Test A: Qs 6, 9, 13, 15, 25, 26, 28, 30, 34

Test B: Qs 3, 7, 8, 11, 12, 16, 18, 23, 25, 40

Test C: Q 11

Test D: Qs 19, 21, 28, 29, 38

Test E: Qs 7, 8, 11, 12, 18, 19, 35, 36, 39

Test F: Qs 6, 9, 13, 15, 25, 26, 28, 30, 31, 34

Test G: Qs 4, 7, 10, 22, 38, 40

Test H: Qs 12, 27, 31, 33, 34

Points to note:

- It's always a good idea to gauge whether you have understood the concepts you have been learning by trying real-life problems. These may not occur frequently enough naturally for us to be confident that we can apply our number skills in practice. One 'real-life' situation you will experience soon is the numeracy test itself. The review pages from the Practice Test CD-ROM can be used to identify questions that assess the skills covered in modules 3 and 4. Warning: some questions may also require skills that you haven't reviewed yet, so don't panic!

- The proportion of questions that involve knowledge of fractions, decimals and percentages varies greatly from test to test, but on average around a third of the questions require this. These are frequently tested skills!

- You don't need to answer all the questions. There are only so many ways of asking you to solve problems involving fractions, decimals and percentages, as there are with any other of the number skills. Trust yourself – if you know it, you know it.

- Questions from the Practice Test CD-ROM are from the 'item bank' of questions used for the actual test you will be taking.

- You can print out the review pages and find questions that you can use to practise any set of skills. Use the *Adult Numeracy Core Curriculum* to find the curriculum references and skills, and map them to the review pages.

Journal

Module 4: Fractions, decimals and percentages 2

What have you learnt from this module?

How will you apply skills/strategies learnt with learners within your organisation?