Decimals - Introduction

Knowledge of decimal notation and meaning are important to most adults because they are intrinsic to everyday measurement and money calculations, whether in relation to shopping, cooking, planning finances, sewing and home maintenance, or to a range of work-related roles. This section provides a range of activities and games that assist students to explore this meaning and strengthen their 'sense of' decimal numbers through simulations with money, visual representations, pair and small group discussions and use of calculators. Some adult learners need a variety of approaches and a lot of revisiting to really grasp the significance of decimal notation.

The first activity, *'Where are the Decimal Points?'* allows adult learners to begin the discussion of decimals by drawing on their existing knowledge of the decimal quantities that they see on a daily basis and lays a foundation for further exploration of meaning. The practice examples in later activities then encourage students to return to these everyday contexts in order to apply their developing decimal skills.

Exploring meaning: decimal number sense

Several activities focus on students gaining a thorough understanding of decimal notation and the decreasing value of numbers in the first and second decimal places: in other words, learning about the relationship between fractions and decimals.

Whilst not strictly necessary in order to take simple measurements or perform fundamental operations on a calculator, not having this type of conceptual understanding hinders the ability to estimate and calculate with quantities involving decimals. Traditional teaching has tended instead to concentrate on rote learning of rules for decimal calculations. Relying as they do on counting numbers after the point then 'moving the point' from left to right accordingly, these rules are sometimes bewildering and very easily forgotten, leaving many adults anxious when approaching decimals in any form.

The activities *'Exploring Decimals and Tenths 1 and 2',* and two *'Exploring Decimals and Hundredths'* activities use visual representations, money and place value charts to consolidate the meaning and relative sizes of the decimals places. These may be used either as initial teaching activities or as valuable clarifying and revision exercises for more advanced numeracy students.

'Exploring Decimals on Measuring Scales' provides further consolidation of meaning and important practice at reading and plotting decimal numbers on a variety of measuring scales. This activity also provides templates of measuring scales that can be used by teachers to generate further decimal and measurement exercises according to students' particular needs.

Using calculators

In modern workplaces efficient use of calculators and electronic devices to perform decimal related calculations is taken for granted. Most adults would also benefit from using them for domestic purposes, from simply checking bills, to performing more complex calculations related to future financial decisions. At minimum this requires the ability to translate between written and spoken expressions for money and the way monetary amounts are entered and displayed on a calculator. Attention is given to this fundamental requirement in the activity *'Talking Money with Calculators'.*

At the same time, as teachers we should be aware that sensible use of calculators and electronic devices for calculations requires the ability to check that the answers produced are reasonable. This means that the ability to estimate and perform in-the-head calculations is just as important as reading the calculator display. Decimal number sense, sufficient understanding of the size of decimal numbers to enable rounding off and estimation of calculations, is therefore necessary for sensible use of calculators.

Estimating with decimals

Estimation concepts, language and techniques are introduced and scaffolded in *'About How Much?'* and *'Is the answer reasonable?'*, with several practice sheets provided as stepping stones in each. *'Multiplying and Dividing Decimals by 10, 100 and 1000'* develops further relevant skills using a 'leading digit' or 'sensible number' approach rather than relying on rote learning of rules.

Whilst these provide a beginning, it is also recommended that students have continuing practice with these techniques. This is best provided using realistic local artefacts such as newspaper advertisements, shopping catalogues, power and water bills and the like, with up to date prices and materials relating to students' lives. Moreover students should be encouraged to do estimations like these alongside all numeracy calculations, whether they are made using manual arithmetic techniques or with a calculator or a spreadsheet.

Activities to encourage interaction and discussion

'Matching Decimals with Common Fractions', *'True or False Fractions and Decimals'*, *'Matching Decimals, Scales and Pictures'*, '*Sorting Decimals – a near thing?'* and *'What's the Decimal Number'* cooperative logic problems, are all activities designed for use with small groups or pairs. These activities, which revise and/or develop students' appreciation of the meaning of decimal notation and its relationship to common fractions, serve several teaching and informal assessment purposes. They can either be used to observe students' existing knowledge and provide a basis from which to begin teaching the concepts or, they can be used as revision activities after students have explored meaning in other ways. In either case, observing students as they undertake these activities together usually provides valuable, and sometimes unexpected, information for teachers.

These activities also encourage students to use and engage in the language related to decimal notation.

Games for developing skills and decimal numbers sense

Students' decimal number sense can also be enhanced through several enjoyable games provided in this section. *'Dicing with Decimals 1, 2 and 3',* and '*Target 100'* focus on awareness of decimal place value and its effect when calculating with decimal numbers. They also provide valuable practice with estimation, addition and calculator use.

At a more advanced level,*' Decimal Dilemma'* encourages exploration of all four arithmetic operations with decimals.