Exploring Decimals and Hundredths Further

Overview

Many adult learners who have little experience with decimal notation and its meaning, have difficulty understanding the differences between numbers such as, 5, 0.5 and 0.05. This activity uses 'Hundredths Grids' to visualise the relative sizes represented by the first and second decimal places then consolidates the concepts further using a Place Value Chart. The place value chart is also used to briefly TO introduce the third decimal place as representing thousandths.

The activity can be used either to build on the ideas first developed in *'Exploring Decimals and Hundredths with Money'* or as an initial or revision activity for more advanced students who do not need the concrete materials.

It should be done after students display confidence with the meaning of the first decimal place in '*Exploring Decimals and Tenths 1 & 2*' and also after they have had some practice at estimating and adding decimals with one decimal place as in the games '*Dicing with Decimals 1 and 2*'.

Skills and Knowledge

- Meaning of decimal place value
- Relationship between decimals and hundredths
- The third decimal place as thousandths (optional)
- Comparing and ordering decimals

Preparation and Materials

- Make several copies of Activity Sheets 1, 2 and 3 (1 per pair of students and several spares).
- Photocopy Practice Sheet 1 & 2 (1 per student).

Suggested Procedure

Visualising the second decimal place using the hundredths grid

Write on the board a selection of numbers with one and two digits after the decimal place. For example:

3.9 *25.3* *501.7* *1.92* *3.15*

2.06 *10.05* *0.02* *.02*

Explain:

- *I want you to read these numbers aloud as decimals*
- *Remember that we said 3.9 as 'three point nine'*
- *Can you say these numbers as decimals?*

Encourage students to say 'one point nine two' rather than 'one point ninety two'. The reason for this will becomes obvious after a few minutes but it is good to encourage good habits at this stage.

Explain:

- *The 0.02 and .02 are just different ways to write the same thing*
- *Calculators usually put the 0 in front but it is not necessary*

The second decimal place as a fraction

Ask:

- *Remember that in fractions, 3.9 means 'three and nine tenths'*
- *Do you know what the second decimal place means as a fraction?*
- *For example, what is .02 as a fraction*

Distribute or display copies of *Activity Sheet 1: The Hundredths Grid* to make sure that students can see clearly that there are 100 squares [10 rows of 10], or that the 10 columns of the 'Tenths Grid' have been divided into 10 squares.

Explain:

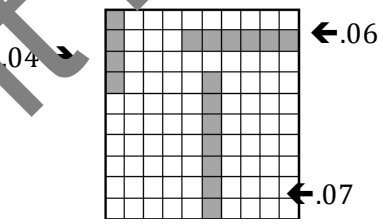
- *The second decimal place represents hundredths*
- *So .02 would be 2 of the small squares.*

Shade in 2 of the squares and ask students to say it as a decimal and a fraction.

Repeat for several more single digit examples, such as .04, .06, .07

Ask:

- *Tell me how to say these as decimals and then fractions.*
- *Shade in the squares with different colours on different parts of the grid.*



When this is sufficiently reinforced introduce one of the numbers with 2 digits after the decimal point, such as 1.92.

Ask:

- *What fraction would you write for .92?*
- *How many squares on the grid would you shade in to get .92?*

- *Will you count 92 squares or is there a quicker way?*

You want students to tell you that .92 is $\frac{92}{100}$ pronounced 'ninety-two hundredths'

Hopefully students will also realise that each column has 10 squares so that they just need to shade 9 columns and 2 more squares.

Make the link with the tenths grid by holding up a copy and asking if students can remember how to show .9 on that grid.

It is important that students can see that 0.92 is just a little bit more than 0.9

The reason that it is not good to read aloud the decimal part as '*point ninety-two'*, is that it makes it sound a lot more than .9 when it really is not.

Some students will appreciate seeing that 0.92 could be seen as a combination of $\frac{9}{10}$ and $\frac{2}{100}$ as well as $\frac{92}{100}$. But do not let this become an emphasis as it may serve to confuse.

Use a few more copies of *Activity Sheet 1: the 'Hundredths Grid*' to demonstrate more examples.

Include in the examples some of the more common decimals, such as:

$\frac{50}{100} = .50 = \frac{1}{2}$

$\frac{25}{100} = .25 = \frac{1}{4}$

$\frac{75}{100} = .75 = \frac{3}{4}$

Adding the whole numbers

Distribute copies of Activity Sheet 2. Ask students to use this to shade in some numbers containing whole numbers and decimals. One number for each line of small grids.

For example:

2.06 1.32 3.45 2.7

Note: it is easy to imagine 2.7 as 2.70 in order to show it on the hundredths grids.

As in the '*Exploring Tenths*' activities you can shade in examples on the blank activity sheet and ask students to write them as mixed number decimals and fractions.

Practice Sheet 1 is suitable for individual practice at this stage.

The second decimal place on the Place Value Chart

Another way to represent decimals as hundredths, and consolidate the ideas presented is to use the place value chart.

On the board draw the *Place Value Chart* used previously to explore tenths, as shown below.

Note: The chart only contains the hundreds, tens, ones and tenths columns so far.

hundreds	tens	ones		tenths
			.	
			.	
			.	
			.	

First remind students about how the chart was used before.

Ask: *How could we write 120.6 in this Place Value Chart*?

Now, write the number 104.75 on the board and repeat the process.

Ask: *How would you write this number on the Place Value Chart*?

Students should now be able to suggest adding another column to the chart. Add this to the chart, making the column approximately the same width as the other columns.

Ask: *What heading do we write on this column*?

Ask them to label it 'hundredths' and fill in the number 104.75.

Now ask them to fill in a selection of numbers on the chart as you read them out. Vary these between numbers read in decimal form and numbers read as fractions.

For example:

109. 04 $2\frac{7}{100}$ 15 and $\frac{3}{100}$

$708\frac{3}{10}$

Display or distribute a copy of the chart in which you have written numbers and ask students to write them as decimals and fractions. Also encourage them to read the numbers aloud.

Practice Sheet 2 focuses on comparing the sizes of numbers containing decimals. If students have doubts about any of the relative values ask them to visualise the numbers by shading in the grids on *Activity Sheet 2*, filling in the *Place Value Chart*, or modelling them as money.

Possible extension to thousandths

For students who easily understood tenths and hundredths, suggest the possibility of further decimal places by imagining the next column in the *Place Value Chart*.

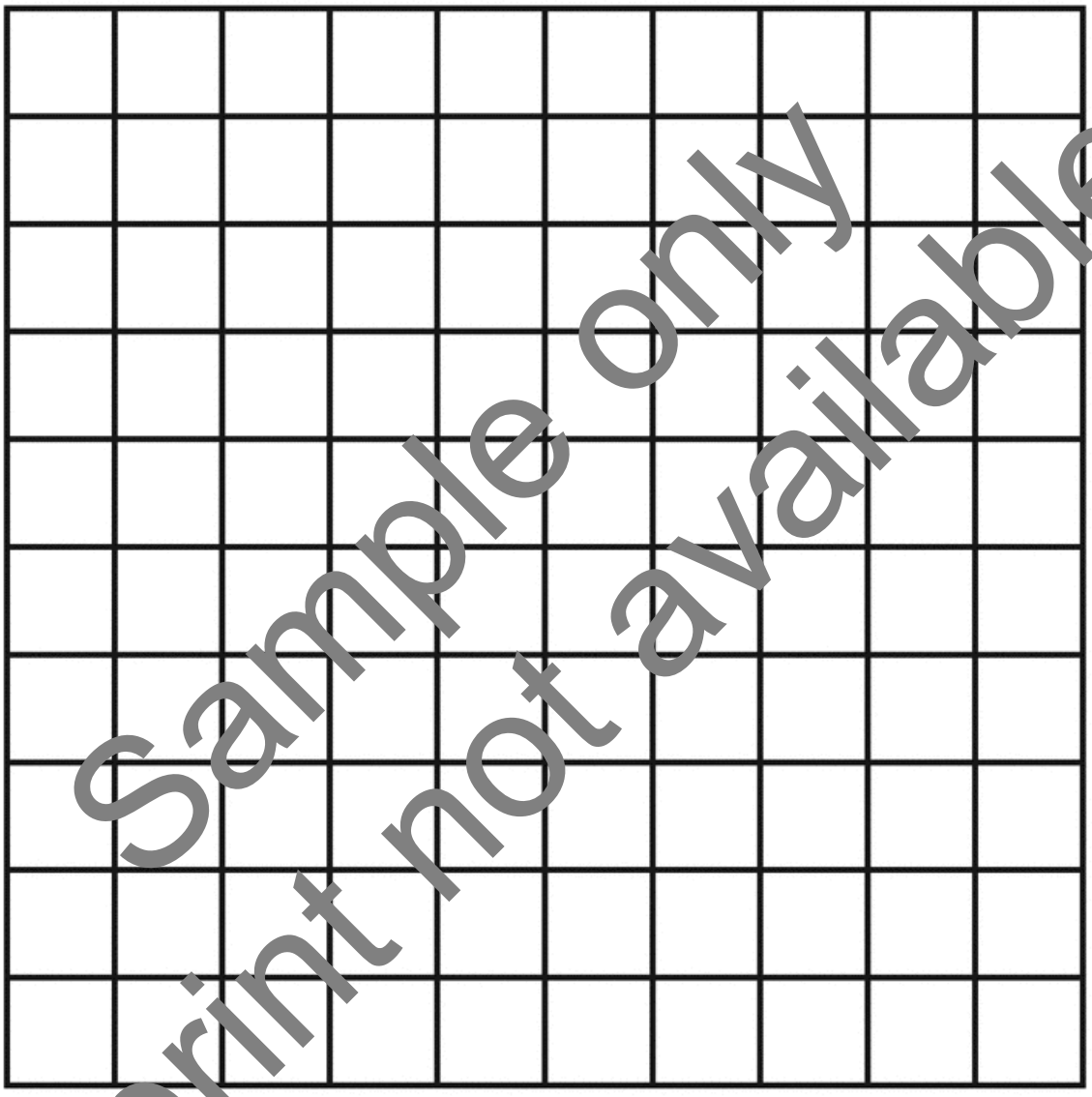
Read a selection of decimal numbers including thousandths, similar to the examples above, and ask students to write them on the chart.

Follow up

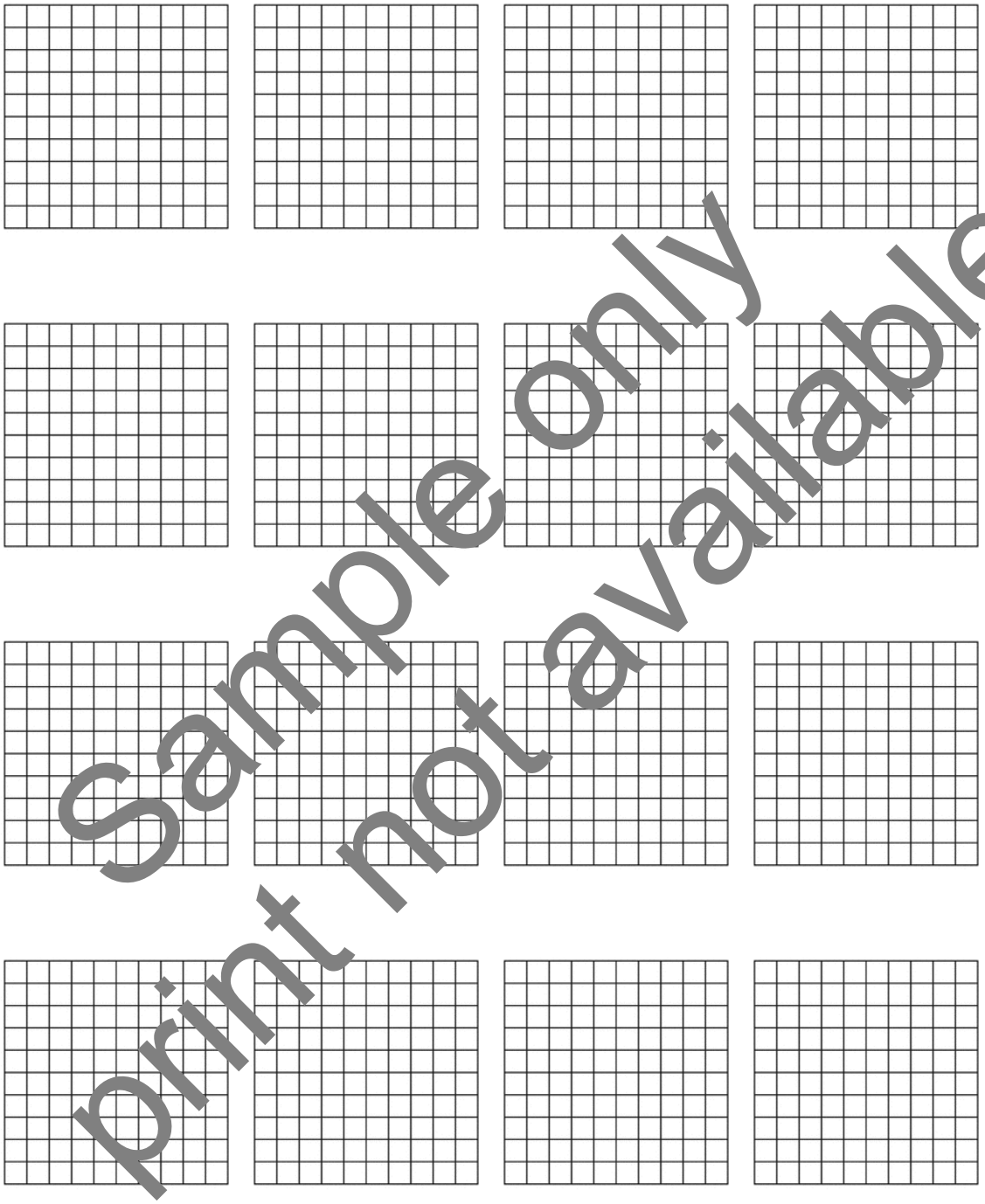
The game '*Dicing with Decimal 3*' is an excellent activity to consolidate awareness of the second decimal place.

The matching activity '*Matching Decimals, Scales and Pictures*' is a useful follow up activity to observe students' understanding of this material. The Cooperative Logic Activities '*What's the Decimal Number?'* are small group problem solving tasks which consolidate this knowledge.

The Hundredths Grid



Exploring decimals and hundredths further Activity Sheet 2

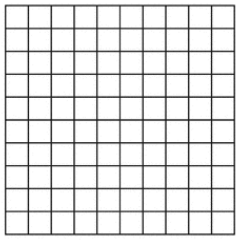
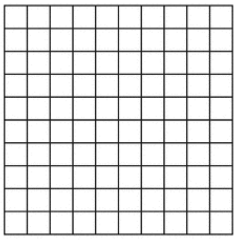
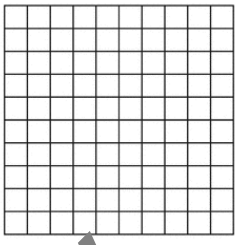


Place Value Chart

hundreds	tens	ones		tenths	hundredths
			•		
			•		
			•		
			•		
			•		
			•		
			•		
			•		
			•		
			•		
			•		
			•		
			•		
			•		
			•		

Exploring decimals and hundredths further Practice Sheet 1

1. Shade the grids and fill in the spaces.

a. 0.78 = $\frac{\quad}{100}$ b. 0.25 = $\frac{\quad}{100}$ c. 0.91 = $\frac{\quad}{100}$

2. Fill in the spaces.

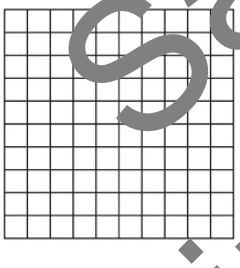
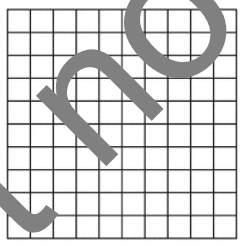
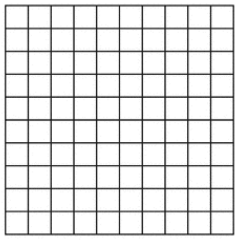
a. 4.32 = b. 8.04 =

c. 7.43 = d. 9.70 =

e. two point eight six = _____

f. three and seventeen hundredths = _____

3. Shade the grids and fill in the spaces.

a. 0.03 = $\frac{3}{100}$ b. 0.09 = $\frac{\quad}{100}$ c. 0.20 = $\frac{\quad}{100}$

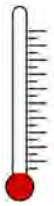
4. Write as mixed number fractions.

a. 2.02 = $2\frac{\quad}{100}$ b. 4.06 = _____

c. 7.08 = _____ d. 8.30 = _____

Exploring decimals and hundredths further Practice Sheet 2

1. Joe was ill. Every half hour the nurse took his temperature.



Time	1.00 pm	1.30 pm	2.00 pm	2.30 pm
Temperature °C	38.37	38.4	38.29	38.08

a. When was his temperature the highest? _____

b. Put the temperatures in order.

_____ _____ _____ _____

lowest highest

2. Circle the bigger number in each pair.

a.	0.8	0.7	b.	2.58	2.6
c.	3.03	3.12	d.	3.02	2.95
e.	1.60	2	f.	10.50	10.9

3. Put these library book numbers in order from smallest to largest.

843.01 729.32 843.10 729.04

620.9 540.82 729.4