Exploring Decimals and Tenths 2 Mixed numbers

Overview

This activity is designed to follow *'Exploring Decimals and Tenths 1'* as it continues to explore the meaning of decimal places when they are combined with whole numbers. As in Part 1, it uses diagrams, fraction circles and place value charts to consolidate meaning.

'Dicing with Decimals - Games 1 and 2', in which students estimate and add decimal numbers, are useful to follow up or complement this activity as is *'Exploring Decimals and Measuring Scales*'. *'Exploring Decimals and Hundredths'* should follow soon after to consolidate the difference in significance of the first and second decimal places.

Skills and Knowledge

- Meaning of decimal place value in mixed numbers
- Relationship between decimals and tenths

Preparation and Materials

- Make several copies of Activity Sheets 1 & 2: *The Tenths Grid* and *The Circle Template* from '*Exploring Decimals and Tenths 1'*
- Photocopy Activity Sheet 1: *Mixed number grids* (1 per small group of students)
- Photocopy Activity Sheet 2: *Place Value Chart* (1 per small group of students)
- Photocopy Practice Sheet 1 (1 per student)

Optional Materials

Select suggested procedure to make a selection from this list.

- Fraction Circle kits (1 per small group of students)
- Calculators (1 per small group of students)

Suggested Procedure

Revising the meaning of the first decimal place

To remind students of the significance of the first decimal place, write several decimals, such as, 0.4; .8; 0.2; .3 and 0.5 on flashcards (see *'Quick Questions'*) in the *'Getting Started'* section), show them one by one and ask students to rewrite them as fractions.

When going through the answers ask students also to read them aloud, i.e. as *'point four'* as well as *'four tenths'.*

Ensure they also realise that the zero at the front is not significant to the value of the decimal.

Note: As in '*Exploring Decimals and Tenths 1*' you may have to remind students that these decimals represent fractions of a whole thing, e.g. a cake, a pizza, a litre, a dollar etc.

Combining decimals with whole numbers

Write the number, 3.9 on the board and ask:

- *How could you write and say this number using fractions instead of decimals?*

Write:

3.9 = read as '*three point nine*'

$3\frac{9}{10}$ = read as '*three and nine tenths*'

Encourage students to write the symbols and read the numbers aloud in both forms.

Write several similar numbers on the board and ask students to:

- *First rewrite them as numbers and fractions.*
- *Then say them aloud in both decimal and fraction form.*

Modelling the mixed numbers with 'Fraction Circle Kits'

If you have used the Fraction Circle Kits previously in modelling decimals, distribute one kit to each small group of students.

Ask:

- *How could you use these fraction pieces to show:*
  - *1.4?* [This will be one whole circle and four tenth pieces]
  - *2.1?*

For this last number students will have to decide how to make two whole circles when there is only one whole piece in the kit. How they tackle this could reveal their depth of understanding of fractions.

- They could take a whole circle from another group to display 2 whole circles and 3 tenths.
- They could make a second whole circle by combining other fraction pieces such as 2 halves, 4 quarters or 3 thirds.

Give a few more examples until students seem confident with the idea.

Mixed numbers using the tenths grid

Hold up a blank copy of Activity Sheet 1: *'Tenths grid'.*

Ask:

- *How) could I show 3.9 on this grid?*
  [Of course you cannot do it on one grid]
- *Could I show 3.9 if I use more than one of these?*

Hold up a handful of blank grids

- *How many of these would I need?*
- *What would one whole look like on the grid?*
  [One whole grid would be shaded]
- *So how many would I need to show 3?*
  [Three grids shaded]

This might seem like a lot of detail and fuss for something so seemingly obvious, but it should help consolidate the idea of the relative sizes/values of the 3 and .9 in students' minds.

Hold up the three shaded grids and the partially shaded .9, so that the relative sizes are displayed pictorially.

Ask students:

- *How many of these would I need to show 2.1?*

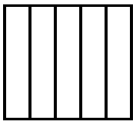
Explain that instead of holding up all these pieces of paper you will now use some smaller pictures which are easier to handle.

Distribute Activity Sheet 2 *Mixed number grids* (1 per 2 or 3 students) and some coloured pencils. Make sure students realise that each of the smaller grids still represents the same as the large grid, i.e. one whole.

Ask:

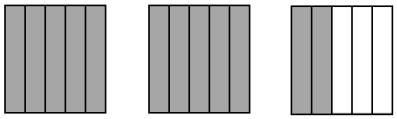
- *How would you shade in the grids to show:*
  - *2.1?*
  - *1.8?*
  - *3.5?*

When they are confident with these, reverse the procedure. This time you shade in some similar mixed numbers on a copy of the Activity Sheet and ask the students to tell you the decimal that is shaded.



Note: The last rows of the activity sheet have grids with only five divisions. This is to encourage students to think more deeply about the meaning of the decimal place as tenths.

For example, shade in 2 whole grids and 2 of the small divisions.



Ask:

- *What is this number that I have shaded?*

Encourage students to see that these five divisions are bigger than on the other grids and since there are not ten of them they will not represent .2.

In order to see the decimal equivalent you would need to cut or subdivide each of the five divisions into two to make ten equal pieces, or tenths.

This means that the 2 larger pieces will become 4 of the tenth pieces or .4

With prompting, students should be able to tell you that this fraction is $\frac{2}{5}$. But any temptation to diverge into rules of equivalent fractions is likely to confuse many students and to distract from the meaning of decimals.

Using circles without the kits

If you are not using the Fraction Circle Kits then ask students to draw the fractions used above as circles on the board or distribute blank paper for them to do this in small groups or pairs. This will ensure they have seen the representation as more than one shape, and so are more likely to be able to generalize the idea.

Mixed numbers on the place value chart

Distribute copies of the Activity Sheet *'Place Value Chart'*.

Choose some of the numbers modelled with the circles and the tenths grid and ask students to write these on the chart.

To check that they fully understand the chart, read aloud a selection of numbers and ask students to write them on the chart as you read them out.

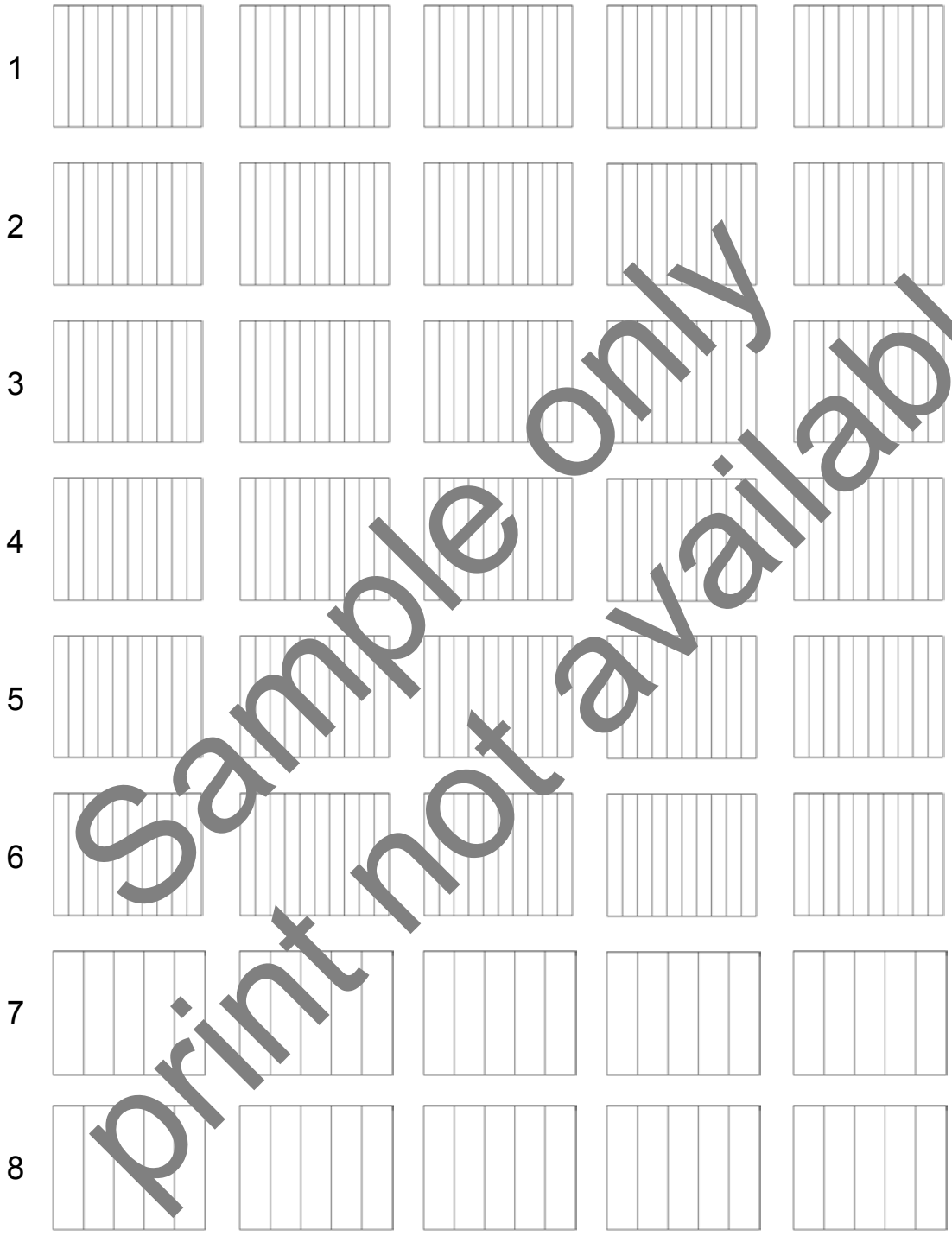
For example

$3\frac{1}{10}$ 70.6 $150\frac{4}{10}$ $206\frac{2}{10}$

Further practice

When students seem confident with these representations whilst working as a class or in small groups, they can tackle some more independently using Practice Sheet 1.

Games 1 and 2 of *'Dicing with Decimals'* are highly recommended as consolidation before proceeding to examine hundredths, in *'Exploring the Second Decimal Place'*. They are also an enjoyable way to introduce adding decimals.



Place Value Chart

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

Exploring decimals and tenths 2

Practice Sheet 1

1. Fill in the gaps.

a. 1.2 = $1\frac{}{10}$

b. 2.4 = ___ $\frac{}{10}$

c. _____ = $4\frac{6}{10}$

d. 2.1 = _____

e. 0.7 = _____

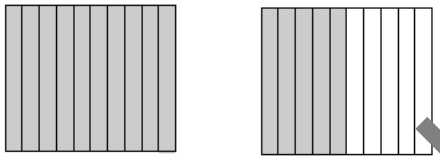
f. _____ = $10\frac{3}{10}$

g. 21.5 = _____

h. _____ = $108\frac{2}{10}$

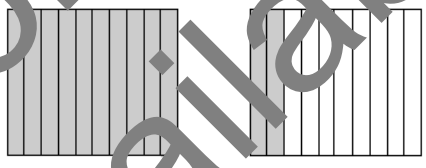
2. Write the fractions that are shaded in each of the diagrams.

a.



1. ___ = 1 ___

b.

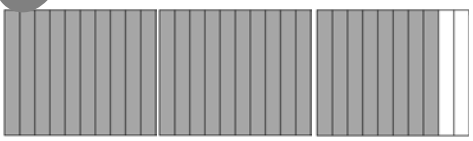


___ . ___ = ___ $\frac{}{10}$

c.

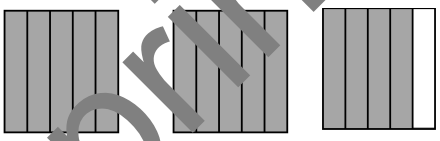
___ . ___ = $2\frac{}{10}$

d.



___ . ___ = ___

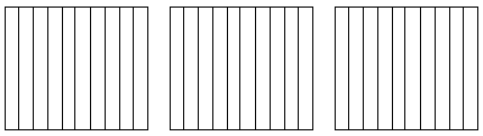
e.



___ . ___ = $\frac{}{10}$

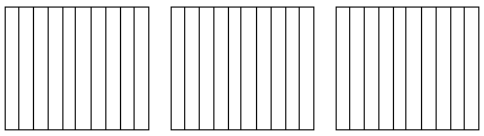
3. Shade in the number written.

a.



$2.7 = 2\frac{\quad}{10}$

b.



1.4 = __ -

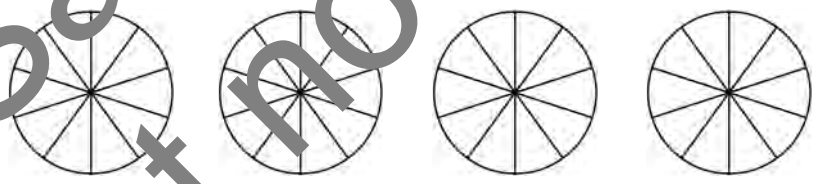
c.

1.8 = __ -

d.

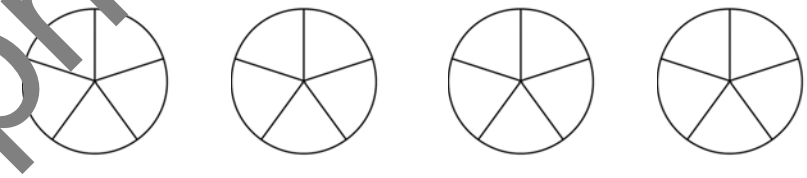
2.1 = 2 -

e.



$1.6 = \_\_\frac{\quad}{10}$

f.



$2.4 = 2\frac{\quad}{10}$