

Has difficulty in partitioning numbers with zero place holders and/or numbers less than one, for example partitioning 0.45 as 0.4 and 0.05

Opportunity for: making connections

Resources

- Place value boards
- Number cards 0–10 (Resource sheet 1)
- Several 0 cards
- Place value (arrow) cards (including decimal place value cards)
- *Place value chart* (Resource sheet 39)
- Base 10 equipment such as bundles of straws
- Calculator
- Sticky notes

Key vocabulary

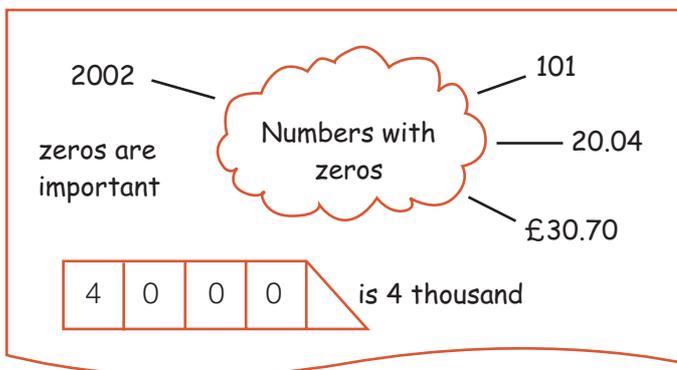
- | | |
|--------------|------------|
| zero | units/ones |
| place holder | decimal |
| column | tenth |
| hundreds | hundredth |
| tens | |

Teaching activity

Time 15–20 minutes

‘We are going to think about some numbers that have zeros in them. Can you tell me a number that has one or more zeros?’

‘Let’s make a concept map for numbers with zeros.’



Follow on from what the child says.

Record some numbers for the child to name and put on a place value board using digit cards, for example 1074 and 304.



- ? Enter the number three hundred and four into the calculator.**
- ? How many hundreds? How many tens? How many ones?**
- ? Make that number with place value cards.**

Use the *Place value chart* (Resource sheet 39) and ask the child to point to the numbers that make up, for example, five hundred and three. That is five hundred and three. There are no tens.

Repeat for the other numbers.

If the child needs more support, make sure they can partition whole numbers using place value cards. Putting the numbers into a calculator can help to consolidate the child's understanding.

- ? Make a number with seven in the hundreds, three tens and no ones. (730)**
- ? What if the zero was in the tens column and the three in the ones? (703)**
- ? Is this right?**

$$703 = \begin{array}{|c|c|} \hline 7 & 0 \\ \hline \end{array} + \begin{array}{|c|} \hline 3 \\ \hline \end{array} \quad \text{X} \\ \text{wrong!}$$

- ? Explain how you know.**
- ? Shut your eyes and try to see a picture in your head of seven hundred and three made with straws. Tell me about the picture.**
- ? Is seven hundred and three more or less than seven hundred and thirty?**

Move on to explore decimals if appropriate.

- ? What if we re-name the headings of the place value board so that the column on the left is the tens, then the ones, then there is a decimal point, then tenths. What would the last column be for? (*Hundredths.*)**
- ? So if we wanted to write down an amount of money such as £5.93, can you put digit cards onto the place value board to show that amount of money?**

£10	£1	10p	1p
	5	9	3

In £1s

In 1ps

- ? What is the value of the three? (*Three hundredths – of a pound.*)**
- ? Make five point nine three with place value cards. How is it different from five hundred and ninety-three?**

If the child needs more support, use coins on the place value board.

? What if we take away the nine 10p coins? What is our amount of money now? (£5.03)



? How do you know?

If you are using a calculator for support, with 5.93 keyed in, ask the child to make the 9 into a 0 in one move.

‘Let’s write down some of the things you learned today and some of the things you found tricky about numbers with zeros, then we will remember to come back to them next time.’



? In the number 60.07 what is the value of the seven? (Seven hundredths.)

? How many grams are there in sixty point zero seven kilograms? (60 070)

Spotlight 1

Has difficulty in partitioning numbers with zero place holders and/or numbers less than one, for example partitioning 0.45 as 0.4 and 0.05

Opportunity for: reasoning about numbers and quantities



Explode a number

Time 10–20 minutes

Resources

- Bundles of straws
- Weights
- Tape measure or metre rules
- Number lines
- Place value board
- Place value (arrow) cards
- Money

Key vocabulary

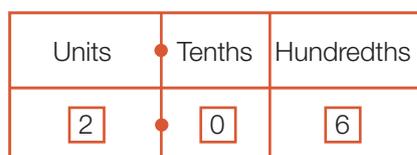
- | | |
|--------------|------------|
| zero | units/ones |
| place holder | decimal |
| column | tenth |
| hundreds | hundredth |
| tens | partition |

Teaching activity

‘Let’s look at our concept map from last time.’

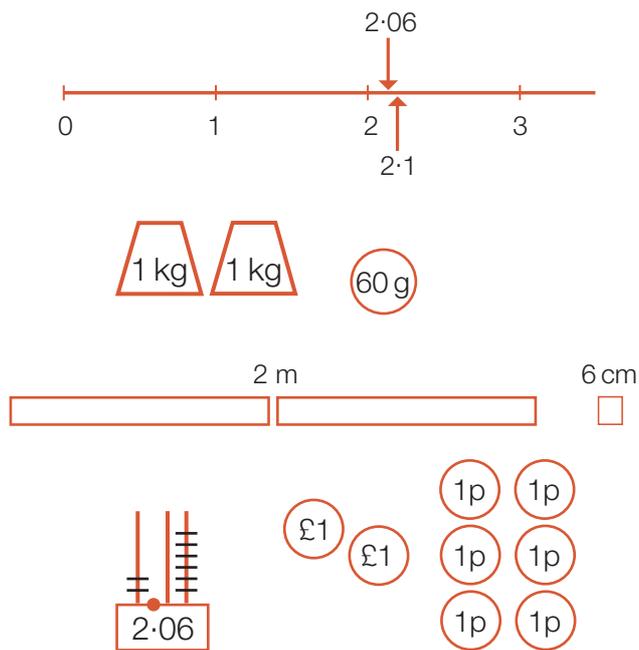
‘Today we are going to take the number two point zero six and we are going to make that number in as many different ways as we can, so that you will understand more about decimal numbers with tenths and hundredths.’

? Shut your eyes and try to make a picture of two point zero six as it is on a place value board. Keep your eyes shut and tell me about the columns and the numbers.



? Look at all the mathematics equipment we have here. Find ways to show two point zero six.

You might need to get the child started by, for example, finding 2 m and 6 cm on a tape measure and putting out £2.06 in coins.



- ? Put two point zero six on a number line.**
- ? How would you round two point zero six to the nearest whole number? (2)**
- ? How would you round it to the nearest tenth? (2.1)**
- ? Which is larger, two point zero six or two point six zero? How do you know?**
- ? Is this correct? How do you know?**

$$2.06 = \boxed{2} + \boxed{0.06}$$

‘Let’s write down some more things you’ve learned about decimal numbers on the concept map.’

Spotlight 2

Has difficulty in partitioning numbers with zero place holders and/or numbers less than one, for example partitioning 0.45 as 0.4 and 0.05

Opportunity for: recognising mathematical connections



Is this right?

Time 10–20 minutes

Resources

- Place value (arrow) cards
- Calculator

Key vocabulary

- | | |
|--------------|------------|
| zero | units/ones |
| place holder | decimal |
| column | tenth |
| hundreds | hundredth |
| tens | partition |

Teaching activity

‘Let’s look at our concept map. Today we are going to do some more about whole and decimal numbers with zeros and making those numbers with place value cards. Sometimes I might not partition the numbers correctly so you must make sure I get it right.’

Ask the child to partition 3.6.

? Is it three plus zero point six? (Yes.)

? How do you know?

Make more numbers, sometimes partitioning them incorrectly.

Use a range of equipment that the child likes to work with to clarify ideas.

Putting numbers into a calculator and talking about each part added can help. Then ask the child to get rid of one digit of the number at a time.

Enter 5 0 . 0 6

–50 = 0.06
–0.06 = zero

14.3 = 14 + 0.03 No

7.60 = 7 + 0.6 Yes

? In the number 0.25, what is the value of the 2? (Two tenths.)

? If the number was 0.05 why is there a zero in the tenths? (To hold the place to show that there are no tenths.)

‘Now you choose some numbers and partition them.’

? Is there anything you want to add to the concept map?



‘Make a number that has four zeros in it and a decimal point. Draw the number partitioned with place value cards.’

Spotlight 3

Has difficulty in partitioning numbers with zero place holders and/or numbers less than one, for example partitioning 0.45 as 0.4 and 0.05

Opportunity for: solving problems with money

Watch out for red!

Time 10–15 minutes

Resources

- Standard 1–6 dice with a red sticker on the 6 (or use the spinners on Resource sheet 13+)
- Money place value board for each child or pair
- £1, 10p and 1p coins
- At least one other child

Key vocabulary

- | | |
|--------------|------------|
| zero | units/ones |
| place holder | decimal |
| column | tenth |
| hundreds | hundredth |
| tens | partition |

Teaching activity

'Today we are going to play a game called **Watch out for red!** It will help you to learn more about zeros marking places in numbers when there is no other digit. It's called **Watch out for red!** because if you spin red on the spinner (or throw a red on the dice) you lose all the 1p coins you have, so you must aim to exchange your 1p coins as quickly as possible.'

How to play

1. The aim of the game is to end up with a total of four hundred pence on the board, but this will be in £1 coins and 10p coins as well as 1p coins.
2. Players mustn't go over four hundred pence or they are out!
3. Players take turns to spin the spinner and then take the number of coins in their spin. Players can take any combination of coins to make the number of coins they spin. So if they spin 4, they could take two £1 coins and two 10p coins.
4. They put their coins on their board and must say and record the number of pence they have altogether.

£	•	10p	1p
1	0	8	

? How would I write two hundred and twenty pence in pounds? (£2.20)

5. Each player should keep a running total. Remember not to go over four hundred!
6. If anyone spins red, everyone loses all their 1p coins!

Make sure the children understand which column coins go in as the game goes on.

Remind them that if someone spins red, everyone will lose all their 1p coins. 10p and £1 coins are safe, but not 1p coins, so they must exchange these as soon as they get ten of them.

? Have you got enough 1p coins to exchange to get a 10p coin? Which column does the 10p go in? Why?

If the child has difficulties with exchanging 1p coins for a single 10p, you could make a strip of ten drawings of 1p coins and encourage the child to put any winnings of 1p coins on the strip so that they can see when they need to exchange.

You could record for each child how much they have altogether, asking them to read the numbers of their running total.

Eli's score

$$320 + 7 + 3$$



'How much is forty-three thousand pence? How many 10p coins is that?'

Spotlight 4

Has difficulty in partitioning numbers with zero place holders and/or numbers less than one, for example partitioning 0.45 as 0.4 and 0.05

Opportunity for: making decisions

Spot the zero

Time 15–20 minutes

Resources

- Sticky notes
- Counters or rewards
- Place value cards

Key vocabulary

zero	units/ones
place holder	decimal
column	tenth
hundreds	hundredth
tens	partition

Teaching activity

‘We are going to do some more work on numbers with zeros today.’

Write some numbers with zeros on sticky notes, for example:

2010	6000	790	60.9
606	6.09	3030	3.04

Put the numbers on display.

‘I’m going to choose one of the numbers and I’m going to give you a clue about which number it is and you have to work out which number I mean.’

? Which number is a three-digit number with zero in the units? (790)

? How did you know which number to choose?

If the child needs support, you could ask them to identify all the numbers with three digits.

Also, as the numbers are indicated, you could make them with place value cards.

Repeat with all the numbers; then suggest that you swap roles so they have to write some numbers and give you clues.

You are likely to have to support work with the decimal numbers with a place value board, place value cards, or with money amounts if you found that helped the child.

? What can you tell me about numbers with zeros in them?

? What would you like more practice with?



‘Write a number with four zeros and just two other single digits, six and eight. Are there lots of possible numbers or just a few?’

Spotlight 5: a learning check

Has difficulty in partitioning numbers with zero place holders and/or numbers less than one, for example partitioning 0.45 as 0.4 and 0.05

Opportunity for: explaining and discussing

Zap the zero

Time 5–15 minutes

Resources

- One calculator for each pair
- At least two children
- Numbers on slips of paper that have one zero in them (609, 2053, etc.)
- Timer

Check: does the child use key vocabulary?

zero	units/ones
place holder	decimal
column	tenth
hundreds	hundredth
tens	partition

Teaching activity

‘This game, **Zap the zero**, will help you with understanding more about place value and numbers with zero in them.’

Pairs can cooperate to play this against another pair, each pair trying to get their score to one whole one in ten minutes.

You need to give each child or pair some numbers with zeros to get them started, doing this secretly so the other children don’t hear. For example, one child or pair might have the number one thousand and sixty-three on paper, and they must know the name of the number and how to key it into the calculator.

How to play

1. The first child enters a number that has at least one zero into the calculator. They must read the number correctly and pass the calculator to the other pair or child, for example 1063 read as one thousand and sixty-three.
2. The second pair or child must in one move (either the or key, a number and the key) make the zero become another number.
For example, $1063 + 900$ would make 1963. The zero has disappeared so that second child or pair score 0.1, but they must also read the number they have made, in this case: one thousand, nine hundred and sixty-three.
If this is done correctly, that pair score 0.1.
If there is still a zero in the number, they score nothing.
3. Then the second pair or child enters a different number with a zero in it and so on.
4. Aim to get a score of one whole one (ten tenths) in ten minutes.

Variations

- Play with decimal numbers. This could be just tenths or hundredths as well, for example keying in 6.01.
- Play with numbers that have two zeros in them.

Learning outcomes

By the end of this set of activities, children should be able to:

- tackle related learning tasks with increased motivation and confidence;
- use and understand connected mathematical vocabulary;
- partition numbers with zero place holders, including decimals with tenths and hundredths.