

# Estimating proportions

CN4L17

Using estimates of proportions to estimate numbers of objects and positions of numbers on a number line

## Objectives

- Estimate a proportion.
- Use the vocabulary of proportion to describe the relationship between two quantities.

## Prior knowledge and skills

- Estimating numbers of objects
- Finding fractions of numbers

## Vocabulary

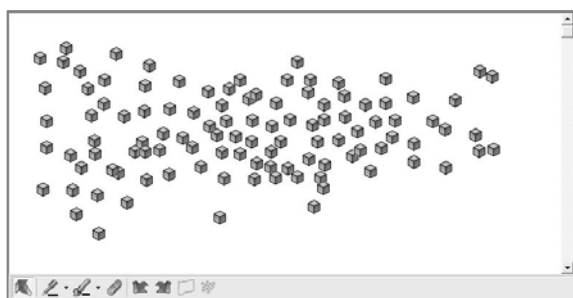
estimate, guess how many, nearly, roughly, close to, approximate, approximately, just under, just over, too many, too few, exact, proportion, fraction, method

## Resources

- small whiteboards and pens
- items for the estimation activity for each group, including objects (e.g. beads or coins) filling part of a jar, a fiction book, dotty paper

## Oral and mental starter

(Page 1 on whiteboard)



Remind children that an estimate is a sensible guess. Refer to the cubes on the board and ask:

**Q How many cubes do you think there are? How did you decide?**

Children show their estimates on their small whiteboards. Discuss methods, e.g. counting how many cubes there are on about a quarter of the whole screen and multiplying this number by 4.

Click on the 'Estimating number of objects' button on the toolbar and then on the 'Check answer' button to show the actual number of cubes on the screen.

Move to question 2 and repeat the activity for other random numbers of cubes. (Click the 'Estimating numbers of objects'

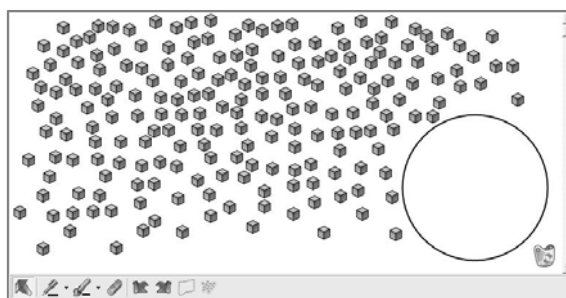
button on the toolbar. Choose 'cubes' and the range that best suits your class, e.g. 'from 1 to 200', then click on 'OK'. Clicking on 'Clear' will reset the screen.

**Q What method did you use for your estimate this time? Did you use a different method from last time? Why?**

## Main teaching activity

### Whole class

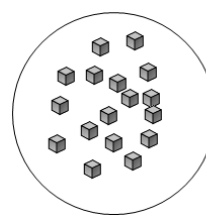
(Page 2 on whiteboard)



**Q How many cubes do you think there are on the board? How did you decide?**

Discuss children's reasoning. Then click on the 'Estimating numbers of objects' button on the toolbar and on the 'Check answer' button, to reveal the actual number of cubes on the board (200).

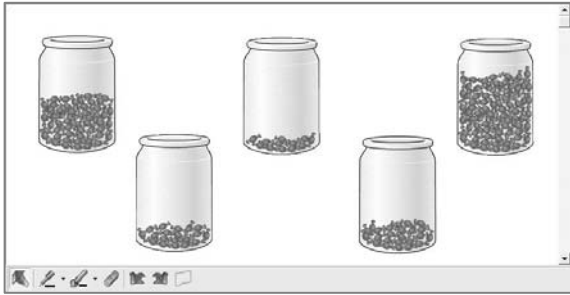
Use the circle on the board to group about 17 of the cubes. The circle and the cubes can be dragged, and the circle can be resized by clicking on it and dragging its resizing handles.



**Q Roughly what proportion of the cubes on the board do you think are in the circle? (about  $\frac{1}{10}$ ) How did you decide?**

Establish that, because there are nearly 20 cubes in the circle, and 20 out of 200 is  $\frac{1}{10}$ , just under  $\frac{1}{10}$  of the cubes are in the circle.

Repeat for several other numbers of grouped cubes. You could also change the total number of cubes on the screen by dragging some of the cubes into the bin.

**(Page 3 on whiteboard)**

Refer to each jar in turn and ask children to estimate what proportion of the jar contains sweets (about  $\frac{1}{2}$ ,  $\frac{1}{8}$ ,  $\frac{3}{4}$ ,  $\frac{1}{5}$ ,  $\frac{1}{4}$ ). To clarify proportions, drag the top copy of each jar into the bin to reveal a copy beneath with divisions marked. Use the 'Pen' tool to label each jar with an appropriate fractional proportion.

When all 5 jars are labelled, ask children to imagine that a full jar holds 100 sweets. Refer to each jar on the whiteboard in turn and ask:

**Q If a full jar holds 100 sweets, how many sweets do you estimate there are in this jar? How did you make your estimate?**

Repeat this activity imagining that there are 200 sweets in a full jar (i.e. 2 sweets in each wrapper).

**Groups**

Give each small group several items suitable for an estimation activity, including objects (e.g. beads or coins) filling part of a jar, a fiction book and dotty paper. Children estimate the number of objects in a jar, the number of words on a page of a fiction book and the number of dots on a sheet of dotty paper.

Encourage children to think about appropriate strategies for each item, e.g. counting the number of lines of text and multiplying by the number of words in the first line.

When children have made an estimate of the number of objects in a jar, ask:

**Q What proportion of the jar is full?  
So how many objects do you estimate would fit in the whole jar? How did you decide?**

If time allows, children count the actual numbers of each item and make comparisons with their estimates.

**Q Did you overestimate or underestimate?  
How close to the exact number was your estimate?**

**Support:** Provide children with sets of fewer than 120 objects.

**Extension:** Provide children with sets of more than 250 objects.

**Other tasks**

You could ask children to:

- estimate the proportion of objects that are one colour in a selection of different coloured objects, e.g. beads or buttons.

**Review****(Page 4 on whiteboard)**

Refer to the 0 to 100 number line on the whiteboard. Drag the arrow to a position along the line and ask children to estimate what number the arrow is pointing to. They show their estimates on their small whiteboards.

Encourage children to justify their estimates using proportions, e.g. the arrow is about one quarter of the way along the line and  $\frac{1}{4}$  of 100 is 25.

Reveal the answer by clicking on the 'Show/hide answer' button.

Repeat several times, clicking 'Clear' to hide the answer label before repositioning the arrow.

**Key idea and assessment**

Estimating proportions can help us to estimate amounts of objects or positions of numbers on a number line

**Can children...**

- estimate what proportion of a complete set of objects a group of objects is?
- use estimates of proportions to make estimates about amounts of objects or positions of numbers on a number line?
- explain their estimation strategies?