Ratio and proportion: numbers

Prior learning

- Can solve problems involving fractions.

Learn

- Start with the example of the red and blue square in the textbook, and progress to a variety of groupings, such as sets of shapes, beads, cars, and so on. Demonstrate and discuss the difference between fractions and proportions. For each example, move on to showing the difference between fractions, proportion and ratio. Present each one clearly, separately, and with the appropriate notation.
- In particular, point out how proportions and ratios can be simplified to their lowest terms, just as fractions can be.
- Using the information about animals on a farm in the textbook, extend ratio and proportion to larger numbers. The textbook prompts children to consider other statements. Children can also discuss these ideas in other contexts, for example using information about the children in the class: eye colours, hair colours.
- The first two lessons of *100 Maths Lessons Year 6, Summer 1, Week 6* provide useful ideas and resources for consolidating children's understanding.

Talk maths

- After allowing the children to make statements about the coloured squares in the textbook, arrange the children into small groups to prepare four or five questions about the squares, focusing on ratio and proportion. Explain that they will be challenging other groups with their questions, and introduce them to negative statements, such as: *What proportion of the tiles are not red?*
- While listening to their question-and-answer exchanges, ensure that the children are clear about the differences between ratio and proportion. Note those children who are simplifying these with ease. If appropriate, recap work on fractions and multiples for simplifying fractions and apply this to proportions and ratios.

Activities

- If desired, the questions in this section can be expanded to cover other proportions and ratios.
- In addition, the *Year 6 Practice Book* has good consolidation activities. You can also use the 'Recipe' activity in *100 Maths Lessons Year 6, Summer 1, Week 6, Lesson 2*.

Problems

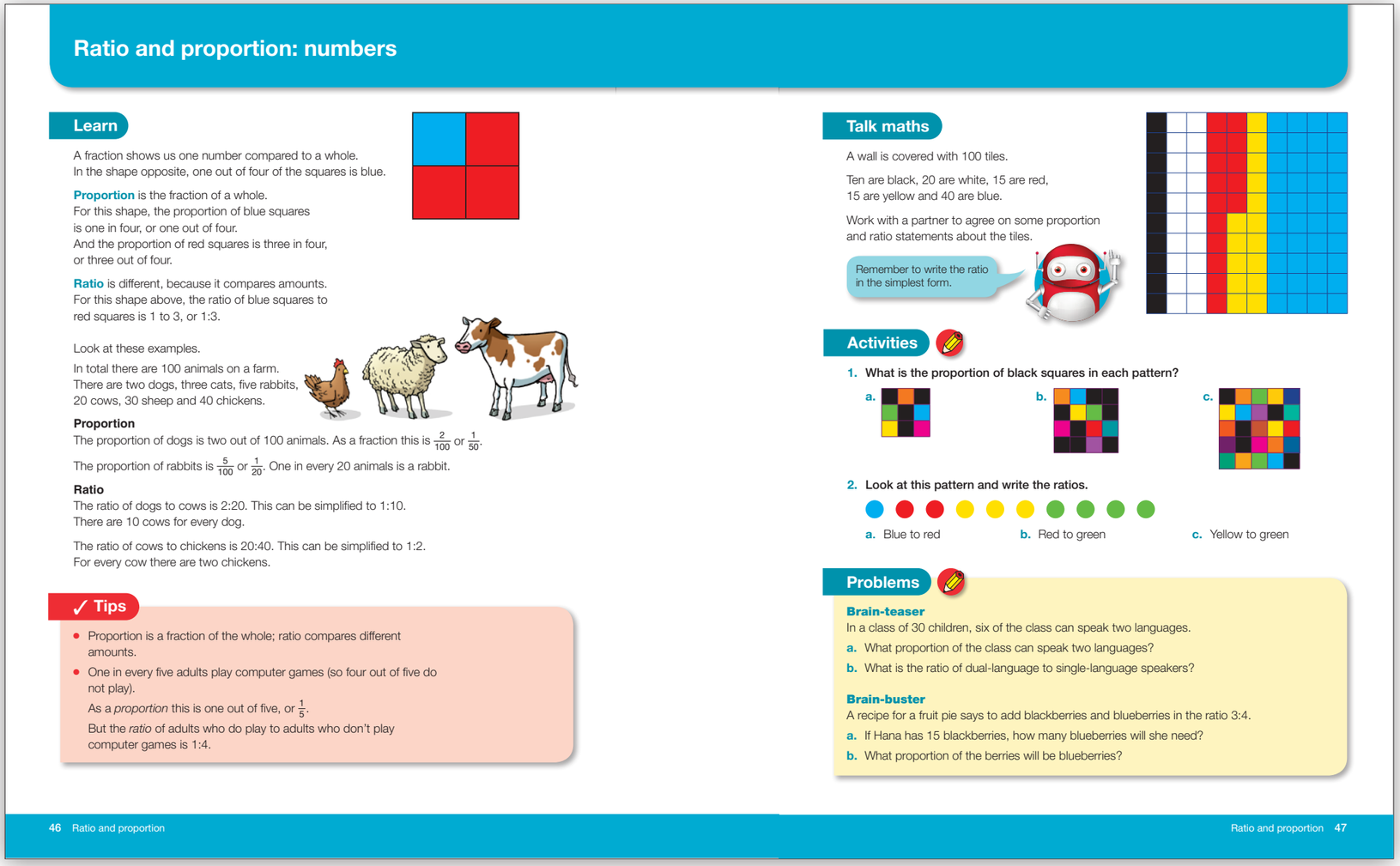
- Be sure to work though the Brain-teaser with the children once they have tried it. Check that they are able to simplify both proportion and ratio.
- Note that the Brain-buster is much trickier, as children must use a given ratio to calculate a quantity. Ideally, children should receive more practice with this type of calculation through practical problems.

Curriculum objectives

- To solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.
- To solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Success criteria

- I can compare quantities using ratio and proportion.



Ratio and proportion: numbers

Learn

A fraction shows us one number compared to a whole.
In the shape opposite, one out of four of the squares is blue.

Proportion is the fraction of a whole.
For this shape, the proportion of blue squares is one in four, or one out of four.
And the proportion of red squares is three in four, or three out of four.

Ratio is different, because it compares amounts.
For this shape above, the ratio of blue squares to red squares is 1 to 3, or 1:3.

Look at these examples.

In total there are 100 animals on a farm.
There are two dogs, three cats, five rabbits, 20 cows, 30 sheep and 40 chickens.

Proportion
The proportion of dogs is two out of 100 animals. As a fraction this is $\frac{2}{100}$ or $\frac{1}{50}$.

The proportion of rabbits is $\frac{5}{100}$ or $\frac{1}{20}$. One in every 20 animals is a rabbit.

Ratio
The ratio of dogs to cows is 2:20. This can be simplified to 1:10.
There are 10 cows for every dog.

The ratio of cows to chickens is 20:40. This can be simplified to 1:2.
For every cow there are two chickens.

Tips

- Proportion is a fraction of the whole; ratio compares different amounts.
- One in every five adults play computer games (so four out of five do not play).
  As a *proportion* this is one out of five, or $\frac{1}{5}$.
  But the *ratio* of adults who do play to adults who don't play computer games is 1:4.

46 Ratio and proportion

Talk maths

A wall is covered with 100 tiles.

Ten are black, 20 are white, 15 are red, 15 are yellow and 40 are blue.

Work with a partner to agree on some proportion and ratio statements about the tiles.

Remember to write the ratio in the simplest form.

Activities

1. What is the proportion of black squares in each pattern?
   a. b. c.
2. Look at this pattern and write the ratios.
   a. Blue to red b. Red to green c. Yellow to green

Problems

Brain-teaser
In a class of 30 children, six of the class can speak two languages.
a. What proportion of the class can speak two languages?
b. What is the ratio of dual-language to single-language speakers?

Brain-buster
A recipe for a fruit pie says to add blackberries and blueberries in the ratio 3:4.
a. If Hana has 15 blackberries, how many blueberries will she need?
b. What proportion of the berries will be blueberries?

Ratio and proportion 47

100 Maths Lessons Year 6 links:

- Summer 1, Week 6 (pages 198–202): understand and use ratio and proportion

Year 6 Practice Book links:

- (page 78): Baking time
- (page 80): All in a day