

Spring Block 4

# Fractions, decimals and percentages

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## Small steps

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# Decimal and fraction equivalents

## Notes and guidance

In Year 5, children explored common equivalents between fractions and decimals. In this small step, they extend this learning to include more complex equivalents.

A hundred square is a useful representation to allow children to explore equivalence. Using fraction and decimal walls also enables children to see the relationship between fractions such as  $\frac{1}{5}$  and  $\frac{2}{10}$  and therefore their decimal equivalents.

They look at methods for finding more complex equivalents by finding a common denominator of 100. These should include examples where children need to simplify fractions with larger denominators, for example  $\frac{146}{200}$

### Things to look out for

- If children are not confident finding equivalent fractions, they may find converting more complex fractions to decimals difficult.
- Children may be comfortable with the idea of finding a common denominator of 100, but struggle with examples that do not lend themselves to this strategy, for example  $\frac{1}{8}$

## Key questions

- If the whole has been split into 10/100 equal parts, what is each part worth as a fraction/decimal?
- If you know that \_\_\_\_\_ is equivalent to \_\_\_\_\_, what is \_\_\_\_\_ as a decimal?
- How can you convert fractions with a denominator of 100 to decimals?
- How can you convert fractions with a denominator that is a factor of 100 to decimals?
- How can you find equivalent fractions?
- Why might it be helpful to find an equivalent fraction with a denominator of 100/1,000?

## Possible sentence stems

- The first/second digit after a decimal point represents \_\_\_\_\_
- To find an equivalent fraction, I need to \_\_\_\_\_ or \_\_\_\_\_ the \_\_\_\_\_ and the \_\_\_\_\_ by the same number.

### National Curriculum links

- Use common factors to simplify fractions; use common multiples to express fractions in the same denomination

# Decimal and fraction equivalents

## Key learning

- The bar model is split into tenths.



- Complete the sentences.

The whole has been divided into \_\_\_\_\_ equal parts.

Each part is worth \_\_\_\_\_

As a fraction, this is written \_\_\_\_\_

- On a similar bar model, shade:

- 4 parts
- 5 parts
- 7 parts
- 10 parts

What decimal and what fraction is shown in each diagram?

- Use a blank hundred square.

- Complete the sentences to match the hundred square.

The whole has been divided into \_\_\_\_\_ equal parts.

Each part is worth \_\_\_\_\_

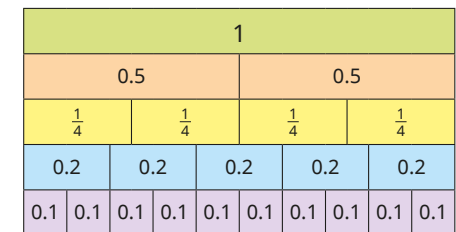
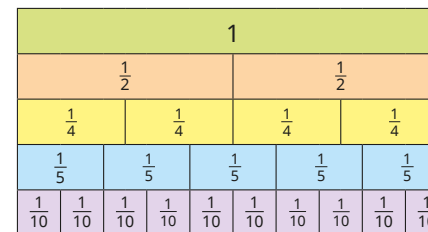
As a fraction, this is written \_\_\_\_\_

- On different hundred squares, shade:

- 9 parts
- 25 parts
- 75 parts
- 13 parts
- 50 parts
- 90 parts

What decimal and what fraction is shown in each of your hundred squares?

- Use the fraction and decimal walls to complete the equivalents.



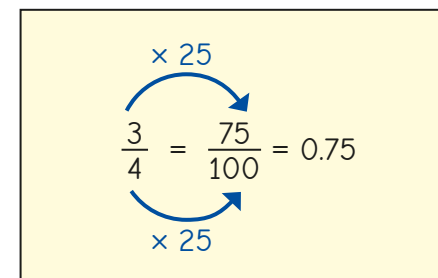
$$\frac{1}{2} = \frac{\square}{4} = \frac{\square}{10} = \dots$$

$$\frac{3}{4} = \dots$$

$$0.2 = \frac{1}{\square} = \frac{\square}{10}$$

$$\frac{4}{5} = \frac{\square}{\square} = \dots$$

- Rosie has converted three-quarters to a decimal.



Use Rosie's method to find the decimal equivalents of the fractions.

$$\frac{17}{20}$$

$$\frac{23}{50}$$

$$\frac{11}{25}$$

$$\frac{112}{200}$$

$$\frac{275}{500}$$

$$\frac{192}{300}$$

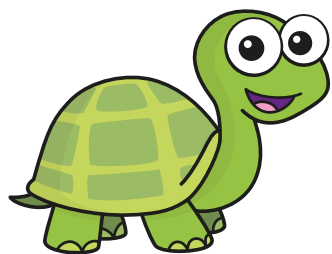
# Decimal and fraction equivalents

## Reasoning and problem solving

Tiny wants to convert  $\frac{137}{500}$  to a decimal.



I can divide 500 by 5 to get a denominator of 100, but then I cannot divide 137 by 5, so I cannot convert it to a decimal.



Explain a different method that Tiny could use.

Write  $\frac{137}{500}$  as a decimal.



0.274

1							
$\frac{1}{2}$				$\frac{1}{2}$			
$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$	
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$



To convert  $\frac{1}{8}$  to a decimal, would you use an equivalent fraction with a denominator of 10, 100 or 1,000?

Use your choice to convert  $\frac{1}{8}$  to a decimal.

Now use your answer to convert  $\frac{3}{8}$  to a decimal.

Why is it easy to convert  $\frac{4}{8}$  to a decimal?



1,000

0.125

0.375

# Fractions as division

## Notes and guidance

In this small step, children build on the learning from the previous step as they look at fractions as division to support them in converting between fractions and decimals.

Children explore the idea of fractions as divisions, learning that, for example  $\frac{3}{4}$  can be interpreted as  $3 \div 4$ . They use place value counters to exchange ones for tenths and share them into equal groups to see that, for example,  $\frac{1}{5} = 0.2$

Children progress to performing multiple exchanges to find other decimal equivalents. Once confident with this concept, they work with the more abstract short division method. It can be helpful to explore more complex examples, for example those that give recurring decimal answers, such as  $\frac{1}{3} = 0.\dot{3}$

### Things to look out for

- Children may interpret the division the wrong way around, for example  $\frac{4}{5}$  as  $5 \div 4$  rather than  $4 \div 5$
- Children may need support to use extra zeros as placeholders when dividing, to avoid errors such as  $3 \div 4 = 0.7$  remainder 2

## Key questions

- If the denominator is \_\_\_\_\_, how many equal parts are there? What are you dividing by?
- Can you share 1 one into 4 equal parts? What can you exchange the 1 one for?
- What can you exchange the remaining \_\_\_\_\_ tenths for?
- What do you notice about the decimal parts when dividing 1 by 3?
- What does “recurring” mean?
- How do you know that  $\frac{1}{2} = 2$  or  $\frac{5}{8} = 1.6$  cannot be correct?

## Possible sentence stems

- The fraction \_\_\_\_\_ can be expressed as \_\_\_\_\_  $\div$  \_\_\_\_\_
- \_\_\_\_\_  $\div$  \_\_\_\_\_ is the same as the fraction \_\_\_\_\_
- I can exchange 1 \_\_\_\_\_ for \_\_\_\_\_

## National Curriculum links

- Associate a fraction with division and calculate decimal fraction equivalents for a simple fraction

# Fractions as division

## Key learning

- Write each fraction as a division.

▶  $\frac{3}{4}$       ▶  $\frac{7}{9}$       ▶  $\frac{112}{137}$

Write each division as a fraction.

▶  $2 \div 3$       ▶  $5 \div 8$       ▶  $24 \div 35$

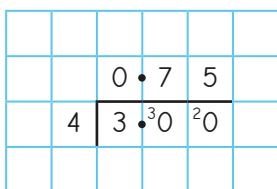
- Aisha uses place value counters to convert  $\frac{1}{2}$  to a decimal by dividing 1 whole by 2



$$\frac{1}{2} = 0.5$$

- ▶ Use Aisha's method to find the decimal equivalent of  $\frac{1}{5}$
- ▶ Use place value counters to find the decimal equivalent of  $\frac{1}{4}$

- Kim converts  $\frac{3}{4}$  to a decimal.



$$\frac{3}{4} = 0.75$$

Use Kim's method to find the decimal equivalent of each fraction.

▶  $\frac{2}{5}$       ▶  $\frac{4}{5}$       ▶  $\frac{3}{8}$       ▶  $\frac{5}{8}$

- Use division to find the decimal equivalents of  $\frac{2}{3}$ ,  $\frac{5}{6}$  and  $\frac{2}{9}$   
What do you notice?
- Teddy, Rosie and Jack have each found the decimal equivalent of  $\frac{7}{8}$

**Teddy**

		0	•	8	7	5	
8	7	•	0	0	0	0	

$$7 \div 8$$

$$\frac{7}{8} = 0.875$$

**Rosie**

		0	•	1	2	5	
8	1	•	0	0	0	0	

$$1 \div 8$$

$$\frac{1}{8} = 0.125$$

$$\frac{7}{8} = 7 \times 0.125$$

$$\frac{7}{8} = 0.875$$

**Jack**

		0	•	1	2	5	
8	1	•	0	0	0	0	

$$1 \div 8$$

$$\frac{1}{8} = 0.125$$

$$\frac{7}{8} = 1 - 0.125$$

$$\frac{7}{8} = 0.875$$

- ▶ Explain why each method works.
- ▶ Whose method do you prefer?
- ▶ Use your preferred method to find the decimal equivalent of  $\frac{19}{20}$

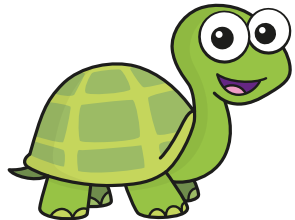


# Fractions as division

## Reasoning and problem solving

Tiny uses division to find the decimal equivalent of  $\frac{3}{5}$

		1	•	6	6	...	
3		5	•	20	20	...	



$$\frac{3}{5} = 1.66 \dots$$

Tiny worked out  $5 \div 3$  instead of  $3 \div 5$

0.6

How do you know that Tiny must be incorrect?

What mistake has Tiny made?

What is the correct answer?

Filip shares 7 large pizzas equally with 7 of his friends.

Esther shares 5 large pizzas with 5 of her friends.

Who gets more pizza, Filip or Esther?

Use decimals to help compare.

Filip

Annie has a plank of wood that is 1 metre long.



I have painted  $\frac{5}{8}$  of the plank red.

0.625 m

62.5 cm

How long is the piece of wood that is painted red?

Give your answer in metres and then in centimetres.

# Understand percentages

## Notes and guidance

In this small step, children explore percentages. They were introduced to percentages for the first time in Year 5, learning that “per cent” relates to “the number of parts per 100” and that if the whole is split into 100 equal parts, then each part is worth 1%.

Using bar models, children split 1 whole into 10 equal parts to explore multiples of 10%. They estimate 5% on a bar model split into 10 equal parts by splitting a section in half, for example 45% is four full sections and half of another section. Other common percentages that are useful to explore are 50%, 25% and 20% by splitting the bar model into 2, 4 and 5 equal parts respectively. They then explore ways of making more complex percentages using a combination of these, for example  $65\% = 50\% + 10\% + 5\%$ .

It is important for children to recap knowledge of complements to 100 to allow them to see that, for example,  $35\% + 65\% = 100\%$ .

### Things to look out for

- Children may think that 1% means 1 unit rather than 1 part out of 100 equal parts.
- If children are not confident with dividing 100 by 10, 5, 4 and 2, they may struggle to use bar models to find common percentages.

## Key questions

- What does “per cent” mean?
- How many parts are shaded/not shaded?
- What does 100% mean?
- How many equal parts is the bar model split into? What percentage is each part worth?
- How many ways could you make 95% using 50%, 25%, 10%, 5% and 1%?

## Possible sentence stems

- If the whole is shared into 100/10/5/4/2 equal parts, each part represents \_\_\_\_\_%.
- If \_\_\_\_\_ parts are shaded, the percentage shown is \_\_\_\_\_%.
- To find \_\_\_\_\_%, I can halve \_\_\_\_\_%.

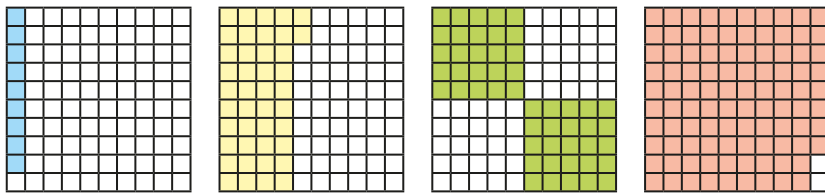
## National Curriculum links

- Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

# Understand percentages

## Key learning

- Here are some hundred squares.

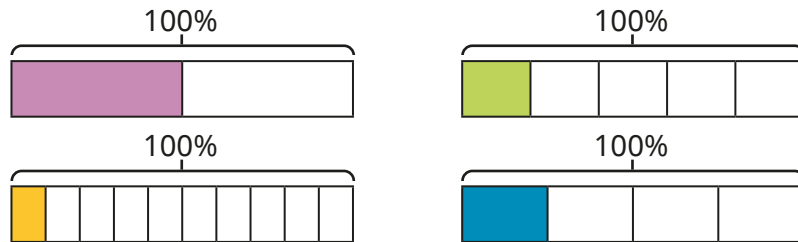


- ▶ How many parts out of 100 are shaded on each hundred square?
- ▶ What percentage of each hundred square is shaded?
- ▶ What percentage of each hundred square is **not** shaded?

What do you notice?

- What percentage of each bar model is shaded?

Use the sentences to help.



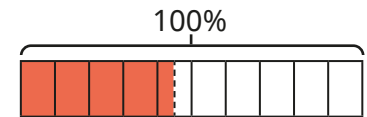
100% has been split into \_\_\_\_\_ equal parts.

Each part is worth \_\_\_\_\_%.

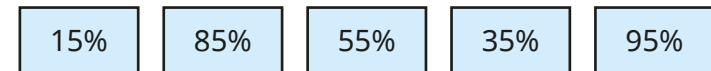
- Shade the percentages on the bar models.



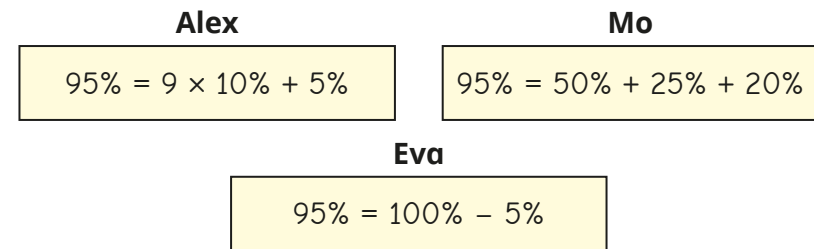
- 45% of the bar model is shaded.



Draw bar models to show the percentages.

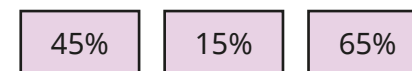


- Alex, Mo and Eva are exploring different ways of making 95%.



Explain each child's thinking.

Find four different ways of making each percentage.



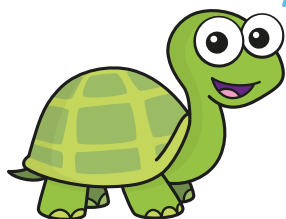
# Understand percentages

## Reasoning and problem solving

Tiny is shading percentages on bar models.



I have shaded 9% of the bar model.



90%

Part of the first box shaded. Just under 10%

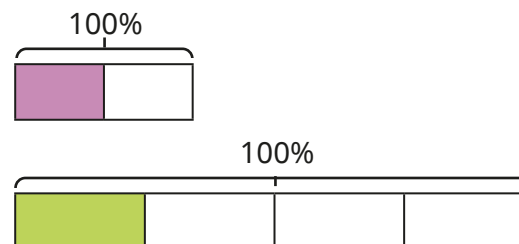
Explain the mistake that Tiny has made.



What percentage of the bar model has Tiny shaded?

What would 9% look like on the bar model?

Tommy is comparing percentages.



25% is greater than 50%, because the green part is bigger than the purple part.



No

Do you agree with Tommy?

Explain your answer.



# Fractions to percentages

## Notes and guidance

In this small step, children recap Year 5 learning on equivalent fractions and percentages, using visual representations, before moving on to more abstract methods.

Children use hundred squares and bar models to explore equivalents, for example  $\frac{1}{5}$  is the whole split into 5 equal parts and 100% split into 5 equal parts is 20%, so  $\frac{1}{5} = 20\%$ . They then explore the relationship with non-unit fractions, seeing that if  $\frac{1}{4}$  is equal to 25%, then  $\frac{3}{4} = 3 \times 25\% = 75\%$ . More abstract methods allow children to convert more complex examples such as  $\frac{11}{25}$ .

They recognise that if they can find an equivalent fraction with a denominator of 100, then they can easily find percentage equivalences. Children explore examples where they are required to multiply (for example,  $\frac{9}{20}$ ) or divide (for example,  $\frac{132}{200}$ ).

### Things to look out for

- Children need to be able to fluently find equivalent fractions.
- Children may not be confident with factors of 100, including 20 and 25

## Key questions

- What is a percentage?
- If the whole is split into 100 equal parts, then what percentage is \_\_\_\_\_ parts equivalent to?
- How are percentages and fractions similar/different?
- If you know  $\frac{1}{5}$  is equal to 20%, what percentage is  $\frac{4}{5}$  equal to?
- How do you find an equivalent fraction?
- How many 20s/25s are there in 100?
- What do you know about the relationship between  $\frac{1}{4}$  and  $\frac{1}{8}$ ?

## Possible sentence stems

- \_\_\_\_\_% is equivalent to  $\frac{\square}{100}$
- $\frac{\square}{\square}$  is equivalent to  $\frac{\square}{100}$  because ...
- The fraction  $\frac{\square}{\square}$  is equivalent to \_\_\_\_\_%.

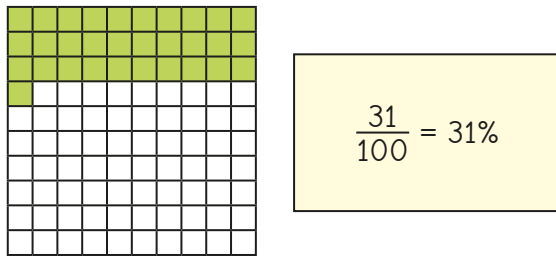
## National Curriculum links

- Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

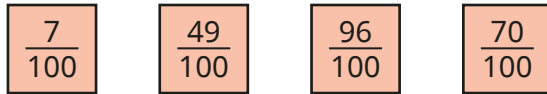
# Fractions to percentages

## Key learning

- Max uses a hundred square to convert  $\frac{31}{100}$  to a percentage.

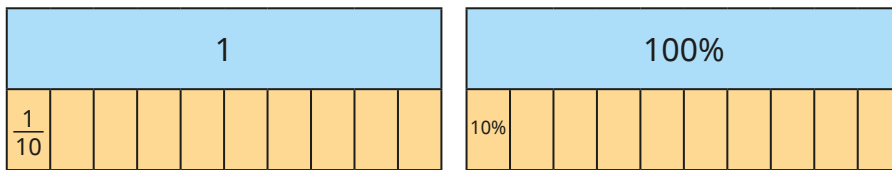


Shade hundred squares to show the fractions.



What percentage is shown on each hundred square?

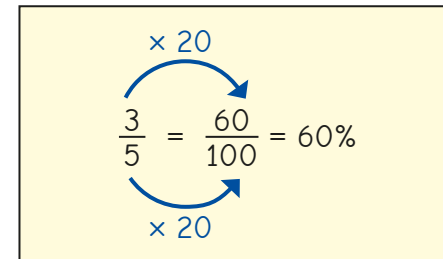
- The bar models show that  $\frac{1}{10}$  is equal to 10%.



Use the bar models to complete the statements.

▶  $\frac{3}{10} = \underline{\hspace{1cm}}\%$  ▶  $\frac{9}{10} = \underline{\hspace{1cm}}\%$  ▶  $\frac{\square}{100} = 50\%$  ▶  $\frac{\square}{\square} = 70\%$

- Whitney converts  $\frac{3}{5}$  to a percentage.



Use Whitney's method to convert the fractions to percentages.



- $\frac{2}{5}$  of the people in a stadium have brown hair.

17% of the people have ginger hair.

$\frac{4}{25}$  of the people have black hair.

The rest have blonde hair.

What percentage of the people have blonde hair?

# Fractions to percentages

## Reasoning and problem solving

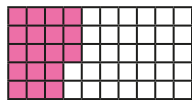


I know  $\frac{2}{8}$  is equal to  $\frac{1}{4}$  and  $\frac{1}{4}$  is equal to 25%, so  $\frac{2}{8}$  is also equal to 25%.

12.5%

How can you use Ron's facts to work out  $\frac{1}{8}$  as a percentage?

What is  $\frac{1}{8}$  as a percentage?



Huan thinks that 18% of the grid has been shaded.

Dora thinks that 36% of the grid has been shaded.

Who do you agree with?

Explain your answer.

Dora



In a maths test, Scott answered 58% of the questions correctly.

Nijah answered  $\frac{2}{5}$  of the questions incorrectly.

Nijah

Who answered more questions correctly?

Explain your reasoning.



Tiny converts  $\frac{13}{25}$  to a percentage.

$$\frac{13}{25} = \frac{13}{100} = 13\%$$

$\times 4$

52%

What mistake has Tiny made?

What is the correct percentage?



# Equivalent fractions, decimals and percentages

## Notes and guidance

In this small step, children continue to explore the fraction, decimal and percentage equivalents that they began in Year 5

Children use hundred squares, bar models and number lines to recap equivalents to  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$  and  $\frac{1}{10}$  as well as related non-unit fractions such as  $\frac{3}{4}$ ,  $\frac{2}{5}$  and  $\frac{7}{10}$ . They then look at more abstract methods of converting between fractions, decimals and percentages. Learning from the previous step is reinforced, in which equivalent fractions are found with a denominator of 100, allowing for a straightforward conversion to decimals and percentages. Children also convert decimals or percentages into a fraction with a denominator of 100 and then simplify where possible, for example  $15\% = \frac{15}{100} = \frac{3}{20}$ . This enables them to find equivalents to more complex numbers, such as 92% or 0.76

### Things to look out for

- Children may not be confident with methods for finding equivalent fractions – both fractions with a denominator of 100 and those that need simplifying.

## Key questions

- How many parts has the whole been split up into? What fraction is each part worth?
- If the whole is 100%, what is  $\frac{1}{2}/\frac{1}{4}/\frac{1}{5}$ ?
- If  $\frac{1}{10}$  is equal to 10%, what is  $\frac{3}{10}$  equal to?
- How do you find equivalent fractions?
- How many 5s are there in 100?
- Can the fraction be simplified? How do you know?

## Possible sentence stems

- If the whole is equal to 100%, then each part is worth \_\_\_\_\_%.
- If  $\frac{1}{\square}$  is equal to \_\_\_\_\_%, then  $\frac{\square}{\square}$  is equal to \_\_\_\_\_%.
- To find an equivalent fraction with a denominator of 100, I need to \_\_\_\_\_ by \_\_\_\_\_

## National Curriculum links

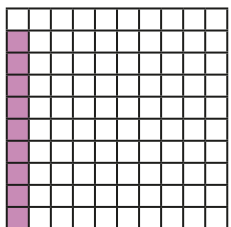
- Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts



# Equivalent fractions, decimals and percentages

## Key learning

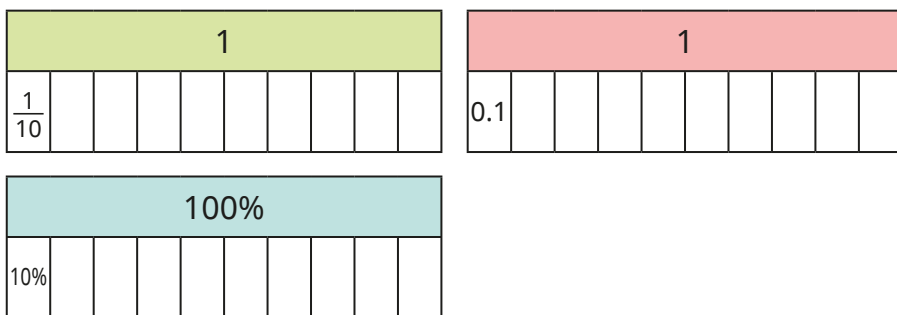
- Complete the sentences to describe the hundred square.



The fraction shaded is  $\frac{\square}{100}$   
 The decimal shaded is \_\_\_\_\_  
 The percentage shaded is \_\_\_\_\_

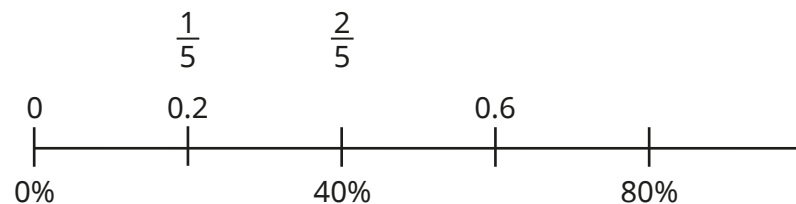
- What are the fraction and decimal equivalents of 97%?  
 What are the percentage and fraction equivalents of 0.23?

- What is the same about each bar model? What is different?

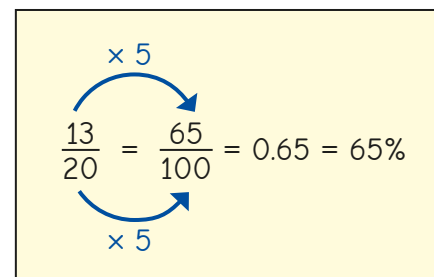


- ▶ Shade three parts of each bar model.  
 What fraction, decimal and percentage is shaded?
- ▶ What other equivalent fractions, decimals and percentages can you find?

- Complete the number line to show the equivalent fractions, decimals and percentages.



- Dexter converts  $\frac{13}{20}$  to a decimal and a percentage.



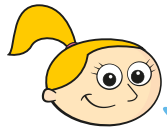
Explain Dexter's method.

Use Dexter's method to write each fraction as a decimal and as a percentage.



# Equivalent fractions, decimals and percentages

## Reasoning and problem solving



Eva

I know that 45% is equivalent to  $\frac{45}{100}$

I know that 45% is equivalent to  $\frac{9}{20}$



Amir

They are both correct, but Amir has written the fraction in its simplest form.

Who do you agree with?  
Explain your reasoning.



$\frac{11}{25}$  and 44%

Which of these pairs are equivalent?

$\frac{49}{50}$  and 0.98

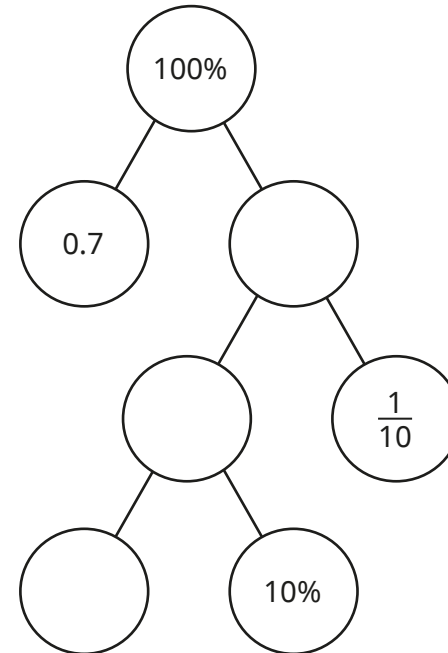
$\frac{11}{25}$  and 44%

$\frac{23}{50}$  and 23%

$\frac{17}{20}$  and 0.17

$\frac{49}{50}$  and 0.98

Complete the part-whole model.



0.3, 30%,  $\frac{30}{100}$ ,  $\frac{3}{10}$   
0.2, 20%,  $\frac{20}{100}$ ,  $\frac{2}{10}$ ,  $\frac{1}{5}$   
0.1, 10%,  $\frac{10}{100}$ ,  $\frac{1}{10}$

Is there more than one way to complete it? How do you know?

Create your own question like this for a partner.



# Order fractions, decimals and percentages

## Notes and guidance

In Year 5, children compared and ordered decimal numbers with up to 3 decimal places. In Year 6 Autumn Block 3, they ordered fractions with the same numerator or denominator. In this small step, they use their conversion skills from recent steps to order and compare fractions, decimals and percentages.

Children explore a range of strategies to compare and order numbers, including converting to the same form. Ask children to discuss if they prefer converting amounts to decimals, percentages or fractions and why. Children also look at strategies such as comparing amounts to a half and whether some amounts are closer or further away from the whole.

For consistency, use the word “greatest” rather than “biggest” or “largest” when comparing numbers.

### Things to look out for

- Children may decimalise the percentage, for example 0.67%.
- Children may turn numerators into decimals or percentages even if the denominator is not 100, for example  $\frac{45}{50} = 0.45 = 45\%$ .

## Key questions

- What fraction/decimal/percentage is \_\_\_\_\_ equivalent to?
- Which is the greater amount, \_\_\_\_\_ or \_\_\_\_\_? How do you know?
- Which of the amounts are greater than a half?
- Which of the amounts is closer to 1 whole?
- Where do these amounts go on a number line?
- Is it easier to convert the numbers to fractions, decimals or percentages?

## Possible sentence stems

- \_\_\_\_\_ is greater/smaller than one half, and \_\_\_\_\_ is smaller/greater than one half, so \_\_\_\_\_ is greater/smaller than \_\_\_\_\_
- \_\_\_\_\_ is equivalent to \_\_\_\_\_, so it is greater/smaller than \_\_\_\_\_

## National Curriculum links

- Compare and order fractions, including fractions  $>1$
- Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

# Order fractions, decimals and percentages

## Key learning

- Teddy knows that  $\frac{11}{20}$  is greater than a half and 42% is less than a half because it is less than 50%, so  $\frac{11}{20}$  is greater than 42%. Use Teddy's method to write "greater" or "less" to complete the sentences.

- ▶ 0.45 is \_\_\_\_\_ than  $\frac{16}{30}$
- ▶  $\frac{251}{500}$  is \_\_\_\_\_ than 15%.
- ▶ 50% is \_\_\_\_\_ than 0.309
- ▶  $\frac{13}{24}$  is \_\_\_\_\_ than 0.5

- Aisha knows that  $\frac{9}{10}$  is closer to 1 whole than a half, but 52% is closer to a half than 1 whole, so  $\frac{9}{10}$  is greater than 52%. Use Aisha's method to write <, > or = to compare the amounts.

$$0.61 \bigcirc 95\% \quad 0.809 \bigcirc \frac{26}{50} \quad 61\% \bigcirc \frac{33}{35}$$

- Kim converts  $\frac{13}{20}$  to  $\frac{65}{100}$ , which is equivalent to 65%.

She uses this to recognise that  $\frac{13}{20} < 67\%$ .

Use Kim's method to write <, > or = to compare the amounts.

$$\frac{34}{50} \bigcirc 68\% \quad \frac{24}{25} \bigcirc 98\% \quad \frac{4}{10} \bigcirc 38\% \quad 44\% \bigcirc \frac{9}{20}$$

- Convert 0.38 and  $\frac{1}{4}$  to percentages.

Use your conversions to write 45%, 0.38 and  $\frac{1}{4}$  in ascending order.

- Order the numbers from greatest to smallest.

50%	$\frac{2}{5}$	0.45	$\frac{3}{10}$	54%	0.05
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- Explain why  $\frac{13}{10}$  is greater than 87%.

- Write <, > or = to compare the amounts.

$$\frac{2}{3} \bigcirc 1.1 \quad 105\% \bigcirc \frac{19}{20} \quad 1.01 \bigcirc 100\%$$

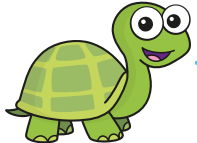
- Write the values in ascending order.

$\frac{1}{2}$	0.48	2.7	65%	$\frac{21}{20}$	49%
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Compare methods with a partner.

# Order fractions, decimals and percentages

## Reasoning and problem solving



I know that 100% is greater than  $\frac{53}{0}$  because 100 is less than 53

Do you agree with Tiny?  
Explain your answer.

No

Is the statement true or false?

There is no fraction, decimal or percentage that is greater than  $\frac{99}{100}$ , 0.99 or 99%, but smaller than 1 whole.

Explain your answer.

False

Write a fraction, decimal and percentage that could complete the comparison.

$$\frac{3}{5} < \boxed{\phantom{000}} < \frac{4}{5}$$

multiple possible answers, e.g.

$\frac{7}{10}$ , 70%, 0.7,  
 $\frac{13}{20}$ , 75%, 0.78

Mo wants to write the numbers in descending order.

87%	0.19	$\frac{17}{15}$
0%	2.19	$\frac{4}{8}$



I am going to convert them all to percentages.

2.19,  $\frac{17}{15}$ , 87%,  
 $\frac{4}{8}$ , 0.19, 0%

Explain why Mo does not need to do this.

Write the numbers in descending order.

# Percentage of an amount – one step

## Notes and guidance

In this small step, children calculate percentages of amounts for the first time. Children are familiar with finding fractions of amounts, but it may be worth recapping this before moving on to percentages.

Children find percentages of amounts that can be completed in one step, for example finding 1%, 10%, 20%, 25% and 50% by dividing by 100, 10, 5, 4 and 2 respectively. Using bar models to represent this allows children to see the links to finding fractions of amounts. They explore different strategies for dividing by these amounts, looking for the most efficient method for the calculation, including moving the digits when dividing by 10 and 100, halving and halving again for dividing by 4, as well as the formal written division method.

## Things to look out for

- Knowing that to find 10% of a number they divide by 10 may confuse some children, leading to misconceptions such as dividing by 20 to find 20%.
- Children may answer every question by dividing the number by 100 to find 1% and then multiplying, rather than solving in one step.

## Key questions

- How are percentages and fractions similar/different?
- How do you find a fraction of an amount?
- How can you represent this question with a bar model?
- How many lots of 10/20/25/50% are there in 100%?
- What do you need to divide a number by to find 10/20/25/50%?
- What strategies could you use to divide by \_\_\_\_\_?

## Possible sentence stems

- There are \_\_\_\_\_ lots of \_\_\_\_\_% in 100%  
To find \_\_\_\_\_% of a number, I need to divide by \_\_\_\_\_
- The whole amount is worth \_\_\_\_\_ %.  
To find \_\_\_\_\_%, I need to divide the whole by \_\_\_\_\_
- If 100% is equal to \_\_\_\_\_, then \_\_\_\_\_% is equal to \_\_\_\_\_

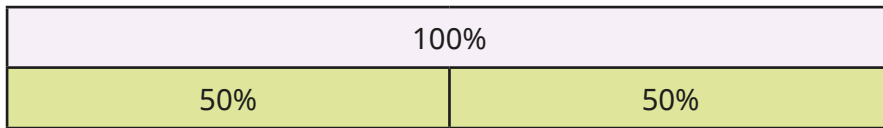
## National Curriculum links

- Solve problems involving the calculation of percentages and the use of percentages for comparison

# Percentage of an amount – one step

## Key learning

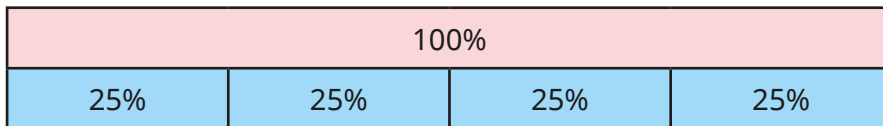
- There are two lots of 50% in 100%.



This means that to find 50% of an amount, you divide it by 2  
Work out 50% of each number.



- There are four lots of 25% in 100%.



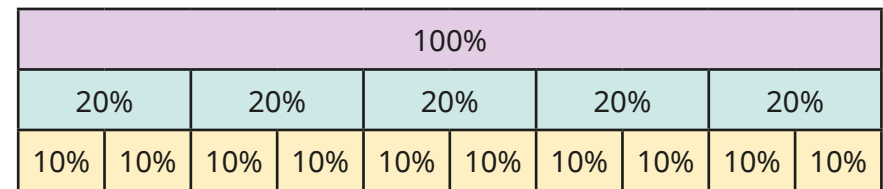
This means that to find 25% of an amount, you divide it by 4  
Work out 25% of each number.



What do you notice about your answers?

Why does this happen?

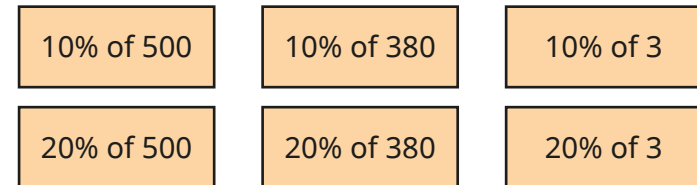
- Use the bar model to complete the sentences for 10% and 20%.



There are \_\_\_\_\_ lots of \_\_\_\_\_% in 100%.

To find \_\_\_\_\_% of an amount, you divide it by \_\_\_\_\_

- Work out the percentages.

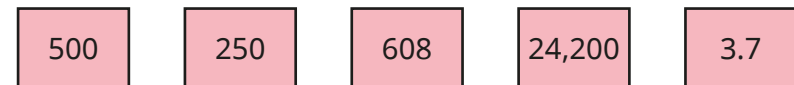


What do you notice?

- $100 \div 100 = 1$

So to find 1% of an amount, divide it by 100

Find 1% of each number.

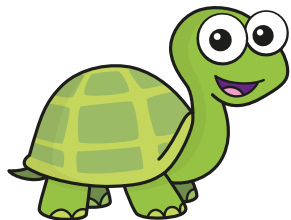


# Percentage of an amount – one step

## Reasoning and problem solving

Tiny is finding percentages of amounts.

To find 10% I divide by 10, so to find 50% I divide by 50



Explain the mistake that Tiny has made.

What do you need to divide by to find 50%?

What percentage would you find if you divided by 50?

2

2%

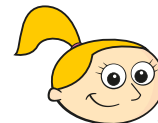


Max

My amount is greatest, because I started with the greatest amount.

**Max**

20% of 480

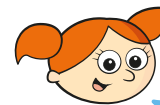


Eva

My amount is greatest, because I am finding the greatest percentage.

**Eva**

50% of 210



Alex

I think my amount is greatest.

**Alex**

25% of 424

Who do you agree with?

Talk about it with a partner.

Alex



# Percentage of an amount – multi-step

## Notes and guidance

In this small step, children build on the learning of the previous step by finding percentages of amounts that require more than one step.

Using knowledge of how to find 1%, 10%, 20%, 25%, 50%, children find multiples of these amounts. For example, to find 75% they can find 25% and multiply it by 3; to find 60% they can find 10% and multiply it by 6. They then move on to more complex percentages.

Allow children time to explore different ways of making percentages without actually calculating the percentages of amounts, for example 45% can be made from  $25\% + 10\% + 10\%$ ,  $5\% \times 9$ ,  $1\% \times 45$ ,  $50\% - 5\%$ . Once children recognise that percentages can be made in a range of ways, they apply this to finding a percentage of an amount using the most efficient method.

## Things to look out for

- Children often do not explore subtraction as an efficient strategy, particularly subtracting from the whole, for example  $95\% = 100\% - 5\%$ .
- Children may rely on finding 1% and then multiplying it, rather than considering more efficient methods.

## Key questions

- How can you find 1%/10%/20%/25%/50% of a number?
- How can you use 10% to find 30%?
- How can the percentage 36% be made using 1%, 5%, 10%, 20%, 25%, 50% and 100%?
- If you know 1% of an amount, how can you work out 37% of that amount?
- If you know 1% of an amount, how can you work out 99% of that amount?

## Possible sentence stems

- \_\_\_\_\_% is made up of \_\_\_\_\_%, \_\_\_\_\_ and \_\_\_\_\_%.
- \_\_\_\_\_% of \_\_\_\_\_ is equal to \_\_\_\_\_
- If 100% is equal to \_\_\_\_\_, then \_\_\_\_\_% is equal to \_\_\_\_\_
- \_\_\_\_\_% is equal to \_\_\_\_\_ lots of \_\_\_\_\_%.

## National Curriculum links

- Solve problems involving the calculation of percentages and the use of percentages for comparison

# Percentage of an amount – multi-step

## Key learning

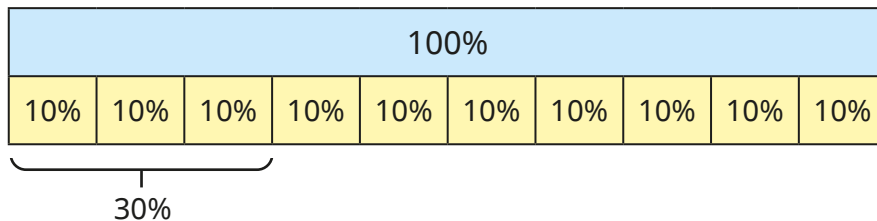
- Work out 1% of each number.



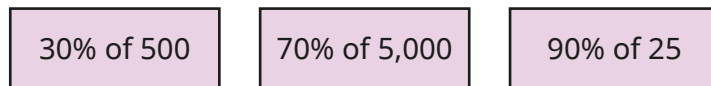
Use your answers to work out the percentages of amounts.



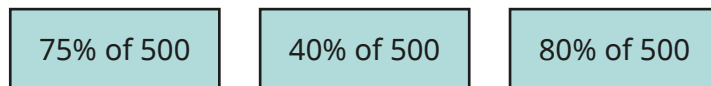
- The bar model shows that 30% is made up of three lots of 10%.



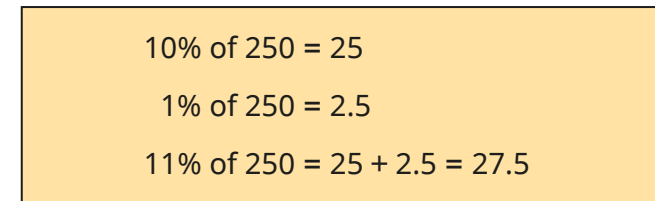
Use the bar model to help you work out the percentages.



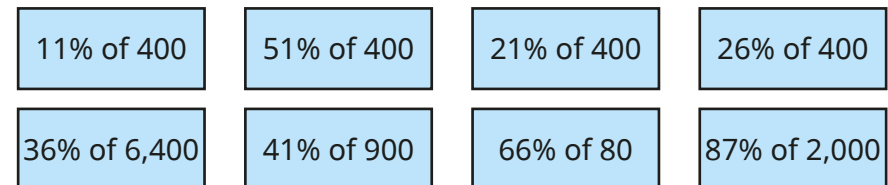
- Calculate the percentages.



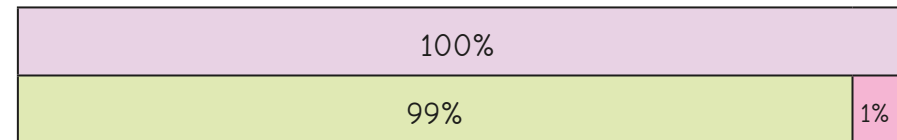
- Here is a method for finding 11% of 250



Use this method to work out the percentages.



- Rosie knows that 99% of an amount is 1% less than the full amount, so she finds 1% and takes that away from the total.



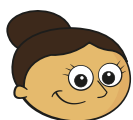
Use this to work out the percentages.



# Percentage of an amount – multi-step

## Reasoning and problem solving

Dora, Jack, Mo and Rosie were asked to find 90% of a number.



I found 10% and multiplied it by 9

Dora



I found 1% by dividing by 100, then I multiplied my answer by 90

Jack



I worked out  $50\% + 10\% + 10\% + 10\% + 10\%$ .

Mo



I found 10% and subtracted it from 100%

Rosie

Whose method is correct?

Explain your answer.



All the methods are acceptable ways of finding 90%.

Work out 24% of 3.5 metres.



Give your answer in centimetres and in metres.

Compare methods with a partner.



84 cm, 0.84 m

Work out the percentages of amounts.



45% of 60

60% of 45

27

27

What do you notice?

Does this always happen?



# Percentages – missing values

## Notes and guidance

For the final small step in this block, children use their understanding of percentages to find the whole number from a given percentage. This links back to the previous step, as children will have to know how many lots of \_\_\_\_\_% are in 100% and multiply accordingly. For example, if they know 20% of a number, then they multiply that by 5 to work out 100%.

Once confident with simple percentages such as 1%, 10%, 20%, 25% or 50%, children work out percentages such as 12% that cannot be solved in one step. With examples such as these, children recognise that for any percentage, they can find 1% first before multiplying up to 100%. For example, if they know 9% of a number, they divide that by 9 then multiply by 100. Similarly, if they know 30% of a number, they can divide that by 3 and then multiply by 10

### Things to look out for

- Children may be confused with two-step solutions, for example saying “30% of a number is 12, so I will multiply 12 by 30”
- Children may use inefficient methods to multiply, for example using the formal method for  $\times 10$

## Key questions

- If you know \_\_\_\_\_% of a number, how can you work out the whole?
- How many lots of \_\_\_\_\_% are there in 100%?
- If you know 23%, how can you find 1%? Once you know 1%, how can you find 100%?
- If you know 40%, how can you find 10%? Once you know 10%, how can you find 100%?
- How can linking percentages to fractions help you to answer this question?

## Possible sentence stems

- If \_\_\_\_\_% of a number is \_\_\_\_\_, then the whole is \_\_\_\_\_
- There are \_\_\_\_\_ lots of \_\_\_\_\_% in 100%.
- If \_\_\_\_\_% of a number is \_\_\_\_\_, then 1% of the number is \_\_\_\_\_, so 100% is \_\_\_\_\_

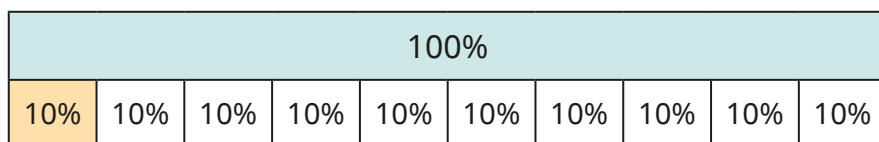
## National Curriculum links

- Solve problems involving the calculation of percentages and the use of percentages for comparison

# Percentages – missing values

## Key learning

- If you know 10% of a number, you can multiply by 10 to find the whole.



Work out the missing numbers.

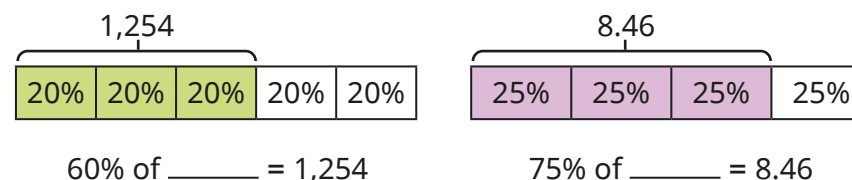
- ▶ 10% of \_\_\_\_\_ = 2.8      ▶ 10% of \_\_\_\_\_ = 709
- ▶ 10% of \_\_\_\_\_ = 45p      ▶ 10% of \_\_\_\_\_ = 38 g
- ▶ If 50% of a number is 123, what is the number?
- ▶ If 25% of a number is 45, what is the number?
- ▶ If 20% of a number is 70, what is the number?
- Tom knows that 30% of a number is 210  
He then works out the whole by finding 10% first.

$10\% = 210 \div 3 = 70$ $100\% = 70 \times 10 = 700$
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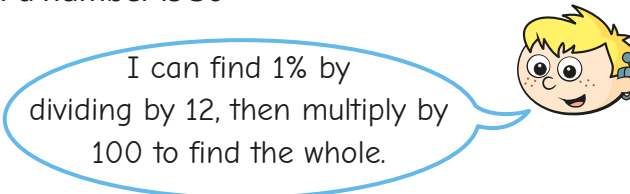
Use Tom's method to work out the missing numbers.

- ▶ 30% of \_\_\_\_\_ = 360      ▶ 70% of \_\_\_\_\_ = 4.9
- ▶ 90% of \_\_\_\_\_ = 0.36 kg      ▶ 60% of \_\_\_\_\_ = 92p

- Use the bar models to work out the missing numbers.



- If you know 1% of a number, you can work out the whole by multiplying by 100  
Use this fact to work out the missing numbers.
- ▶ 1% of \_\_\_\_\_ = 0.06      ▶ 1% of \_\_\_\_\_ km = 56 m
- ▶ 3% of \_\_\_\_\_ = 0.27      ▶ 1% of \_\_\_\_\_ g = 2.9 g
- 12% of a number is 36



Use Max's method to find the whole.

- Annie is thinking of a number.  
15% of her number is 90  
What is her number?

# Percentages – missing values

## Reasoning and problem solving

A bag contains red, blue and yellow balloons.

20% of the balloons in the bag are red.

There are 24 red balloons.

There are three times as many blue balloons as yellow balloons.

How many blue and yellow balloons are there in the bag?



72 blue, 24 yellow

Fill in the missing values to make the statement correct.

$$25\% \text{ of } \square = \square \% \text{ of } 60$$

Can you find more than one way?



multiple possible answers, e.g.

$$25\% \text{ of } 60 = 25\% \text{ of } 60$$

$$25\% \text{ of } 120 = 50\% \text{ of } 60$$

Tiny is solving this problem.

$$5\% \text{ of } \square = 0.3$$

I know that there are 20 lots of 5% in 100%, so I will multiply 0.3 by 20 to find the answer.



$$\begin{aligned} 5\% &= 0.3 \\ 100\% &= 0.3 \times 20 = 6 \end{aligned}$$

Do you agree with Tiny?

Explain your answer.



Yes