Released December 2017

Year 6

Small Steps Guidance and Examples

Block 2 – Percentages

White Rose Maths

Year 6 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number- Place Value		Number- Addition, Subtraction, Multiplication and Division				Fractions				Geometry- Position and Direction	Consolidation
Spring	Number- Decimals		Number- Percentages		Number- Algebra		Measurement Converting units	Measurement Perimeter, Area and Volume		Number- Ratio		Consolidation
Summer	Geometry- Properties of Shapes		Problem solving			Statistics		Investigations				Consolidation

Week 3 to 4 – Number: Percentages

Overview

Small Steps

- Fractions to percentages
- Equivalent FDP
- Percentage of an amount (1)
- Percentage of an amount (2)
- Percentages – missing values
- Percentage increase and decrease
- Order FDP

NC Objectives

Solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison.

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

Fractions to Percentages

Notes and Guidance

It is important that children understand that 'percent' means 'out of 100', therefore they will need to use their knowledge of equivalent fractions to make the denominator 100

Children will recall and use equivalences between simple fractions and percentages in different contexts.

Mathematical Talk

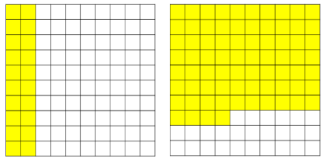
What does the word 'percent' mean? How can you represent this?

Which denominator is the easiest to convert into a percentage? Why is this easiest? Which other denominators are easier to convert into percentages?

If the denominator is 50, 25, 20 or 10 how would you convert it in to 100? What would you need to do to the numerator?

Varied Fluency

1 What fraction of the 100 square is shaded?
Can you write this as a percentage?



Shade in another 100 square to show 50%
Can you write this as two different fractions?

2 What numbers have been covered by the splats?

$\frac{12}{100} = \_\_\_\_\%$.

$\frac{\_\_\_\_}{100} = 35\ \%$

$\frac{12}{50} = \_\_\_\_\%$.

$\frac{44}{\_\_\_\_} = 22\ \%$

3 Complete the table.

Fraction	Fraction in Hundredths	Percentage
$\frac{7}{10}$	$\frac{\_\_\_\_}{100}$	
$\frac{7}{\_\_\_\_}$	$\frac{35}{100}$	
$\frac{7}{\_\_\_\_}$	$\frac{\_\_\_\_}{100}$	28%

Fractions to Percentages

Reasoning and Problem Solving

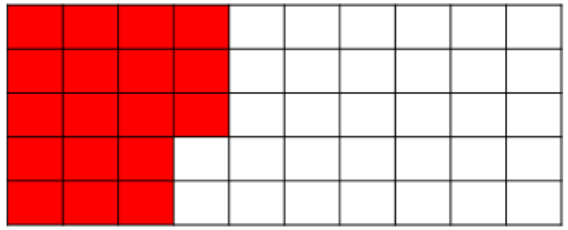
In a Maths test, Tom answered 62% of the questions correctly.

Lily answered $\frac{3}{5}$ of the questions correctly.

Who answered more questions correctly?

Explain your answer.

Tom answered more questions correctly because $\frac{3}{5}$ as a percentage is 60% and this is less than 62%



Mark thinks that $\frac{18}{100}$ of this grid has been shaded.
Nisha thinks that 36% of the grid has been shaded.

Who do you agree with?

Explain your reasoning.

Nisha is correct because the grid is 50 squares not 100 and 18 of them are shaded.

Equivalent FDP

Notes and Guidance

Children convert between fractions, decimals and percentages. They use their knowledge of common equivalent fractions and decimals to find the equivalent percentage.

Children start by focusing on converting decimals to fractions and then to percentages. They then look at how a decimal can be multiplied by 100 in order to find the equivalent percentage.

Mathematical Talk

How does converting a decimal to a fraction help us to convert it to a percentage?

When I convert a decimal to a percentage, what do I need to multiply by? Can I use a place value grid to help me convert the decimal to a percentage?

Varied Fluency

1 Complete the table.

Decimal	Fraction	Percentage
0.35	$\frac{35}{100}$	35%
0.27		
0.6		

2 Fill in the missing boxes.

0.72 = ☐ %

89% = ☐ %

6% = ☐ %

0.4 = ☐ %

3 Complete the table. Can you record the fraction in its simplest form?

Representation	Fraction	Decimal	Percentage
			46%
			
		0.78	
	$\frac{2}{5}$		

Equivalent FDP

Reasoning and Problem Solving

Complete the missing information using a decimal and a percentage.
Can you find more than one solution?

$\frac{1}{4} = 75\% - \square -$ 3 tenths

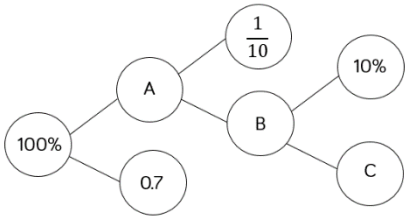
$40\% = \frac{1}{5} + \square + \square$

Possible answers:

1. 0.2 or 20%

2. 0.1 and 10%
   0.05 and 15%
   0.01 and 19%

Complete the part whole model. How many different ways can you complete it?



Can you create your own version with different values?

A = 0.3, 30% or $\frac{3}{10}$

B = 0.2, 20%, $\frac{2}{10}$ or $\frac{1}{5}$

C = 0.1, 10% or $\frac{1}{10}$

Use the digit cards to complete the missing information.
How many ways can you find?

1	2	3	4	5	6

$\frac{\square}{8} = 0.\square 25 = \square 2.\square\%$

Possible answers:

$\frac{1}{8} = 0.125 = 12.5\%$

or

$\frac{5}{8} = 0.625 = 62.5\%$

Percentage of an Amount (1)

Notes and Guidance

Children use different representations to find percentages of amounts. For example 50%, 25%, 10%, 1%.
Allow time for children to explore efficiency of methods and develop a deep understanding of why you can divide by ten to find 10%, but you do not divide by 25 to find 25%.
Children need to understand percentages as parts of 100 and that the whole amount is 100%, therefore when finding 1% we divide by 100.

Mathematical Talk

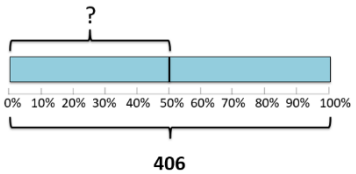
How many other ways could you find 25%? Which is the most effective?

If you know how to calculate 10%, how can you use this to calculate 1%?

What's the same and what's different about 10% of 300, 30 and 3? What do you notice?

Varied Fluency

1 Find 50% of 406
50% is equal to a half so we can divide by 2 to find 50%

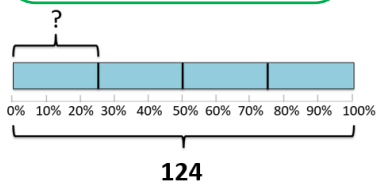


Calculations

$50\% = \frac{1}{2}$

$406 \div 2 = 203$

Use this to find 25% of 124
Which fraction is 124 equivalent to?



2 Complete the sentences:
To find 50%, I can divide by ___
To find 25%, I can divide by ___
To find 10%, I can divide by ___
To find 1%, I can divide by ___

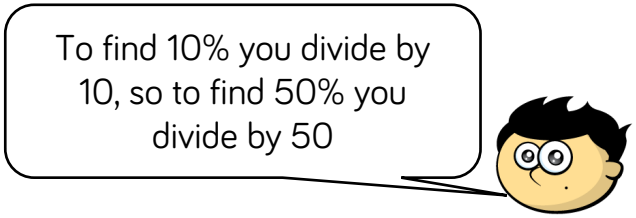
3 Find:

10% of 300	10% of 30	10% of 3
1% of 500	1% of 1 m	1% of 750 ml

Percentage of an Amount (1)

Reasoning and Problem Solving

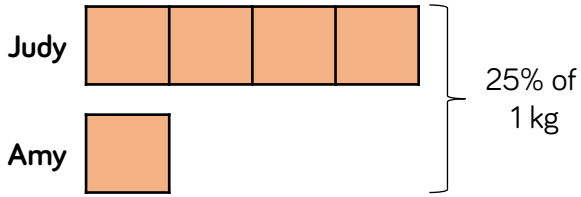
Henry says,



Do you agree? Explain why.

Possible answer:
Henry is wrong because 50% is equivalent to a half so to find it you divide by 2

Amy and Judy shared 25% of a 1 kg bar of chocolate.
Amy ate a quarter of the amount that Jude ate.
How much did they each eat?



How much less did Amy eat than Judy?

Judy ate 200 g, Amy ate 50 g

Amy ate 150 g less than Judy

50% of 300	5% of 20	25% of 244
10% of 890	1% of 120,000	50% of 9402
25% of 225,000	10% of 85,610	5% of 600

Using the table above,

a) What's the biggest total you can make using only 3 amounts?

b) What's the smallest total you can make using 3 amounts?

c) Can you make exactly 300? How?

a) Largest: 69,512

b) Smallest: 92

c) 150 + 89 + 61

= 300

150	1	61
89	1,200	4,701
56,250	8,561	30

Percentage of an Amount (2)

Notes and Guidance

Children use concrete resources and visual representations to find compound percentages of amounts.
Allow time for children to explore efficiency of methods when finding any percentage. For example, when finding 20%, children could do:
$20\% = \frac{20}{100} = \frac{2}{10} = \frac{1}{5}$ then divide the amount by 5, or they could add two lots of 10%

Mathematical Talk

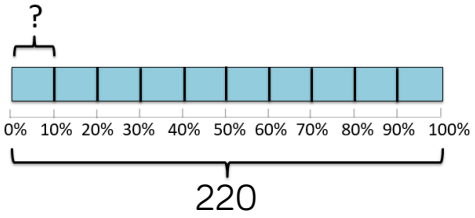
Why wouldn't the method of finding 10% of a number first be necessary when calculating 50%?

Is there a fraction you could use to help you work out 5%?

Which do you think is the most efficient method? Why?

Varied Fluency

1 If you know how to find 10% of 220, how could you use this to find 20%?



Calculations
10% of 220 = 22
To find 20%, we multiply 10% by 2
22 × 2 = 44

Use this method to find:
(a) 40% of 220 (b) 20% of 180 (c) 30% of 320

2 To find 5% of a number you could: Work out 10% and halve it, OR work out 1% and multiply it by 5
Use these methods to work out:
(a) 5% of 140 (b) 5% of 260 (c) 5% of 1 m 80 cm

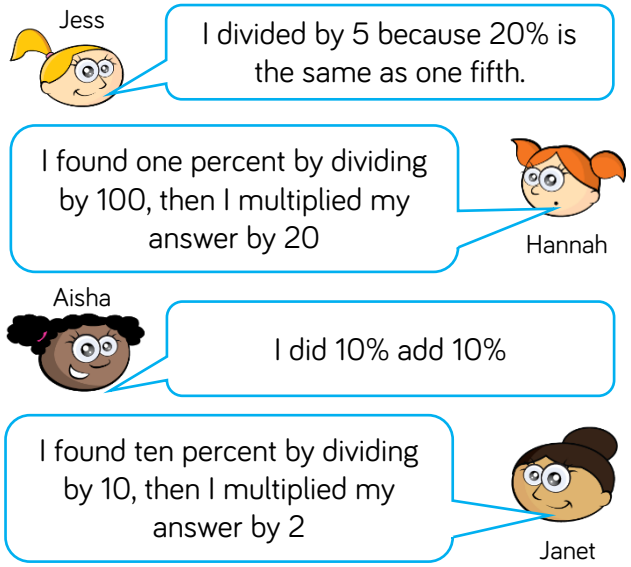
Which method do you find the most efficient?
How else could we work out 5%?

3 Calculate:
(a) 15% of 6 m (b) 35% of 3 kg (c) 65% of 2 hours

Percentage of an Amount (2)

Reasoning and Problem Solving

Four children in a class were asked to find 20% of an amount, this is what they did:



Who do you think has the most efficient method? Explain why.
Who do you think will end up getting the answer incorrect?

All methods are acceptable ways to finding 20%
Children may have different answers because they may find different methods easier.
Discussion could be had around whether or not their preferred method is always the most efficient.

Jack and Tara both have a string of beads.

They have red beads, blue beads, white beads and purple beads.

Jack's beads are 50% blue, 35% red, 10% white and 5% purple.

Tara's beads are 40% blue, 30% red, 20% white and 10% purple beads. Tara has 20 beads.

Jack and Tara have 4 purple beads between them.

How many of each colour does Jack have? How many does he have altogether?

Jack has 40 beads.

2 purple

20 blue

4 white

14 red

Percentages – Missing Values

Notes and Guidance

Children use their understanding of finding percentages of amounts to find missing values. They may choose to use a bar model to support their understanding and structure their ideas.

It is important that children see that there may be more than one way to solve a problem and that some methods are more efficient than others.

Mathematical Talk

Is there more than one way to solve the problem?

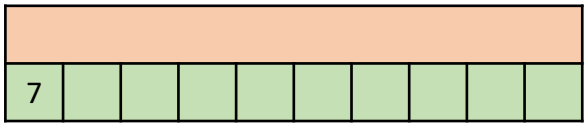
What is the most efficient way to find ___%?

What diagrams could help you visualise this problem?

Varied Fluency

1 If 7 is 10% of a number, what is the number?

Use the bar model to help you.



2 Complete:
Use a bar model to help you if you need.

10% of ☐ = 15 ☐ % of 150 = 45

30% of ☐ = 90 30% of ☐ = 900

Can you see a link between the questions?

3 350,000 people visited the Natural History Museum last week.
15% of people visited on Monday.
40% of people visited on Saturday.
How many people visited the Natural History Museum the rest of the week?

Percentages – Missing Values

Reasoning and Problem Solving

What percentage questions can you ask about this bar model?

Possible answer:
If 20% of a number is 3.5, what is the number?

25% of ☐ = ☐ % of 60

Possible answers:

25% of 120 = 50% of 60
25% of 24 = 10% of 60
25% of 2.4 = 1% of 60

A golf club has 200 members.

58% of the members are male.
50% of the female members are children.

(a) How many male members are in the golf club?
(b) How many female children are in the golf club?

116 male members

42 female children

Percentage Increase & Decrease

Notes and Guidance

Once children are secure in finding percentages of amounts and missing percentages, they move on to finding percentage increase and decrease.

They use a bar model to represent what increase and decrease will look like.

Mathematical Talk

What does increase/decrease mean?

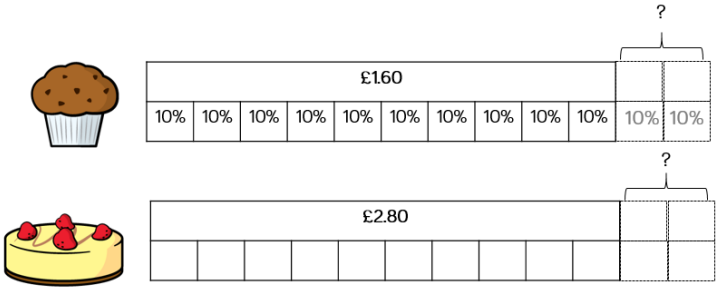
How does the bar model show the percentage increase/decrease?

If prices increase by 20%, what percentage will represent the new price?

If the percentage decrease is ___, how can we work out the original price? What will the new price be?

Varied Fluency

1 Janet is increasing the prices in her café by 20%
Calculate the percentage increase for the following items:



2 Use the same models to calculate the new cost for each item.

3 The price of houses has decreased by 10% in the last year.
Use a bar model to represent the percentage decrease and to complete the table.

House	Original Cost	10% decrease	New cost
A	£235, 650		
B	£145, 950		
C		£32, 760	

Percentage Increase & Decrease

Reasoning and Problem Solving

Football tickets cost £46.80 after a 20% decrease.

Cindy says,

The original tickets cost £56.16

Can you explain her mistake?

Cindy has found 20% of the reduced price rather than realising the reduced price is worth 80%

James says,

Decreasing a number by 13% is the same as finding 87% of that number.

Do you agree?

James is correct as the whole number would be worth 100% and 100 take away 17 is 83.

Children might calculate both and see that they are the same.

Tamzin has an amount of money saved.
The amount is increased by 25%
The new amount is then decreased by 25%

Does Tamzin have the same amount of money as she started with?

Explain your answer.

No she would not as the two 25%s are not of the same value so therefore they will be worth different things.

Children could explore doing these calculations using different values to convince themselves.

Order FDP

Notes and Guidance

Children build upon their previous learning on fractions, decimals and percentages to see that there are different ways of expressing proportions.

Children convert between fractions, decimals and percentages in order to order and compare them.

Mathematical Talk

What do you notice about the fractions, decimals or percentages? Can you compare any straight away?

What is the most efficient way to order them?

If you put them in ascending order, what will it look like?
If you put them in descending order, what will it look like?

Varied Fluency

1 Use <, > or = to complete the statements:

$0.23 \bigcirc 24\% \bigcirc \frac{1}{4}$

$37.6\% \bigcirc \frac{3}{8} \bigcirc 0.27$

2 Order from smallest to largest:

40%	$\frac{2}{5}$	0.45	$\frac{3}{10}$	54%	0.05

Can you place them on a number line?

3 Four friends share a pizza. Tyrone eats 35% of the pizza, Jasmine eats 0.4 of the pizza, Imran eats 12.5% of the pizza and Oliver eats 0.125 of the pizza.

Can you write the amount each child eats as a fraction?
Who eats the most? Who eats the least? Is there any left?

Order FDP

Reasoning and Problem Solving

In a Geography test, Sam scored 62% and Hamza scored $\frac{3}{5}$

Who got the highest score?

Explain your answer.

Sam scored more than Hamza because $\frac{3}{5}$ is equivalent to 60%, and 62% is greater.

In January, Rahima saves $\frac{3}{5}$ of her £20 pocket money.

In February, she saves 0.4 of her £10 pocket money.

In March, she saves 45% of her £40 pocket money.

Which month did she save the most money?

Estimate your answer first using your knowledge of fractions, decimals and percentages.
Explain why you have chosen that month.

She saved the most money in March.
Estimates:
Over £10 in January because $\frac{3}{5}$ is more than half.
Under £10 in February because she only had £10 to start with and 0.4 is less than half.
Nearly £20 in March because 45% is close to a half.