

Year 10 Autumn 1 FDPR: Focus Percentages and Ratio – Links to Fractions, Decimals and Similar shapes



Themes	Objectives (TG 1-9)	Learning Checks	Interventions - Mathswatch video
Percentages	<p>Apply the four operations to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative</p> <p>Find percentages of a number with and without a calculator; - multiples of 10% TG1 5%, 15%...TG2 or any percentage of a number TG3</p> <p>Select the best method to calculate a percentage TG4</p> <p>Work with percentages greater than 100%</p> <p>Write fractions to describe shaded parts of diagrams</p> <p>Convert FDP</p> <p>Express one number as a percentage of another with TG2 and without TG3 a calculator</p> <p>Order decimals, percentages TG3 and fractions TG4 and use the symbols =, ≠, <, >, ≤, ≥</p> <p>Find a percentage of a quantity using a multiplier; use a multiplier to increase or decrease by a percentage.</p> <p>Calculate simple interest TG4 and compound interest/repeated percentage change TG5</p> <p><i>Increase and decrease a number by a percentage including profit and loss calculation TG4</i></p> <p><i>Interpret a ratio as a percentage and a percentage as a ratio TG4</i></p> <p><i>Calculate worded fraction, decimal and percentage problems TG4</i></p> <p><i>Find a percentage of a percentage TG5</i></p> <p><i>Calculate percentage change TG5</i></p> <p><i>Recognise and calculate reverse percentages problems TG5</i></p> <p><i>Solve complex problems involving reverse percentages and compound interest TG8</i></p> <p>Apply percentage increase/decrease to area/volume of similar shapes TG9</p>		
Ratios	<p>Understand the meaning of ratio notation TG1 including simplifying ratios TG1</p> <p>Write a ratio in the form 1:n or n:1 and use the unitary method TG3</p> <p>Represent ratios using concrete materials TG1 and images TG3 and apply images to start to solve simple ratio problems TG3</p> <p>Write two numbers as a ratio TG2 and divide a number into any given ratio TG2</p> <p>Use ratios and equality of ratios to find missing values and solve problems TG3</p> <p>Read maps and find lengths using a scale TG3</p> <p>Understand ratios as fractions, including algebraically TG4 and write ratios algebraically TG5</p> <p>Solve value for money problems TG4</p> <p>Solve problems involving proportional change TG5</p> <p>Recognise when values are in direct proportion by reference to the graph and interpret graphs showing direct and inverse proportion</p> <p>Find the value of k in $y = kx$ with and without a graph; use graphs to solve inverse proportion problems by plotting and reading values</p> <p>Find values using direct and inverse proportion, including interpreting gradient as a rate of change and recognising graphs that illustrate direct and inverse proportion TG5</p> <p>Solve complex and unfamiliar ratio problems TG8</p> <p>Write lengths, areas and volumes of two shapes as ratios in simplest form</p> <p>Express a multiplicative relationship between two quantities as a ratio or a fraction, e.g. when $A : B$ are in the ratio $3 : 5$, A is $\frac{3}{5}B$. When $4a = 7b$, then $a = \frac{7b}{4}$ or $a : b$ is $7 : 4$;</p> <p>Use direct and indirect proportion to find missing values for x, x^2, x^3, \sqrt{x} relationships</p>		

MES 1-6

Order these decimals
Start with the smallest number.
0.61 0.1 0.16 0.106

Here are four numbers.

0.43 $\frac{3}{7}$ 43.8% $\frac{7}{16}$

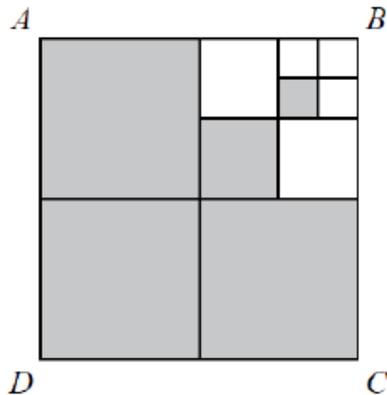
Write these numbers in order of size. Start with the smallest number.

Write 0.7 as a percentage.

Write $\frac{3}{5}$ as a decimal.

Find 15% of 120

ABCD is a square.
This diagram is drawn accurately



What fraction of the square ABCD is shaded?

(a) Work out $\frac{2}{7} + \frac{1}{5}$

(b) Work out $1\frac{2}{3} \div \frac{3}{4}$

Work out 234% of 150

In a sale, normal prices are reduced by 20%.
The normal price of a coat is reduced by £15
Work out the normal price of the coat.

A and B are two companies.
The table shows some information about the sales of each company and the number of workers for each company in 2004 and in 2014

	Company A		Company B	
	Sales (£ millions)	Number of workers	Sales (£ millions)	Number of workers
2004	320	2960	48	605
2014	388	3200	57	640

(a) Work out the percentage increase in sales from 2004 to 2014 for Company A.
(b) Which company had the most sales per worker in 2014, Company A or Company B? You must show how you get your answer.

The total weight of 3 tins of beans and 4 jars of jam is 2080 g. The total weight of 5 tins of beans is 2000 g.
Work out the weight of 1 tin of beans and the weight of 1 jar of jam.

The diagram below represents two towns on a map.



Scale: 1 cm represents 3 kilometres.
Work out the distance, in kilometres, between Towey and Worsley.

Jane made some almond biscuits which she sold at a fete.
She had:
5 kg of flour 3 kg of butter 2.5 kg of icing sugar 320 g of almonds
Here is the list of ingredients for making 24 almond biscuits.
Ingredients for 24 almond biscuits
150 g flour 100 g butter 75 g icing sugar 10 g almonds
Jane made as many almonds biscuits as she could, using the ingredients she had.
Work out how many almond biscuits she made.

Frank, Mary and Seth shared some sweets in the ratio 4 : 5 : 7
Seth got 18 more sweets than Frank.
Work out the total number of sweets they shared.

In a box of pens, there are
three times as many red pens as green pens
and two times as many green pens as blue pens.
For the pens in the box, write down
the ratio of the number of red pens to the number of green pens to the number of blue pens.

Soap powder is sold in three sizes of box.



A 2 kg box of soap powder costs £1.89
A 5 kg box of soap powder costs £4.30
A 9 kg box of soap powder costs £8.46
Which size of box of soap powder is the best value for money?
You must show how you get your answer.

Bella invests £5000 in an account for two years.
The account pays 3% compound interest per annum.
Bella has to pay 20% tax on the interest earned each year.
This tax is taken from the account at the end of each year.
How much money will Bella have in her account at the end of the two years?

Katy invests £2000 in a savings account for 3 years.
The account pays compound interest at an annual rate of 2.5% for the first year
 $x\%$ for the second year
 $x\%$ for the third year
There is a total amount of £2124.46 in the savings account at the end of 3 years.
(a) Work out the rate of interest in the second year.
Katy goes to work by train.
The cost of her weekly train ticket increases by 12.5% to £225
(b) Work out the cost of her weekly train ticket before this increase.

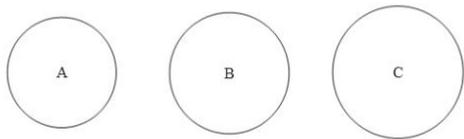
In a company, the ratio of the number of men to the number of women is 3 : 2
40% of the men are under the age of 25
10% of the women are under the age of 25
What percentage of all the people in the company are under the age of 25?

There are 3 red beads and 1 blue bead in a jar.
A bead is taken at random from the jar.
(a) What is the probability that the bead is blue?
There are 4 yellow counters and 3 green counters in a bag.
Sharon puts some more green counters into the bag.
The ratio of the number of yellow counters to the number of green counters is now 2 : 5.
(b) How many green counters did Sharon put into the bag?

On a farm
the number of cows and the number of sheep are in the ratio 6 : 5
the number of sheep and the number of pigs are in the ratio 2 : 1
The total number of cows, sheep and pigs on the farm is 189.
How many sheep are there on the farm?

5 schools sent some students to a conference.
One of the schools sent both boys and girls.
This school sent 16 boys.
The ratio of the number of boys it sent to the number of girls it sent was 1 : 2
The other 4 schools sent only girls.
Each of the 5 schools sent the same number of students.
Work out the total number of students sent to the conference by these 5 schools.

Here are three circles A, B and C.



Diagrams NOT accurately drawn

The area of circle A is 200 cm^2 .
The area of circle B is 10% larger than the area of circle A.
The area of circle C is 10% larger than the area of circle B.

How much larger is the area of circle C than the area of circle A?

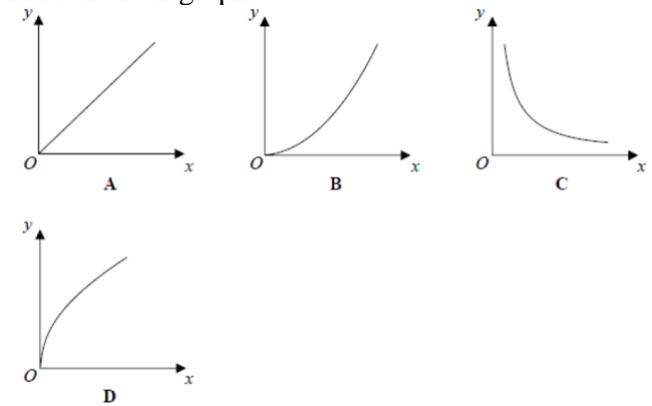
John has an empty box.
He puts some red counters and some blue counters into the box.
The ratio of the number of red counters to the number of blue counters is 1 : 4
Linda takes at random 2 counters from the box.
The probability that she takes 2 red counters is $\frac{6155}{6155}$
How many red counters did John put into the box?

d is inversely proportional to c
When $c = 280$, $d = 25$
Find the value of d when $c = 350$

On a farm, $4\frac{1}{2}$ out of every 15 acres of the land are used to grow crops.
Wheat is grown on $\frac{5}{8}$ of the land used to grow crops.
What percentage of the total area of the land on the farm is used to grow wheat?

Louis and Robert are investigating the growth in the population of a type of bacteria. They have two flasks A and B.
At the start of day 1, there are 1000 bacteria in flask A. The population of bacteria grows exponentially at the rate of 50% per day.
(a) Show that the population of bacteria in flask A at the start of each day forms a geometric progression.
The population of bacteria in flask A at the start of the 10th day is k times the population of bacteria in flask A at the start of the 6th day.
(b) Find the value of k .
At the start of day 1 there are 1000 bacteria in flask B. The population of bacteria in flask B grows exponentially at the rate of 30% per day.
(c) Sketch a graph to compare the size of the population of bacteria in flask A and in flask B.

Here are four graphs.



(a) Write down the letter of the graph that could represent
 y is proportional to x^2 .
(b) The force of attraction, F newtons, between two magnets varies inversely as the square of the distance, d cm, between the two magnets.
(i) What happens to the force of attraction between the magnets when the distance between the magnets is doubled?
When the magnets are 3 cm apart the force of attraction between them is 40 newtons.
(ii) What is the force of attraction between the magnets when they are 10 cm apart?

Solid A and solid B are mathematically similar.
The ratio of the surface area of solid A to the surface area of solid B is 4 : 9
The volume of solid B is 405 cm^3 .
Show that the volume of solid A is 120 cm^3 .

You must give a reason for your answer