What do I need to be able to do?

By the end of this unit you should be able to:

- Understand and use factors
- Understand and use multiples
- Multiply/ Divide integers and decimals by powers of 10
- Use formal methods to multiply
- Use formal methods to divide
- Understand and use order of operations
- Solve area problems
- Solve problems using the mean

Keywords

Array: an arrangement of items to represent concepts in rows or columns
Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number
Milli: prefix meaning one thousandth
Centi: prefix meaning one hundredth
Kilo: prefix meaning multiply by 1000
Quotient: the result of a division
Dividend: the number being divided
Divisor: the number we divide by

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Factors

Arrays can help represent factors

5 x 2 or 2 x 5

Factors of 10
1, 2, 5, 10

10 x 1 or 1 x 10

The number itself is always a factor

Square numbers have an **ODD number** of factors

Factors of 4
1, 2, 4

Factors of 36
1, 2, 3, 4, 6, 9, 12, 18, 36

Be strategic – Lay factors out in pairs can help you not to miss any

Multiples

4	4	4	4	4

Bar models can represent by something is a multiple. Eg 20 is a multiple of 4

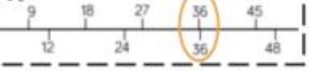
Lowest Common Multiples

LCM of 9 and 12

The first time ther multiples match

9	9, 18, 27, 36, 45, 54
12	12, 24, 36, 48, 60

LCM = 36



Multiply/ Divide by powers of 10

3 x 100 = 300

0.03 x 100 = 3

Repeated multiplication and division by powers of 10 is commutative

÷ 10 then ÷ 10 ⟶ ÷ 100

Metric conversions

Useful Conversions

mm ⇄ cm (÷ 10 / x 10), cm ⇄ m (÷ 100 / x 100), m ⇄ km (÷ 1000 / x 1000)

g ⇄ kg (÷ 1000 / x 1000)

ml ⇄ L (÷ 1000 / x 1000)

Multiplication methods

Long multiplication (column)

Grid method

Repeated addition

Less effective method especially for bigger multiplication

Estimations: Using estimations allows a 'check' if your answer is reasonable

Multiplication with decimals

Perform multiplications as integers
eg 0.2 x 0.3 ⟶ 2 x 3

Make **adjustments** to your answer to match the question: 0.2 x 10 = 2
0.3 x 10 = 3

Therefore 6 ÷ 100 = 0.06

Division methods

Short division

3584 ÷ 7 = 512

$7\overline{)3\,{}^{3}5\,8\,{}^{1}4}$ = 5 1 2

Complex division

÷ 24 = ÷ 6 ÷ 4

Break up the divisor using factors

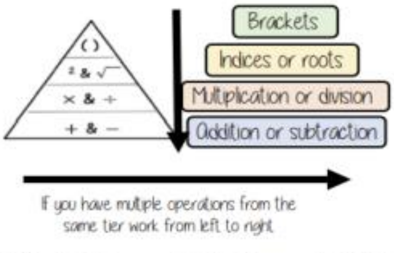
Division with decimals

The placeholder in division methods is essential – the decimal lines up on the dividend and the quotient

24 ÷ 0.02 ⟶ 24 ÷ 0.2 ⟶ 240 ÷ 2

All give the same solution as represent the same proportion
Multiply the values in proportion until the divisor becomes an integer

Order of operations



If you have multiple operations from the same tier work from left to right

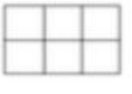
eg 10 – 3 + 5 ⟶ 10 - 3 ⟶ 7 + 5

6 x 4 + 8 x 2

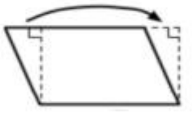
24 + 16 = 40

Area problems

Rectangle
Base x Perpendicular height

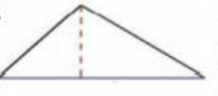


Parallelogram/ Rhombus
Base x Perpendicular height



Triangle
½ x Base x Perpendicular height

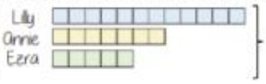
A triangle is half the size of the rectangle it would fit in



Mean problems

Mean – a measure of average
It gives an idea of the central value

Lilly, Annie and Ezra have the following cubes



Finding the mean amount is the average amount each person would have if shared out equally

The mean number of blocks would be 8 each

What do I need to be able to do?

By the end of this unit you should be able to:

- Find a fraction of a given amount
- Use a given fraction to find the whole or other fractions
- Find the percentage of an amount using mental methods
- Find the percentage of a given amount using a calculator

Keywords

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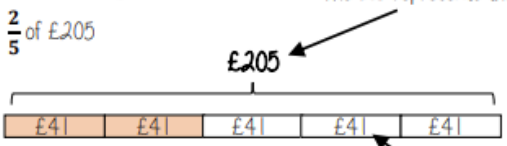
Fraction: how many parts of a whole we have
Equivalent: of equal value
Whole: a number with no fractional or decimal part
Percentage: parts per 100 (uses the / symbol)
Place Value: the value of a digit depending on its place in a number. In our decimal number system, each place is 10 times bigger than the place to its right
Convert: change into an equivalent representation, often fraction to decimal to a percentage cycle

Fraction of a given amount

Find $\frac{2}{5}$ of £205

The bar represents the whole amount

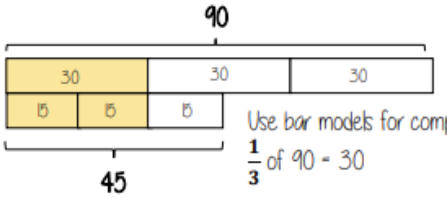


2 out of the 5 equal parts

2 x £41 = **£82**

£205 ÷ 5 = £41

Each part of the bar model represents £41



Use bar models for comparisons

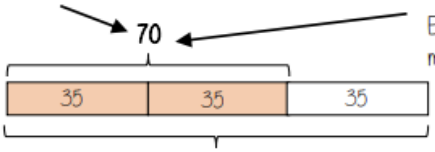
$\frac{1}{3}$ of 90 = 30

$\frac{2}{3}$ of 45 = 30

$\therefore \frac{1}{3}$ of 90 = $\frac{2}{3}$ of 45

Use a fraction of amount

$\frac{2}{3}$ of a value is 70. What is the whole number?



70 ÷ 2 = 35

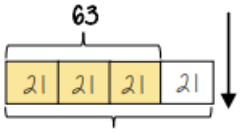
Each part of the bar model represents 35

35 x 3 = 105

The whole number is 105

The wording of the question is important to setting up the bar model

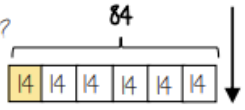
$\frac{3}{4}$ of a number is 63



Find the whole

What is $\frac{1}{6}$ of the number?

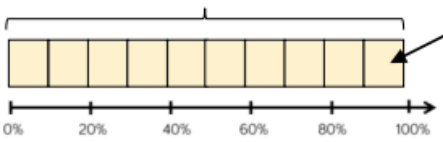
= 14



Use the whole to find a given part

Find the percentage of an amount (Mental methods)

The **whole** represents 100/



10/ = $\frac{1}{10}$ of the whole

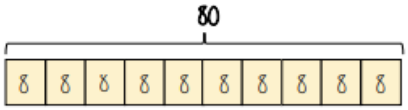
10/ = $\frac{1}{10}$ of the whole

50/ = $\frac{5}{10} = \frac{1}{2}$ of the whole

20/ = $\frac{2}{10} = \frac{1}{5}$ of the whole

5/ = $\frac{1}{20}$ of the whole

Find 65/ of 80



For bigger percentages it is sometimes easier to take away from 100/

Method 1
65/ = 10/ x 6 + 5/
= (8 x 6) + 4
= 52

Method 2
65/ = 50/ + 10/ + 5/
= 40 + 8 + 4
= 52

Find the percentage of an amount (Calculator methods)

Using a multiplier

Find 65/ of 80

Fraction, decimal, percentage conversion

65/ = $\frac{65}{100}$ = 0.65 ← The multiplier

0.65 x 80 = **52**

Using the percent button

Find 65/ of 80

This brings up the / button on screen
You will see 65/

Type **65**

Press SHIFT ((%)

Press × **80** and then press =

You can also use the calculator to support non calculator methods and find 1/ or 10/ then add percentages together

"of" can represent 'x' in calculator methods