

Fractions Level 2

Name: _____

Date: _____

How to Guide

Skills Check

Rate how confident you feel about the skills tested in this section:

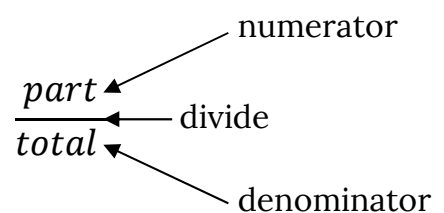
Skill	Not a clue!	I know a little	I feel okay with this	I feel quite confident	I feel very confident
Finding fraction parts					
Simplifying fractions					
Creating fractions using two numbers					
Ordering fractions					
Adding & subtracting fractions					
Working with proper fractions, improper fractions & mixed numbers					

When you have finished the booklet, use a different colour to mark your confidence levels again.

Fractions

Introduction

Fractions are parts out of a whole. The whole, or total amount, is always the bottom of the fraction. The part you are interested in is the top of the fraction. The line represents a division.



It might be a good idea to practise some questions without a calculator, but you may want to use your calculator for more difficult questions.

Fraction Parts

Method

Examples

÷ by the bottom of the fraction

x by the top of the fraction

(t for **times**, t for **top**)

$$\frac{1}{4} \text{ of } 60$$

$$60 \div 4 = 15$$

$$15 \times 4 = 60$$

$$\frac{1}{5} \text{ of } 85.25$$

$$85.25 \div 5 = 17.05$$

$$17.05 \times 5 = 85.25$$

$$\frac{2}{3} \text{ of } 45$$

$$45 \div 3 = 15$$

$$15 \times 2 = 30$$

Try It Out

Question 1

- What is $\frac{1}{4}$ of 80?
- What is $\frac{1}{3}$ of 42?
- What is $\frac{2}{3}$ of 120?
- What is $\frac{3}{4}$ of 125.25?
- What is $\frac{1}{5}$ of 400?
- What is $\frac{7}{8}$ of 60?

Did you know?

You can multiply by the top first and then divide by the bottom and still get the same answer.

Look out for the words **of** and **off**.

You may be asked to take a fraction **off** an amount.

There is $\frac{1}{4}$ off the price of a DVD that costs £17. What does it cost now?

First find $\frac{1}{4}$ as we did above but then take the $\frac{1}{4}$ **off** using subtraction.

$$17 \div 4 = 4.25$$

$4.25 \times 1 = 4.25$ This is $\frac{1}{4}$ but we need to take this **off** the original price.

$$17 - 4.25 = 12.75 \text{ so the new price is } \pounds 12.75.$$

You may also need to use this technique if you see words such as

reduced by, discount, saving

Try it Out

Question 2

a) A coat was priced at £65 but is reduced by a third in the sale. What is the new price to the nearest 10p?

b) Students get $\frac{1}{4}$ off the price of a cinema ticket on Thursdays. If tickets normally cost £8.60, how much would a student pay?

c) A washing machine is only $\frac{2}{3}$ of the original price in the sale. If it originally cost £180, how much would it cost now?

d) 240 people are attending a buffet. The caterers have been told that $\frac{1}{5}$ of the people are vegetarian. How many vegetarians will there be?

Did you know?

If you are finding $\frac{1}{4}$ **off** the price, it's the same as finding $\frac{3}{4}$ **of** the price.

An alternative method would be to do

$$17 \div 4 = 4.25$$

$$4.25 \times 3 = 12.75$$

Simplifying Fractions

This means writing the fraction in its lowest terms. To do this you need to divide both top and bottom of the fraction by the **same number** to make them smaller.

Top Tips

If you know your times tables well, you may be able to find a common number easily but if not, follow the tips below.

Do both numbers end in 0?

• You can divide by 10

Do both numbers end in 5 or 0?

• You can divide by 5

Are both numbers even?

• You can divide by 2

Is there an odd number?

• Try dividing by 3, 7 or 11

Often, you may need to do more than one of the steps above to get your final answer.

Example

$$\frac{24}{54} \div 2 \rightarrow \frac{12}{27} \div 3 \rightarrow \frac{4}{9}$$

We could have divided by 6 at the start for a quicker calculation

When you are simplifying a fraction, you are creating an equivalent fraction. A fraction with the same value but expressed in a simpler way.

$$\frac{1}{2} \rightarrow \frac{2}{4} \rightarrow \frac{3}{6} \rightarrow \frac{5}{10} \rightarrow \frac{24}{48}$$

are all equivalent to each other because they all represent one half. You can see that the top number is half of the bottom number.

Try it Out

Question 3. Write each of these fractions in its simplest form.

a) $\frac{6}{18}$

b) $\frac{14}{70}$

c) $\frac{64}{120}$

d) $\frac{15}{20}$

Creating Fractions

Use this technique when a question asks you 'what fraction...?' or where you know you need to give a fraction as an answer.

Create fractions by writing one number as a fraction of another

- 1) Find or work out the total amount
- 2) Write this on the bottom of your fraction
- 3) Decide what you want to find out about
- 4) Write this number on the top of your fraction
- 5) Simplify your fraction by dividing the top and bottom by the **same** number to make them smaller

Example

Out of 500 people, 150 were under 18. What fraction were under 18?

Total = 500

Under 18 = 150

$$\frac{150}{500} \div 10 = \frac{15}{50} \div 5 = \frac{3}{10}$$

Try it Out

Question 4

- a) An employer works out that out of their 1200 employees, 600 are full-time. What fraction is that?

- b) A supermarket finds that out of 825 people who visit in one day, 400 travelled by car. What fraction is that?

- c) In the audience of a concert, there are 320 people aged 16-24 and 280 people aged over 24. What fraction of the audience are aged over 24? (*Be careful*)

Ordering Fractions

You might have to put fractions in order of size.

If fractions have the same denominator, then it is easy to put them in size order. You just look at the numerators (top number).

Smallest → biggest

$\frac{3}{8}$	$\frac{4}{8}$	$\frac{7}{8}$
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You can imagine working with something in real life if that helps i.e. 3 pieces of cake out of 8 would not be as much as 7 pieces of cake out of 8.

To order fractions, you must find a common denominator: a number that is in the times table of all the denominators you have.

Example

Order the following from smallest to biggest

$\frac{2}{3}$	$\frac{4}{5}$	$\frac{1}{6}$
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We need to find a number in the 3, 5 and 6 times tables.

It's a good idea to start with the biggest number and list the times table up to five x your number. Then work through the times tables of the other denominators looking for anything in common. If that doesn't work, keep going with the first number.

6, 12, 18, 24, **30**

3, 6, 9, 12, 15, 18, 21, 24, 27, **30**

5, 10, 15, 20, 25, **30**

30 is common to all the times tables.

Now, rewrite each fraction with 30 as the new denominator. We need to create an equivalent fraction by multiplying both top and bottom by the same value.

$$\frac{2 \times 10}{3 \times 10} = \frac{20}{30}$$

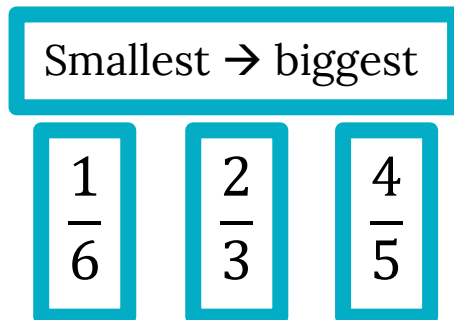
$$\frac{4 \times 6}{5 \times 6} = \frac{24}{30}$$

$$\frac{1 \times 5}{6 \times 5} = \frac{5}{30}$$

Now all the fractions have the same denominator, it is easy to put them in size order

$$\frac{5}{30} \quad \frac{20}{30} \quad \frac{24}{30}$$

You must remember to put the original fractions in size order not just the new ones you have created.



Try it Out

Question 5

a) Order these from smallest to largest

Three vertical blue-bordered boxes containing the fractions $\frac{3}{4}$, $\frac{5}{9}$, and $\frac{1}{3}$ from left to right.

b) Order these in descending order

Three vertical blue-bordered boxes containing the fractions $\frac{1}{10}$, $\frac{7}{8}$, and $\frac{3}{5}$ from left to right.

Vocabulary Check

Ascending = from smallest to biggest

Descending = from biggest to smallest

Adding & Subtracting Fractions

In order to add or subtract fractions, they need to have common denominators.

You can use the method we used above for ordering fractions to create equivalent fractions with common denominators.

To Add & Subtract Fractions

Make sure all the fractions have common denominators.

Add or subtract the tops of the fractions but do NOT add the bottoms.

Simplify the new fraction if possible.

Examples

$$\frac{3}{10} + \frac{5}{10} \Rightarrow \frac{3+5}{10} = \frac{8}{10} = \frac{4}{5}$$

$$\frac{7}{8} - \frac{1}{8} \Rightarrow \frac{7-1}{8} = \frac{6}{8} = \frac{3}{4}$$

Try it Out

Question 6

a) $\frac{5}{9} + \frac{2}{9} =$

b) $\frac{5}{6} - \frac{2}{6} =$

c) $\frac{2}{3} + \frac{2}{8} =$

d) $\frac{4}{5} - \frac{1}{4} =$

Proper Fractions, Improper Fractions & Mixed Numbers

Proper Fractions

The top number is smaller than the bottom number

Examples $\frac{1}{4}$ or $\frac{2}{3}$

Improper Fractions

The top number is bigger than the bottom number

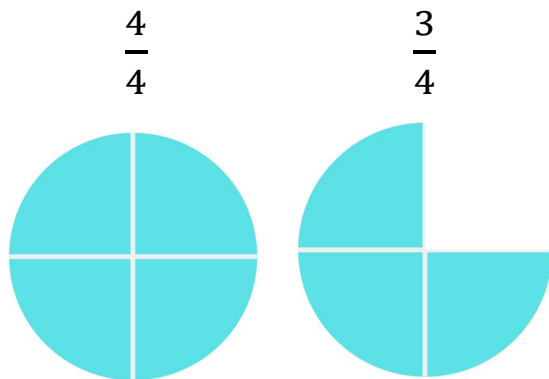
Examples $\frac{7}{4}$ or $\frac{25}{3}$

Mixed Numbers

You have a whole number and a fraction

Examples $1\frac{1}{4}$ or $3\frac{2}{3}$

You may need to convert between mixed numbers and improper fractions to compare them.



We have shapes split into quarters. The first shape has four quarters and the second has three quarters. That means we have seven quarters in total.

$$1 \quad \frac{3}{4} \quad = \quad 1\frac{3}{4}$$

We could also say that we have one whole shape and $\frac{3}{4}$ of a shape.

Converting Between Improper Fractions and Mixed Numbers

To convert $\frac{7}{4}$ to a mixed number, divide the top by the bottom to get a whole number and a remainder

$$7 \div 4 = 1 \text{ remainder } 3$$

The whole goes at the front and the remainder becomes the numerator of the fraction.

The 1 becomes the whole and we are left with three quarters. $1\frac{3}{4}$

To convert $1\frac{3}{4}$ to an improper fraction, multiply the denominator (bottom) by the whole number and add this number to the top of the fraction.

$$1\frac{3}{4} = \frac{7}{4}$$

Further examples

Convert $\frac{12}{5}$ to a mixed number $12 \div 5 = 2$ with remainder 2 = $2\frac{2}{5}$

Convert $6\frac{2}{3}$ into an improper fraction $3 \times 6 = 18$ add this to the top of the fraction and keep the bottom the same = $\frac{18+2}{3} = \frac{20}{3}$

Try it Out

Question 7

- Convert $\frac{16}{7}$ to a mixed number
- Convert $3\frac{1}{9}$ to an improper fraction
- Convert $\frac{25}{4}$ to a mixed number
- Convert $10\frac{2}{3}$ to an improper fraction

Mixed Questions

a) What is $\frac{3}{4}$ of 95?

b) Find $\frac{5}{8}$ of 160.

c) A fridge costs £155 in store but has $\frac{1}{3}$ off the price if you buy online. What is the price of buying online to the nearest pence?

d) What is $\frac{20}{150}$ in its simplest form?

e) In a survey, 128 people out of 450 rated a restaurant as excellent. What fraction is this?

f) Put these fractions $\frac{1}{8}$, $\frac{3}{4}$, $\frac{7}{10}$ in order from smallest to largest.

g) What is $\frac{2}{9} + \frac{3}{4}$?

h) What is $\frac{22}{7}$ as a mixed number?

i) Which of these $\frac{6}{10}$, $\frac{25}{3}$, $2\frac{3}{4}$ is largest?

j) What is $\frac{12}{5} - \frac{1}{4}$?

k) A college has 360 students enrolled on a course. $\frac{2}{3}$ of them are aged 18, $\frac{1}{5}$ are under 18 and the rest are over 18. How many are over 18?