Division of fractions

To divide fractions, we multiply the first fraction by the **reciprocal** of the second fraction.

Example

Work out $\frac{5}{12} \div \frac{1}{2}$.

Answer

$\frac{5}{12} \div \frac{1}{2} = \frac{5}{12} \times \frac{2}{1}$ ($\div$ changes to $\times$, $\frac{1}{2}$ is turned upside down to $\frac{2}{1}$)

$= \frac{5 \times 2}{12 \times 1} = \frac{10}{12} = \frac{5}{6}$

EXERCISE 2.04

1 Multiply these fractions together.

a $\frac{2}{3} \times \frac{5}{8}$ **b** $\frac{3}{7} \times \frac{1}{9}$

c $\frac{1}{5} \times \frac{1}{4}$ **d** $\frac{4}{3} \times \frac{24}{35}$

e $\frac{3}{8} \times \frac{2}{9}$ **f** $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4}$

g $4 \times \frac{2}{3}$ **h** $\frac{3}{5} \times 20$

2 Divide these fractions.

a $\frac{2}{3} \div \frac{5}{6}$ **b** $\frac{3}{4} \div \frac{9}{8}$

c $\frac{4}{7} \div \frac{1}{2}$ **d** $\frac{1}{3} \div \frac{6}{7}$

e $2 \div \frac{1}{4}$ **f** $\frac{15}{28} \div 3$

4 Use the rules for priority of operations (BEDMAS) to work out:

a $\frac{14}{9} - \frac{5}{9} + \frac{1}{9}$ **b** $\frac{1}{2} + \frac{2}{3} \times \frac{3}{4}$

c $\frac{2}{5} \div \frac{4}{9} + \frac{3}{10}$ **d** $\frac{2}{3} \times \left(\frac{5}{6} - \frac{1}{8}\right)$

EXERCISE 2.05

1 Write these fractions as mixed numbers.

a $\frac{7}{2}$ **b** $\frac{15}{4}$

c $\frac{41}{6}$ **d** $\frac{112}{11}$

2 Change these mixed numbers to fractions.

a $1\frac{3}{8}$ **b** $4\frac{5}{9}$

c $6\frac{2}{3}$ **d** $14\frac{2}{3}$

3 Any mixed number can be written in the form $p\frac{q}{r}$. How would this mixed number be written as a fraction?

4 Work out the reciprocals of these mixed numbers.

a $2\frac{1}{3}$ **b** $3\frac{4}{5}$

c $1\frac{7}{8}$ **d** $10\frac{2}{3}$

5 Work out these mixed number problems.

a $2\frac{1}{2} \times 1\frac{1}{2}$ **b** $\left(4\frac{1}{2}\right)^2$

c $2\frac{1}{9} \div 1\frac{2}{3}$ **d** $4\frac{1}{2} + 1\frac{2}{3}$

e $6\frac{2}{5} - 3\frac{2}{3}$ **f** $4 - 1\frac{2}{5}$

g $6\frac{2}{3} \times 4$ **h** $8 \div 1\frac{3}{8}$

6 Use the rules for the priority of operations to calculate these mixed number expressions.

a $1\frac{1}{2} + 2\frac{1}{3} \times 1\frac{2}{3}$ **b** $2\frac{1}{2} \times \left(6\frac{1}{3} + 1\frac{3}{5}\right)$

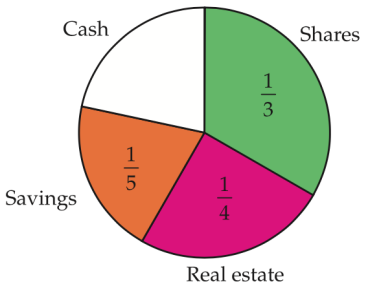
c $3\frac{4}{7} - 2\frac{1}{3} + 3\frac{1}{2}$ **d** $7\frac{1}{2} \div 1\frac{2}{3} \div 3$

Applications of fractions

EXERCISE 2.06

1 Dave swims 60 lengths of the pool every day. When he has completed 35 laps, what fraction remains to be swum?

2 This pie graph shows how John Q Citizen has allocated his investments between shares, real estate, savings and cash. What fraction is in cash?



3 A plastic bottle of cola is $\frac{7}{8}$ full. When it is poured into an empty glass, the bottle is only $\frac{3}{5}$ full. What fraction of a full bottle of cola will remain after two more glasses have been poured out?

4 Jenny uses a memory stick to store digital pictures, music downloads and video clips. These take up $\frac{1}{3}$, $\frac{2}{5}$ and $\frac{1}{8}$, respectively, of the memory. Calculate the fraction of the memory stick that is still available to store data.

5 The Wells family share the ownership of a holiday home with three other families. Each family are entitled to an equal share of time.

a What fraction of the year are the Wells entitled to use the holiday home?

b The Wells rent out their share of the home to tourists for $\frac{4}{5}$ of the time. What fraction of the year do they stay in the holiday home themselves?

6 1000 m is about $\frac{5}{8}$ of a mile. Use this relationship for the following conversions.

a Write 1.5 km as a fraction of a mile.

b Change 2 miles to kilometres. Give the answer as a mixed number.

7 Mrs Johnson is passing a delicatessen and notices a jumbo-sized pizza on display. She goes in and buys $\frac{1}{4}$ of it to take away.

a If she serves $\frac{2}{3}$ of the slice bought for dinner, what fraction of the original pizza is that quantity?

b Later in the day, the owner of the delicatessen sells $\frac{1}{4}$ of the part left to someone else. What fraction of the original pizza is left?

8 Garbage Disposal Ltd pick up household refuse in bags – both plastic and paper. The owner estimates that $\frac{3}{5}$ of the bags are plastic. On a day when 15 376 bags are collected, calculate an approximation for the number of paper bags collected. Give your answer correct to 3 sf.

9 A caterer supplies seven large cheesecakes to a restaurant one morning. At lunch $2\frac{1}{3}$ cheesecakes are eaten, and at dinner $3\frac{3}{4}$ cheesecakes are eaten. What fraction of a cheesecake was left over?

10 A 20-litre canteen contains a fruit drink made up of 13 litres of pure pineapple juice and 7 litres of water. After $\frac{1}{3}$ of the drink has been consumed, the canteen is refilled with water only. What fraction of the new mixture of drink is pure pineapple juice?

11 Sze-Min works in an Italian restaurant, serving both food and drinks to tables of diners. His agreement with the owner specifies that he will receive a wage based on the amount spent by customers. He is to receive $\frac{3}{20}$ of the money spent on food, and $\frac{2}{17}$ of the money spent on drinks. Calculate his wages on an evening when \$550.95 is spent on food, and \$96.30 is spent on drinks.

12 A container is filled with "full-cream" milk. Another identical container is filled with trim milk. The fraction of "full-cream" milk that is cream is $\frac{1}{25}$. The fraction of trim milk that is cream is $\frac{1}{100}$. The contents of the two containers are mixed. What fraction of the mixture is cream?

Inverse Fractions

6 Find the whole amount if

a $\frac{2}{3}$ is 8 apples **b** $\frac{3}{10}$ is \$171 **c** $\frac{5}{8}$ is 10 days

d $\frac{2}{5}$ is 160 g **e** $\frac{3}{4}$ is 1200 m **f** $\frac{9}{10}$ is 81 marks

7 Three quarters of my dairy herd are grazing in my largest paddock. If this is 90 cows, how many are in my herd?

8 If $\frac{2}{5}$ of a bag of flour weighs 800 g, how much does a bag of flour weigh?

9 Rangi won $\frac{2}{3}$ of the tennis matches that he played this summer. If he won 64 matches, how many matches did he play?

10 Briony saved $\frac{1}{10}$ of the money that she earned working at a restaurant. If she spent \$927, how much did she earn?

EXERCISE 5G

1 Find the whole amount if:

a $\frac{1}{5}$ is \$9 **b** $\frac{1}{7}$ is 110 g **c** $\frac{1}{10}$ is 30 bags

d $\frac{1}{6}$ is 6 m **e** $\frac{1}{4}$ is 3 weeks **f** $\frac{1}{2}$ is 2 hours 5 minutes

2 Amiria spent half her holidays in America. She was in America for 17 days. How long were her holidays?

3 Gavin said that one fifth of his supermarket bill was the cost of a leg of lamb at \$10.20. What was his supermarket bill?

4 Katy put 16 jars of jam in her pantry. These were $\frac{1}{4}$ of the jars of jam that she had made. How many jars of jam had she made?

5 The deposit on a refrigerator was one eighth of its value. If the deposit was \$125, how much did the refrigerator cost?

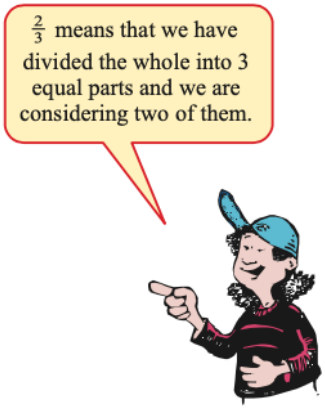
Example 9

Two thirds of my barley crop was 176 bags. How many bags was the whole crop?

2 thirds was 176 bags

So, 1 third was $176 \div 2$
$= 88$ bags.

The whole crop was 3 thirds $= 3 \times 88$ bags
$= 264$ bags.



6 Find the whole amount if:

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d $\frac{2}{5}$ is 160 g **e** $\frac{3}{4}$ is 1200 m **f** $\frac{9}{10}$ is 81 marks

7 Three quarters of my dairy herd are grazing in my largest paddock. If this is 90 cows, how many are in my herd?

8 If $\frac{2}{5}$ of a bag of flour weighs 800 g, how much does a bag of flour weigh?

9 Phillip won $\frac{2}{3}$ of the tennis matches that he played this summer. If he won 64 matches, how many matches did he play?

10 Briony saved $\frac{1}{10}$ of the money that she earned working at a restaurant. If she spent \$927, how much did she earn?