Equivalent fractions

How many fractions are there equivalent to :

1) $\frac{1}{5} = \frac{2}{10} = \frac{4}{20} = \frac{6}{30} = \frac{8}{40} = \frac{100}{500}$

Page 90 A2-A4

2) $\frac{2}{5} = \frac{4}{10} = \frac{8}{20} = \frac{10}{25} = \frac{6}{15}$

Cancelling Fractions

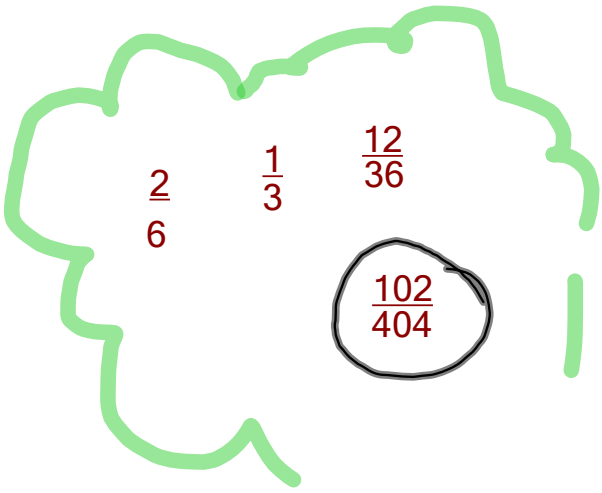
$\frac{4}{12} \div 4 = \frac{1}{3}$

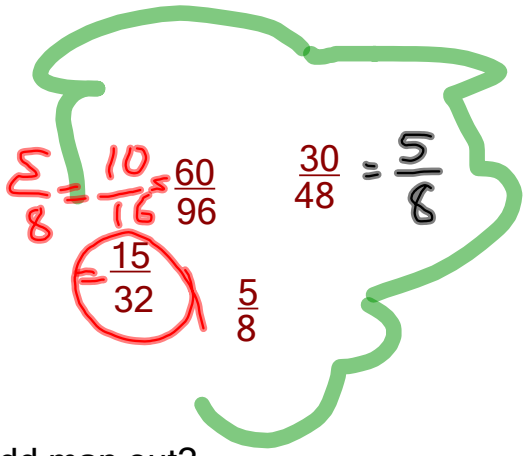
Cancel these fractions to their lowest terms

$\frac{20}{45} = \frac{4}{9}$ $\frac{5}{45} = \frac{1}{9}$ $\frac{40}{90} = \frac{4}{9}$

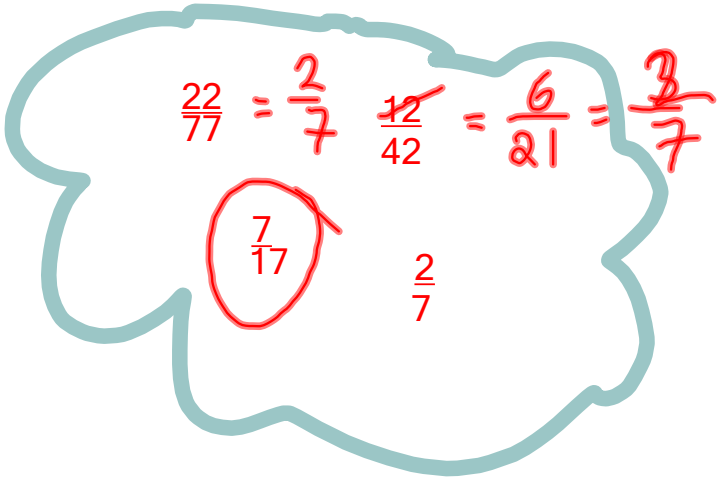
$\frac{27}{42} \div 9 = \frac{9}{14}$ $\frac{16}{96} = \frac{1}{6}$ $\frac{120}{600} = \frac{1}{5}$

page 90 A5-A6





Which of these fractions is the odd man out?



Ordering fractions

There are two main ways to order fractions:

- **if you can use a calculator, change them to decimals.**
- **use equivelent fractions to compare.**

Put these fractions in order of size, starting with the smallest:

1) $\frac{5}{6}$ $\frac{2}{3}$ $\frac{3}{10}$ $\frac{1}{2}$ $\frac{3}{10}, \frac{1}{2}, \frac{2}{3}, \frac{5}{6}$ no calculator

2) $\frac{4}{33}$ $\frac{6}{11}$ $\frac{1}{2}$ $\frac{5}{6}$ $\frac{36}{66}$ $\frac{55}{66}$ $\frac{4}{33}, \frac{1}{2}, \frac{6}{11}, \frac{5}{6}$ no calculator

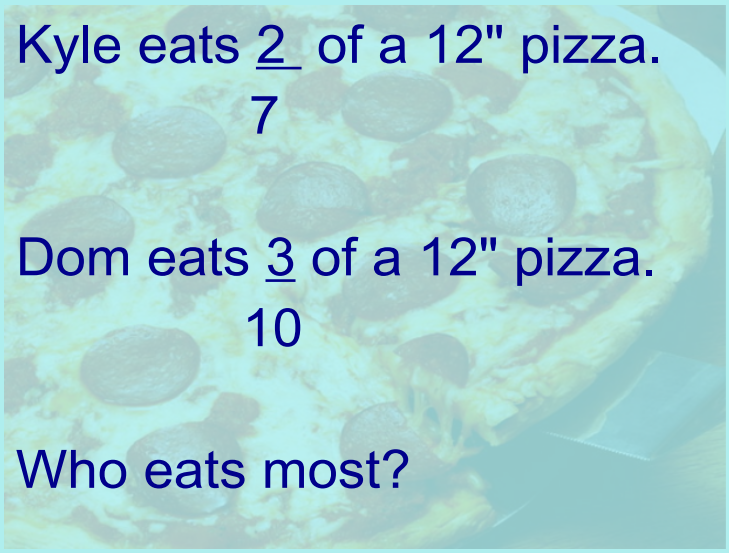
3) $\frac{1}{4}, \frac{2}{5}, \frac{1}{6}, \frac{2}{7}$ $\frac{1}{6}, \frac{2}{7}, \frac{1}{4}, \frac{2}{5}$

4) $\frac{5}{8}, \frac{3}{7}, \frac{4}{9}, \frac{3}{10}$ $\frac{3}{10}, \frac{3}{7}, \frac{4}{9}, \frac{5}{8}$

5) $\frac{7}{11}, \frac{4}{15}, \frac{6}{12}, \frac{5}{7}$

6) $\frac{1}{6}, \frac{2}{9}, \frac{5}{12}, \frac{7}{15}$

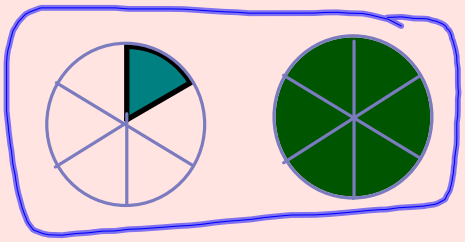
Dolphin game



$\frac{20}{70}$

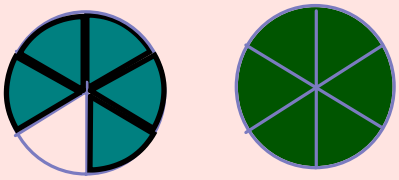
$\frac{21}{70}$

Improper Fractions ⇔ mixed numbers

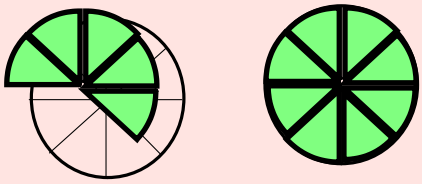


$1\frac{1}{6} = \frac{7}{6}$

mixed no. improper/topheavy fractions



$\frac{11}{6} = 1\frac{5}{6}$



$1\frac{5}{8} = \frac{13}{8}$

Draw a diagram to show $1\frac{2}{3} = \frac{5}{3}$

Draw a diagram to show $\frac{7}{5} = 1\frac{2}{5}$

$\frac{5}{5} = 1$

American currency is in cents:

dimes (10c), 

quarters (25c) 

and dollars (100c).

If I have 11 quarters, how much money is that?

Page 92 C1-C3

Finding a fraction of an amount.

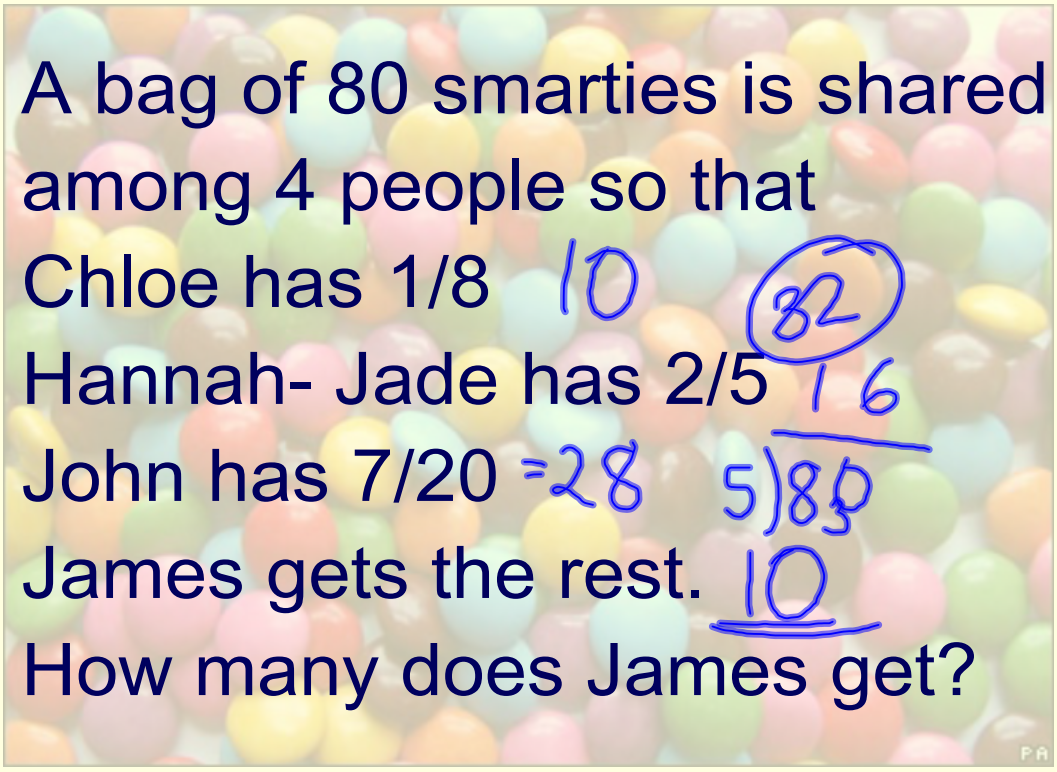
$\frac{5}{8}$ of 88 = 55 means find one eighth, then find 5 of those

work out:

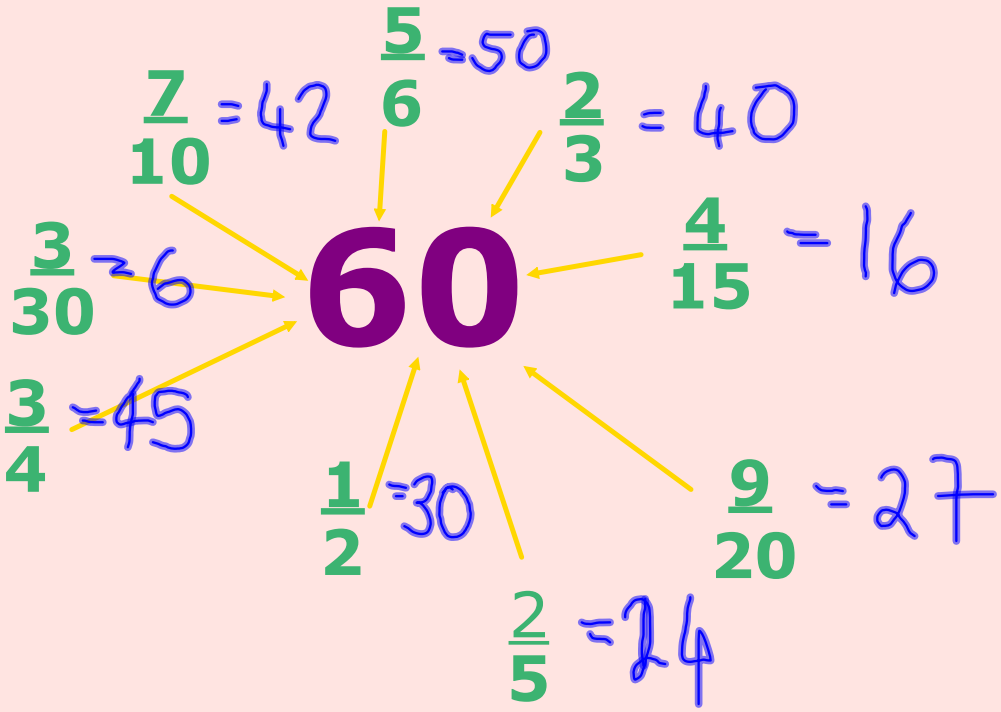
$\frac{3}{7}$ of 35 = 15

$\frac{4}{5}$ of 45 = 36

$\frac{2}{9}$ of 36 = 8

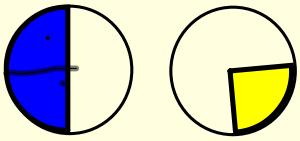


Work out:

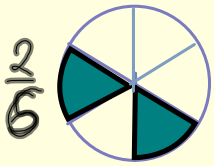


page 145 A2, B2-B8 evens only, C1-C4

Adding Fractions with different denominators



$\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$



$\frac{2}{6}$ $\frac{1}{2}$ $\frac{2}{6} + \frac{1}{2}$

$= \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

$\frac{1}{4} + \frac{1}{8} = \frac{2}{8} + \frac{1}{8} = \frac{3}{8}$

$\frac{1}{3} + \frac{1}{6}$

1. $\frac{2}{3} + \frac{1}{6} = \frac{5}{6}$
2. $\frac{3}{4} + \frac{1}{8} = \frac{7}{8}$
3. $\frac{3}{10} + \frac{2}{5} = \frac{7}{10}$
4. $\frac{2}{5} + \frac{3}{15} = \frac{9}{15}$
5. $\frac{3}{4} + \frac{1}{12} = \frac{10}{12} = \frac{5}{6}$
6. $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

$\frac{1}{3} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$

$\frac{2}{5} + \frac{3}{7} =$

How to add and subtract fractions without going to pieces

1. Find a common denominator, the lower the better.
2. Using your common denominator make equivalent fractions.
3. Add (or subtract) the numerators.
4. Simplify.

$\frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$ (×4, ×4)

$\frac{2}{5} + \frac{1}{8} = \frac{16+5}{40} = \frac{21}{40}$

$\frac{1}{3} + \frac{1}{5} = \frac{5+3}{15} = \frac{8}{15}$

$\frac{3}{5} + \frac{5}{9} = \frac{27+25}{45} = \frac{52}{45} = 1\frac{7}{45}$

$\frac{2}{3} + \frac{1}{5} = \frac{10+3}{15} = \frac{13}{15}$

$\frac{5}{6} + \frac{1}{9} = \frac{15+2}{18} = \frac{17}{18}$

Isabelle eats $\frac{3}{8}$ of a bar of chocolate. Lorna eats $\frac{2}{5}$ of the bar?

How much is left for Oliver?

$\frac{3}{8} + \frac{2}{5} = \frac{15+16}{40} = \frac{31}{40}$

Oliver had $\frac{9}{40}$

Page 93 D1 - D8

$\frac{2}{5}+\frac{1}{2}+\frac{1}{10}$ $\frac{1}{4}+\frac{1}{3}+\frac{5}{12}$

Find 3 fractions that have a sum of 1,
but all have different denominators.

$\frac{1}{3}+\frac{2}{6}+\frac{3}{12}$ $\frac{1}{2}+\frac{1}{4}+\frac{2}{8}$ $\frac{13}{26}+\frac{14}{52}+\frac{3}{13}$

$\frac{2}{4}+\frac{1}{3}+\frac{2}{12}$ $\frac{1}{2}+\frac{1}{3}+\frac{1}{6}$

$\frac{3}{6}+\frac{2}{6}+\frac{1}{6}$

Cancel when you can

$$\frac{12}{20} = \frac{3}{5}$$

$$\frac{12}{20} = \frac{2\times2\times3}{2\times2\times5} = \frac{3}{5}$$

Write the following as product of their primes and cancel:

$$\frac{8}{12} = \frac{2\times2\times2}{2\times2\times3} = \frac{2}{3}$$

$$\frac{24}{42} = \frac{2\times2\times2\times3}{2\times3\times7} = \frac{4}{7}$$

Multiplying Fractions

This is the easiest of all the fraction questions.
Multiply the numerators together.
Multiply the denominators together.
That's it!

$\frac{2}{3} \times \frac{5}{7} = \frac{10}{21}$ $\quad \frac{2\times5}{3\times7} = \frac{10}{21}$

If you have a whole number, change it to an improper fraction:

$2\frac{1}{3} \times \frac{3}{4} = \frac{7}{3} \times \frac{3}{4} = \frac{7}{4} = 1\frac{3}{4}$

A shortcut: $\frac{2}{3} \times \frac{6}{10} = \frac{2\times2\times3}{3\times2\times5} = \frac{2}{5}$

$\frac{3}{20} \times \frac{5}{9} = \frac{3\times5}{2\times2\times5\times3\times3} = \frac{1}{12}$

$\frac{13}{20} \times \frac{5}{39} = \frac{1}{12}$ 4 3 Gy Hi

page 150 E1-E6, F1 - F8

Cancel where you can

$\frac{45}{70} = \frac{5\times9}{7\times2\times5} = \frac{9}{14}$

$\frac{45}{120} = \frac{5\times3\times3}{2\times2\times2\times3\times5} = \frac{3}{8}$

$\frac{42}{70} = \frac{7\times2\times3}{7\times2\times5} = \frac{3}{5}$

$\frac{39}{390} = \frac{39}{39\times10} = \frac{1}{10}$

$\frac{450}{720} = \frac{10\times5\times9}{10\times8\times9} = \frac{5}{8}$

page 150 E1-E6, F1 - F8

$\frac{2}{3}\times\frac{5}{6}\times\frac{3}{7}\times\frac{14}{27} = \frac{10}{81}$

$\frac{2\times5\times3\times14}{3\times6\times7\times27}$

$\frac{2\times5\times6\times42}{6\times8\times27\times10} = \frac{7}{36}$

$\frac{2520}{12960}$ $\frac{42}{6} = \frac{21}{4}$

$\frac{6\times8\times20\times7}{16\times14\times15\times3} = \frac{2}{3}$

$$\frac{13 \times 12 \times 10 \times 35}{25 \times 16 \times 9 \times 28} = \frac{1}{8}$$

$$\frac{12 \times 16 \times 9 \times 100}{75 \times 27 \times 45 \times 6} = \frac{16}{45}$$

Dividing by a fraction

This is easy if you can remember the rule: Turn the second fraction upside down and multiply!

$\frac{1}{4} \div \frac{1}{4} = \frac{1}{4} \times \frac{4}{1} = \frac{4}{4} = 1$

How many quarters are there in a half?

$\frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1} = \frac{4}{2} = 2$

$\frac{1}{2} \div \frac{1}{8} = \frac{1}{2} \times \frac{8}{1} = \frac{8}{2} = 4$

page 284 C1, C2

$\frac{1}{2} \div \frac{1}{8} = \frac{1}{2} \times \frac{8}{1} = 4$

$\frac{1}{5} \div \frac{1}{10} = \frac{1}{5} \times \frac{10}{1} = 2$

$\frac{3}{4} \div \frac{1}{4} = \frac{3}{4} \times \frac{4}{1} = 3$

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

$\frac{3}{7} \div \frac{6}{28} = \frac{3}{7} \times \frac{28}{6} = 2$

page 284 C3- C9, D1- D2

$5 \times \frac{3}{2} = \frac{15}{2} = 7\frac{1}{2}$

$2 \div \frac{3}{4} = \frac{2}{1} \times \frac{4}{3} = \frac{8}{3} = 2\frac{2}{3}$

C 2 → evens only

D1+D2

Converting fractions to decimals

Which fractions do you know the decimal equivalent of?

Terminating decimals	Recurring Decimals
$\frac{1}{2} = 0.5$	$\frac{2}{3} = 0.6\dot{}$ $\frac{1}{9} = 0.\dot{1}$
$\frac{1}{5} = 0.2$	$\frac{1}{3} = 0.3\dot{}$ $\frac{1}{11} = 0.\dot{0}\dot{9}$
$\frac{3}{4} = 0.75$	$\frac{5}{12} = 0.41\dot{6}$
$\frac{1}{10} = 0.1$	$\frac{10}{13} = 0.\dot{7}6923\dot{}$
2, 4, 8, 16 10,	$\frac{1}{6} = 0.16\dot{}$ odd number denoms recur except 5
15	$\frac{5}{7} = 0.\dot{7}1428\dot{5}$

Investigate fractions with a denominator of 7.

Investigate fractions with a denominator of 9.

Try to find a rule for fractions which terminate.
Test it out on the fractions:

Converting fractions to decimals by hand

$\frac{1}{12} = 1 \div 12$ 0.0833 $\frac{1}{12} = 0.0\dot{8}3\dot{}$

12) 1.10040400

$\frac{5}{6} = 5 \div 6$ 0.83 $\frac{5}{6} = 0.8\dot{3}$

6) 5.5020200

$\frac{4}{9} = 0.4$ 0.4

9) 4.4040000

Can this recurring decimal be expressed as a fraction?

0.34343434.....

Let $x = 0.34343434...$

$100x = 34.34343434...$

$x = 0.34343434...$

$99x = 34$

$x = \frac{34}{99}$

0.454545454545....

Let $x = 0.454545$

$100x = 45.454545$

$x = 0.454545$

$99x = 45$

$x = \frac{45}{99} = \frac{15}{33} = \frac{5}{11}$

0.6786786

Let $x =$ 3.153153153....

$1000x = 3153.153$

$x = 3.153$

$999x = 3150$

$x = \frac{3150}{999} = \frac{1050}{333} = \frac{350}{111} = 3\frac{17}{111}$

7.40514051

Convert to a fraction:

a) $0.414141\ldots$ $x = \frac{41}{99}$

b) $0.787878\ldots$ $\frac{78}{99} = \frac{26}{33}$

c) 0.213213213 $\frac{213}{999} = \frac{71}{333}$

Recurring Decimals to Fractions

Express 3.55555...as a fraction

Let $x = 3.5555$

$10x = 35.5555$

$x = 3.5555$

$9x = 32$

$x = \frac{32}{9} = 3\frac{5}{9}$

Examples:

Express as a fraction:

1) 0. 373737.... $= \frac{37}{99}$

2) 5.676767

3) 8.76876876876

4) 23.4444444

Let $x = 0.373737$

$100x = 37.373737$

$x = 0.373737$

$99x = 37.000000$

$99x = 37$

$x = \frac{37}{99}$

Show that 5.676767 = $5\frac{67}{99}$

Let $x = 5.6767\ldots$

$100x = 567.6767$

$x = 5.6767$

$99x = 562$

$x = \frac{562}{99} = 5\frac{67}{99}$

Show that 0.546546546 = 182/333

Let $x = 0.546546\ldots$

$1000x = 546.546546\ldots$

$x = 0.546546$

$999x = 546$

$x = \frac{546}{999} = \frac{182}{333}$

Express a) $0.\overline{34}$ as a fraction

b) $3.\overline{728}$ as a fraction

Let $x = 5.676767$

$100x = 567.676767$

$x = 5.676767$

$99x = 562$ (5 × 99 = 495)

$x = \frac{562}{99} = 5\frac{67}{99}$ ✗

3) 8.76876876

Let $x = 8.76876876$

$1000x = 8768.76876876$

$x = 8.76876876$

$999x = 8760$ (8 × 999 = 8000 − 8)

$x = \frac{8760}{999} = 8\frac{768}{999}$

$= 8\frac{256}{333}$

Let $x = 23.\dot{4}\dot{4}$

$10x = 234.\dot{4}\dot{4}$

$x = 23.\dot{4}\dot{4}$

$9x = 211$

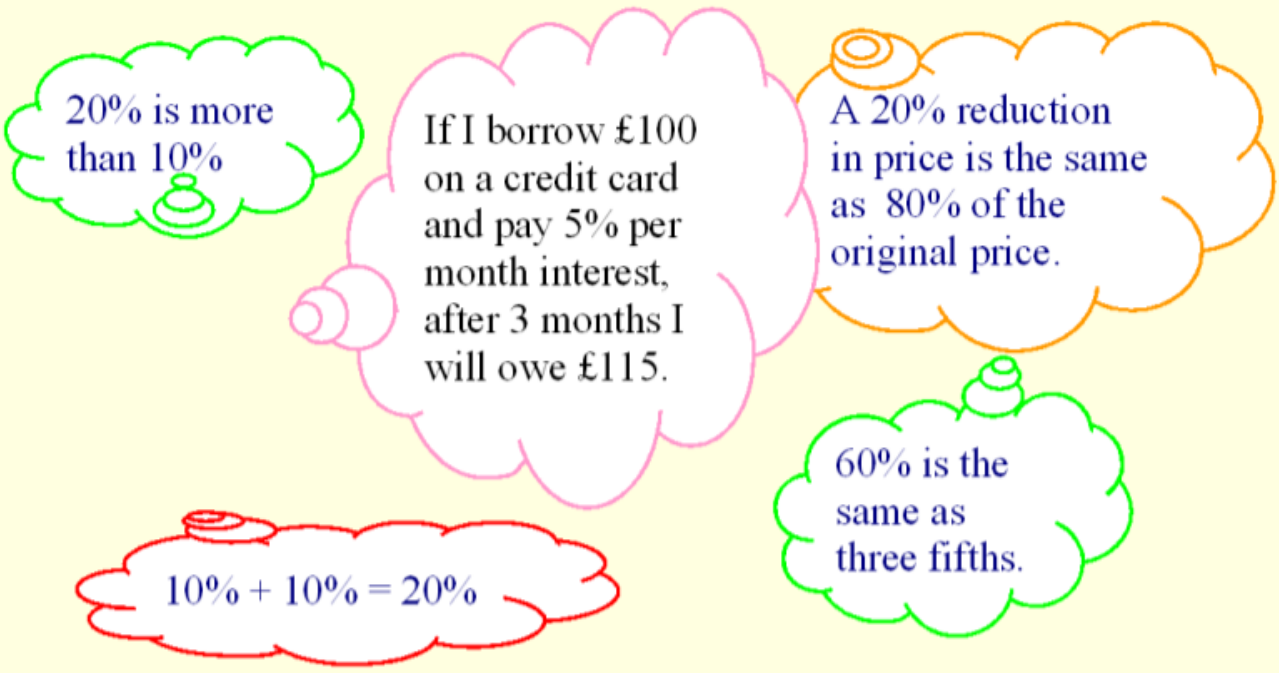
$x = \frac{211}{9} = 23\frac{4}{9}$

1) $0.838383\ldots$ $x = \frac{83}{99}$

2) $1.\dot{2}$ $x = 1\frac{2}{9}$

3) 0.12341234 $x = \frac{1234}{9999}$

Decide whether these statements are true or false.
You need to be able to defend your opinion.



$\frac{5}{6}$ of a school day is spent in lessons.

What percentage of the day is spent in lessons?

72% of students like sport.
What fraction of the students like sport?

Converting between fractions and percentages

Fraction to percent:

Percent to fraction:

Page 155, p 156 B1 and B2, page 158 C4

Solving problems with fractions.

1. A cake is divided up between 3 people. Jess has two fifths, Nic has two sevenths and Jamie has the rest.
a) How much does Jamie get?
b) Who has the biggest piece?
c) If Jamie gave half his piece to Nic how muc would they each get?

2. A bag of sweets is shared between 4 people. Toby has 20%, Cameron has one fifteenth, Trinity has one third and Alice has 60 sweets.
How many sweets did they have?

3. A school day of 6 hours is divided into modules of three-quarters of an hour. How many modules are there in a day?

8 ?

12

B.O.G.O.F

I paid £ 60 for my shopping bill.
Later, when I looked at my receipt, it showed a "multibuy" saving of £20.
This means about 33% of my food was free.

On a different occasion I spent £64.55 and my multibuy saving was £18.
What percentage of my food was free?


The sales
I got a great bargain in the sales. This bag was £15.00 last week. Today it was reduced to £5.00.
Karen
Well, what do you think of this…I spent £30.00 on these trousers and they were priced at £50.00. That's an even better bargain.
Sharon
Page 109, 110 C1 - D7

understand equivalent fractions, simplifying a fraction by cancelling all common factors
order fractions by rewriting them with a common denominator
calculate a given fraction of a given quantity, expressing the answer as a fraction
express a given number as a fraction of another
add and subtract fractions by writing them with a common denominator
perform short division to convert a simple fraction to a decimal
addition, subtraction, multiplication and division of mixed numbers
multiply and divide a given fraction by an integer, by a unit fraction and by a general fraction
distinguish between fractions with denominators that have only prime factors of 2 and 5 (which are represen
terminating decimals), and other fractions (which are represented by recurring decimals)
convert a recurring decimal to a fraction
multiply and divide a given fraction by an integer, by a unit fraction and by a general fraction
convert simple fractions of a whole to percentages of the whole and vice versa
use efficient methods to calculate with fractions, including cancelling common factors before carrying out the calculation, recognising that, in many cases, only a fraction can express the exact answer