

Fractions - 28.03.19

Y3 - Number - fractions

Pupils should be taught to:

count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10

recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators

recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators

recognise and show, using diagrams, equivalent fractions with small denominators

add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]

compare and order unit fractions, and fractions with the same denominators

solve problems that involve all of the above

Y4 - Number - fractions (including decimals)

Pupils should be taught to:

recognise and show, using diagrams, families of common equivalent fractions

count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10

solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number

add and subtract fractions with the same denominator

recognise and write decimal equivalents of any number of tenths or hundreds

recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$

find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths

round decimals with 1 decimal place to the nearest whole number

compare numbers with the same number of decimal places up to 2 decimal places

solve simple measure and money problems involving fractions and decimals to 2 decimal places

Y5 - Number - fractions (including decimals and percentages)

Pupils should be taught to:

**compare and order fractions whose denominators are all multiples of the same number
identify, name and write equivalent fractions of a given fraction, represented visually,
including tenths and hundredths**

**recognise mixed numbers and improper fractions and convert from one form to the other
and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$]**

**add and subtract fractions with the same denominator, and denominators that are multiples
of the same number**

**multiply proper fractions and mixed numbers by whole numbers, supported by materials
and diagrams**

read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$]

**recognise and use thousandths and relate them to tenths, hundredths and decimal
equivalents**

round decimals with 2 decimal places to the nearest whole number and to 1 decimal place

read, write, order and compare numbers with up to 3 decimal places

solve problems involving number up to 3 decimal places

**recognise the per cent symbol (%) and understand that per cent relates to 'number of parts
per 100', and write percentages as a fraction with denominator 100, and as a decimal
fraction**

**solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$,
 $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25**

Y6 - Number - Fractions (including decimals and percentages)

Pupils should be taught to:

use common factors to simplify fractions; use common multiples to express fractions in the same denomination

compare and order fractions, including fractions >1

add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions

multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $1/4 \times 1/2 = 1/8$]

divide proper fractions by whole numbers [for example, $1/3 \div 2 = 1/6$]

associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $3/8$]

identify the value of each digit in numbers given to 3 decimal places and multiply and divide numbers by 10, 100 and 1,000 giving answers up to 3 decimal places

multiply one-digit numbers with up to 2 decimal places by whole numbers

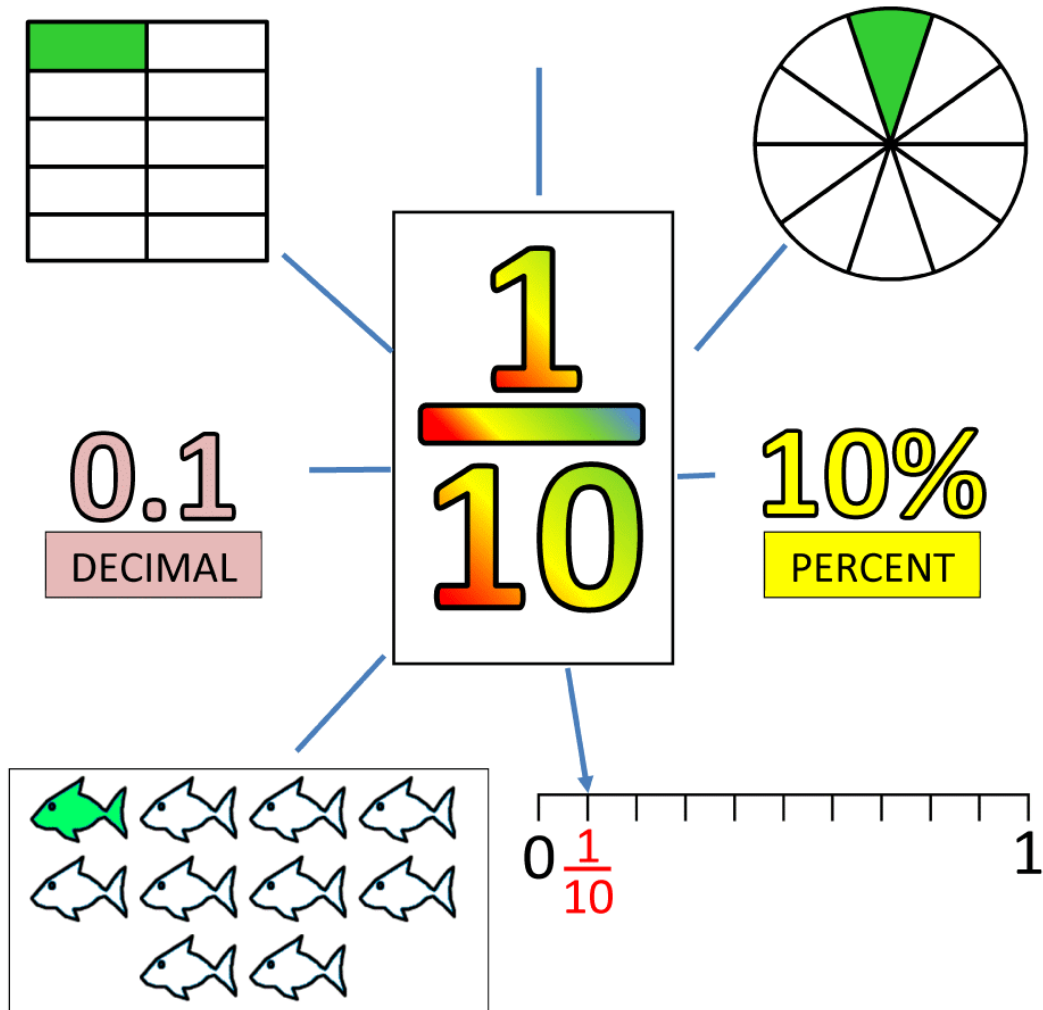
use written division methods in cases where the answer has up to 2 decimal places

solve problems which require answers to be rounded to specified degrees of accuracy

recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

Counting up and down in tenths

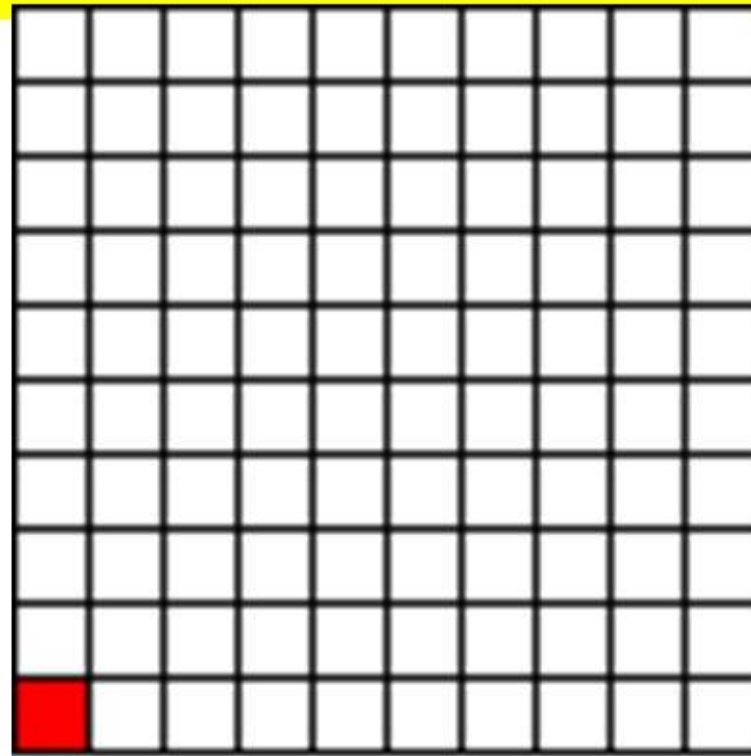
One-tenth



Counting in one hundredths

- One of one hundred equal parts

Example:



↑ $\frac{1}{100}$ or 0.01

Fraction of amounts

Challenge 1				
Find $\frac{1}{10}$ of:	Find $\frac{1}{5}$ of:	Find $\frac{1}{3}$ of:	Find $\frac{1}{4}$ of:	
a) 30	e) 10	i) 9	m) 8	
b) 80	f) 30	j) 27	n) 32	
c) 20p	g) 25cm	k) £30	o) 20m	
d) 50p	h) 45cm	l) £12	p) 36m	
Challenge 2				
a) $\frac{1}{10}$ of 60	e) $\frac{1}{5}$ of 50	i) $\frac{5}{6}$ of 12	m) $\frac{2}{7}$ of 70p	q) $\frac{5}{6}$ of 30cm
b) $\frac{3}{10}$ of 60	f) $\frac{4}{5}$ of 50	j) $\frac{2}{5}$ of 35	n) $\frac{3}{4}$ of 28p	r) $\frac{7}{9}$ of 18cm
c) $\frac{1}{4}$ of 16	g) $\frac{1}{3}$ of 21	k) $\frac{4}{9}$ of 27	o) $\frac{5}{8}$ of £16	s) $\frac{3}{8}$ of 40m
d) $\frac{3}{4}$ of 16	h) $\frac{2}{3}$ of 21	l) $\frac{7}{10}$ of 90	p) $\frac{2}{3}$ of £24	t) $\frac{4}{7}$ of 21m
Challenge 3				

Circle $\frac{1}{3}$ of the set of objects below.



Circle $\frac{2}{5}$ of the set of objects below.



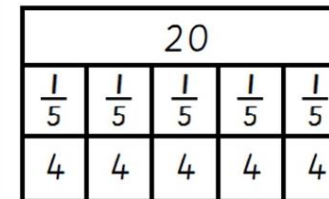
Circle $\frac{3}{4}$ of the people below.



Deepening Understanding

YR4 Fractions of Amounts

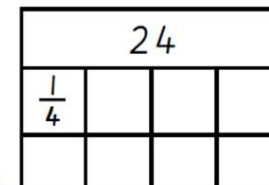
Bar Models



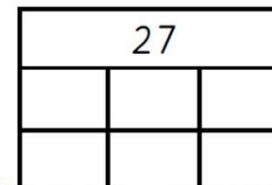
I know this bar model tells me that one fifth of 20 is 4

What other facts does it show?

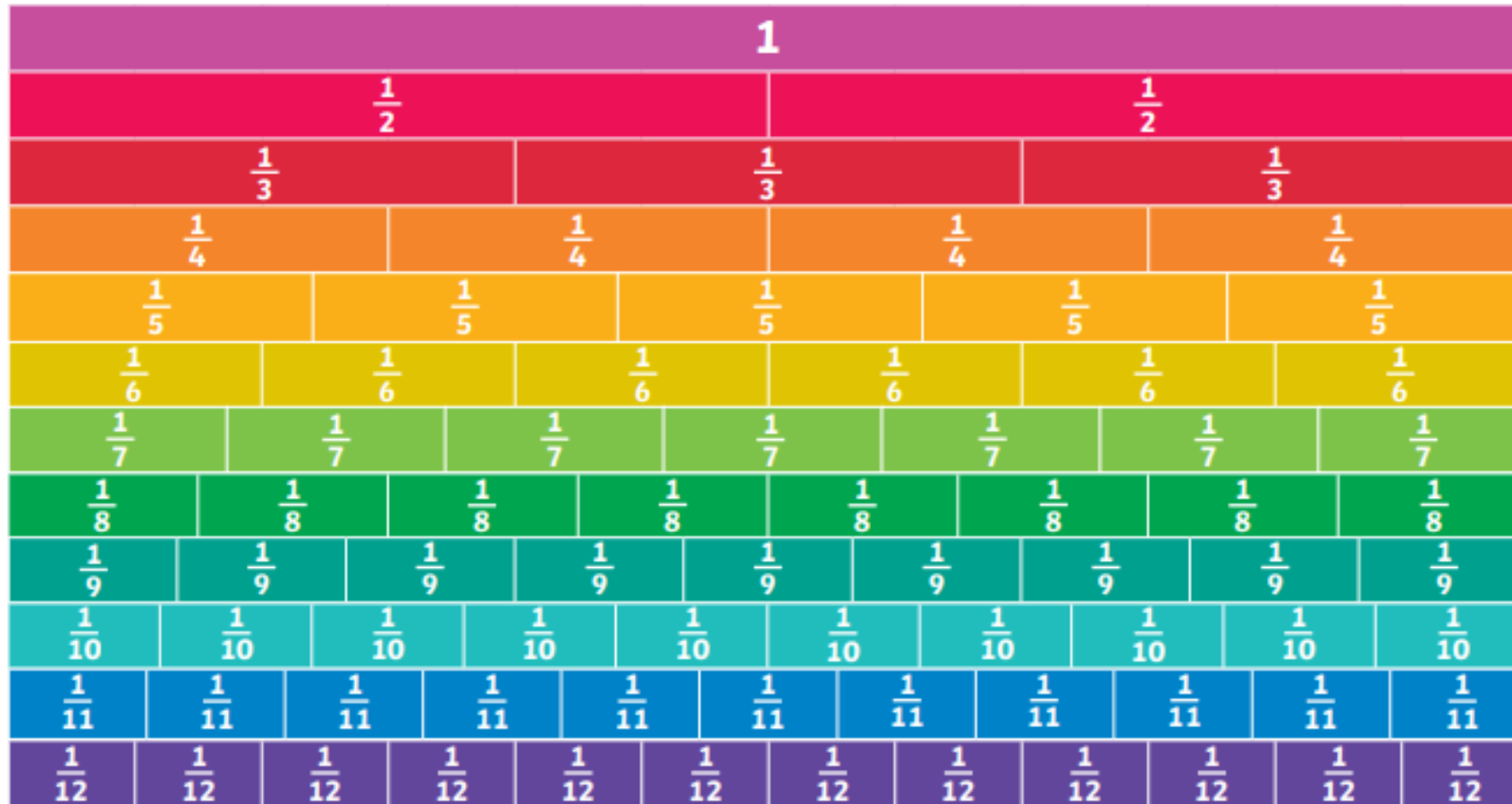
Complete the bar model and write all of the known facts



Complete the bar model and write all of the known facts



Fractions Wall



Simplifying Fractions

****Make Fractions as Small as Possible**

$$\frac{14}{42} = \frac{1}{3}$$

1. Find the Greatest Common Factor!

$$14 \\ \uparrow \\ (7) \times (2)$$

$$42 \\ \uparrow \quad \uparrow \\ 7 \times 6 \\ \uparrow \quad \uparrow \\ 1 \times (7) \times 3 \times (2)$$

Factors that Repeat:

$$7 \times 2 = 14$$

$$\text{GCF} = 14$$

Numerator: $14 \div 14 = 1$
Denominator: $42 \div 14 = 3$

2. Keep Your Fraction Balanced!!

~~DIVIDE~~ THE **NUMERATOR** AND
THE **DENOMINATOR** BY THE
GREATEST COMMON FACTOR!

Addition and subtraction of fractions with the same denominator

$$1) \quad \frac{7}{6} + \frac{2}{6} = \frac{9}{6}$$

$$2) \quad \frac{7}{5} - \frac{4}{5} = \frac{3}{5}$$

$$3) \quad \frac{9}{10} - \frac{7}{10} = \frac{2}{10}$$

$$4) \quad \frac{7}{9} + \frac{6}{9} = \frac{13}{9}$$

$$5) \quad \frac{8}{7} + \frac{6}{7} = \frac{14}{7}$$

$$6) \quad \frac{11}{4} - \frac{6}{4} = \frac{5}{4}$$

$$7) \quad \frac{12}{15} + \frac{7}{15} = \frac{19}{15}$$

$$8) \quad \frac{15}{12} - \frac{4}{12} = \frac{11}{12}$$

Adding Fractions

$$\frac{2}{5} + \frac{3}{4} = \frac{8}{20} + \frac{15}{20} = \frac{23}{20} = 1\frac{3}{20}$$

The diagram shows the process of finding a common denominator. Red arrows labeled 'x4' point from the denominator 5 of the first fraction to the denominator 20 of the second fraction. Blue arrows labeled 'x5' point from the denominator 4 of the second fraction to the denominator 20 of the third fraction.

Change to a mixed number



Find a **COMMON DENOMINATOR** then you can **ADD**.

Subtraction Fractions with **UNLIKE** denominators

$$\frac{5}{6} - \frac{3}{9} =$$

1. Find the **LCM** of the **denominators**. This is your new denominator.

Multiples of 6 = 6, 12, 18

Multiples of 9 = 9, 18, 27

$$\text{LCM} = 18$$

2. Rewrite the problem using the LCM.

$$\frac{5 \times 3}{6 \times 3} - \frac{3 \times 2}{9 \times 2} = \frac{15}{18} - \frac{6}{18}$$

Whatever you do to the numerator you must do to the denominator.

3. Subtract the numerators. The denominator stays the same.

$$\frac{15}{18} - \frac{6}{18} = \frac{9}{18}$$

4. Simplify

$$\frac{9}{18} \begin{array}{l} +9 = \\ +9 = \end{array} \frac{1}{2}$$

Divide by the Greatest Common Factor.

Addition and subtraction of fractions whose denominators are multiples of the same number

Adding and subtracting fractions: different denominators 1

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

3. $\frac{2}{9} + \frac{4}{6} =$

5. $\frac{1}{14} + \frac{3}{7} =$

7. $\frac{3}{20} + \frac{6}{10} =$

9. $\frac{5}{9} + \frac{5}{3} =$

2. $\frac{3}{10} - \frac{1}{5} =$

4. $\frac{3}{4} - \frac{3}{12} =$

6. $\frac{6}{21} - \frac{1}{7} =$

8. $\frac{3}{4} - \frac{1}{16} =$

10. $\frac{7}{12} - \frac{1}{4} =$

Adding and subtracting fractions: different denominators 2

11. $\frac{1}{3} + \frac{1}{5} =$

13. $\frac{2}{7} + \frac{1}{2} =$

15. $\frac{2}{3} + \frac{3}{7} =$

17. $\frac{3}{9} + \frac{6}{10} =$

19. $\frac{5}{6} + \frac{1}{4} =$

12. $\frac{1}{3} - \frac{1}{8} =$

14. $\frac{3}{4} - \frac{3}{10} =$

16. $\frac{6}{11} - \frac{1}{4} =$

18. $\frac{3}{4} - \frac{5}{11} =$

20. $\frac{7}{15} - \frac{1}{10} =$

Recognise mixed and improper fractions

Convert a Mixed Number to an Improper Fraction

Mixed Number

$$2 \frac{5}{6}$$

A mixed number contains whole numbers and parts of a whole (fraction).

1. Look at the denominator of the fraction. This tells you how many parts make up a whole.

Whole Number

$$2 \frac{5}{6}$$

Fraction

2. The numerator for the converted whole number equals the whole number multiplied by the denominator.

$$\frac{12}{6} + \frac{5}{6}$$

3. We can now add the whole number in its fraction form to the fraction already in the mixed number.

Numerator → $\frac{17}{6}$

Denominator → 6

4. Add the numerators together to give you your improper fraction.

Improper Fraction

$$\frac{17}{6}$$

An improper fraction is one where the numerator is greater than the denominator.

Recognise mixed and improper fractions

How to make an improper fraction

Divide **R**ight **D**aily
Divide **R**emainder **D**enominator

$\frac{17}{5} = 3 \frac{2}{5}$

$17 \div 5 = 3, r.2$

Denominator stays the same.

Change an Improper fraction into a mixed number.

© 2011 by Mrs. [unreadable]

Multiply fractions

$$\begin{aligned} & 5 \times \frac{8}{10} \\ &= \frac{5}{1} \times \frac{8}{10} \\ &= \frac{40}{10} \end{aligned}$$

How to Multiply Fractions with Whole Numbers

Multiplying Fractions

$$\frac{2}{4} \times \frac{3}{6}$$

$$\frac{2}{4} \times \frac{3}{6} = \frac{6}{24}$$

Multiply the numerators. Multiply the Denominators.

$$\frac{6}{24} = \frac{1}{4}$$

Simplify the fraction by dividing the numerator and denominator by their lowest common factor.



Multiply fractions

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

$$= \frac{3}{2} \times \frac{32}{7}$$

$$= \underline{\underline{96}}$$

Divide fractions

$$\begin{aligned} \frac{9}{17} \div 3 &= \frac{9}{17} \div \frac{3}{1} = \frac{9}{17} \times \frac{1}{3} = \frac{9 \times 1}{17 \times 3} \\ &= \frac{9}{51} = \frac{9 \div 3}{51 \div 3} = \frac{3}{17} \end{aligned}$$

Stack it, Flip it, Kiss it

Percentages of amounts

Example:

What is 32% "of" 44?

↑
multiply

$$32\% \times 44 =$$

Convert percent into
a fraction or decimal

↓

$$\frac{32}{100}$$

↓

$$0.32 \times 44 = \boxed{}$$

$$\begin{array}{r} 0.32 \\ \times 44 \\ \hline \end{array}$$

32%



32



↑
drop the % sign
and move decimal
2 places to the left