Adding fractions with a different denominator

Wednesday, 14 March 2018 5:12 pm

By the end of the lesson I would hope that we can all:
- Add fractions with different denominators
- Subtract fractions with different denominators
- Finds fractions of quantities

RECAP:

Fractions come up in all aspects of Mathematics.
By the time we get to Year 10 and 11 we might be asked to do questions like ...

$$\frac{2x+1}{3} - \frac{x-1}{2}$$

$$\frac{3x-1}{3} - \frac{2x-3}{4}$$

$$\frac{x+6}{5} - \frac{x-4}{3}$$

← Arbegla

They might look pretty ugly ... and possibly hard, but they work in exactly the same way as "normal" fractions.
It's important we can add, subtract, multiply and divide fractions.

Adding and Subtracting fractions where the denominator is the same:

The easiest fraction questions are those where the denominator is the same!

Examples:

1) $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$ 🙂

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

3) $\frac{4}{9} + \frac{2}{9} = \frac{6}{9} = \frac{2}{3}$ (÷3, ÷3)

Note: When the bottoms are the same, we add the tops of the fractions!
Don't be tricked: You only add the tops ... NOT the bottoms.
Imagine what would happen if you added the tops and the bottoms:

Numerator → $\frac{1}{2} + \frac{1}{2} = \frac{1}{2}$ ← Denominator

Must be the same!

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

Bottom stays the same
Add the tops

Adding and subtracting fractions where the denominator is different:

These are the types of questions which really confused students :(
Whilst we can't add or subtract them straight away ... we can do some maths trickery by making the denominators the same!

Examples:

1) $\frac{1}{2} + \frac{1}{3}$ ×3 ×2 → $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$

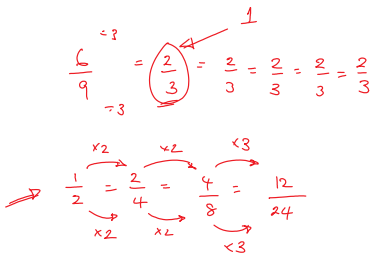
2) $\frac{1}{4} + \frac{2}{3} = \frac{3}{12} + \frac{8}{12} = \frac{11}{12}$

3) $\frac{1}{8} + \frac{3}{5} = \frac{5}{40} + \frac{24}{40} = \frac{29}{40}$

4) $\frac{5}{3} + \frac{1}{6}$ → $\frac{10}{6} + \frac{1}{6} = \frac{11}{6} = 1\frac{5}{6}$

5) $1\frac{1}{2} + \frac{2}{3} = \frac{3}{2} + \frac{2}{3} = \frac{9}{6} + \frac{4}{6} = \frac{13}{6} = 2\frac{1}{6}$

B.F.T.



Note: When the bottoms are the same, we use equivalent fractions to make them the same!
Once they are the same, you add them like you did the "easier" questions.
Don't be tricked: You only add the tops ... NOT the bottoms.

Exercise for you to do:

(1) $\frac{1}{3} + \frac{1}{4}$ $\quad \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$ ✓

(2) $\frac{2}{5} + \frac{1}{4}$ $\quad \frac{8}{20} + \frac{5}{20} = \frac{13}{20}$ ✓

(3) $\frac{8}{9} + \frac{1}{6}$ $\quad \frac{48}{54} + \frac{9}{54} = \frac{57}{54} = 1\frac{3}{54} = 1\frac{1}{18}$ ✓

(4) $\frac{7}{2} + \frac{3}{4} = \frac{14}{4} + \frac{3}{4} = \frac{17}{4} = 4\frac{1}{4}$ ✓

(5) $2\frac{1}{2} + \frac{4}{5}$ $\quad = \frac{5}{2} + \frac{4}{5} = \frac{25}{10} + \frac{8}{10} = \frac{33}{10} = 3\frac{3}{10}$ ✓

(6) $\frac{1}{2} + \frac{1}{3} + \frac{1}{4}$ $\quad \frac{6}{12} + \frac{4}{12} + \frac{3}{12} = \frac{13}{12} = 1\frac{1}{12}$ ✓

(7) $3\frac{1}{2} + 2\frac{1}{3}$ $\quad \frac{7}{2} + \frac{7}{3} = \frac{21}{6} + \frac{14}{6} = \frac{35}{6} = 5\frac{5}{6}$ ✓

Finding "Fractions of"

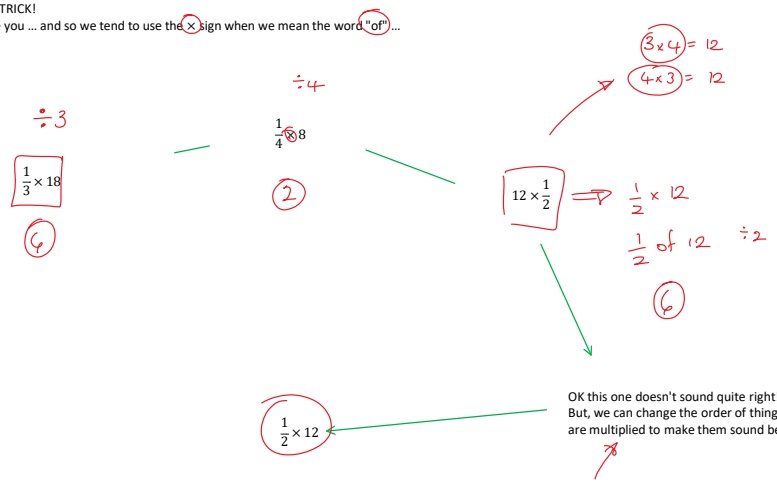
Sometimes, saying a maths question out loud can actually make it easier.

For example:

- "What is one half of 12"? — 6 — ÷2
- What is a quarter of 8? — 2 — ÷4
- What is one third of 18? — 6 — ÷3

Maths is a BIG FAT TRICK!
We try and confuse you ... and so we tend to use the × sign when we mean the word "of" ...

Examples:



OK this one doesn't sound quite right!
But, we can change the order of things which are multiplied to make them sound better:

Sometimes we can't do them in our heads ...
So, we need to come up with a Mathematical way of doing them.

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

2×3×4
4×3×2
2×4×3
3×2×4

Most people like to multiply fractions!
They are the easiest.
It doesn't matter what the numerators and denominators are!
Rule: Multiply the top two numbers together, multiply the bottom two numbers together. Then cancel down/simplify.

Examples:

(1) $\frac{1}{3}$ of 12 $= \frac{1 \times 12}{3 \times 1} = \frac{12}{3} = 4$

(2) $\frac{1}{4}$ of 16 $= \frac{1}{4} \times \frac{16}{1} = \frac{16}{4} = 4$

(3) $\frac{2}{3}$ of 18 $= \frac{2}{3} \times \frac{18}{1} = \frac{36}{3} = 12$

$\frac{1}{3} \div 3$ $\quad 18 \div 3 = 6$
$\frac{1}{3} = 6$ $\quad \frac{2}{3} = 12$

(4) $\frac{9}{10}$ of 120 ÷10
$\frac{1}{10} \times \frac{120}{1} = 12 \times 9 = 108$

(5) $\frac{3}{5}$ of 60
$\frac{1}{5}$ of 60 = 60 ÷ 5 = 12
$\frac{3}{5} = 3 \times \frac{1}{5} = 3 \times 12 = 36$

(6) $\frac{7}{8}$ of 64
$\frac{1}{8}$ of 64 = 8 (÷8)
$\frac{7}{8} = 8 \times 7 = 56$

How does this work though with:

Good news!
Any whole number can be written as a fraction ...

These are equivalent

$5 = \frac{5}{1}$ $\quad 7 = \frac{7}{1}$ $\quad 100 = \frac{100}{1}$

So, $\frac{3}{5} \times 15 = \frac{3}{5} \times \frac{15}{1} = \frac{45}{5} = 9$ (multiply)

Happy face!

So, $\frac{3}{5} \times 15 = \frac{3}{5} \times \frac{15}{1} = \frac{45}{5} = 9$ ☺ Happy face.

Change whole numbers into a fraction

Cancel down

Exercise for you to do:

① $\frac{2}{3}$ of 33 → $\frac{1}{3} = 11$ (33 ÷ 3) → $\frac{2}{3} = 22$

② $\frac{1}{6}$ of 36 → $\frac{1}{6} \times \frac{36}{1} = \frac{36}{6} = 6$

③ $\frac{4}{5}$ of 90 → 90 ÷ 5

$= \frac{1}{5} = 90 \div 5 = 18$

$\frac{4}{5} = 18 \times 4 = 72$

④ $\frac{6}{7}$ of $\frac{3}{4}$

$= \frac{6 \times 3}{7 \quad 4} = \frac{18}{28} \div 2$

$= \frac{9}{14}$

⑤ $\frac{1}{2}$ of $\frac{2}{3}$

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

$= \frac{1}{3}$

⑥ $\frac{9}{10}$ of 17

$\frac{9}{10} \times \frac{17}{1} = \frac{153}{10}$

$= 15\frac{3}{10}$

17
9
153
6