

Fractions: Quick Questions

Mini whiteboard questions, with solutions

Contents

- Simplifying fractions
- Ordering fractions
- Mixed numbers and improper fractions
- Adding and subtracting fractions
- Converting fractions, decimals and percentages
- Ordering fractions, decimals and percentages
- Fractions of amounts (no calculator)
- Fractions of amounts (calculator)
- Four operations with mixed numbers and negatives
- Word problems with mixed numbers
- Recurring decimals to fractions

Simplifying fractions

Simplify $\frac{4}{8}$

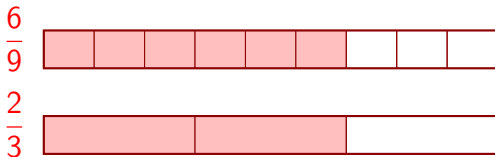
Simplify $\frac{4}{8}$



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

Simplify $\frac{6}{9}$

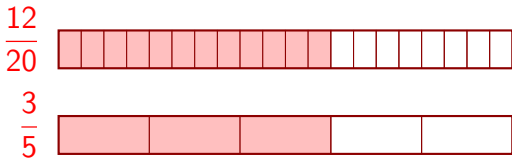
Simplify $\frac{6}{9}$



$$\frac{6}{9} = \frac{6 \div 3}{9 \div 3} = \frac{2}{3}$$

Simplify $\frac{12}{20}$

Simplify $\frac{12}{20}$



$$\frac{12}{20} = \frac{12 \div 4}{20 \div 4} = \frac{3}{5}$$

Simplify $\frac{24}{36}$

Simplify $\frac{24}{36}$

$$\frac{24}{36} = \frac{24 \div 12}{36 \div 12} = \frac{2}{3}$$

Simplify $\frac{45}{60}$

Simplify $\frac{45}{60}$

$$\frac{45}{60} = \frac{45 \div 15}{60 \div 15} = \frac{3}{4}$$

Simplify $\frac{42}{70}$

Simplify $\frac{42}{70}$

$$\frac{42}{70} = \frac{42 \div 14}{70 \div 14} = \frac{3}{5}$$

Simplify $\frac{84}{144}$

Simplify $\frac{84}{144}$

$$\frac{84}{144} = \frac{84 \div 12}{144 \div 12} = \frac{7}{12}$$

Simplify $\frac{91}{117}$

Simplify $\frac{91}{117}$

$$91 = 7 \times 13 \qquad 117 = 9 \times 13$$

$$\frac{91}{117} = \frac{91 \div 13}{117 \div 13} = \frac{7}{9}$$

Simplify $\frac{315}{420}$

Simplify $\frac{315}{420}$

Both divide by 105:

$$\frac{315}{420} = \frac{315 \div 105}{420 \div 105} = \frac{3}{4}$$

Simplify $\frac{1001}{1309}$

(Hint: both numbers are multiples of 7 and of 11.)

Simplify $\frac{1001}{1309}$

(Hint: both numbers are multiples of 7 and of 11.)

$$1001 = 7 \times 11 \times 13 \qquad 1309 = 7 \times 11 \times 17$$

Divide both by 77:

$$\frac{1001}{1309} = \frac{13}{17}$$

Ordering fractions

Put these in order, smallest first:

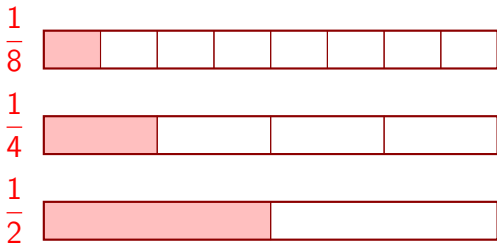
$$\frac{1}{4}$$

$$\frac{1}{2}$$

$$\frac{1}{8}$$

Put these in order, smallest first:

$$\frac{1}{4} \quad \frac{1}{2} \quad \frac{1}{8}$$



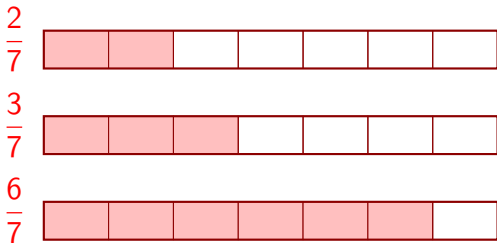
The bigger the denominator, the smaller the piece.

Put these in order, smallest first:

$$\frac{3}{7} \quad \frac{6}{7} \quad \frac{2}{7}$$

Put these in order, smallest first:

$$\frac{3}{7} \quad \frac{6}{7} \quad \frac{2}{7}$$



Same denominator, so just order the numerators.

Put these in order, smallest first:

$$\frac{1}{2} \quad \frac{3}{4} \quad \frac{5}{8}$$

Put these in order, smallest first:

$$\frac{1}{2} \quad \frac{3}{4} \quad \frac{5}{8}$$



$$\frac{1}{2} \quad \frac{5}{8} \quad \frac{3}{4}$$

Put these in order, smallest first:

$$\frac{2}{3} \quad \frac{5}{6} \quad \frac{3}{4}$$

Put these in order, smallest first:

$$\frac{2}{3} \quad \frac{5}{6} \quad \frac{3}{4}$$



$$\frac{2}{3} \quad \frac{3}{4} \quad \frac{5}{6}$$

Put these in order, smallest first:

$$\frac{3}{5} \quad \frac{7}{10} \quad \frac{13}{20}$$

Put these in order, smallest first:

$$\frac{3}{5} \quad \frac{7}{10} \quad \frac{13}{20}$$

Common denominator 20:

$$\frac{12}{20} \quad \frac{14}{20} \quad \frac{13}{20}$$

$$\frac{3}{5} \quad \frac{13}{20} \quad \frac{7}{10}$$

Put these in order, smallest first:

$$\frac{5}{9} \quad \frac{2}{3} \quad \frac{7}{12}$$

Put these in order, smallest first:

$$\frac{5}{9} \quad \frac{2}{3} \quad \frac{7}{12}$$

Common denominator 36:

$$\frac{20}{36} \quad \frac{24}{36} \quad \frac{21}{36}$$

$$\frac{5}{9} \quad \frac{7}{12} \quad \frac{2}{3}$$

Put these in order, **largest** first:

$$\frac{4}{5} \quad \frac{7}{9} \quad \frac{11}{15}$$

Put these in order, **largest** first:

$$\frac{4}{5} \quad \frac{7}{9} \quad \frac{11}{15}$$

Common denominator 45:

$$\frac{36}{45} \quad \frac{35}{45} \quad \frac{33}{45}$$
$$\frac{4}{5} \quad \frac{7}{9} \quad \frac{11}{15}$$

Put these in order, smallest first:

$$\frac{5}{8}$$

$$\frac{7}{11}$$

$$\frac{9}{14}$$

Put these in order, smallest first:

$$\frac{5}{8} \quad \frac{7}{11} \quad \frac{9}{14}$$

The denominators share no factors, so divide instead:

$$\frac{5}{8} = 0.625$$

$$\frac{7}{11} = 0.636 \dots$$

$$\frac{9}{14} = 0.642 \dots$$

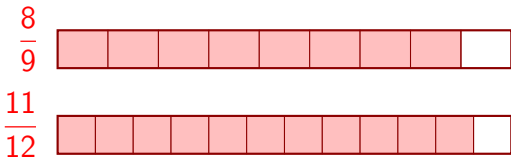
$$\frac{5}{8} \quad \frac{7}{11} \quad \frac{9}{14}$$

Which is closer to 1: $\frac{8}{9}$ or $\frac{11}{12}$?

How do you know?

Which is closer to 1: $\frac{8}{9}$ or $\frac{11}{12}$?

How do you know?



The gaps left are $\frac{1}{9}$ and $\frac{1}{12}$.

$\frac{1}{12}$ is smaller, so $\frac{11}{12}$ is closer to 1.

Write a fraction that lies between

$$\frac{5}{8} \quad \text{and} \quad \frac{2}{3}$$

Write a fraction that lies between

$$\frac{5}{8} \quad \text{and} \quad \frac{2}{3}$$

In 24ths they are next-door neighbours: $\frac{15}{24}$ and $\frac{16}{24}$.

Double both denominators to make room:

$$\frac{30}{48} < \frac{31}{48} < \frac{32}{48}$$

So $\frac{31}{48}$ works.

Mixed numbers and improper fractions

Write $1\frac{1}{2}$ as an improper fraction

Write $1\frac{1}{2}$ as an improper fraction



Three halves are shaded:

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

Write $2\frac{3}{4}$ as an improper fraction

Write $2\frac{3}{4}$ as an improper fraction



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

Write $\frac{7}{2}$ as a mixed number

Write $\frac{7}{2}$ as a mixed number



$$7 \div 2 = 3 \text{ remainder } 1, \text{ so } \frac{7}{2} = 3\frac{1}{2}$$

Write $4\frac{2}{5}$ as an improper fraction

Write $4\frac{2}{5}$ as an improper fraction

$4 \times 5 = 20$, then add the 2:

$$4\frac{2}{5} = \frac{22}{5}$$

Write $\frac{23}{4}$ as a mixed number

Write $\frac{23}{4}$ as a mixed number



$$23 \div 4 = 5 \text{ remainder } 3, \text{ so } \frac{23}{4} = 5\frac{3}{4}$$

Write $5\frac{7}{8}$ as an improper fraction

Write $5\frac{7}{8}$ as an improper fraction

$5 \times 8 = 40$, then add the 7:

$$5\frac{7}{8} = \frac{47}{8}$$

Write $\frac{100}{7}$ as a mixed number

Write $\frac{100}{7}$ as a mixed number

$7 \times 14 = 98$, leaving 2:

$$\frac{100}{7} = 14\frac{2}{7}$$

Write $12\frac{5}{9}$ as an improper fraction

Write $12\frac{5}{9}$ as an improper fraction

$12 \times 9 = 108$, then add the 5:

$$12\frac{5}{9} = \frac{113}{9}$$

Write $-3\frac{2}{5}$ as an improper fraction

Write $-3\frac{2}{5}$ as an improper fraction

Convert $3\frac{2}{5}$ first, then put the sign back:

$$3 \times 5 + 2 = 17, \text{ so } -3\frac{2}{5} = -\frac{17}{5}$$

The mixed number $6\frac{a}{7}$ is the same as $\frac{45}{7}$.

Find a .

The mixed number $6\frac{a}{7}$ is the same as $\frac{45}{7}$.

Find a .

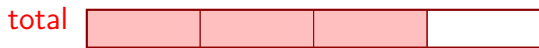
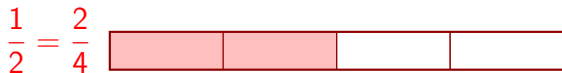
$$6\frac{a}{7} = \frac{42 + a}{7}$$

$$42 + a = 45, \text{ so } a = 3$$

Adding and subtracting fractions

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

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

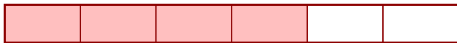


$$\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$$

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

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

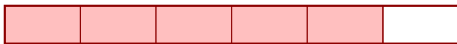
$$\frac{2}{3} = \frac{4}{6}$$



$$\frac{1}{6}$$



total

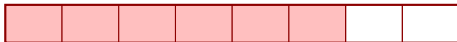


$$\frac{4}{6} + \frac{1}{6} = \frac{5}{6}$$

$$\frac{3}{4} - \frac{1}{8}$$

$$\frac{3}{4} - \frac{1}{8}$$

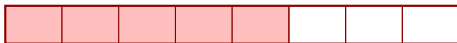
$$\frac{3}{4} = \frac{6}{8}$$



take off $\frac{1}{8}$



leaves



$$\frac{6}{8} - \frac{1}{8} = \frac{5}{8}$$

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

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

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



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



total



$$\frac{4}{12} + \frac{3}{12} = \frac{7}{12}$$

$$\frac{3}{5} - \frac{1}{4}$$

$$\frac{3}{5} - \frac{1}{4}$$

Common denominator 20:

$$\frac{12}{20} - \frac{5}{20} = \frac{7}{20}$$

$$\frac{5}{6} + \frac{3}{8}$$

$$\frac{5}{6} + \frac{3}{8}$$

Common denominator 24:

$$\frac{20}{24} + \frac{9}{24} = \frac{29}{24} = 1\frac{5}{24}$$

$$\frac{7}{10} - \frac{2}{15}$$

$$\frac{7}{10} - \frac{2}{15}$$

Common denominator 30:

$$\frac{21}{30} - \frac{4}{30} = \frac{17}{30}$$

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

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

Common denominator 12:

$$\frac{8}{12} + \frac{9}{12} + \frac{2}{12} = \frac{19}{12} = 1\frac{7}{12}$$

$$\frac{5}{12} - \frac{7}{18}$$

$$\frac{5}{12} - \frac{7}{18}$$

Common denominator 36:

$$\frac{15}{36} - \frac{14}{36} = \frac{1}{36}$$

What must be added to $\frac{5}{9}$
to make $\frac{7}{8}$?

What must be added to $\frac{5}{9}$
to make $\frac{7}{8}$?

The missing amount is $\frac{7}{8} - \frac{5}{9}$.

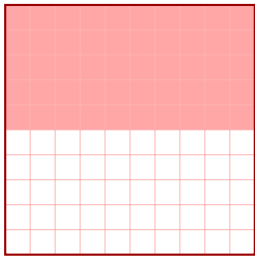
Common denominator 72:

$$\frac{63}{72} - \frac{40}{72} = \frac{23}{72}$$

Converting fractions, decimals and percentages

Write $\frac{1}{2}$ as a decimal and as a percentage

Write $\frac{1}{2}$ as a decimal and as a percentage

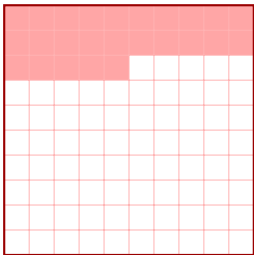


Half the square is 50 out of 100:

$$\frac{1}{2} = \frac{50}{100} = 0.5 = 50\%$$

Write 0.25 as a fraction and as a percentage

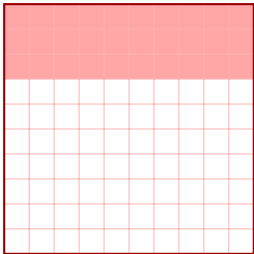
Write 0.25 as a fraction and as a percentage



$$0.25 = \frac{25}{100} = \frac{1}{4} = 25\%$$

Write 30% as a decimal and as a fraction in its simplest form

Write 30% as a decimal and as a fraction in its simplest form



$$30\% = \frac{30}{100} = 0.3 = \frac{3}{10}$$

Write $\frac{3}{4}$ as a percentage, and 0.6 as a percentage

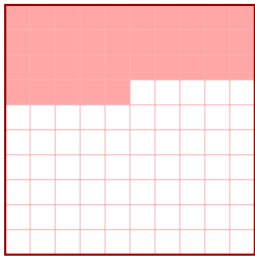
Write $\frac{3}{4}$ as a percentage, and 0.6 as a percentage

$$\frac{3}{4} = \frac{75}{100} = 75\%$$

$$0.6 = \frac{60}{100} = 60\%$$

Write $\frac{7}{20}$ as a decimal and as a percentage

Write $\frac{7}{20}$ as a decimal and as a percentage

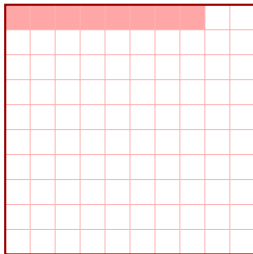


Multiply top and bottom by 5:

$$\frac{7}{20} = \frac{35}{100} = 0.35 = 35\%$$

Write 0.08 as a percentage and as a fraction in its simplest form

Write 0.08 as a percentage and as a fraction in its simplest form



$$0.08 = \frac{8}{100} = 8\% = \frac{2}{25}$$

Write $\frac{3}{8}$ as a decimal and as a percentage

Write $\frac{3}{8}$ as a decimal and as a percentage

$$3 \div 8 = 0.375$$

$$0.375 \times 100 = 37.5\%$$

Write 12.5% as a fraction in its simplest form

Write 12.5% as a fraction in its simplest form

$$12.5\% = \frac{12.5}{100} = \frac{125}{1000}$$

$$\text{Divide both by 125: } \frac{1}{8}$$

Write $\frac{5}{6}$ as a decimal, and as a percentage to 1 decimal place

Write $\frac{5}{6}$ as a decimal, and as a percentage to 1 decimal place

$$5 \div 6 = 0.8333 \dots$$

$$0.8333 \dots \times 100 = 83.3\% \text{ (1 d.p.)}$$

Write 137.5% as a mixed number in its simplest form

Write 137.5% as a mixed number in its simplest form

$$137.5\% = 1.375 = 1\frac{375}{1000}$$

$$\text{Divide both by 125: } 1\frac{3}{8}$$

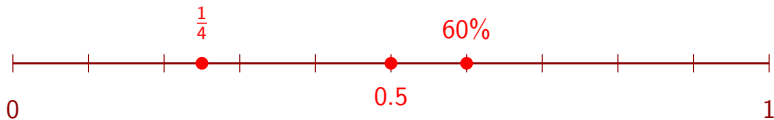
Ordering fractions, decimals and percentages

Put these in order, smallest first:

0.5 $\frac{1}{4}$ 60%

Put these in order, smallest first:

0.5 $\frac{1}{4}$ 60%



$$\frac{1}{4} = 0.25 \qquad 60\% = 0.6$$

$\frac{1}{4}$ 0.5 60%

Put these in order, smallest first:

0.7 $\frac{3}{4}$ 70%

Put these in order, smallest first:

0.7 $\frac{3}{4}$ 70%



0.7 and 70% are equal, and $\frac{3}{4} = 0.75$.

0.7 = 70%, then $\frac{3}{4}$

Put these in order, smallest first:

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

45%

0.35

Put these in order, smallest first:

$$\frac{2}{5} \quad 45\% \quad 0.35$$

As decimals: 0.4 0.45 0.35

$$0.35 \quad \frac{2}{5} \quad 45\%$$

Put these in order, smallest first:

$$0.62 \quad \frac{5}{8} \quad 63\%$$

Put these in order, smallest first:

$$0.62 \quad \frac{5}{8} \quad 63\%$$

As decimals: 0.62 0.625 0.63

$$0.62 \quad \frac{5}{8} \quad 63\%$$

Put these in order, **largest** first:

$$\frac{7}{8}$$

0.87

88%

Put these in order, **largest** first:

$$\frac{7}{8} \quad 0.87 \quad 88\%$$

As decimals: 0.875 0.87 0.88

$$88\% \quad \frac{7}{8} \quad 0.87$$

Put these in order, smallest first:

$$\frac{1}{3}$$

0.3

33%

Put these in order, smallest first:

$$\frac{1}{3} \quad 0.3 \quad 33\%$$

As decimals: 0.333... 0.3 0.33

$$0.3 \quad 33\% \quad \frac{1}{3}$$

Put these in order, smallest first:

$$0.045 \quad 4.5\% \quad \frac{1}{20}$$

Put these in order, smallest first:

$$0.045 \quad 4.5\% \quad \frac{1}{20}$$

As decimals: 0.045 0.045 0.05

$$0.045 = 4.5\%, \text{ then } \frac{1}{20}$$

Put these in order, smallest first:

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

83%

0.835

Put these in order, smallest first:

$$\frac{5}{6} \quad 83\% \quad 0.835$$

As decimals: $0.8333 \dots$ 0.83 0.835

$$83\% \quad \frac{5}{6} \quad 0.835$$

Put these in order, smallest first:

$$\frac{2}{7}$$

$$0.28$$

$$29\%$$

Put these in order, smallest first:

$$\frac{2}{7} \quad 0.28 \quad 29\%$$

As decimals: $0.2857 \dots$ 0.28 0.29

$$0.28 \quad \frac{2}{7} \quad 29\%$$

Put these in order, smallest first:

$$\frac{3}{8}$$

0.38

37.5%

$$\frac{3}{7}$$

What do you notice?

Put these in order, smallest first:

$$\frac{3}{8}$$

0.38

37.5%

$$\frac{3}{7}$$

What do you notice?

As decimals: 0.375 0.38 0.375 0.4285...

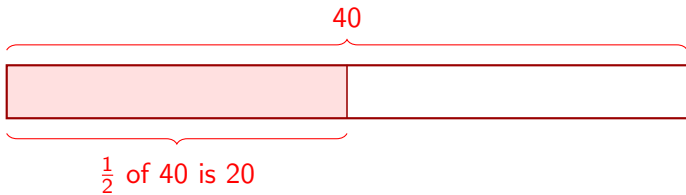
$\frac{3}{8} = 37.5\%$, then 0.38, then $\frac{3}{7}$

$\frac{3}{8}$ and 37.5% are the same number written two ways.

Fractions of amounts (no calculator)

$\frac{1}{2}$ of 40

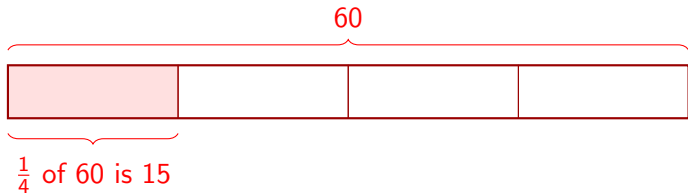
$\frac{1}{2}$ of 40



$$40 \div 2 = 20$$

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

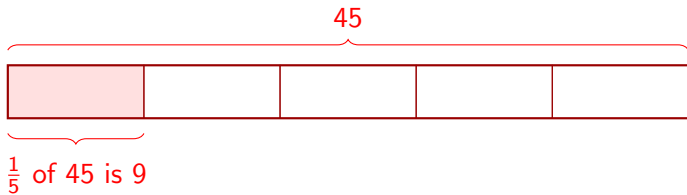
$\frac{1}{4}$ of 60



$$60 \div 4 = 15$$

$$\frac{1}{5} \text{ of } 45$$

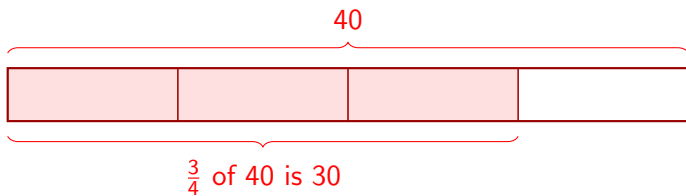
$\frac{1}{5}$ of 45



$$45 \div 5 = 9$$

$\frac{3}{4}$ of 40

$\frac{3}{4}$ of 40

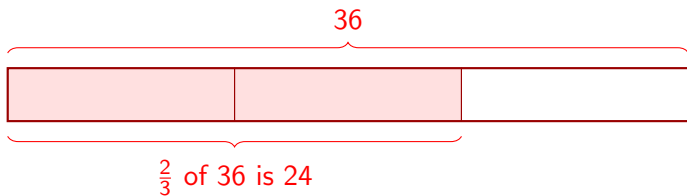


$\frac{1}{4}$ of 40 is 10

$\frac{3}{4}$ of 40 is 30

$\frac{2}{3}$ of 36

$\frac{2}{3}$ of 36

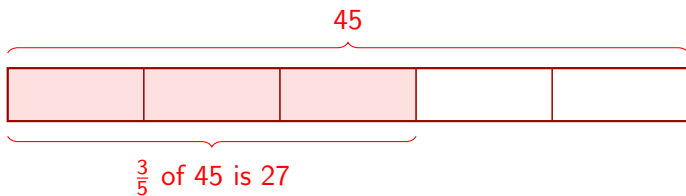


$\frac{1}{3}$ of 36 is 12

$\frac{2}{3}$ of 36 is 24

$\frac{3}{5}$ of 45

$\frac{3}{5}$ of 45

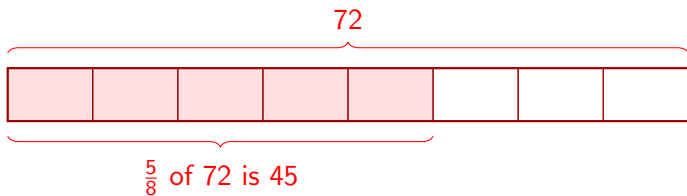


$\frac{1}{5}$ of 45 is 9

$\frac{3}{5}$ of 45 is 27

$\frac{5}{8}$ of 72

$\frac{5}{8}$ of 72

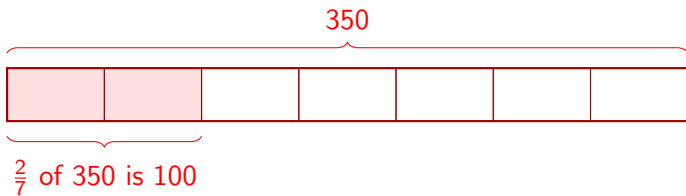


$\frac{1}{8}$ of 72 is 9

$\frac{5}{8}$ of 72 is 45

$\frac{2}{7}$ of 350

$\frac{2}{7}$ of 350



$\frac{1}{7}$ of 350 is 50

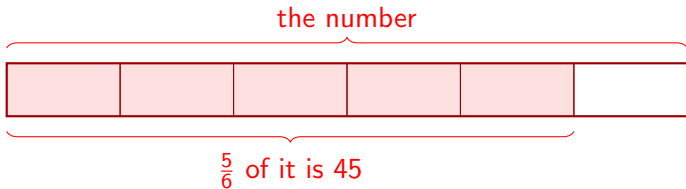
$\frac{2}{7}$ of 350 is 100

$\frac{5}{6}$ of a number is 45.

What is the number?

$\frac{5}{6}$ of a number is 45.

What is the number?



$\frac{5}{6}$ of it is 45

$\frac{1}{6}$ of it is 9

the number is 54

$$\frac{3}{8} \text{ of } \frac{2}{5} \text{ of } 200$$

$$\frac{3}{8} \text{ of } \frac{2}{5} \text{ of } 200$$

Work from the inside out:

$$\frac{2}{5} \text{ of } 200 \text{ is } 80$$

$$\frac{1}{8} \text{ of } 80 \text{ is } 10$$

$$\frac{3}{8} \text{ of } 80 \text{ is } 30$$

Fractions of amounts (calculator)

$\frac{1}{4}$ of 386

$\frac{1}{4}$ of 386

$$386 \div 4 = 96.5$$

$\frac{3}{5}$ of 245

$\frac{3}{5}$ of 245

$\frac{1}{5}$ of 245 is 49

$\frac{3}{5}$ of 245 is 147

$\frac{2}{7}$ of 483

$\frac{2}{7}$ of 483

$\frac{1}{7}$ of 483 is 69

$\frac{2}{7}$ of 483 is 138

$\frac{3}{16}$ of 1024

$\frac{3}{16}$ of 1024

$\frac{1}{16}$ of 1024 is 64

$\frac{3}{16}$ of 1024 is 192

$\frac{5}{9}$ of 738

$\frac{5}{9}$ of 738

$\frac{1}{9}$ of 738 is 82

$\frac{5}{9}$ of 738 is 410

$\frac{7}{8}$ of \$312.40

$\frac{7}{8}$ of \$312.40

$\frac{1}{8}$ of it is £39.05

$\frac{7}{8}$ of it is £273.35

$\frac{11}{13}$ of 2405

$\frac{11}{13}$ of 2405

$\frac{1}{13}$ of 2405 is 185

$\frac{11}{13}$ of 2405 is 2035

$\frac{4}{7}$ of 3.5 kg.

Give your answer in grams.

$$\frac{4}{7} \text{ of } 3.5 \text{ kg.}$$

Give your answer in grams.

$$\frac{1}{7} \text{ of } 3.5 \text{ kg is } 0.5 \text{ kg}$$

$$\frac{4}{7} \text{ of } 3.5 \text{ kg is } 2 \text{ kg}$$

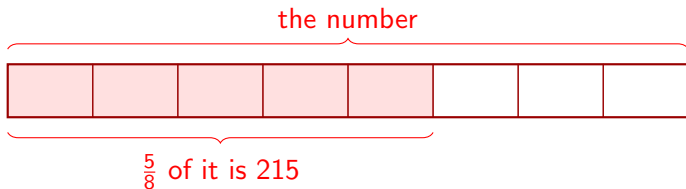
$$2 \text{ kg} = 2000 \text{ g}$$

$\frac{5}{8}$ of a number is 215.

What is the number?

$\frac{5}{8}$ of a number is 215.

What is the number?



$\frac{5}{8}$ of it is 215

$\frac{1}{8}$ of it is 43

the number is 344

$\frac{7}{12}$ of 4 hours 48 minutes.

Give your answer in hours and minutes.

$\frac{7}{12}$ of 4 hours 48 minutes.

Give your answer in hours and minutes.

$$4 \text{ h } 48 \text{ min} = 288 \text{ minutes}$$

$$\frac{1}{12} \text{ of } 288 \text{ is } 24$$

$$\frac{7}{12} \text{ of } 288 \text{ is } 168$$

$$168 \text{ min} = 2 \text{ hours } 48 \text{ minutes}$$

Four operations with mixed numbers and negatives

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

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

Add the wholes, then the fractions:

$$\begin{aligned} 1 + 2 &= 3 & \frac{1}{2} + \frac{1}{4} &= \frac{3}{4} \\ & & &= 3\frac{3}{4} \end{aligned}$$

$$3\frac{4}{5} - 1\frac{2}{5}$$

$$3\frac{4}{5} - 1\frac{2}{5}$$

$$\begin{aligned} 3 - 1 &= 2 & \frac{4}{5} - \frac{2}{5} &= \frac{2}{5} \\ & & &= 2\frac{2}{5} \end{aligned}$$

$$2\frac{1}{2} + \left(-1\frac{1}{4}\right)$$

$$2\frac{1}{2} + \left(-1\frac{1}{4}\right)$$

Adding a negative is subtracting:

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

$$4\frac{1}{6} - 2\frac{3}{4}$$

$$4\frac{1}{6} - 2\frac{3}{4}$$

Improper fractions, common denominator 12:

$$\frac{25}{6} - \frac{11}{4} = \frac{50}{12} - \frac{33}{12} = \frac{17}{12} = 1\frac{5}{12}$$

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

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

Four lots of $2\frac{1}{2}$:

$$2\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2} = 10$$

$$\text{or } \frac{5}{2} \times 4 = \frac{20}{2} = 10$$

$$-3\frac{1}{3} + 1\frac{5}{6}$$

$$-3\frac{1}{3} + 1\frac{5}{6}$$

$$\begin{aligned} -\frac{10}{3} + \frac{11}{6} &= -\frac{20}{6} + \frac{11}{6} \\ &= -\frac{9}{6} = -\frac{3}{2} = -1\frac{1}{2} \end{aligned}$$

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

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

Improper fractions first:

$$\frac{3}{2} \times \frac{8}{3} = \frac{24}{6} = 4$$

$$3\frac{3}{4} \div 1\frac{1}{2}$$

$$3\frac{3}{4} \div 1\frac{1}{2}$$

Improper fractions, then multiply by the reciprocal:

$$\frac{15}{4} \div \frac{3}{2} = \frac{15}{4} \times \frac{2}{3} = \frac{30}{12} = \frac{5}{2} = 2\frac{1}{2}$$

$$-5\frac{1}{3} \div \frac{2}{3}$$

$$-5\frac{1}{3} \div \frac{2}{3}$$

$$-\frac{16}{3} \div \frac{2}{3} = -\frac{16}{3} \times \frac{3}{2} = -\frac{48}{6} = -8$$

$$-2\frac{1}{4} \times \left(-1\frac{1}{3}\right) + 1\frac{1}{2}$$

$$-2\frac{1}{4} \times \left(-1\frac{1}{3}\right) + 1\frac{1}{2}$$

Multiply first; two negatives give a positive:

$$-\frac{9}{4} \times -\frac{4}{3} = \frac{36}{12} = 3$$

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

Word problems with mixed numbers

A recipe needs $1\frac{1}{2}$ cups of flour.

Alex makes a double batch.

How much flour is needed?

A recipe needs $1\frac{1}{2}$ cups of flour.

Alex makes a double batch.

How much flour is needed?



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

A plank is $3\frac{1}{4}$ m long.

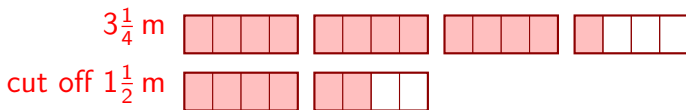
A piece $1\frac{1}{2}$ m long is cut off.

How much plank is left?

A plank is $3\frac{1}{4}$ m long.

A piece $1\frac{1}{2}$ m long is cut off.

How much plank is left?



$$\frac{13}{4} - \frac{6}{4} = \frac{7}{4} = 1\frac{3}{4} \text{ m left}$$

Priya has two ribbons, $2\frac{1}{3}$ m and $1\frac{5}{6}$ m long.

What is their total length?

Priya has two ribbons, $2\frac{1}{3}$ m and $1\frac{5}{6}$ m long.

What is their total length?

Common denominator 6:

$$\frac{14}{6} + \frac{11}{6} = \frac{25}{6} = 4\frac{1}{6} \text{ m}$$

Sam runs $2\frac{3}{4}$ miles on Monday and $3\frac{1}{2}$ miles on Tuesday.

How much further did he run on Tuesday?

Sam runs $2\frac{3}{4}$ miles on Monday and $3\frac{1}{2}$ miles on Tuesday.

How much further did he run on Tuesday?

$$3\frac{1}{2} - 2\frac{3}{4} = \frac{14}{4} - \frac{11}{4} = \frac{3}{4}$$

$\frac{3}{4}$ of a mile further

A tin holds $4\frac{1}{2}$ litres of paint.

Five jugs of $\frac{3}{4}$ of a litre are poured out.

How much paint is left?

A tin holds $4\frac{1}{2}$ litres of paint.

Five jugs of $\frac{3}{4}$ of a litre are poured out.

How much paint is left?



$$5 \times \frac{3}{4} = \frac{15}{4}, \text{ and } \frac{18}{4} - \frac{15}{4} = \frac{3}{4} \text{ of a litre left}$$

A wall is $7\frac{1}{2}$ m wide.

Panels are $1\frac{1}{4}$ m wide.

How many panels fit across the wall?

A wall is $7\frac{1}{2}$ m wide.

Panels are $1\frac{1}{4}$ m wide.

How many panels fit across the wall?

$$\begin{aligned} 7\frac{1}{2} \div 1\frac{1}{4} &= \frac{15}{2} \div \frac{5}{4} \\ &= \frac{15}{2} \times \frac{4}{5} = \frac{60}{10} = 6 \text{ panels} \end{aligned}$$

A bottle holds $1\frac{1}{3}$ litres of water.

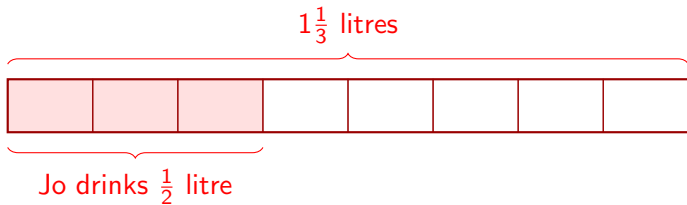
Jo drinks $\frac{3}{8}$ of it.

How much water does Jo drink?

A bottle holds $1\frac{1}{3}$ litres of water.

Jo drinks $\frac{3}{8}$ of it.

How much water does Jo drink?



$$\frac{3}{8} \times \frac{4}{3} = \frac{12}{24} = \frac{1}{2} \text{ of a litre}$$

A journey takes $2\frac{1}{4}$ hours.

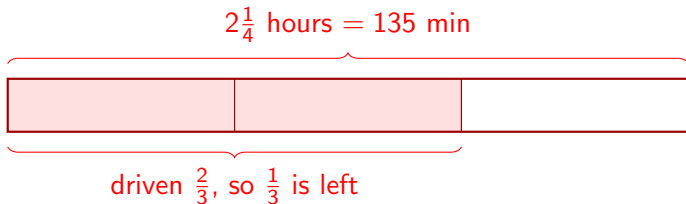
Maria has driven $\frac{2}{3}$ of the way.

How long is left, in minutes?

A journey takes $2\frac{1}{4}$ hours.

Maria has driven $\frac{2}{3}$ of the way.

How long is left, in minutes?



$\frac{1}{3}$ of 135 min is 45 min

A rope $12\frac{1}{2}$ m long is cut into pieces $1\frac{3}{4}$ m long.

How many whole pieces are there, and how much rope is left over?

A rope $12\frac{1}{2}$ m long is cut into pieces $1\frac{3}{4}$ m long.

How many whole pieces are there, and how much rope is left over?

$$\frac{25}{2} \div \frac{7}{4} = \frac{25}{2} \times \frac{4}{7} = \frac{50}{7} = 7\frac{1}{7}$$

$$7 \text{ whole pieces use } 7 \times 1\frac{3}{4} = 12\frac{1}{4} \text{ m,}$$

$$\text{leaving } 12\frac{1}{2} - 12\frac{1}{4} = \frac{1}{4} \text{ m of rope.}$$

A recipe for 4 people uses $2\frac{1}{2}$ cups of rice and $1\frac{3}{4}$ litres of stock.

How much rice and stock are needed for 10 people?

A recipe for 4 people uses $2\frac{1}{2}$ cups of rice and $1\frac{3}{4}$ litres of stock.

How much rice and stock are needed for 10 people?

10 people is $2\frac{1}{2}$ times as many, so multiply by $\frac{5}{2}$:

$$\text{Rice: } \frac{5}{2} \times \frac{5}{2} = \frac{25}{4} = 6\frac{1}{4} \text{ cups}$$

$$\text{Stock: } \frac{7}{4} \times \frac{5}{2} = \frac{35}{8} = 4\frac{3}{8} \text{ litres}$$

Recurring decimals to fractions

Use an algebraic method to write

$0.\dot{3}$ as a fraction

Use an algebraic method to write

$0.\dot{3}$ as a fraction

$$x = 0.333\dots$$

$$10x = 3.333\dots$$

$$9x = 3$$

$$x = \frac{3}{9} = \frac{1}{3}$$

Use an algebraic method to write

$0.\dot{7}$ as a fraction

Use an algebraic method to write

$0.\dot{7}$ as a fraction

$$x = 0.777 \dots$$

$$10x = 7.777 \dots$$

$$9x = 7$$

$$x = \frac{7}{9}$$

Use an algebraic method to write

$0.\dot{4}\dot{5}$ as a fraction

Use an algebraic method to write

$0.\dot{4}\dot{5}$ as a fraction

Two digits repeat, so multiply by 100:

$$x = 0.4545 \dots$$

$$100x = 45.4545 \dots$$

$$99x = 45$$

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

Use an algebraic method to write
 $0.\dot{1}\dot{2}$ as a fraction in its simplest form

Use an algebraic method to write
 $0.\dot{1}\dot{2}$ as a fraction in its simplest form

$$x = 0.1212\dots$$

$$100x = 12.1212\dots$$

$$99x = 12$$

$$x = \frac{12}{99} = \frac{4}{33}$$

Use an algebraic method to write
 $0.\dot{2}\dot{7}$ as a fraction in its simplest form

Use an algebraic method to write
 $0.\dot{2}\dot{7}$ as a fraction in its simplest form

$$x = 0.2727 \dots$$

$$100x = 27.2727 \dots$$

$$99x = 27$$

$$x = \frac{27}{99} = \frac{3}{11}$$

Use an algebraic method to write
 $0.\dot{1}2\dot{3}$ as a fraction in its simplest form

Use an algebraic method to write
 $0.\dot{1}2\dot{3}$ as a fraction in its simplest form

Three digits repeat, so multiply by 1000:

$$x = 0.123123 \dots$$

$$1000x = 123.123123 \dots$$

$$999x = 123$$

$$x = \frac{123}{999} = \frac{41}{333}$$

Use an algebraic method to write
 $0.1\dot{6}$ as a fraction in its simplest form

Use an algebraic method to write
 $0.1\dot{6}$ as a fraction in its simplest form

Only the 6 repeats, so line up $10x$ and $100x$:

$$10x = 1.666 \dots$$

$$100x = 16.666 \dots$$

$$90x = 15$$

$$x = \frac{15}{90} = \frac{1}{6}$$

Use an algebraic method to write
 $0.8\dot{3}$ as a fraction in its simplest form

Use an algebraic method to write
 $0.8\dot{3}$ as a fraction in its simplest form

$$10x = 8.333\dots$$

$$100x = 83.333\dots$$

$$90x = 75$$

$$x = \frac{75}{90} = \frac{5}{6}$$

Use an algebraic method to write

$1.\dot{2}\dot{7}$ as a mixed number in its simplest form

Use an algebraic method to write

$1.\dot{2}\dot{7}$ as a mixed number in its simplest form

Deal with the decimal part, then put the 1 back:

$$x = 0.2727 \dots$$

$$99x = 27$$

$$x = \frac{27}{99} = \frac{3}{11}$$

$$1.\dot{2}\dot{7} = 1\frac{3}{11}$$

Use an algebraic method to show that

$$0.\dot{9} = 1$$

Use an algebraic method to show that

$$0.\dot{9} = 1$$

$$x = 0.999 \dots$$

$$10x = 9.999 \dots$$

$$9x = 9$$

$$x = 1$$

So $0.\dot{9}$ and 1 are the same number.