MATHS FIELD GUIDE · GRADE 5

# Wholes and fraction units can be renamed

OPENING PROBLEM

## How many quarter-units altogether?

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

↓

8 quarters + 3 quarters

↓

$\frac{11}{4}$

02 Regroup at a whole
03 Rules and worked cases
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ILLUSTRATED PROBLEM SHEET

# Regroup at a whole

A mixed number joins a whole-number part and a proper fraction. Keep the size of the fraction unit fixed.

**1**

$$2\frac{3}{4} = 2 + \frac{3}{4}$$
$$\downarrow$$
$$\text{8 quarters + 3 quarters}$$
$$\downarrow$$
$$11/4$$

### How many quarter-units altogether?

Eleven. Each whole gives four quarters.

**2**

$$17/5$$
$$\downarrow$$
$$15/5 + 2/5$$
$$\downarrow$$
$$3\frac{2}{5}$$

### How many full groups of five fit?

Three wholes with two fifths left over.

**3**

$$1\frac{3}{4} + 2\frac{1}{2}$$
$$\downarrow$$
$$3 + 3/4 + 2/4$$
$$\downarrow$$
$$4\frac{1}{4}$$

### Where does the fourth whole come from?

Five quarters contain one whole plus one quarter.

**4**

$$3\frac{1}{4} - 1\frac{3}{4}$$
$$\downarrow$$
$$2 + 5/4 - (1 + 3/4)$$
$$\downarrow$$
$$1\frac{1}{2}$$

### How do you subtract three quarters from one quarter?

Exchange one whole for four quarters first. Five quarters minus three is two quarters.

**13/4**
**$3\frac{1}{4}$.**

**$3\frac{1}{4} \times 4$**
**13.**

CHAPTER PROBLEM

### Write 9/4 as a mixed number.

2 1/4. Eight quarters make two wholes; one quarter remains.

MATHS REFERENCE · GRADE 5

# Wholes and fraction units can be renamed

A mixed number combines a whole-number amount and a proper fraction.

An improper fraction has a numerator at least as large as its denominator. It can equal or exceed one.

## Cases to recognise

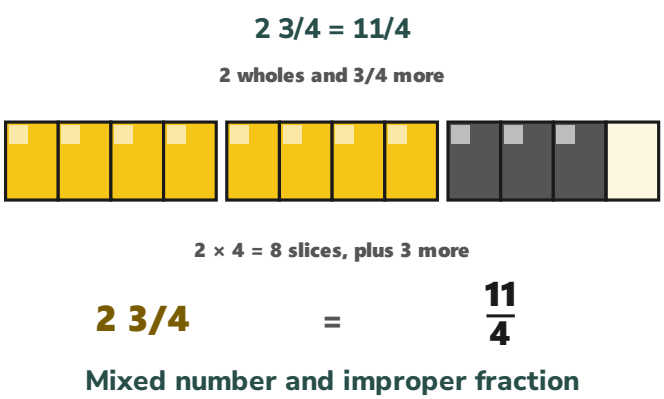
| Situation | What to do and why |
|---|---|
| **3 2/5 as fifths** | Three wholes supply fifteen fifths. Add two: 17/5. |
| **23/6 as a mixed number** | 23 ÷ 6 leaves three wholes and five sixths. |

## Read the model

### Count all the quarter units

Two wholes and three quarters contain eight quarters and three more.

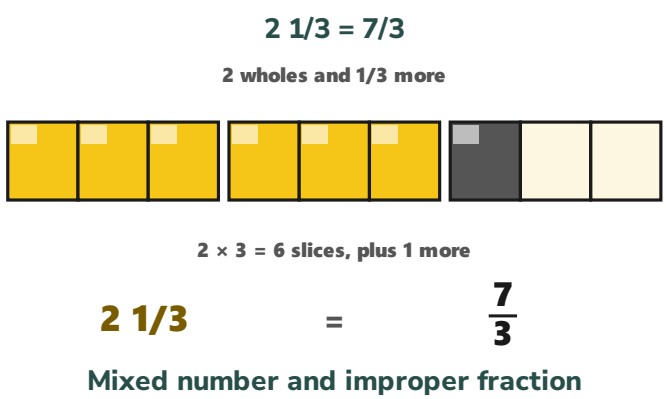
That is eleven quarters: 2 3/4 = 11/4. The amount has not changed.



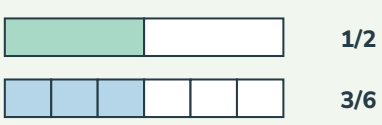

### Regroup fraction units into wholes

Seven thirds contain two full groups of three thirds, with one third left.

So 7/3 = 2 1/3. Every full group of three thirds is one whole.




**mixed number** A whole-number part plus a proper fraction.
**improper fraction** A fraction whose numerator is at least its denominator.
**regroup** Exchange fraction units for equal-valued wholes.




### Do the equal-length bars agree?

Yes. Splitting each half into three pieces gives three shaded sixths.

WORKED INVESTIGATION

# The walking route

Walk 2 3/4 km on Monday and 1 1/2 km on Tuesday. Group whole kilometres first, then express the fractional parts in quarters.

| Look at this part | What it tells you |
|---|---|
| **Whole parts** | 3 km |
| **Fraction parts** | 5/4 km |
| **Combined** | 4 1/4 km |

### Work it through

To find Monday's extra distance, subtract 1 2/4 from 2 3/4. The difference is 1 1/4 km.

### Catch the mistake

Three wholes and five quarters is valid before regrouping. In a mixed number move four quarters into the whole part.

## Compare the cases

### A mixed number means addition

2 3/4 means 2 + 3/4.

It does not mean 2 × 3/4. The whole-number and fraction parts join.

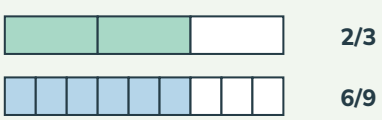
### Regroup across a whole

For 1 1/4 − 1/2, rename the amount as five quarters.

Subtract two quarters. Three quarters remain.

### Change one condition

Taking 1 3/4 from 3 1/4 needs an exchange. Write 3 1/4 as 2 5/4 to get 1 2/4.




### Which multiplier connects the labels?

Multiply both numbers by three. The strip keeps the same length.

WHOLES AND FRACTION UNITS CAN BE RENAMED

# Compare the models

### Exact wholes also have fraction names

8/4 is exactly two wholes.

An improper fraction does not always leave an extra fractional part.

### Check the size

11/4 lies between two and three because eight quarters make two and twelve quarters make three.

A conversion to 1 3/4 would be too small.

### Use the clearest form

A mixed number can show how many full metres of ribbon there are.

An improper fraction can be easier to use when adding or multiplying fraction units.

## Explain your reasoning

### Write 1 2/5 as a single fraction. Explain.

7/5. One whole is five fifths; add two more fifths.

## Two more worked cases

| Situation | Reasoning |
|---|---|
| **2 5/6 + 1 1/3** | Fractional parts make 7/6. Regroup to get 4 1/6. |
| **4 1/4 − 2 3/4** | Exchange a whole: 3 5/4 − 2 3/4 = 1 1/2. |

**18/24**
↓
**divide both by 6**
↓
**3/4**

### Why divide by their greatest common factor?

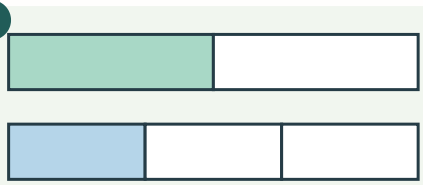
It reaches lowest terms in one step. Three and four share no positive factor beyond one.

ILLUSTRATED PROBLEM SHEET

# Change the unit before combining

Rename both quantities in equal-sized pieces of the same whole.

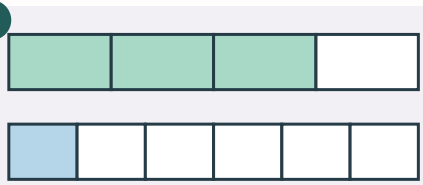
1




### Add the shaded amounts. What common piece works?

Sixths: 3/6 + 2/6 = 5/6.

2




### How much greater is the first amount?

Use twelfths. 9/12 − 2/12 = 7/12.

3

$$1\tfrac{1}{3} + \tfrac{3}{4}$$
↓
$$1 + 4/12 + 9/12$$
↓
$$2\ 1/12$$

### Why does the whole number increase?

Thirteen twelfths can be regrouped as a whole and one twelfth.

4

$$2\tfrac{1}{4} - \tfrac{2}{3}$$
↓
$$1 + 15/12 - 8/12$$
↓
$$1\ 7/12$$

### Where did the extra twelve twelfths come from?

One of the two wholes was exchanged. Total value stays fixed.

**1/6 + 1/3**
**1/6 + 2/6 = 1/2.**

**1/3 − 1/6**
**2/6 − 1/6 = 1/6.**

CHAPTER PROBLEM

### Does 6/3 have to leave a fraction part?

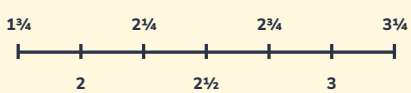
No. Six thirds is exactly two wholes.

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

# Check your reasoning

| Try the problem | Solution and reasoning |
|---|---|
| **01**<br>Is 2⅓ the same as two times one third? | No. It means two plus one third, or seven thirds. |
| **02**<br>Can you add numerators directly for 2/7 + 3/7? | Yes. The unit is already sevenths. Five pieces give 5/7. |
| **03**<br>A trail is 5 1/3 km. You have walked 2 2/3 km. How far remains? | Exchange one kilometre: 4 4/3 − 2 2/3 = 2 2/3 km. Adding both distances returns 5 1/3 km. |
| **04**<br>A trail of 6 1/6 km has 2 5/6 km left. How far have you walked? | Exchange a whole: 5 7/6 − 2 5/6 = 3 2/6 = 3 1/3 km. |
| **05**<br>How many quarters are in 4 3/4? | Four wholes make sixteen quarters. Add three for nineteen. |

## How far apart are the marks?




A ribbon starts at 1¾ m on a tape and ends at 3¼ m. From 1¾ to 2 is ¼ m. From 2 to 3 is 1 m. From 3 to 3¼ is another ¼ m.

The ribbon is 1½ m long. Adding that length to the start lands at 3¼ m.

**3/5 and 5/8**
↓
**3 × 8 = 24**
↓
**5 × 5 = 25**

### Which is larger?

Write both in fortieths. 25/40 exceeds 24/40, so 5/8 is larger.

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