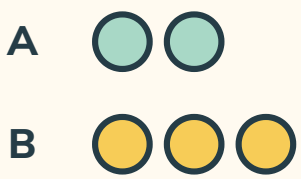
MATHS FIELD GUIDE · GRADE 6

Ratios compare quantities multiplicatively

OPENING PROBLEM

The mix is two parts A to three parts B. How many parts in all?



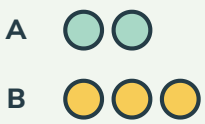
02 Keep corresponding parts together
03 Rules and worked cases
04 Mixing sports drink
05 Read the units on a rate
06 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Keep corresponding parts together

Multiply or divide both counts by the same factor to preserve a ratio.

1



The mix is two parts A to three parts B. How many parts in all?

Five. A is two fifths of the whole mixture.

2

A	B
2	3
4	6
6	9

What changes across batches?

The totals change, while the amount of B for each unit of A stays at 3/2.

3

Total 35 g
↓
35 ÷ 5 = 7 g
↓
A = 14 g

How much A is in 35 g of this mix?

One part is 7 g. Two parts give 14 g and the remaining 21 g is B.

4

A	B
2	3
3	4

Does adding one to both counts preserve this recipe?

No. Cross-products 2 × 4 and 3 × 3 differ.

1:4 by parts
first share is 1/5 of the total.

1:4 by parts
first amount is 1/4 of the second.

CHAPTER PROBLEM

In red:blue = 2:3, what fraction of all counters is red?

Two fifths. The whole has two plus three, or five, equal ratio units.

MATHS REFERENCE · GRADE 6

Ratios compare quantities multiplicatively

A ratio compares two quantities in a stated order. Red:blue = 2:3 means two red units for every three blue units.

A rate compares quantities with different units. A unit rate states the amount for one unit of the other quantity.

Four cases to recognise

Situation	What to do and why
5:3 blue to white with 32 counters	Eight equal parts give four each. Counts are 20 and 12.
₹135 for 3 kg	One kg costs ₹45. At the same rate, 5 kg costs ₹225.
A 4:7 ratio is enlarged to 12:__	Multiply both parts by three. The missing value is 21.
A 3:2 mixture is 60% concentrate when concentrate comes first	Three out of five total parts are concentrate.

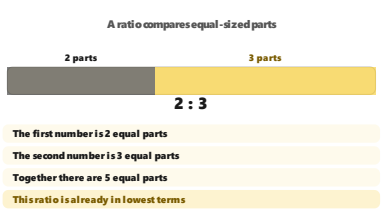
Read the model

Build the idea

Make a batch with two red counters and three blue. Two identical batches have four red and six blue. The ratio remains 2:3.

All parts must scale by the same factor to preserve the relationship. Adding the same amount to both does not generally preserve it.

What a ratio means



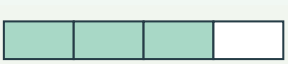
Equal parts, in order

Why it works

A ratio is a multiplicative relationship, not simply a difference. The differences in 2:3 and 4:6 are different, yet their proportions match.

To find a unit rate, divide an amount into the corresponding number of equal input units.

ratio An ordered multiplicative comparison.
rate A comparison with different units.
unit rate Amount per one unit.



A sale price of ₹450 is 75% of the tag price. What was the tag price?

Three parts total ₹450. One is ₹150, so four parts give ₹600.

WORKED INVESTIGATION

Mixing sports drink

Use two parts concentrate to five parts water. For a 700 mL batch, seven equal parts fit into the total, so one part is 100 mL.

Look at this part	What it tells you
Concentrate	200 mL
Water	500 mL
Total	700 mL

Work it through

For a 1.05 L batch, one part is 1,050 ÷ 7 = 150 mL. Two parts concentrate and five parts water give 300 mL and 750 mL.

Catch the mistake

The concentrate is 2/7 of the whole drink. The ratio 2/5 compares concentrate with water alone.

Compare the cases

Follow an example

Six notebooks cost 18 dollars at a constant price. One notebook costs 18 ÷ 6 = 3 dollars.

Ten notebooks at that same rate cost 30 dollars. The prediction depends on the constant price assumption.

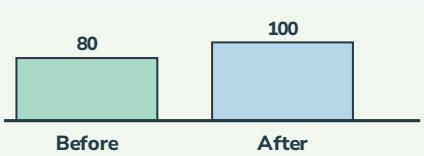
What changes? What stays true?

A part-to-part ratio 2:3 is not the same as the fraction 2/3 of the whole. There are five parts altogether, so the red fraction is 2/5.

Write units and the order explicitly. Reversing a comparison reverses its ratio.

Change one condition

With 450 mL concentrate, one part is 225 mL. The matching water volume is 5 × 225 = 1,125 mL.



How large is the increase as a percent of the starting value?

The increase is 20 out of 80. That is 25%.

ILLUSTRATED PROBLEM SHEET

Read the units on a rate

A rate compares two quantities with different units.

1

Time (h)	Distance (km)
1	18
2	36
2.5	45

At steady speed, how far in 2½ hours?

Two hours give 36 km and half an hour adds 9 km. Total 45 km.

2

600 m in 5 min
↓
120 m per min
↓
7.2 km per hour

Why divide before multiplying?

Find distance in one minute, then scale to sixty minutes and convert metres to kilometres.

3

Pack	Price
250 g	₹40
400 g	₹60

Which pack costs less per 100 g?

₹16 versus ₹15. The 400 g pack costs less per 100 g.

4

Time (min)	Water (L)
0	3
1	5
2	7

Is water volume proportional to time?

It grows by 2 L each minute but starts at 3 L. Doubling time need not double the amount.

₹45 for three equal packs
₹15 per pack.

Three packs per hour
one pack every 20 minutes at a steady rate.

CHAPTER PROBLEM

A mix uses 2 cups of juice for every 3 cups of water. How much juice goes with 12 cups of water?

12 ÷ 3 = 4 batches. Scale the juice by the same factor: 2 × 4 = 8 cups.

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

Check your reasoning

Try the problem	Solution and reasoning
01 In the same mix B weighs 18 g. How much does A weigh?	Three parts weigh 18 g, so one weighs 6 g and A weighs 12 g.
02 A cyclist rides one hour at 10 km/h and two hours at 16 km/h. Average speed?	42 km over 3 hours gives 14 km/h.
03 Which drink is stronger, 2:5 or 3:8 concentrate to water?	With 40 parts water, the first uses 16 concentrate and the second 15. The first is stronger.
04 A map scale is 1 cm for 4 km. What does 6.5 cm mean?	At four km per cm, multiply 6.5 by four to get 26 km.
05 Can adding two to both parts preserve 2:3?	The new 4:5 differs: cross-products 4 × 3 and 5 × 2 are unequal.

₹200 × 1.10
↓
₹220 × 0.90
↓
₹198

Why do a 10% rise and a 10% fall fail to cancel?

The fall is 10% of ₹220. It removes ₹22 after a rise of ₹20.

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