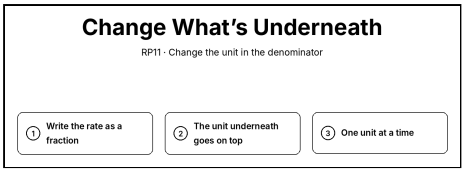
Change What’s Underneath: teacher script

RP11-V1 · RP11 Change the unit in the denominator · teachers only. Without a screen, read each Say line and draw each Draw step on the board. About 81 seconds as a video.

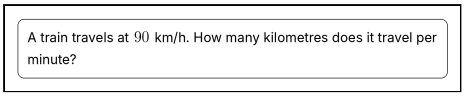
01



Say. Change what's underneath. Write the rate as a fraction. To change the unit underneath, put that unit on top of the factor. And change one unit at a time.

Draw. Write the title “Change What’s Underneath” and the steps: 1. Write the rate as a fraction; 2. The unit underneath goes on top; 3. One unit at a time.

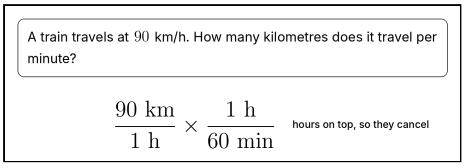
02



Say. A train travels at 90 kilometres per hour. How many kilometres does it travel per minute?

Draw. Clear the board. Write “A train travels at 90 km/h. How many kilometres does it travel per minute?” in a box at the top.

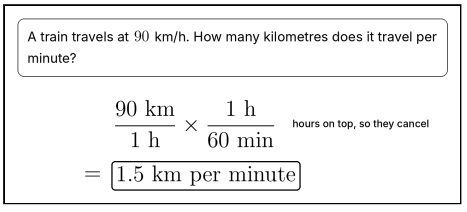
03



Say. Hours are underneath in the rate, so the factor has hours on top. They cancel.

Draw. Write 90 km/(1 h) × 1 h/(60 min) on the next line. Beside it, write “hours on top, so they cancel”.

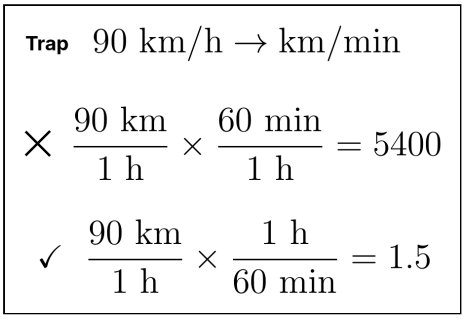
04



Say. 90 divided by 60 is 1.5 kilometres per minute.

Draw. Write = 1.5 km per minute and box it on the next line.

05



Say. Watch for the trap: a factor with hours underneath. Then the hours don't cancel, and you get 5400. In a minute the train goes less far than in an hour.

Draw. Clear the board. Write “Trap” and 90 km/h \to km/min. Below, write 90 km/(1 h) × 60 min/(1 h) = 5400 and cross it out ×. Then write 90 km/(1 h) × 1 h/(60 min) = 1.5 with a tick ✓.

06

How many metres per second is 90 km/h?

Say. How many metres per second is 90 kilometres per hour?

Draw. Clear the board. Write “How many metres per second is 90 km/h?” in a box at the top.

07

How many metres per second is 90 km/h?

$$\frac{90\ \text{km}}{1\ \text{h}} \times \frac{1000\ \text{m}}{1\ \text{km}} = \frac{90\,000\ \text{m}}{1\ \text{h}}$$ first the unit on top

Say. One unit at a time. First the kilometres on top: times 1000 metres over 1 kilometre gives 90 thousand metres per hour.

Draw. Write 90 km/(1 h) × 1000 m/(1 km) = 90 000 m/(1 h) on the next line. Beside it, write “first the unit on top”.

08

How many metres per second is 90 km/h?

$$\frac{90\ \text{km}}{1\ \text{h}} \times \frac{1000\ \text{m}}{1\ \text{km}} = \frac{90\,000\ \text{m}}{1\ \text{h}}$$ first the unit on top

$$\frac{90\,000\ \text{m}}{1\ \text{h}} \times \frac{1\ \text{h}}{3600\ \text{s}}$$ then the unit underneath

Say. Then the hours underneath: times 1 hour over 3600 seconds.

Draw. Write 90 000 m/(1 h) × 1 h/(3600 s) on the next line. Beside it, write “then the unit underneath”.

09

How many metres per second is 90 km/h?

$$\frac{90\ \text{km}}{1\ \text{h}} \times \frac{1000\ \text{m}}{1\ \text{km}} = \frac{90\,000\ \text{m}}{1\ \text{h}}$$ first the unit on top

$$\frac{90\,000\ \text{m}}{1\ \text{h}} \times \frac{1\ \text{h}}{3600\ \text{s}}$$ then the unit underneath

$$= \boxed{25\ \text{m/s}}$$

Say. 90 thousand divided by 3600 is 25 metres per second.

Draw. Write = 25 m/s and box it on the next line.

10

Trap $90\ \text{km/h} \to \text{m/s}$

✗ $90 \times 1000 = 90\,000\ \text{m/s}$

✓ $90 \times 1000 \div 3600 = 25\ \text{m/s}$

Say. Watch for the trap: changing only the unit on top. For metres per second, change both: the kilometres and the hours.

Draw. Clear the board. Write “Trap” and 90 km/h \to m/s. Below, write 90 × 1000 = 90 000 m/s and cross it out ×. Then write 90 × 1000 ÷ 3600 = 25 m/s with a tick ✓.

11

Your turn

Put the unit underneath on top of the factor, and change one unit at a time.

Say. Now it is your turn. Put the unit underneath on top of the factor, and change one unit at a time.

Draw. Point to today’s activity: Put the unit underneath on top of the factor, and change one unit at a time.