Converting Rates

A proportional relationship always multiplies by the same number, the unit rate. Converting a rate changes one unit, then the other, with a sense check after each step: bigger or smaller?

1 THE VOCABULARY
Words we use

Convert change the units, not the amount.

Conversion fact 1 mile = 5,280 feet; look it up.

Unit rate how much for one; keep it a rate the whole way.

Sense check should the number get bigger or smaller?

- Watch out for these.
- Changing both units in one jump. One at a time.
- Multiplying when you should divide. The sense check catches it: minutes are shorter than hours, so the number should shrink.
- Dropping the units partway through. Write feet per hour, then feet per minute.
- Trying to memorize every conversion fact. Use the box.

2 THE METHOD
Convert a rate

1. ONE UNIT pick one unit to change and find its conversion fact.
2. PREDICT bigger or smaller? Smaller units: more of them. Shorter time: less happens.
3. MULTIPLY OR DIVIDE by the conversion fact, and check the prediction.
4. THE OTHER UNIT repeat for the second unit.

> WHY ONE AT A TIME
> Each unit change is its own multiply or divide. Doing them one at a time keeps every step small enough to sense check.

3 ZOOMY
0.029 miles per hour, in feet per minute

$0.029 \times 5{,}280 = 153.12$ feet per hour	miles to feet: smaller unit, bigger number
$153.12 \div 60 \approx 2.55$ feet per minute	hours to minutes: shorter time, smaller number
6 m/s × 60 = 360 m per minute	the sprint: longer time, bigger number
21,600 ÷ 1,000 = 21.6 km per hour	meters to kilometers: bigger unit, smaller number
2 cups × 24 = 48 cups a day; 48 ÷ 16 = 3 gallons a day	the faucet, both steps

> THE EXIT TICKET
> 15 feet per second to feet per minute: longer time, bigger number. 15 × 60 = 900 feet per minute.

> SAY IT OUT LOUD
> One unit at a time. Bigger or smaller?