Proportional Graphs

A proportional relationship always multiplies by the same number, the unit rate. On a graph that is a straight line through the origin. Steeper means a bigger unit rate.

1 THE VOCABULARY

Words we use

Graph a picture of the pairs as points.

Origin the point (0, 0), both amounts zero.

Straight line through the origin the picture of a proportional relationship.

Steeper rises faster: a bigger unit rate.

- Watch out for these.
- Calling any straight line proportional. It must also go through (0, 0).
- Calling any graph through the origin proportional. It must also be straight.
- Connecting dots for amounts that come whole, like dogs or tickets.
- Giving the steepness its 8th grade name. Say steeper, and say unit rate.

2 THE METHOD

The graph test

1. PLOT input across, output up, one point per row.
2. STRAIGHT? do the points line up? A bend means not proportional.
3. THROUGH (0, 0)? does the line pass through the origin? Missing it means a fee is hiding.
4. STEEPNESS steeper means a bigger unit rate. Read the unit rate at x = 1.
5. DOTS OR LINE connect only if both amounts can be split into smaller parts.

WHY THROUGH THE ORIGIN

A proportional relationship multiplies the input, and zero times anything is zero. So zero in always gives zero out, and the graph must pass through (0, 0).

3 THREE GRAPHS

Lemonade, bowling, and a square

lemonade: (1, 0.75), (2, 1.50), (3, 2.25), (4, 3.00)	a straight line through (0, 0): proportional
bowling: (0, 3), (1, 8), (2, 13), (3, 18)	straight, but it starts at $3: misses the origin
square: (0, 0), (1, 1), (2, 4), (3, 9)	through the origin, but it bends
Mia $9 an hour, Jordan $8 an hour	Mia's line is steeper: bigger unit rate
minutes and gallons: line; cups sold: dots	connect only when both amounts split

THE EXIT TICKET

A straight line crossing the y-axis at 5 misses the origin. Not proportional.

SAY IT OUT LOUD

Straight, and through the origin. Steeper means a bigger unit rate.