Unit Rate Problems

A proportional relationship always multiplies by the same number, the unit rate. This page is the review for all of Unit 1: the four ways to find the unit rate, the two graph tests, and the two points to know.

1 THE VOCABULARY

Words we use

Unit rate how much for one; the constant of proportionality.
Proportional always multiplies by the same number.
y = rx output equals unit rate times input.
Origin (0, 0) zero in gives zero out.
(1, r) the point that shows the unit rate.
Scale factor how many times bigger.
Better buy the lower price for one.

- Watch out for these.
- Using the wrong unit rate for the question. Know the miles? Use minutes per mile.
- Comparing totals instead of price for one.
- Calling a straight line proportional without checking the origin.
- Forgetting the sense check when converting.

2 THE METHOD

Find the unit rate, four ways

1. TABLE divide any output by its input. Same number every row means proportional.
2. GRAPH go over to 1 and up to the line: the point (1, r).
3. EQUATION y = rx: the number next to x.
4. WORDS ask how much for one, and divide, even with fractions.

THE TWO GRAPH TESTS

Straight, and through the origin. A line that misses (0, 0) has a fee in it. A graph that bends does not multiply by the same number. Steeper means a bigger unit rate.

3 TWO WAYS, ONE ANSWER

$1\frac{1}{2}$ cups for 12 cookies; how much for 30?

$1\frac{1}{2} \div 12 = \frac{1}{8}$ cup per cookie	unit rate way: how much for one
$\frac{1}{8} \times 30 = 3\frac{3}{4}$ cups	then multiply
$30 \div 12 = 2.5$	scale factor way: how many times bigger
$1\frac{1}{2} \times 2.5 = 3\frac{3}{4}$ cups	both amounts scale the same way
\$3.00 ÷ 12 = \$0.25; \$4.40 ÷ 20 = \$0.22	better buy: the 20-ounce bag
$\frac{3}{4} \times \frac{4}{3} = 1$ mile, so $4\frac{1}{2} \times \frac{4}{3} = 6$ minutes per mile; $3.42 \times 6 \approx 20\frac{1}{2}$ minutes	Emily arrives about 8:45:30, before the 8:50 bell

THE TWO POINTS TO KNOW

(0, 0): zero in gives zero out, on every proportional graph. (1, r): one in gives the unit rate out. Every other point (x, y) means in x, you get y.

SAY IT OUT LOUD

A proportional relationship always multiplies by the same number, the unit rate.