# Scale or Not?

Sort relationships by how their quantities change.

**7.A.1.1** "Identify a relationship between two varying quantities, x and y, as proportional if it can be expressed in the form y/x = k or y = kx; distinguish proportional relationships from non-proportional relationships."

NAME _____ DATE _____

**PROPORTIONAL**

The ratio y/x is the same for every nonzero x. If x is 0, y must also be 0.

A recipe uses 8 cups of flour per batch. If x is the number of batches and y is the cups of flour, then y = 8x.

**NOT PROPORTIONAL**

The ratio y/x changes, or y is not 0 when x is 0.

A candle starts at 20 cm and loses 2 cm of height each hour. If x is hours and y is height in cm, then y = 20 - 2x.

## 1 SORT

8 items

For Part 1 SORT, circle Proportional or Not proportional for each item; for Part 2 PROVE IT, choose one item from each category and explain how you know.

**1.** y = 7x — SCALES OTHER

**2.** Each notebook costs $3. If x is notebooks bought, y is the total cost. — SCALES OTHER

**3.** y = 2x + 4 — SCALES OTHER

**4.** The only (x, y) pairs are (2, 5), (4, 10), and (6, 15). — SCALES OTHER

**5.** A taxi fare y is $6 plus $2 for each mile x. — SCALES OTHER

**6.** $y = x^2$, where x can be 1, 2, or 3. — SCALES OTHER

**7.** y = x/4 — SCALES OTHER

**8.** The only (x, y) pairs are (1, 5), (2, 10), and (3, 16). — SCALES OTHER

## 2 PROVE IT

Explain your thinking

Choose one item from each category and explain how you know.

**ITEM #** _____ **HOW I KNEW** _____

**ITEM #** _____ **HOW I KNEW** _____

## 3 MAKE YOUR OWN

One of each

For Part 3 MAKE YOUR OWN, write one new x-and-y rule for each category and label each rule.

**SCALES** _____

**OTHER** _____

**CHALLENGE**

Write a rule in the form y = ax + b that is not proportional, then change only b to make it proportional and explain why the change works.

**ANSWER KEY**

# Scale or Not?

**GRADE 7 · 7.A.1.1**

## PART 1 · SORT

| # | ITEM | CATEGORY | WHY |
|---|---|---|---|
| 1 | $y = 7x$ | **SCALES** | For every nonzero x, $y/x = 7$. |
| 2 | Each notebook costs $3. If x is notebooks bought, y is the total cost. | **SCALES** | The rule is $y = 3x$, with no extra charge. |
| 3 | $y = 2x + 4$ | **OTHER** | When $x = 0$, $y = 4$. |
| 4 | The only (x, y) pairs are (2, 5), (4, 10), and (6, 15). | **SCALES** | Each listed pair has $y/x = 5/2$. |
| 5 | A taxi fare y is $6 plus $2 for each mile x. | **OTHER** | At 0 miles, the fare is $6. |
| 6 | $y = x^2$, where x can be 1, 2, or 3. | **OTHER** | The ratios y/x are 1, 2, and 3. |
| 7 | $y = x/4$ | **SCALES** | For every nonzero x, $y/x = 1/4$. |
| 8 | The only (x, y) pairs are (1, 5), (2, 10), and (3, 16). | **OTHER** | The ratios are 5, 5, and 16/3, so they are not constant. |

## PART 2 · PROVE IT

**Task:** Choose one item from each category and explain how you know.
Accept any explanation that names the deciding feature from the rule box for the chosen item.

## PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **SCALES**: Proportional: $y = 12x$.
- **OTHER**: Not proportional: $y = 12x + 1$.

**Challenge:** The rule $y = 4x + 9$ is not proportional because $y = 9$ when $x = 0$. Changing b from 9 to 0 gives $y = 4x$, which is proportional because $y/x = 4$ for every nonzero x.

For Part 2, a student could explain that item 2 has the constant ratio $y/x = 3$, while item 5 has a $6 fare even when $x = 0$. Accept other explanations that correctly use a constant ratio or the value of y at $x = 0$.