# One Unit Rate, Many Forms

Find the constant of proportionality in a table, equation, graph, and situation

**NY-7.RP.2.b** · Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Name _____ Date _____

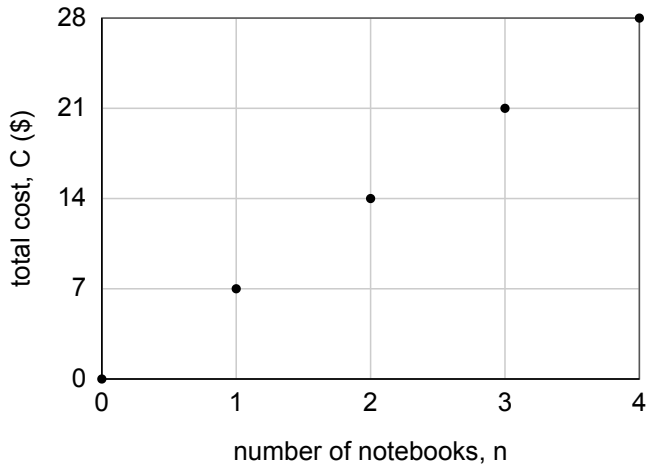
## Part 1 - Same Relationship, Four Forms

Only whole notebooks are sold. Each graph dot represents a valid whole-number count.

**Listen while your teacher reads the launch.** The information below describes one classroom practice scenario. It is invented for this worksheet. In every form, n is the number of notebooks and C is the total cost in dollars.

| Number of notebooks, n | Total cost, C ($) |
|---|---|
| 1 | 7 |
| 2 | 14 |
| 3 | 21 |
| 4 | 28 |

The equation is C = 7n. The school store charges 7 dollars for each notebook. The graph shows the same relationship.



**1.** Find the constant of proportionality, k, in each form. Use k = C/n. For the graph, choose any point with n not equal to 0. Include units.

| Representation | Nonzero pair or information used | Calculation: C/n | k with units |
|---|---|---|---|
| Table | | | |
| Equation | | | |
| Graph | | | |
| Situation | | | |

## Part 2 - Compare a New Relationship

**2.** Another invented classroom practice scenario: A club sells concert tickets. The total cost T, in dollars, is proportional to the number of tickets t. The relationship is T = 6t.

| Tickets, t | Total cost, T ($) |
|---|---|
| 0 | 0 |
| 1 | 6 |
| 3 | 18 |
| 5 | 30 |

Use a nonzero pair from the table to find the ticket relationship's constant of proportionality. Show division and include units.

**3.** Compare the ticket relationship with the notebook relationship from Part 1. Which constant is greater? By how much per item? Explain how you know both relationships are proportional.

**Answer Key and Teaching Notes**

Graph dots represent whole notebooks; do not connect them as fractional purchases.

**Materials and setup:** Print and supply all student pages, keeping teacher-key pages separate. Students need pencils. The supplied table, equation, graph, and practice contexts are the only math stimuli needed. Display or read the launch before students begin Part 1.

**Teacher-read launch:** “Today, the same cost relationship is shown in several forms. Your job is to find the amount of cost for one notebook, even when the information is shown differently. In a proportional relationship, divide the output by a nonzero input in the stated quantity order.”

**Observation method:** As students complete item 1, scan the graph row. Look for a nonzero graph point and division in the order C divided by n, such as 14 divided by 2. Ask a student who writes 2/14 to name what each quantity means, then direct the student to reread k = C/n. During item 3, listen for both a unit-rate comparison and a proportionality reason.

**1. Part 1 answers:** All four forms have k = 7 dollars per notebook. Table: for example, 14/2 = 7. Equation: C = 7n, so the coefficient of n is 7 dollars per notebook; equivalently, when n = 1, C/n = 7/1 = 7. Graph: for example, point (3, 21) gives 21/3 = 7. Situation: 7 dollars for each notebook means 7 dollars per 1 notebook. Accept any nonzero point on the graph and equivalent unit wording.

**2. Ticket answer:** k = T/t = 18/3 = 6 dollars per ticket. Other nonzero table pairs are valid.

**3. Comparison answer:** The notebook constant, 7 dollars per notebook, is greater than the ticket constant, 6 dollars per ticket, by 1 dollar per item. Both are proportional because each has a constant cost for one item and includes zero items costing zero dollars. A complete response should state the two rates, the difference, and a proportionality reason.

**Source credit:** Standard focus: New York Next Generation Mathematics NY-7.RP.2.b, “Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.” Reference: https://lessonmakerpro.com/standards/ny-nextgen-math/ny-7-rp-2-b