Reading the Constant of Proportionality from Graphs

Original tasks 1, 2, 3 / complete keys

Task 1

A proportional line passes through the origin and has a marked point at (3, 12). The x-axis is in seconds and the y-axis is in meters. Find k and write the equation.

Answer: k = 12/3 = 4 meters per second. Equation: y = 4x.

Reason: For a proportional line, k = y/x. Using (3,12), k = 12/3 = 4. The equation is y = 4x with units meters per second.

Check: Substitute (3,12) into y = 4x: 12 = 4(3) = 12. Also draw a slope triangle from (0,0) to (3,12): rise 12, run 3, ratio 4.

Task 2

A graph shows a line through the origin with a marked point at (5, 7). The axes have no units. Compute k as a fraction and as a decimal rounded to two places. Write the equation.

Answer: k = 7/5 = 1.4. Equation: y = 1.4x (or y = (7/5)x).

Reason: k = y/x = 7/5. The fraction simplifies to 7/5, which equals 1.4. The equation uses this constant.

Check: Substitute (5,7): 7 = 1.4(5) = 7. Slope triangle from origin: rise 7, run 5, ratio 7/5 = 1.4.

Task 3

A proportional line through the origin has a marked point at (2, 9). The x-axis is in items and the y-axis is in dollars. Find k, write the equation, and state the unit of k.

Answer: k = 9/2 = 4.5 dollars per item. Equation: y = 4.5x.

Reason: k = y/x = 9/2 = 4.5. Units are dollars divided by items, so dollars per item. The equation is y = 4.5x.

Check: Substitute (2,9): 9 = 4.5(2) = 9. Slope triangle: rise 9, run 2, ratio 4.5.

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Original tasks 4 / complete keys

Task 4

A line through the origin has a marked point at (8, 6). Another point on the line is (4, 3). Compute k using both points and confirm they agree. Write the equation.

Answer: Using (8,6): k = 6/8 = 3/4 = 0.75. Using (4,3): k = 3/4 = 0.75. Equation: y = 0.75x (or y = (3/4)x).

Reason: Both points give the same ratio y/x = 3/4. Since the line passes through the origin, k is constant. The equation uses k = 3/4.

Check: Substitute each point into y = 0.75x: 6 = 0.75(8) = 6 and 3 = 0.75(4) = 3. Slope triangle between points: run = 8−4 = 4, rise = 6−3 = 3, ratio 3/4 = 0.75.

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Source rubric / reflection

- [ ] Correctly identifies the line as proportional by checking it passes through the origin.
- [ ] Reads the marked point coordinates accurately from the axes.
- [ ] Computes k = y/x with correct arithmetic and consistent units.
- [ ] Writes the equation y = kx using the computed k.
- [ ] Verifies k using a slope triangle or substitution.
- [ ] States units for k and explains the meaning in context.
- [ ] Uses clear notation and shows steps; accepts equivalent fractions or decimals.

Reflection: What did you check, what did you change, and what will you try next?