

The Invariant in Proportion

Name: _____

Date: _____

Check the invariant. $y = \frac{5}{2}x$ gives $(2, 5)$ and $(4, 10)$: both have $y/x = \frac{5}{2}$. It also includes $(0, 0)$; do not divide by zero to test that point.

Explore and explain

1. For $y = \frac{5}{2}x$, find y at $x = 0, 2, 6$. State the unit rate if x is meters and y is dollars.

2. Complete: a proportional relationship includes $(3, 12)$, so $k = \square$ and $y = \square x$. Explain what $(1, k)$ means.

3. A student says $y = 4x + 1$ is proportional because it is linear. Test two positive x -values and explain.

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Apply and transfer

4. A runner travels $\frac{5}{6}$ mile in $\frac{1}{3}$ hour at constant speed. Find the speed and distance in 2 hours.
5. A \$60 item increases in price by 10%, then decreases by 10%. Find the final price and explain the net percent change.
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6. A scale drawing uses 2 cm for 5 m. Write drawing length y in cm as a function of actual length x in m. Find y for 12.5 m.

Think Like a Mathematician

Optional extension. Choose a strategy and justify why it works. Try a diagram, organized cases, a simpler example, or an equation.

7. A price is increased by 25%. What percent decrease from the new price restores the original price? Explain using a convenient starting value and a multiplier.

8. A proportional relationship contains $(a, 6)$ and $(6, 9)$ with $a > 0$. Find a . Then find the point whose two coordinates add to 20. Explain why it is unique.