

Fractions in Linear Relationships

Name: _____

Date: _____

Study the slope. On $y = \frac{3}{2}x + 4$, use $(0, 4)$ and $(2, 7)$:

$$m = \frac{7 - 4}{2 - 0} = \frac{3}{2}.$$

The change is 3 vertical units for 2 horizontal units. The starting value is 4; the coordinate ratio $7/2$ is not the slope.

Rate of change: Grade 8

1. A line passes through $(0, 3)$ and $(4, 6)$. Find its slope as a ratio of changes and write its equation. What does the 3 represent?

2. A learner uses $6/4$ as the slope in Problem 1. Explain the error and repair it using both points.

3. A tank starts with 5 liters and gains $\frac{3}{4}$ liter each minute. Write $V(t)$, find $V(8)$, and explain whether volume is proportional to elapsed time.

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Equivalent equations: Algebra I

Study two methods. Solve $\frac{3}{2}x + 4 = 10$.

Isolate: $\frac{3}{2}x = 6$, so $x = 6 \times \frac{2}{3} = 4$.

Clear denominators: $3x + 8 = 20$, so $x = 4$. Every term was doubled; both methods preserve equality.

4. Complete both methods for $\frac{2}{3}x + 1 = 7$.

Isolate: $\frac{2}{3}x = \square$, so $x = \square$.

Clear denominators: $2x + \square = 21$, so $x = \square$. Check.

5. Jules multiplies $\frac{3}{4}x + 2 = 8$ by 4 and gets $3x + 2 = 32$. Identify the first error, write the correct equation, and solve.

6. A bicycle rental costs \$6 plus $\frac{5}{2}$ dollars per hour. Write $C(h)$. How many hours cost \$21? Solve two ways and interpret the intercept.

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Think Like a Mathematician

Optional extension. Explain why your reasoning works.

7. Plan A costs \$6 plus $\frac{5}{2}$ dollars per hour; Plan B costs \$9 plus $\frac{7}{4}$ dollars per hour. Both charge by exact elapsed time with no rounding or extra fees. When do they cost the same, and what is that cost? Which is cheaper before and after? Also justify using the starting-cost gap and rate difference.

8. A line passes through $(2, a)$ and $(6, a + 3)$. Find its slope without finding a . Find the one value of a making the relationship proportional. For that value, write the equation and find y when $x = 10$. Explain how changing a changes the line.