Solving ratios without algorithms

The contents of this content module were developed by special educator Bethany Smith, PhD and validated by content expert Drew Polly, PhD at University of North Carolina at Charlotte under a grant from the Department of Education (PR/Award #: H373X100002, Project Officer, Susan.Weigert@Ed.gov). However, the contents do not necessarily represent the policy of the Department of Education and no assumption of endorsement by the Federal government should be made

Using proportional reasoning

- Another way to solve ratios is by using proportional reasoning and not an algorithm. $\frac{3}{2} = \frac{x}{1}$
- Solving ratios without using an algorithm often requires using a conversion table.
- The next slide demonstrates how you can solve the same word problem with and without using an algorithm

Algorithm vs. Reasoning

Problem: If you can drive 250 miles on 1 tanks of gas, then how many miles can you drive on 5 tanks of gas

Using the algorithm

$$\frac{250}{1} = \frac{x}{5}$$

$$1250 = 1x$$

$$1250 = x$$

No Algorithm

Tanks of gas	Mileage
1	250
2	500
3	750
4	1000
5	1250

This conversion table would have been filled in by students using multiplication or addition

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Ideas for application

- Once students complete the table, have them graph their results
  - In the example provided previously, the tanks would serve as x-coordinates and the miles would be the y-coordinates
  - This demonstrates that as the number of tanks increases, so does the mileage

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Making connections

- Solving ratios without using algorithms addresses the following middle school Core Content Connectors
  - 6.ME.1b4 Complete a conversion table for length, mass, time, volume
  - 6.PRF.2a3 Use variables to represent two quantities in a real-world problem that change in relationship to one another
  - 6.PRF.1c2 Represent proportional relationships on a line graph
  - 6.PRF.2b5 Use ratios and reasoning to solve real-world mathematical problems
  - 7.PRF.1e2 Represent proportional relationships on a line graph
  - 7.PRF.1g2 Use variables to represent quantities in a real-world or mathematical problems, and construct simple equations and inequalities to solve problems by reasoning about the quantities
  - 8.PRF.1e2 Represent proportional relationships on a line graph

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