Ideas in Mathematics:

Graphing

Readiness
Individual
Algebra:
Teaching of
Supporting

Concepts to Know:

Students can deepen their understanding of slope, linear functions, and algebraic equations by integrating the ideas of proportions, ratios and proportional reasoning.

Sense making can occur by applying the understanding of linear functions, algebraic equations, and the concept of slope to familiar concepts that surface proportional reasoning.

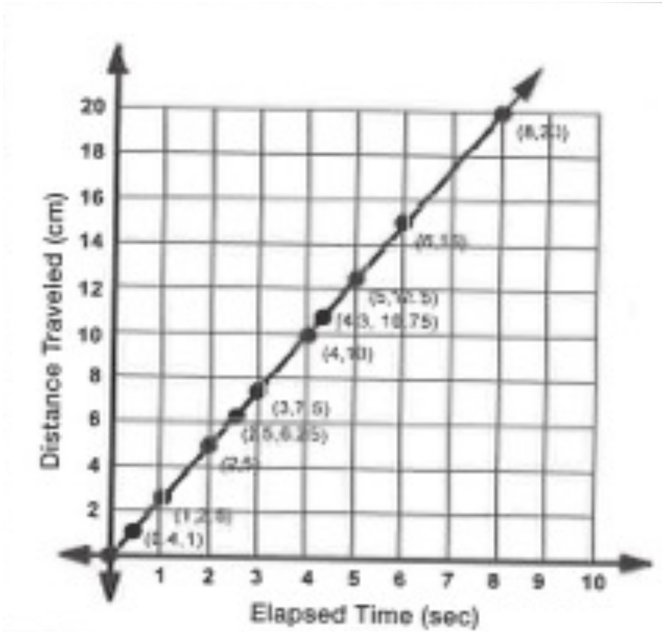
Relate the expression of the form y = mx as a statement of proportionality, with m as an invariant ratio also known as constant of proportionality . Shown as m = y/x ordered pairs can be used to surface the value of m which can help students understand the concept of a constant.

Use the definition of a ratio as a multiplicative comparison of quantities, or a joining of two quantities in a composed unit.

Surface the connection of proportionality and linearity

Strategies to Try:

- Create scenarios that are easy to contextualize for students such as using the concept of motion (speed). Students can compare two characters walking along a path with specific distance traveled during a specific time. The students can be given a specific observation of distance/time relationship (speed) and be asked to generate more ordered pairs based on the initial observation.



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Strategies to Try:

- Add another way of connecting linearity and proportionality by forming the equation that relates time and distance values such as y = 2.5x (y = mx), where x represents elapsed time and y represents distance traveled. Isolate the x value algebraically so that students are directed to observe that the solution represents a set of equivalent ratios. The equation used as our example can be interpreted directly in terms of ratios, each y value is 2.5 times as great as its corresponding x value.

Elapsed Time (sec)	Distance Traveled (cm)
4	10
8	20
12	30
2	5
6	15
1	2.5
3	7.5
5	12.5
2.5	6.25
0.4	1
4.3	10.75

A second interpretation in the example involves seeing 2.5 as the distance units (meters, centimeters) traveled by our character during each time unit (per second or per minute). Then the total distance traveled is 2.5 (distance units) for each second that passes as the character travels.

Therefore the students can note that for the first ordered pair the character traveled = 2.5cm in 1 sec, 2.5cm in the second sec, 2.5cm on the third sec, and finally 2.5cm on the fourth second. Resulting in 2.5+2.5+2.5+2.5 = 2.5 X 4 = 10 cm traveled.

Students can generate ordered pairs and analyze how the ordered pairs relate to the initial distance traveled of 2.5. For example, ordered pair (6, 15) means after 6 (time unit) our character traveled 2.5 (distance unit) which represents 2.5 * 6 = 15.

(Lobato et al., 2010)