PROPORTION, GRAPHS AND EQUATIONS - SUMMARY

For Year Level 9

This material relates to the following Australian Curriculum (Mathematics) Outcome/s:

- Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems (ACMNA208

Rationale for Use

It is expected that students will have access to an array of practice material in the form of textbooks or school prepared exercises. The purpose of the AMSI materials is to support the development of **understanding** and **reasoning** about the concepts involved. They complement and enhance the teacher instruction elements of normal classroom instruction.

Explanation (What this includes):

- Identify and describe everyday examples of direct proportion, e.g. as the number of hours worked increases, earnings also increase

- Identify and describe everyday examples of inverse (indirect) proportion, e.g. as speed increases, the time taken to travel a particular distance decreases

- Recognise direct and inverse proportion from graphs, and distinguish between positive and negative gradients when using a graph

- Interpret and use conversion graphs to convert from one unit to another, such as 'kilometres per hour' to 'metres per second' or converting between different currencies, or from metric to imperial measures and vice-versa

- Use the equation $y = kx$ to model direct linear proportion, where k is the 'constant of proportionality'; Use it to find an unknown quantity by calculating the 'constant of proportionality' given the right information

- Use graphing software or a table of values to graph equations representing linear direct proportion

Resources

1. **Watch and understand,** with some useful online videos:

   Watch the following video first, because it also explains how this maths can relate to the real world and how it's useful:

   - ParksMath – 'The Constant of Proportionality from a table and an Equation' - https://www.youtube.com/watch?v=9Gi9eyT6w84

   Then, watch the following Khan Academy clips, which explain proportionality and the linear relationships that result from this really clearly:

- Khan Academy – 'Proportionality' - https://www.youtube.com/watch?v=AQFZuih2odo *(Note that this video is quite long. You could stop at 9:00 minutes, take a break, then tackle the last 8 minutes later on!)*

- Khan Academy – 'Graphing Proportional Relationships' - https://www.youtube.com/watch?v=1F7LAJEVp-U

Finally OR alternatively, there is a fantastic set of 10 lessons available on My Woo's 'WooTube' channel, which will step you through all of this content really clearly:

- WooTube – 'Further rates and ratios' - https://www.youtube.com/playlist?list=PL5KkMZvBpo5B6qu4q2C3_YPJVs1P-dBPg

2. **Interact and observe,** with the following AMSI Schools authored GeoGebra file **– 'Rates Practice'.**

   You will need to have the GeoGebra application loaded on your computer, which can be downloaded here: https://www.geogebra.org/download?lang=en

   With this file, you can 'play' with practical applications of directly proportional rates, by changing both the **unit measurements** (e.g. 'metres per second', 'kilometres per hour' or 'dollars per hour'…) – which are the 'x' and 'y' values in the linear relationship;

   …as well as the **rate** in the relationship, which is the 'constant of proportionality' ('k') value, and also the **gradient** of the linear graph.
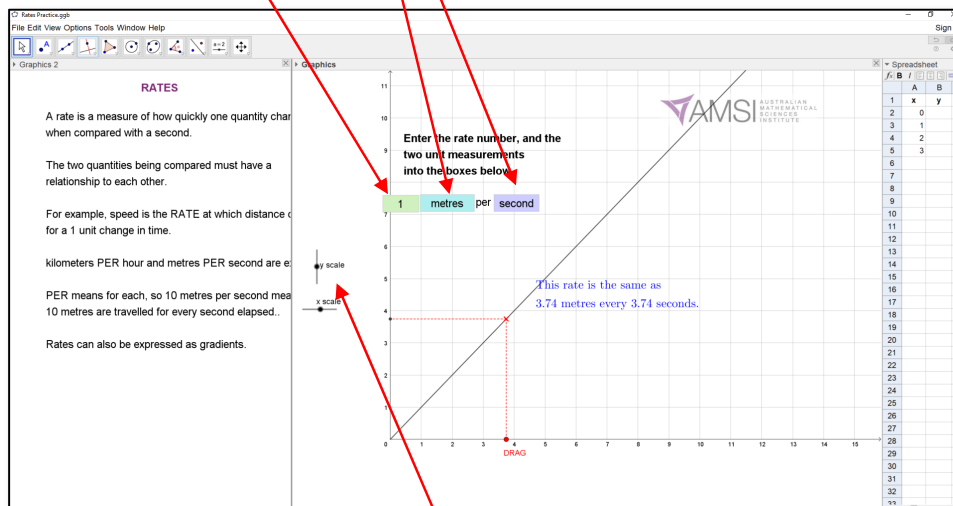
   Move the x and y scales using the **sliders**, to see the graph more clearly.

3. **Explore and consolidate** with the AMSI Schools 'TIMES' Module on Direct Proportion:

   - http://amsi.org.au/teacher_modules/pdfs/Proportion.pdf - Although this is mainly a guide for teachers, students will find it useful as well.
   - … and with the Khan Academy 'Rates & proportional relationships' unit, available here: https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-ratio-proportion#constant-of-proportionality

4. **Review and practice** by using your textbook chapter's 'review' questions on Rates and Proportionality.