

# MATHS TREATS

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## MODELLING THE GLOBAL ISSUE OF POPULATION

Mathematical modelling is the process of using mathematics to understand real-life situations, make predictions and help with decisions (reSolve, 2021). Usiskin (2011) categorised mathematical models into three types: 1. exact models where the application originates from mathematics (e.g., compound interest loans), 2. almost-exact theory-based models evident in physical world applications (e.g., paths of projectiles) and 3. impressionistic models that fit real data but are not theoretically based (e.g., a plot of 100 m world records over time).

### GATHER DATA AND BUILD MODELS



The population of a region or country is continually changing through births, deaths, and immigration, and occasionally changing due to shifting borders. Historical population data is readily available on the internet.

#### ACTIVITY

Find annual population data over an extended period (e.g., the last 200 years). You might like to consider the entire world, a comparison of countries, or a comparison of regions within a country. How confident can you be in the accuracy of the historical data? Calculate the annual population growth (or decline). How has the change in population varied over time or between countries? Think about the different ways you could display the data for a single year versus multiple years. Why would you choose one type of graph over another? How could your choice of graph influence the message communicated?

### MAKING PREDICTIONS



Population forecasts are important for making decisions about the infrastructure and services needed for communities. For example, the number of females of child-bearing age affects the number of births, and the number of older people will affect aged care, pension, and health costs.

#### ACTIVITY

Use the data you collected to build a numerical, graphical, or algebraic model for the population over time. How would the years of data that you choose affect the predictions for the future population? Why could predictions from an algebraic model diverge from the actual population data? Investigate the impact of births, deaths, and immigration on the Australian population. Compare the age distribution in Australia against another country. How could you explain the historical age-distribution differences between the two countries? What other factors might affect changes in population? How significant might these factors be on the overall population trend?

## REFERENCES AND FURTHER READING

Wikipedia: mathematical model, list of global issues

[www.immchallenge.org.au/supporting-resources/what-is-mathematical-modelling](http://www.immchallenge.org.au/supporting-resources/what-is-mathematical-modelling)

[www.un.org/en/global-issues](http://www.un.org/en/global-issues)

reSolve. (2021). [www.resolve.edu.au/mathematical-modelling](http://www.resolve.edu.au/mathematical-modelling)

Luciana the Possum. (2021). *Vinculum*, 58(2), 24.

Usiskin, Z. (2011). Mathematical modeling in the school curriculum. [ucsmp.uchicago.edu/resources/conferences/2011-09-11/](http://ucsmp.uchicago.edu/resources/conferences/2011-09-11/)

Data: <https://ourworldindata.org/world-population-growth>, <https://population.un.org/wpp/> and <https://www.gapminder.org/>

Images: Leadbeater possum - Steve Kuitert, others from Pixabay.