VCE General Mathematics Unit 3

Area of Study 1 sample application task: Data analysis
Measles immunisation rates

The application task is to be of 4–6 hours’ duration over a period of 1–2 weeks.

Introduction

Immunisation is a key aspect of public health policy for the control of disease around the world.

In particular, data on immunisation rates is an important part of analysis. In this task we investigate the percentage of children aged 12–23 months immunised against the disease of measles in [various countries](https://www.health.gov.au/funnelback/search?query=measles). Relevant data can be found at [Databank](http://databank.worldbank.org/data/reports.aspx?source=2&series=SH.IMM.MEAS&country).

Component 1

Compare the distribution of immunisation rates in 1990 with those in 2015 for a group of countries.

1. Randomly select 30 countries from the dataset.
2. Construct an appropriate display to compare the immunisation rates for these countries in 1990 and 2015.
3. Compare the distribution of immunisation rates for these countries in terms of shape, centre, spread and outliers.

Component 2

1. Select two countries of interest and construct time series plots of the immunisation rates from 2007 to 2015 for each on the same axes.
2. Describe the two time series plots, noting any similarities or differences in the trends between the two countries.

Component 3

Based on the 30 countries selected:

1. Construct a scatterplot of the immunisation rates in 2010 against the immunisation rates in 1990, and describe it in terms of direction, form and strength.
2. Determine the equation of the regression line, draw the regression line on the scatterplot, and interpret the intercept and slope in terms of the immunisation rates in 1990 and 2010.
3. Use your model to predict the immunisation rate in 2015 for each of the countries. Compare the predictions with the real data, using percentage error to determine the accuracy of your predictions.
4. Construct a scatterplot of the immunisation rate in 2015 against GDP per capita in 2015 (a measure of the wealth of that country). [GDP data](https://data.worldbank.org/indicator/NY.GDP.PCAP.CD)
5. Determine the correlation coefficient and hence the coefficient of determination between the immunisation rates and GDP in 2015 and interpret these statistics.

Areas of study

The following content from the areas of study is addressed through this task.

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| **Unit 3** |
| **Area of study** | **Topics** | **Content dot points** |
| Data analysis, probability and statistics | Investigating data distributionsInvestigating associations between two variablesInvestigating and modelling linear associationsInvestigating and modelling time series data | 3, 4, 5, 61, 3, 4, 5, 61, 2, 3, 4, 5, 6, 7, 81 |

Outcomes

The following outcomes, key knowledge and key skills are addressed through this task.

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| **Unit 3** |
| **Outcome** | **Key knowledge dot point** | **Key skills dot point** |
| 1 | 1, 2, 4, 7, 8, 9, 10, 11, 12 | 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 18 |
| 2 | 1, 2, 3, 4 | 1, 4 |
| 3 | 1, 3, 4, 5 | 1, 3, 4, 5, 6, 9, 10, 11, 12 |