



# MATHEMATICS APPLICATIONS ATAR COURSE

## FORMULA SHEET

### 2020

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This document is valid for teaching and examining until 31 December 2020.

**Statistics**

Bivariate data	
Residual value	observed value – predicted value = $y - \hat{y}$
Least-squares line	$\hat{y} = a + bx$ where $y$ is the response variable and $x$ is the explanatory variable or $\hat{y} = a + bt$ where $y$ is the response variable and $t$ is time (the explanatory variable)
Periodic time series	
$\text{Deseasonalised value} = \frac{\text{Actual value}}{\text{Seasonal index}}$	

**Growth and decay in sequences**

Arithmetic sequence	$T_1 = a, T_n = a + (n - 1)d \quad d = T_{n+1} - T_n$
Geometric sequence	$T_1 = a, T_n = ar^{(n-1)} \quad r = \frac{T_{n+1}}{T_n}$
First-order linear recurrence relation	$T_1 = a, T_{n+1} = bT_n + c \quad \text{for } n \geq 1$

**Graphs, networks and decision mathematics**

Euler’s formula	$v + f - e = 2$
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**Loans, investments and annuities**

Simple interest	$I = Prt$
Compound interest	$A = P(1+r)^t$ compounded annually $A = P\left(1 + \frac{r}{n}\right)^{nt}$ compounded $n$ times a year
Effective annual rate of interest	$i_{\text{effective}} = \left(1 + \frac{i}{n}\right)^n - 1$

*Note: Any additional formulas identified by the examination panel as necessary will be included in the body of the particular question.*