FURTHER MATHEMATICS

Written examinations 1 and 2

FORMULA SHEET

Directions to students

Detach this formula sheet during reading time.
This formula sheet is provided for your reference.
Further Mathematics Formulas

### Business-related mathematics

**simple interest:** \[ I = \frac{PrT}{100} \]

**compound interest:** \[ A = PR^n \quad \text{where} \quad R = 1 + \frac{r}{100} \]

**hire purchase:** effective rate of interest \[ = \frac{2n}{n+1} \times \text{flat rate} \]

**annuities:** \[ A = PR^n - \frac{Q(R^n - 1)}{R - 1}, \quad \text{where} \quad R = 1 + \frac{r}{100} \]

### Geometry and trigonometry

**area of a triangle:** \[ \frac{1}{2} bh \]

**area of a triangle:** \[ \frac{1}{2} bc \sin A \]

**area of a circle:** \[ \pi r^2 \]

**volume of a sphere:** \[ \frac{4}{3} \pi r^3 \]

**volume of a cone:** \[ \frac{1}{3} \pi r^2 h \]

**Pythagoras’ theorem:** \[ c^2 = a^2 + b^2 \]

**sine rule:** \[ \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \]

**cosine rule:** \[ c^2 = a^2 + b^2 - 2ab \cos C \]

### Graphs and relations

#### Straight line graphs

**gradient:** \[ m = \frac{y_2 - y_1}{x_2 - x_1} \]

**equation:** \[ y - y_1 = m(x - x_1) \quad \text{gradient-point form} \]

\[ y = mx + c \quad \text{gradient-intercept form} \]

\[ \frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{two-point form} \]
Number patterns and applications

arithmetic series: \[ a + (a + d) + \ldots + (a + (n - 1)d) = \frac{n}{2} [2a + (n - 1)d] = \frac{n}{2} (a + l) \]

geometric series: \[ a + ar + ar^2 + \ldots + ar^{n-1} = \frac{a(1 - r^n)}{1 - r}, \quad r \neq 1 \]

infinite geometric series: \[ a + ar + ar^2 + ar^3 + \ldots = \frac{a}{1 - r}, \quad |r| < 1 \]

linear difference equations: \[ t_n = at_{n-1} + b = a^{n-1}t_1 + b \frac{(a^{n-1} - 1)}{a - 1}, \quad a \neq 1 \]
\[ = a^n t_0 + b \frac{(a^n - 1)}{a - 1} \]

Networks and decision mathematics

Euler’s formula: \[ v + f = e + 2 \]

Statistics

seasonal index: \[ \text{seasonal index} = \frac{\text{actual figure}}{\text{deseasonalised figure}} \]