

FURTHER MATHEMATICS

UNIT 4

Written examination 2

FORMULA SHEET

Directions to students

Remove this formula sheet during reading time.
This formula sheet is provided for your reference.

Further Mathematics Formulas

Core: Data analysis

standardised score:
$$z = \frac{x - \bar{x}}{s_x}$$

least squares line:
$$y = a + bx \text{ where } b = r \frac{s_y}{s_x} \text{ and } a = \bar{y} - b\bar{x}$$

residual value:
$$\text{residual value} = \text{actual value} - \text{predicted value}$$

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

Module 1: Number patterns

arithmetic series:
$$a + (a + d) + \dots + (a + (n-1)d) = \frac{n}{2} 2a + (n-1)d = \frac{n}{2}(a + 1)$$

geometric series:
$$a + ar + ar^2 + \dots + ar^{n-1} = \frac{a(1-r^n)}{1-r}, r \neq 1$$

infinite geometric series:
$$a + ar + ar^2 + ar^3 + \dots = \frac{a}{1-r}, |r| < 1$$

Module 2: Geometry and trigonometry

area of a triangle:
$$\frac{1}{2}bc \sin A$$

Heron's formula:
$$A = \sqrt{s(s-a)(s-b)(s-c)} \text{ where } s = \frac{1}{2}(a+b+c)$$

circumference of a circle:
$$2\pi r$$

area of a circle:
$$\pi r^2$$

volume of a sphere:
$$\frac{4}{3}\pi r^3$$

surface area of a sphere
$$4\pi r^2$$

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

volume of a cylinder:
$$\pi r^2 h$$

volume of a prism:
$$\text{area of base} \times \text{height}$$

volume of a pyramid:
$$\frac{1}{3} \text{area of base} \times \text{height}$$

Pythagoras' theorem:
$$c^2 = a^2 + b^2$$

sine rule:
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

cosine rule:
$$c^2 = a^2 + b^2 - 2ab \cos C$$

Module 3: Graphs and relations

Straight line graphs

gradient (slope):
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

equation:
$$y = mx + c$$

Module 4: Business-related mathematics

simple interest:
$$I = \frac{PrT}{100}$$

compound interest:
$$A = PR^n \text{ where } R = 1 + \frac{r}{100}$$

hire purchase:
$$\text{effective rate of interest} \approx \frac{2n}{n+1} \times \text{flat rate}$$

Module 5: Networks and decision mathematics

Euler's formula:
$$v + f = e + 2$$

Module 6: Matrices

determinant of a 2×2 matrix:
$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}; \det A = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

inverse of a 2×2 matrix:
$$A^{-1} = \frac{1}{\det A} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix} \text{ where } \det A \neq 0$$

END OF FORMULA SHEET