VCE General Mathematics Formula Sheets

Original worked revision examples with notes on units and assumptions.

Use the board PDF below for the official sheet. Coverage of examples varies by subject.

Official reference material

Official VCAA Examination 1 formula sheet

Official VCAA Examination 2 formula sheet

What to work out beyond the sheet

For a weighted shortest-path problem, compare total edge weights. Euler's relation counts faces and does not select a path.

Formulas and worked examples

Data analysis · standardised score

Formula or reference: $z = (x - \bar{x})/s_x$

Units and conditions: z has no units. x, $\bar{x}$ and s_x share the original units.

Worked example: An observation of 18 with mean 12 and standard deviation 4 has z = 1.5.

Data analysis · boxplot fences

Formula or reference: Lower = $Q_1 - 1.5 \times IQR$. Upper = $Q_3 + 1.5 \times IQR$.

Units and conditions: Fences use the observations' units.

Worked example: $Q_1 = 8$ and $Q_3 = 12$ give an IQR of 4 and fences of 2 and 18.

Data analysis · least-squares regression

Formula or reference: $\hat{y} = a + bx$, where $b = r\, s_y/s_x$ and $a = \bar{y} - b\,\bar{x}$.

Units and conditions: b uses y units per x unit. a and $\hat{y}$ use y units.

Worked example: With r = 0.8, $s_y = 10$, $s_x = 4$, $\bar{x} = 5$ and $\bar{y} = 18$, b = 2 and a = 8. At x = 6 the prediction is 20.

Data analysis · residual

Formula or reference: Residual = observed value − predicted value

Units and conditions: Use the response variable's units.

Worked example: A value of 22 with a prediction of 20 gives a residual of +2.

Data analysis · seasonal index

Formula or reference: Seasonal index = observed figure ÷ deseasonalised figure

Units and conditions: The index is a unitless ratio.

Worked example: An observed 150 sales against a deseasonalised 120 gives a seasonal index of 1.25.

Finance · first-order recurrence

Formula or reference: $u_0 = a$. $u_{n+1} = Ru_n + d$.

Units and conditions: R is unitless. a, u and d use the same units.

Worked example: For $u_0 = \$100$, R = 1.05 and $d = -\$10$, $u_1 = \$95$ and $u_2 = \$89.75$.

Finance · effective annual rate

Formula or reference: Effective rate = $[(1 + r/(100n))^{n} - 1] \times 100\%$.

Units and conditions: r is the quoted annual percentage number. n counts compounding periods per year.

Worked example: For a nominal 8% compounded quarterly, $(1.02^{4} - 1) \times 100\% \approx 8.24\%$.

Matrices · 2 × 2 determinant

Formula or reference: For A = [[a,b],[c,d]], det A = ad − bc.

Units and conditions: Use the units implied by the entries, when applicable.

Worked example: For A = [[3,1],[2,4]], det A = 12 − 2 = 10.

Matrices · 2 × 2 inverse

Formula or reference: A^{-1} = [[d,−b],[−c,a]] ÷ det A when det A ≠ 0.

Units and conditions: Divide every entry by the determinant.

Worked example: For A = [[3,1],[2,4]], the inverse is [[4,−1],[−2,3]]/10.

Matrices · recurrence with a constant input

Formula or reference: S_0 is the initial state. $S_{n+1} = TS_n + B$.

Units and conditions: S and B use the same units and dimensions. T is the transition matrix.

Worked example: Let T = [[0.9,0.2],[0.1,0.8]], $S_0 = (100,50)^{T}$ and $B = (4,0)^{T}$. Then $S_1 = (104,50)^{T}$.

Matrices · Leslie recurrence

Formula or reference: S_0 is the initial population. $S_{n+1} = LS_n$.

Units and conditions: S is a population vector. L contains fertility and survival factors.

Worked example: With L = [[0,2],[0.5,0]] and $S_0 = (20,10)^{T}$, $S_1 = (20,10)^{T}$.

Networks · Euler’s relation

Formula or reference: v + f = e + 2 for a connected planar drawing.

Units and conditions: v, e and f count vertices, edges and faces, including the outer face.

Worked example: A planar drawing with 5 vertices and 7 edges has 4 faces.