

2500/201

SCOTTISH
CERTIFICATE OF
EDUCATION
1998

THURSDAY, 7 MAY
9.30 AM – 11.30 AM

MATHEMATICS
HIGHER GRADE
Paper I

Read Carefully

- 1 Full credit will be given only where the solution contains appropriate working.
- 2 Answers obtained by readings from scale drawings will not receive any credit.

FORMULAE LIST

The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle centre $(-g, -f)$ and radius $\sqrt{(g^2 + f^2 - c)}$.

The equation $(x - a)^2 + (y - b)^2 = r^2$ represents a circle centre (a, b) and radius r .

Scalar Product: $\mathbf{a} \cdot \mathbf{b} = |\mathbf{a}| |\mathbf{b}| \cos \theta$, where θ is the angle between \mathbf{a} and \mathbf{b}

OR

$$\mathbf{a} \cdot \mathbf{b} = a_1 b_1 + a_2 b_2 + a_3 b_3 \text{ where } \mathbf{a} = \begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} \text{ and } \mathbf{b} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}$$

Trigonometric formulae:

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$= 2\cos^2 A - 1$$

$$= 1 - 2\sin^2 A$$

$$\sin 2A = 2\sin A \cos A$$

Table of standard derivatives:

$f(x)$	$f'(x)$
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$\sin ax$	$a \cos ax$
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$\cos ax$	$-a \sin ax$
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Table of standard integrals:

$f(x)$	$\int f(x) dx$
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$\sin ax$	$-\frac{1}{a} \cos ax + C$
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$\cos ax$	$\frac{1}{a} \sin ax + C$
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