

2500/201

SCOTTISH  
CERTIFICATE OF  
EDUCATION  
1997

THURSDAY, 8 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  $\theta$  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:

$$f(x) \quad f'(x)$$

$$\sin ax \quad a \cos ax$$

$$\cos ax \quad -a \sin ax$$

Table of standard integrals:

$$f(x) \quad \int f(x) dx$$

$$\sin ax \quad -\frac{1}{a} \cos ax + C$$

$$\cos ax \quad \frac{1}{a} \sin ax + C$$