612. Conical Projection of Circle into Ellipse

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formula, provided the unit of measure were made sufficiently small. This is especially true if one thinks of a surface as composed of points distributed symmetrically.

The fact that the formula $\frac{1}{2}m(m+1)$ does not express the area of an equilateral triangle whose sides are equal to m , even when m increases without limit, but has for its lower limit the area of an isosceles triangle whose altitude and base are both equal to m , seems therefore to be discordant with the assumption that a surface is composed of points. When this formula is used to find the area of an equilateral triangle the error will always exceed 15 per cent., as can easily be verified.

G. A. MILLER.

611. [I. 1.] *A Notation for the Use of Common Logarithms.*

The definition of logs to base 10 is implied in

$$2 = 10^{.3010\dots}$$

This may be written $2 = {}_{10}[.3010\dots]$

This form is convenient in computation for two reasons :

- (i) It is a continual reminder of what a logarithm is.
- (ii) It enables a straight-on direct statement of the working to be made.

Example 1.

$$\begin{aligned} x &= \sqrt{\{23 \cdot 14^2 + 51 \cdot 06^2\}} \\ &= \sqrt{\{{}_{10}[2(1 \cdot 3643)] + {}_{10}[2(1 \cdot 7081)]\}} \\ &= \sqrt{\{{}_{10}[2 \cdot 7286] + {}_{10}[3 \cdot 4162]\}} \\ &= \sqrt{\{535 \cdot 3 + 2607\}} = \sqrt{3142} = {}_{10}[\tfrac{1}{2}(3 \cdot 4972)] = {}_{10}[1 \cdot 7486] = \underline{56 \cdot 06}. \end{aligned}$$

Example 2.

$$\begin{aligned} x &= 1 \cdot 372^{3 \cdot 14} \\ &= {}_{10}[3 \cdot 14 \times 0 \cdot 1374] \\ &= {}_{10}[{}_{10}[0 \cdot 4969 + \bar{1} \cdot 1380]] = {}_{10}[{}_{10}[\bar{1} \cdot 6349]] = {}_{10}[0 \cdot 4314] = \underline{2 \cdot 702}. \end{aligned}$$

In the cases for which logs are commonly used, the working can be set out thus :

$$\begin{aligned} &\frac{217 \cdot 6 \times \sqrt{81 \cdot 93} \times 0 \cdot 367^2}{9 \cdot 321^3 \times \sqrt{0 \cdot 5671} \times 1 \cdot 629^{2\frac{1}{2}}} \\ &= {}_{10}[2 \cdot 3377 + \tfrac{1}{2}(1 \cdot 9134) + 2(\bar{1} \cdot 5647)] \\ &\quad - 3(0 \cdot 9695) - \tfrac{1}{2}(\bar{1} \cdot 7537) - 2\tfrac{1}{2}(0 \cdot 2119)] \\ &= {}_{10}[2 \cdot 3377 - 2 \cdot 9085 \\ &\quad 0 \cdot 9567 \quad \bar{1} \cdot 8769 \\ &\quad \bar{1} \cdot 1294 \quad 0 \cdot 5298] \\ &= {}_{10}[2 \cdot 4238 - 3 \cdot 3149] = {}_{10}[\bar{1} \cdot 1089] = \underline{0 \cdot 1285}. \end{aligned}$$

Note.—As a point of incidental interest in logarithms, the following is an extreme instance of the unreliability of tables :

$$\begin{aligned} \log 9 \cdot 321 &= 0 \cdot 9694, \\ \text{antilog } 0 \cdot 9694 &= 0 \cdot 919. \end{aligned}$$

F. C. BOON.

612. [K¹. 23. a.] *Conical Projection of Circle into Ellipse.*

The following remarks may be of interest to the engineering draughtsman.

Under conditions, some of which will be stated later in square brackets, the conical projection of a circle is an ellipse. It is required to find the points on the circle that project into the extremities of the principal (major and minor) axes of the ellipse.

The circle $ABCD$ to be projected is supposed to be in the plane of paper of Fig. Let G be its centre and r its radius. Let MN be the line in which