reading of the percentage humidity. \( I, I \) are pointers set at the dry and wet bulb readings by means of pieces sliding on the rods \( A, B \) and joined together by a link \( C \), which actuates by a slot the scale \( F \) (movable in the vertical) on which the percentage humidity is read at the pointer \( D \).

Let \( t_1, t_2 \) be the temperatures of the dry and wet bulbs respectively, \( t_3 \) the dew point; let \( v_1, v_3 \) be the vapour tensions of saturated air at \( t_1, t_2 \) and \( H \) the percentage humidity. Then the approximate theory is as follows:

\[
t_2 = t_1 - c(t_2 - t_1) \quad (c \text{ constant})
\]

(According to Glaisher \( c \) varies with \( t_1 \); this is taken into account by the inclination of the rods).

Experiment gives

\[
v_1 = a10^{t_1} \quad \text{and} \quad v_2 = a10^{t_2}
\]

also by definition

\[
H = 100v_3/v_1
\]

so that

\[
H = 100 \cdot 10^{-c(t_2 - t_1)}
\]

\[
\log H = 2 - c(t_2 - t_1)
\]

\[
= 2 - HK.
\]

This relation shows that the humidity scale is that of an inverted slide rule.

WALTER JAMIESON.

**Geometrical Illustrations of a Formula in the Differential Calculus.**—In this note the formula

\[
\frac{1}{PT} = \frac{d}{ds}(\log y)
\]

is illustrated for a few curves.

For any curve

\[
PT = ycosecPTN = y \frac{ds}{dy}
\]

from which the above formula follows. Only two variables are involved: the \( y \) axis may be excluded. Also the formula holds for oblique axes.

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1. Parabola $y^2 = 4ax$. (Fig. 1)

$$\frac{2 \, dy}{y \, ds} = \frac{1 \, dx}{x \, ds}.$$  

whence $TA = AN$. 

FIG. 1

FIG. 2
2. Hyperbola \( xy = \text{const.} \) (Fig. 2)
\[
\frac{1}{x} \frac{dx}{ds} + \frac{1}{y} \frac{dy}{ds} = 0.
\]
\[
\therefore \quad PT = -Pt.
\]

3. Conic \( \beta y = ka^2 \), having \( AB, AC \) tangents and \( BC \) chord of contact. (Fig. 3)
\[
\frac{1}{PM} + \frac{1}{PN} = \frac{2}{PL}
\]
hence
\[
(MN, PL) = -1.
\]

4. Cubic Hyperbola \( \alpha \beta y = \alpha' \beta' y' \) through \( P(\alpha_1, \beta_1, \gamma_1) \). (Fig. 4)
\[-2PL = \text{harmonic mean between } PM, PN.\]

Draw \( AQ \) the fourth harmonic mean to \( AB, AP, AC \) and a parallel to \( BC \) at three times the distance \( P \) has to \( BC \). The intersection \( U \) of these lines gives the tangent at \( P \), for
\[
P \ U = \text{harmonic mean of } PM, PN = -2PL.
\]

5. Similar results apply to curves \( \alpha y = k \beta \delta : OP^2 = kPU \cdot PU' \) (where \( O \) is a fixed point and \( PU, PU' \) are perpendiculars on fixed straight lines); \( 27ay^2 = 4x^2 \); \( (x + y + z)^3 = 6mxyz \); etc.

R. F. Davis.

**Geometrical Proof of a Trigonometrical Identity.**——
The following method of proof of the identity,
\[
1 - \cos^2 A - \cos^2 B - \cos^2 C - 2 \cos A \cos B \cos C = 0
\]