A KEY TO THE NEW AND PREVIOUS EDITIONS OF A MANUAL OF PLANE TRIGONOMETRY

A Key to the New and Previous Editions of a Manual of Plane Trigonometry by Joseph A. Galbraith & Samuel Haughton & James McDowell

Edited by Trieste Publishing Pty Ltd.
 Cover @ 2017

www.triestepublishing.com

JOSEPH A. GALBRAITH & SAMUEL HAUGHTON & JAMES MCDOWELL

A KEY TO THE NEW AND PREVIOUS EDITIONS OF A MANUAL OF PLANE TRIGONOMETRY

A KEY

TO THE NEW AND PREVIOUS EDITIONS OF

A MANUAL OF PLANE TRIGONOMETRY.

BY

THE REV. JOSEPH A GALBRAITH, M.A.,

FELLOW OF TRINITY COLLEGE,
AND ERASMUS SMITH'S PROFESSOR OF NATURAL AND EXPERIMENTAL PHILOSOPHY
IN THE UNIVERSITY OF DUBLIN,

AND

THE REV. SAMUEL HAUGHTON, M.A.,

FELLOW OF TRINITY COLLEGE,
AND PROFESSOR OF GEOLOGY IN THE UNIVERSITY OF DUBLIN.

BY

JAMES M'DOWELL, A.B.,

TRINITY COLLEGE, DUBLIN.

By the same Author:

KEYS *to Galbraith and Haughton's Scientific Manuals :—*

NOTICE.

THE solutions of the examples numbered 7 to 12 in pages 5 and 6 of the Fourth Edition of the Manual will be found at pages 6 and 7 of this New Edition of the "Key," numbered 1 to 6 respectively.

The new examples introduced into the Fourth Edition of the Manual are—

Pages.	Examples.
5, 6	1 to 6
16	1 to 12
70 to 88	All examples in these pages.

The solutions of these new examples will be found at the end of this New Edition of the "Key," beginning at p. 72.

Page 6.

(1.) By equation (3)

$$N'' = 206265'' \times \frac{a}{r} = 206265 \times \frac{9}{100}$$

$$= 2062.65 \times 9 = 18563.85''$$

$$= 5° 9' 23''.85. \quad Ans.$$

(2.)
by equation (3)
$$3' 28'' = 208'' = N'''$$

$$N'' = 206265'' \times \frac{a}{r}$$

$$\therefore r = \frac{206265 \times a}{N} = \frac{206265 \times 6}{208}$$

$$= \frac{1237590}{208} = 5949.9519 \text{ ft.} = 1983.3173 \text{ yds.}$$

$$= 1 \text{ mile } 223.3173 \text{ yds.} \quad Ans.$$

(3.) $\quad a = 7926$ miles, $r = 237638$ miles
$\therefore$ by equation (3)

$$N'' = 206265'' \times \frac{a}{r}$$

$$= 206265'' \times \frac{7926}{237638} = \frac{1634856390}{237638}$$

$$= 6879''.608 = 1° 54' 39''.608. \quad Ans.$$

(4.) $\quad 31' 7'' = 1867'' = N''$, $r = 237638$ miles;
by equation (3)

$$N'' = 206265'' \times \frac{a}{r}$$

$$\therefore a = \frac{N \times r}{206265} = \frac{1867 \times 237638}{206265}$$

$$= \frac{443670146}{206265} = 2150.97 \text{ miles.} \quad Ans.$$

(5.) $\qquad N'' = 17''.2, \ a = 7926$ miles;
by equation (3)

$$N'' = 206265'' \times \frac{a}{r}$$

$$\therefore r = \frac{206265 \times a}{N} = \frac{206265 \times 7926}{17.2}$$

$$= \frac{1634856390}{17.2} = \frac{16348563900}{172}$$

$$= 95049790.1 \text{ miles. } Ans.$$

(6) $\qquad 32' \ 3'' = 1923'' = N'',$

$r = 95049790$ miles (by the answer to the last example).
By equation (3)

$$N'' = 206265'' \times \frac{a}{r},$$

$$\therefore a = \frac{N \times r}{206265} = \frac{1923 \times 95049790}{206265}$$

$$= \frac{182780746170}{206265} = 886145.2 \text{ miles. } Ans.$$

Page 9.

(3.) By equation (6)

$$\cos A = \frac{1}{\sec A}$$

and by equation (2)

$$\sec A = \sqrt{(1 + \tan^2 A)},$$

$$\therefore \cos A = \frac{1}{\sqrt{(1 + \tan^2 A)}}. \quad Ans.$$

(4.) By equation (8)

$$\operatorname{cosec} A = \frac{1}{\sin A}$$

and by example (1)

$$\sin A = \sqrt{(1 - \cos^2 A)},$$

$$\therefore \operatorname{cosec} A = \frac{1}{\sqrt{(1 - \cos^2 A)}}. \quad Ans.$$

(5.) By example (1)

$$\sin A = \sqrt{(1 - \cos^2 A)}$$

and by equation (6)

$$\cos A = \frac{1}{\sec A}$$

$$\therefore 1 - \cos^2 A = 1 - \frac{1}{\sec^2 A} = \frac{\sec^2 A - 1}{\sec^2 A}$$

$$\text{and} \therefore \sin A = \sqrt{(1 - \cos^2 A)} = \sqrt{\frac{\sec^2 A - 1}{\sec^2 A}}$$

$$= \frac{\sqrt{(\sec^2 A - 1)}}{\sec A}. \quad Ans.$$

Page 14.

(3.) $\sin 30° = .50000,$ and

$$\cos 30° = .86602 \ (\text{by page } 13)$$

$$\therefore \tan 30° = \frac{\sin 30°}{\cos 30°} = \frac{50000}{86602} = .57735. \quad Ans.$$

(6.) Let $x =$ greater part of 1 cut in extreme and mean ratio, then $1 - x =$ less part, but product of whole and less part = square of greater part (Euclid, Book vi. p. 30),

$$\therefore 1 \times (1 - x) = x^2 \text{ or } x^2 + x = 1$$

$$\therefore x^2 + x + \frac{1}{4} = \frac{5}{4}$$

and $\therefore x + \frac{1}{2} = \frac{\sqrt{5}}{2}$ and $x = \frac{\sqrt{5}-1}{2}$

(7.) $\cos 18° = \sqrt{(1 - \sin^2 18°)} = \sqrt{\left\{ 1 - \left(\frac{\sqrt{5}-1}{4} \right)^2 \right\}}$

by last example

$$= \sqrt{\left(1 - \frac{6 - 2\sqrt{5}}{16} \right)} = \sqrt{\left(\frac{10 + 2\sqrt{5}}{16} \right)}$$

$$= \frac{\sqrt{(10 + 2\sqrt{5})}}{4} = \frac{\sqrt{(10 + 4.47213595)}}{4}$$

$$= \frac{3.80422}{4} = .95105. \quad \text{Ans.}$$

(8) $\sin 18° = \frac{\sqrt{5}-1}{4}$ and $\cos 18° = \frac{\sqrt{(10 + 2\sqrt{5})}}{4}$

$$\therefore \tan 18° = \frac{\sin 18°}{\cos 18°} = \frac{\sqrt{5}-1}{\sqrt{(10 + 2\sqrt{5})}}$$

$$= \frac{1.236067977}{3.80422} = .32492. \quad \text{Ans.}$$

Page 15.

(9)　　　　$\sin 72° = \cos 18° = .95105$

by example (7);

　　　　$\cos 72° = \sin 18° = .30901$

by example (6),

$$\therefore \tan 72° = \frac{95105}{30901} = 3.07773. \quad \text{Ans.}$$