

TRIGONOMETRY.

University of Toronto.—First Examination, 1880.

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1. Define the logarithm of a number, and explain what is meant by the "base" of a system of logarithms.

Show that $\log. \frac{a^n}{b^m} = n \log. a - m \log. b$.

Find $\log. 175$, and $\log. 6860$.

Of what numbers are, 2, 0, $\bar{3}$, 0.25 the common logarithms?

2. Find the logarithm of, the square root of $\frac{\sqrt{3} \cdot \sqrt[3]{577}}{49 \cdot \sqrt[4]{686}}$, and of $\frac{\sqrt[3]{.002}}{\sqrt[4]{.07}}$.

3. Define the terms sine, cosine, and tangent, and make a table of their variations in magnitude and algebraic sign from 0 to 180°.

Having given the tangent of an angle, find the sine and cosine.

4. Find the sine, cosine, and secant of 30 and 45°.

5. If ABC be a triangle, right-angled at C , show how to find any of the quantities B , a , b , if A , c are given.

6. Prove that

$$\sin A \pm B = \sin A \cos B \pm \cos A \sin B.$$

$$\sin 3A = 3 \sin A - 4 \sin^3 A.$$

7. Prove the following formulæ:

$$\cos \theta = \frac{1 - \tan^2 \frac{\theta}{2}}{1 + \tan^2 \frac{\theta}{2}}$$

$$\sin 45^\circ \theta \sin 45^\circ - \theta = \frac{1}{2} \cos 2\theta.$$

$$\sin 2\theta - \sin 2\alpha = \sin(\theta + \alpha) \sin \theta - \alpha$$

$$\frac{\sin \theta + \sin 3\theta}{\cos \theta + \cos 3\theta} = \tan 2\theta. \quad \tan 67^\circ 30' = 1 + \sqrt{2}.$$

8. In any triangle, prove

$$(i) \cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$(ii) \cos \frac{A}{2} = \sqrt{\frac{s(s-a)}{bc}}$$

9. Solve completely the triangles:

$$(i) \cos a = 1263, b = 1359, c = 1468.$$

$$(ii) A = 67^\circ 59', a = 2045, c = 2000.$$

10. Find the areas of the triangles in question 9.

11. The elevations of a tower is found to be 45°, and on retiring 60 yards it is 30°, find the height of the tower.

No.	Log.
12630	.10140
13590	.13322
14680	.16673
14948	.17458
16124	.20747
20000	.30103

No.	Log.
20450	.31069
30000	.47712
57700	.76118
68600	.83632
70000	.84510
78200	.89321
79561	.90070

ANGLE.	L. SIN.
46° 58'	9.86389
52° 54'	9.90178
59° 7'	9.93360
65° 3'	9.95745
67° 59'	9.96711