Find the tabular logarithms of sin 45°, tan 60°, cos 30°.

3. Show that the logarithms of the trigonometrical ratios need not be entered for angles greater than 45°; take sin A, tan A as examples, where A has any value from 0 to 180°.

If $\sec 120 = \frac{a}{40}$, can a be found by logarithms? Adapt $\sin A - \tan \frac{1}{2} A$ to logarithmic computation.

4. Prove the following relations:

$$\sin^2 A = 1 - \cos^2 A$$

$$\tan^2 A = \sec^2 A - 1$$

$$\operatorname{cosec} A - \sin A = \cos A \cot A$$

$$\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A.$$

5. A person standing on one bank of a river observes that an object on the opposite bank has an angle of elevation of 45°, and going back 150 feet, the corresponding angle is 30°. Find the breadth of the river.

6. A vertical stick whose height is 10 feet throws on a horizontal plane a shadow 7.74 ft. long. Find the sun's altitude.

Indicate how the problem would be solved if the shadow fell on a plane through the foot of the stick inclined at an angle θ to the horizon, the line of intersection of the plane and horizon being perpendicular to the plane through the sun and stick.

7. Prove $\cos (A+B) = \cos A \cos B - \sin A \sin B$, $2 \sin^2 \frac{1}{2} A = 1 - \cos A$

$$(\cos A - \sin A)^2 = \cos 2A \tan (45^\circ - A),$$

$$\frac{\cos\theta + \cos 3\theta}{\sin\theta + \sin 3\theta} = \frac{1 - \tan^2\theta}{2 \tan\theta}.$$

8. In any triangle establish the following:

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c},$$

$$\cos \tfrac{1}{2} C = \sqrt{\frac{s(s-c)}{ab}},$$

$$2 \times \text{area} = bc \sin A = \frac{c^2}{\cot A + \cot B}$$

9. In a triangle

$B = 123° 40'$, $b = 100$, $c = 60$, find A, C.

$A = 112° 40'$, $b = 213.4$, $c = 213.4$ solve the triangle.

$A = 200$ $b = 77.4$, $C = 41° 50'$, find the area,

10. If $(\sin\theta + \cos\theta)^2 = 3 \sin\theta + \sin 2\theta$, find θ in degrees, &c.

If $1 + \sin\theta = 2 \cos \frac{1}{2}\theta (\cos \frac{1}{2}\theta - \sin \frac{1}{2}\theta)$, find θ in degrees, &c.

11. In any triangle show that $2 (1 - \sin C) \cdot (\cos A - \sin B)^2$.

No.	Log.
20000	30103
30000	47712
41645	61956
77400	88874
21340	32919
17761	24946
51623	71284

Angle.	Log.
tan 52° 15′	10.11110
tan 52° 16′	10.11136
sin 56° 20′	9.92027
sin 29° 57′ 30″	9.69842
sin 41° 50′	9.82410
sin 19° 28′	9.52278
sin 19° 29′	9.52314
tan 26° 33′	9.69868
tan 26° 34′	9.69900

SOLUTIONS.

1. Cherriman, § 4

$$\log .25 = -.60206 = \bar{1}.39794$$

then $\log 2.5 = .39794$

and $\log (2.5)^{20} = 7.9588$

∴ the number of digits will be 7 + 1 or 8.

2. Cher. § 5

$$\log (\sqrt[4]{80} \times \sqrt[3]{2.7}) = \log 2 + \tfrac{1}{4} \log 5 + \log 3 - \tfrac{1}{3} \log 10$$

$$= .30103 + .17474 + 47712 - .33333$$

$$= .61956 \text{ which is the log of } 4.1645.$$

$$(\sqrt[5]{-5 \times 18^{\frac{1}{5}}}) = (-1)^{\frac{1}{5}} \times (\tfrac{5}{18})^{\frac{1}{5}}$$

$$\log (\tfrac{5}{18})^{\frac{1}{5}} = \tfrac{1}{5} \log 5 - \tfrac{1}{5} \log 2 - \tfrac{2}{5} \log 3$$

$$= \bar{1}.88874 = \log \text{ of } .774$$

$$\therefore \sqrt[5]{-5 \times 18^{\frac{1}{5}}} = (-1)^{\frac{1}{5}} \times .774 = -.774.$$

$L \sin 45° = 10 + \log \sin 45°$,