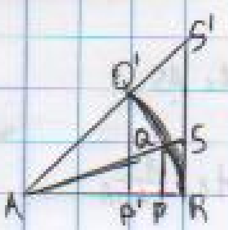

By DEFINITION (Pg. 62):

$AR = AQ = AQ' = 1$

then: $\sin A = \frac{PQ}{AQ} = \frac{PQ}{1} = PQ$;

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$\cos A = \frac{AP}{AQ} = \frac{AP}{1} = AP$;

$\tan = \frac{PQ}{AP} = \frac{PQ}{AP}$;

for triangle ASR:

$\sin = \frac{SR}{AS}$; $\cos = \frac{AR}{AS}$; $\tan = \frac{SR}{AR}$; then:

$\sec A = \frac{1}{\left(\frac{AR}{AS}\right)} = \frac{1}{\left(\frac{1}{AS}\right)} = \left(\frac{1}{1}\right) \div \left(\frac{1}{AS}\right) = \frac{AS}{1}$

$\tan A = \frac{SR}{AR} = \frac{SR}{1} = SR$ $\quad \sec^2 A = 1 + \tan^2 A$

By DEFINITION (on Pg 64):

$\sec^2 A = AS^2$ $\quad \tan^2 A = SR^2$ $\quad \rightarrow AS^2 = SR^2 + AR^2$ → P64 (PYTHAGOREAN THEOREM)

$AS^2 = AR^2 + 1$ $\quad$ then: $\sec^2 A = 1 + \tan^2 A = 1 + AS^2 - SR^2$ → Pg 72

2. In Figure 7 draw a line perpendicular to AB at B, intersecting AS in T. Show that BT = cot A. ($\angle BTA = \angle TAP$) and that AT = csc A. In triangle BTA, prove the relationship $\csc^2 A = 1 + \cot^2 A$.

→ FROM (P 50) PERPENDICULAR
→ ⊥
→ AB ? → AP

$BT = \cot A$ $\quad$ then $\quad BT = \frac{1}{\tan A}$

$\frac{1}{\tan A} = \frac{1}{\left(\frac{TB}{AB}\right)} = \frac{1}{\left(\frac{BT}{1}\right)} = \frac{1}{BT}$

$\frac{AP}{\sin T} = \frac{TP}{\sin A} = \frac{AT}{\sin P}$ $\quad \frac{AT}{\sin B} = \frac{BT}{\sin A}$

$\cot A = \frac{1}{\tan A}$ $\quad \tan A = \frac{BT}{AB} = \frac{QP}{AP}$ $\quad \cot A = \frac{1}{\left(\frac{BT}{AB}\right)} = \frac{AB}{BT}$

$\frac{QP}{AP} = \frac{SR}{AR} = \frac{SR}{1}$ $\quad \rightarrow \cot A = \frac{1}{\left(\frac{SR}{1}\right)} = \frac{1}{SR} = \frac{1}{BT}$

$\csc A = \frac{1}{\sin A} = \frac{1}{\left(\frac{TB}{AT}\right)}$ $\quad \sin A = \frac{BT}{AT} = \frac{SR}{AS} = \frac{PQ}{AQ} = \frac{1}{AT}$

$\csc A = \frac{1}{\left(\frac{1}{AT}\right)} = \frac{1}{\left(\frac{AT}{1}\right)} = \frac{1}{AT}$ $\quad \tan A = \frac{BT}{AB} = \frac{SR}{AR} = \frac{BT}{1}$

$\angle BTA = \angle APQ = \angle ARS$ $\quad \cot A = \frac{1}{\tan A}$

$\cot A = \frac{1}{\left(\frac{TB}{AB}\right)} = \frac{1}{\left(\frac{BT}{1}\right)} = \frac{1}{BT}$ $\quad \csc A = \frac{1}{\left(\frac{BT}{AT}\right)} = \frac{1}{\left(\frac{PQ}{AQ}\right)} = \frac{1}{\left(\frac{1}{AT}\right)} = \frac{AT}{1}$

$\cot A = \frac{1}{\left(\frac{AP}{AQ}\right)} = \frac{1}{\left(\frac{BT}{1}\right)} = \frac{1}{BT}$ $\quad \tan A = \frac{BT}{AB} = \frac{BT}{1} = BT$