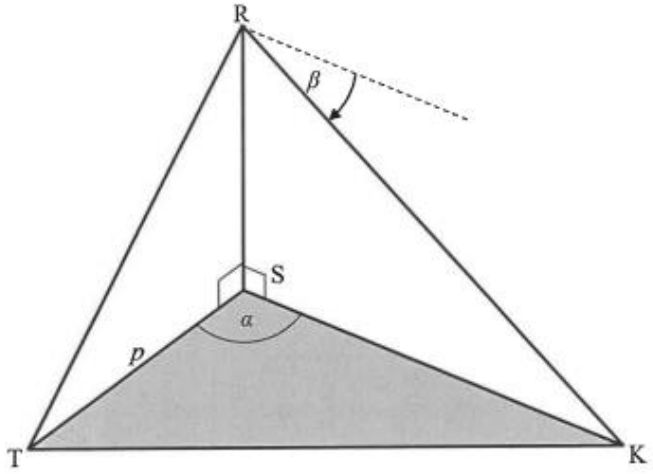
Trigonometry 3-D

Exercise A

QUESTION 7

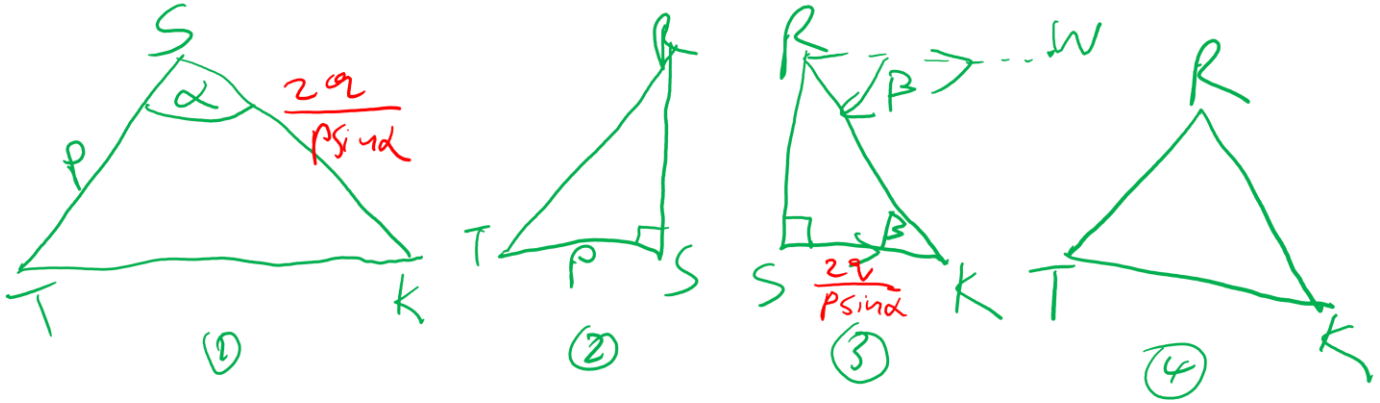
In the diagram, S, T and K lie in the same horizontal plane. RS is a vertical tower. The angle of depression from R to K is β. $\hat{TSK} = \alpha$, TS = p metres and the area of ΔSTK is q m^2.



7.1 Determine the length of SK in terms of p, q and α.

7.2 Show that $RS = \dfrac{2q\tan\beta}{p\sin\alpha}$

7.3 Calculate the size of α if $\alpha < 90°$ and RS = 70 m, p = 80 m, q = 2 500 m^2 and $\beta = 42°$.



7.1 $\text{Area}\,\Delta STK = \frac{1}{2} \times ST \times SK \times \sin\hat{TSK}$

$q = \frac{1}{2} \times p \times SK \times \sin\alpha$

$2q = p.\sin\alpha.SK$

$\frac{2q}{p\sin\alpha} = SK$

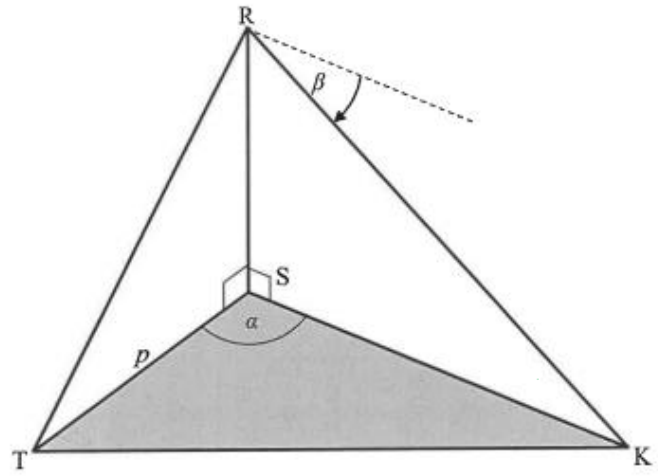
$\therefore SK = \frac{2q}{p\sin\alpha}$

Trigonometry 3-D

Exercise A cont.

QUESTION 7

In the diagram, S, T and K lie in the same horizontal plane. RS is a vertical tower. The angle of depression from R to K is β. $\hat{TSK} = \alpha$, TS = p metres and the area of ΔSTK is q m^2.



7.1 Determine the length of SK in terms of p, q and α.

7.2 Show that $RS = \frac{2q \tan \beta}{p \sin \alpha}$

7.3 Calculate the size of α if $\alpha < 90°$ and RS = 70 m, p = 80 m, q = 2 500 m^2 and $\beta = 42°$.

7.2 $R\hat{K}S = \beta$ (alt ∠s; RK // SK)

In ΔRKS

$\tan\beta = \frac{RS}{\frac{2q}{p\sin\alpha}}$

$\frac{2q\tan\beta}{p\sin\alpha} = RS \quad \therefore RS = \frac{2q\tan\beta}{p\sin\alpha}$

7.3 $RS = \frac{2q\tan\beta}{p\sin\alpha}$

$70 = \frac{2 \times 2500 \times \tan 42°}{80 \times \sin\alpha}$

$\sin\alpha = \frac{2 \times 2500 \times \tan 42°}{80 \times 70}$

$\therefore \alpha = 63{,}51°$