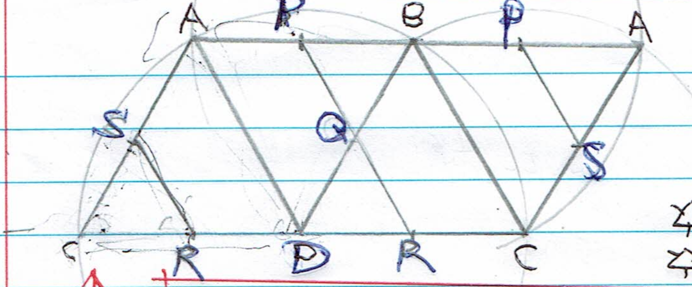
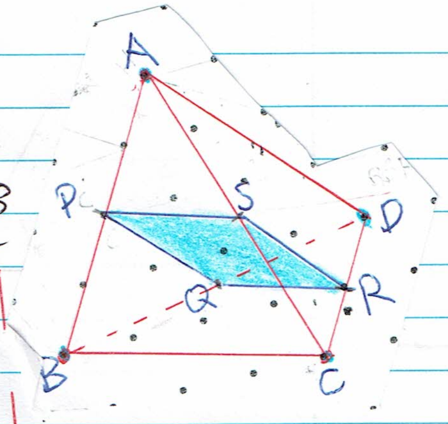
Tetra Slice



All faces are equaletrial triangles.
$\triangle ACD$, $\triangle ADB$
$\triangle BDC$, $\triangle BAC$



This is the net of this regular tetrahedron shown. The lines joining P, Q, R and S are also shown.

The shape PQRS has 2 sets of parrarell ~~lines~~ sides, which makes it a parrarelogram.
I have to prove there are 2 sets of pararell sides.
$\triangle CSR$ is similar to $\triangle ACR$
Since S and R are the centre points of their respective side.

$\therefore \frac{\overline{CS}}{\overline{CA}} = \frac{\overline{CR}}{\overline{CD}} = \frac{\overline{SR}}{\overline{AD}} = \frac{1}{2}$ —— (1)

and both triangles have common angle $\angle C$
Vertices $C \to C$
$S \to A$
$R \to D$

$\therefore SR // AD$ —— (2)

Repeat Above Anaylisis
$\triangle PBQ$ is similar to $\triangle ABD$
$\therefore PQ // AD$ —— (3)

$\frac{\overline{BP}}{\overline{BA}} = \frac{\overline{BQ}}{\overline{BD}} = \frac{\overline{PQ}}{\overline{AD}} = \frac{1}{2}$ —— (4)

(2) and (3) $\left.\begin{array}{l} SR // AD \\ PQ // AD \end{array}\right\} \therefore SR // PQ$

From (1) and (4)
$\frac{\overline{SR}}{\overline{AD}} = \frac{1}{2}$
$\frac{\overline{PQ}}{\overline{AD}} = \frac{1}{2}$
$\therefore \overline{SR} = \overline{PQ}$

Repeat Above Analysis for:
$\triangle QDR$ and $\triangle BDC$ are similar triangles ($\triangle$)
$\therefore QR // BC$ —— (5)

Repeat
$\triangle BAC$ is similar to $\triangle PAS$
$\therefore PS // BC$ —— (6)

Based on (5) and (6) $QR // BC$ $PS // BC$
$\therefore QR // PS$

$\frac{\overline{DQ}}{\overline{DB}} = \frac{\overline{DR}}{\overline{DC}} = \frac{\overline{QR}}{\overline{BC}} = \frac{1}{2}$ ——— 7

$\frac{\overline{AS}}{\overline{AC}} = \frac{\overline{AP}}{\overline{AB}} = \frac{\overline{PS}}{\overline{BC}} = \frac{1}{2}$ ——— 8

$\therefore \overline{QR} = \overline{PS} = \frac{1}{2} \times \overline{BC}$

I have now proved that PQRS is quaderitrial that is also a pararellogram.

SR//PQ } 2 pairs of pararell sides
QR//PS }

and $\overline{SR} = \overline{PQ} = \frac{1}{2} \times \overline{AD}$

and $\overline{QR} = \overline{PS} = \frac{1}{2} \times \overline{BC}$

for the regular tetrahedron $\overline{AD} = \overline{BC}$

$\therefore$ All ~~are~~ sides are equal length

$\overline{SR} = \overline{PQ} = \overline{QR} = \overline{PS}$.

This para~~r~~rellogram has 4 equal sides, which makes it a rhombus

when it is not a regular tetrahedron, it means that $\overline{AD} \neq \overline{BC}$

Only ~~the~~ $\overline{SR} = \overline{PQ} \neq \overline{QR} = \overline{PS}$

$\therefore$ PQRS is only a standard pararelogram

Ong Ci Hui Minh Ngoc Yr 5
Kelvin Grove State College
Brisbane, Australia.