Landscape Block Circle Algorithm : Inscribe in an Equalateral Triangle

R_m the minumun R_s

Given: equalateral triangle (P1,P2,P3) with sides of length *a*
Determine: radius *r* or inscribed circle

1. radii {(P4,P7),(P5,P7),(P6,P7)}of length *r* will split triange P1,P2,P3 with sides of length *a* into four smaller triangle of with side of length *a*/2
2. all of these triangles with have angles of 60 degrees
3. since angle P4, P5, P6 are equally spaced radii in a circle around P7, so dividing 360 by 3 gives 120 degees for angle P5,P7,P6.
4. the law of cosines states $c^2 = a^2 + b^2 - 2ab\,\textit{cosine}(\gamma)$ with γ beging the angle opposite of side C in any triangle with other sides of length a and b.
5. substituting a/2 for c; r for a and b; and 120° for γ to represent triangle P5,P6,P7 gives $(a/2)^2 = r^2+r^2 - 2rr\,\textit{cosine}(\gamma)$
    1. $a^2/4 = 2r^2-2r^2\textit{cosine}(120°)$
    2. $a^2/4 = 2r^2(1-\textit{cosine}(120°))$
    3. $a^2/(4•2(1-\textit{cosine}(120°)) = 2r^2$; note • indicates multiplicaton
    4. $r = √(a^2/(4•2(1-\textit{cosine}(120°)))$; note √ indicates square root
    5. $r = √(a^2/(8(1-\textit{cosine}(120°)))$; note √ indicates square root

    substituting W_f for a gives
    EQN : the minimun $R_s = √(W_f^2/(8(1-\textit{cosine}(120°)))$

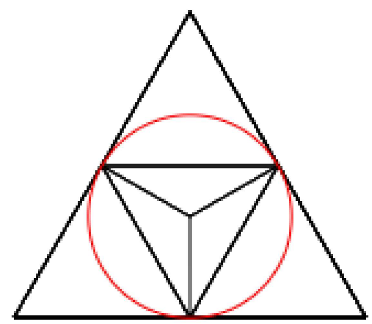

Diagram 1 - Incsribed Circle

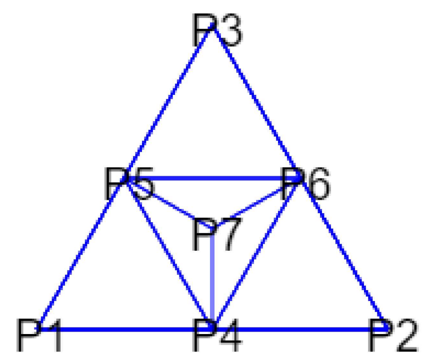

Diagram 2 - Points

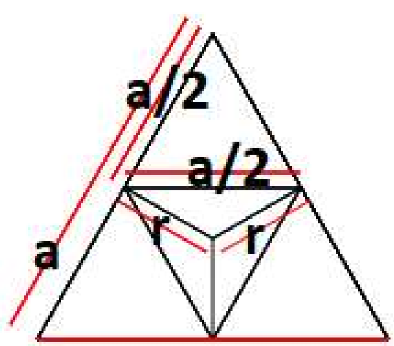

Diagram 3 -

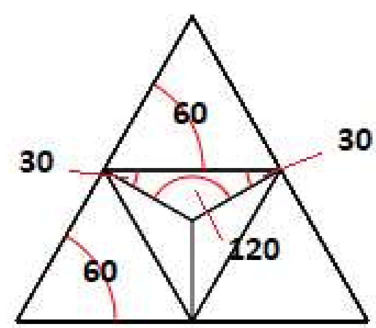

Diagram 4 -