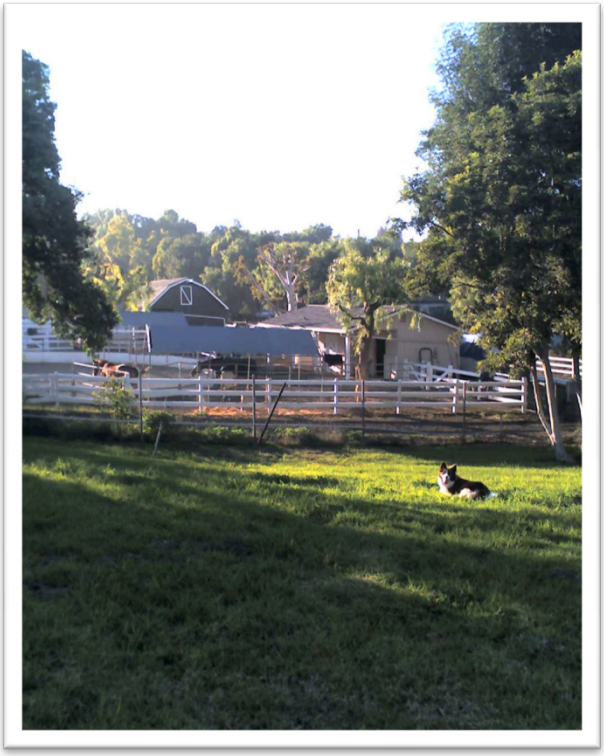
Lot Size Calculation

<u>Question</u>: Square footage of an arced pie shaped lot



Hello Randy,

We have a surveyor's map without the lot size on it. Land Registry can't help us. The surveyor is no longer in business.

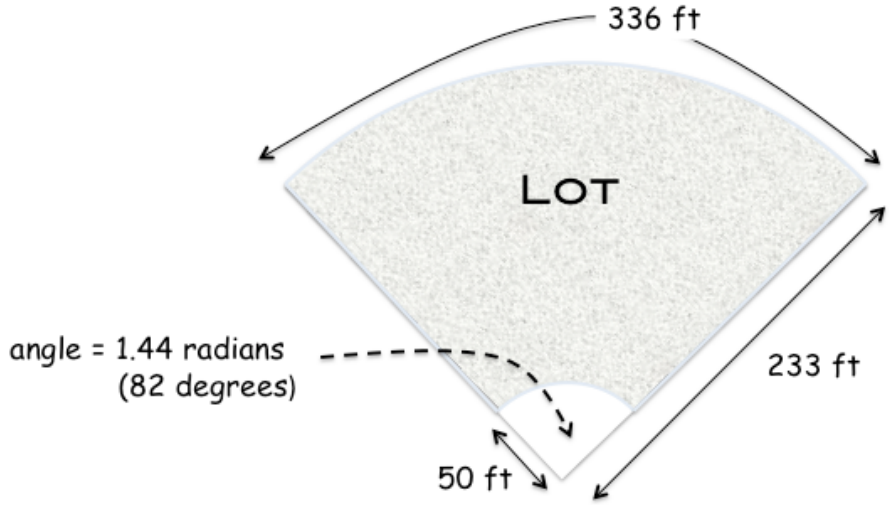
The dimensions of the lot are:

front is R 50 with Arc 72.08
back is RAD 233.0 with Arc 335.90
Both sides are 183.0

Can you help? Thank you in advance.

Lin - Vancouver, Canada

<u>Answer</u>: It looks like you have 2 pie shaped sections, a big one with a radius of 233 ft and a smaller one, whose center is at the same point, with radius 50 ft (see figure).



Subtracting the area of the smaller section from the area of the larger one will give you the area of your lot.

The length of the arc of the larger section is

arc_large = 335.9 ft = $\theta \cdot 233$ ft,

which gives $\theta = 1.44$ radians[1] (82 degrees).

This is the same angle you get for the smaller section;
arc_small = 72.08 = $\theta \cdot 50$ -> $\theta = 1.44$ radians also.

Thus the pie shaped sections have the same opening angle (thank goodness) and so we have the shape described above. Also note that 233 - 50 = 183 = length of sides, so we have a consistent shape.

The areas of the pie sections are a fraction of the area of the whole circle with the same radius; the fraction is given by $\theta/2\pi = 1.44/2\pi$ = 0.23. Thus the area of the large section is

A_large = $(0.23)\cdot(\pi r^2) = (0.23)\cdot(\pi \cdot 233^2)$ = 39227 sq ft.

Similarly, the area of the smaller section is

A_small = $(0.23)\cdot(\pi \cdot 50^2)$ = 1806 sq rt.

Thus, your lot size should be

A_large - A_small = 37241 sq ft = 0.86 acres.

I think this works. Good luck!

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[1] Radians are the natural way to measure angles in geometry and mathematics. As you may remember from high school, the circumference of a circle is $2\pi r$, where r is the radius of the circle. This relation says that a point on the edge of the radius sweeps out a circle (circumference) as it goes through a full rotation of 360° or, by definition, 2π radians.

OMG Randy!! Simple words cannot adequately express our appreciation of your help. I was told yesterday by Jonathan at the surveying company who bought out the surveyor who did the original survey in 1969 that they could help me for $95/hour. When I asked how long it would take, he wasn't very pleasant, stating something like, "Well, they will have to....." I don't think he enjoys his job. It was worth the couple of hours I spent on the internet yesterday trying to find a way to figure it out. I found the AllExperts site! At any rate, you provided not only a quick answer, but in a most pleasant manner. Bless you. You are a gem. Lin