

## Answers to "Test Yourself" No. 14

### Area of Circle Intersect

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Problem Statement:

The coordinates for Circle A's radius point are 1122.33 North, 3344.55 East and its radius is 987.65 feet. The coordinates for Circle B's radius point are 511.33 North, 4433.55 East and its radius is 420.88 feet. Compute the area of the figure covered by both circles. No fair working this problem in CAD. Imagine yourself in a test environment and only an HP33 and your geometry and trigonometry skills to solve the problem.

Solution:

Let "C" be one of the intersect points of the two circles. Now let "Area A" be the area of Circle A that intersects with Circle B that is within the arc of Circle A and the chord of the intersect. Let "Area B" be the area of Circle B that intersects with Circle A that is within the area of Circle B and the chord of the intersect. (These areas would be segment in geometry terms.)

First lets work on triangle ABC.

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

$$C = 119^\circ 17' 04''$$

$$\text{By Law of Sines, } B = 43^\circ 37' 09''$$

$$\text{Therefore } A = 17^\circ 05' 47''$$

Now for "Area A" and "Area B".

$$\text{Area A} = \frac{2A}{360^\circ} \pi R_A^2 - (R_A \sin A)(R_A \cos A)$$

$$\text{Area A} = 16,973.20 \text{ ft}^2$$

$$\text{Area B} = \frac{2B}{360^\circ} \pi R_B^2 - (R_B \sin B)(R_B \cos B)$$

$$\text{Area B} = 46,386.68 \text{ ft}^2$$

$$\text{Total Area of Intersect} = 63,359.9 \text{ ft}^2$$