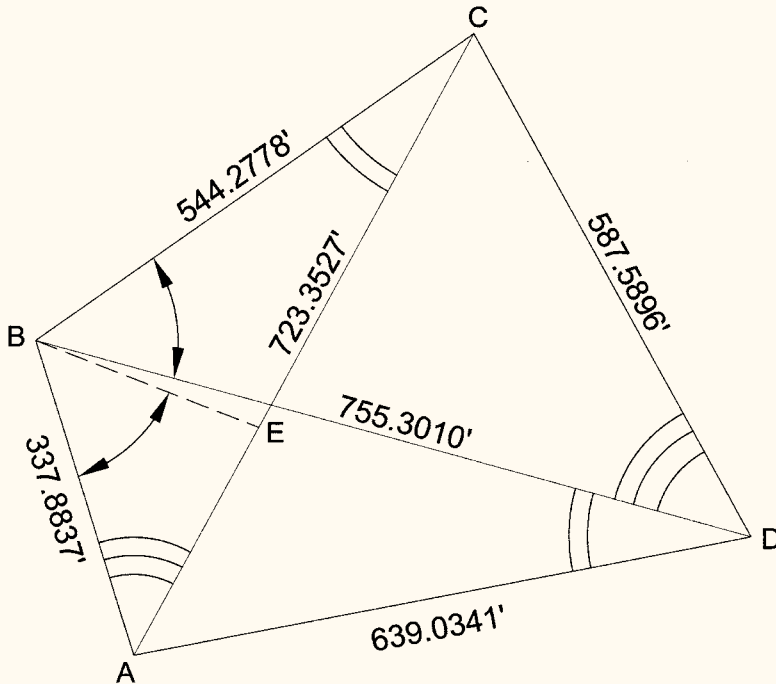




## Solution to Problem 119



Let quadrilateral A-B-C-D be a cyclic quadrilateral (inscribed in a circle).

Construct angle A-B-E = angle D-B-C.

Angle C-A-B = angle C-D-B because they subtend a common chord, BC.

Triangle ABE is therefore similar to triangle DBC, with all angles equal,

$$\text{so, } AE/AB = DC/DB \text{ and } AE \times DB = AB \times DC \dots\dots\dots(1)$$

Angle A-B-E = angle D-B-C (by construction).

Angle A-B-E + angle E-B-D = angle D-B-C + angle E-B-D,

But angle A-D-B = angle B-C-E because they subtend the common chord AB.

Triangle ABD is therefore similar to triangle ECB,

$$\text{so } AD/DB = EC/CB \text{ and } EC \times DB = AD \times CB \dots\dots\dots(2)$$

Adding (1) and (2),  $AE \times DB + EC \times DB = AB \times DC + AD \times CB$ .

$$(AE + EC) \times DB = AB \times DC + AD \times CB$$

$$\text{but } AE + EC = AC$$

so, for a quadrilateral to be inscribed in a circle,  $AC \times DB = AB \times DC + AD \times CB$ .

For this problem,  $AC=723.3527$ ,  $DB=755.3010$ ,  $AB=337.8837$ ,  $DC=587.5896$ ,  
 $AD=639.0341$  and  $CB=544.2778$

Does  $723.3527 \times 755.3010 = 337.8837 \times 587.5896 + 639.0341 \times 544.2778$  ?

$$546,349.0177 = 198,536.9481 + 347,812.0741$$

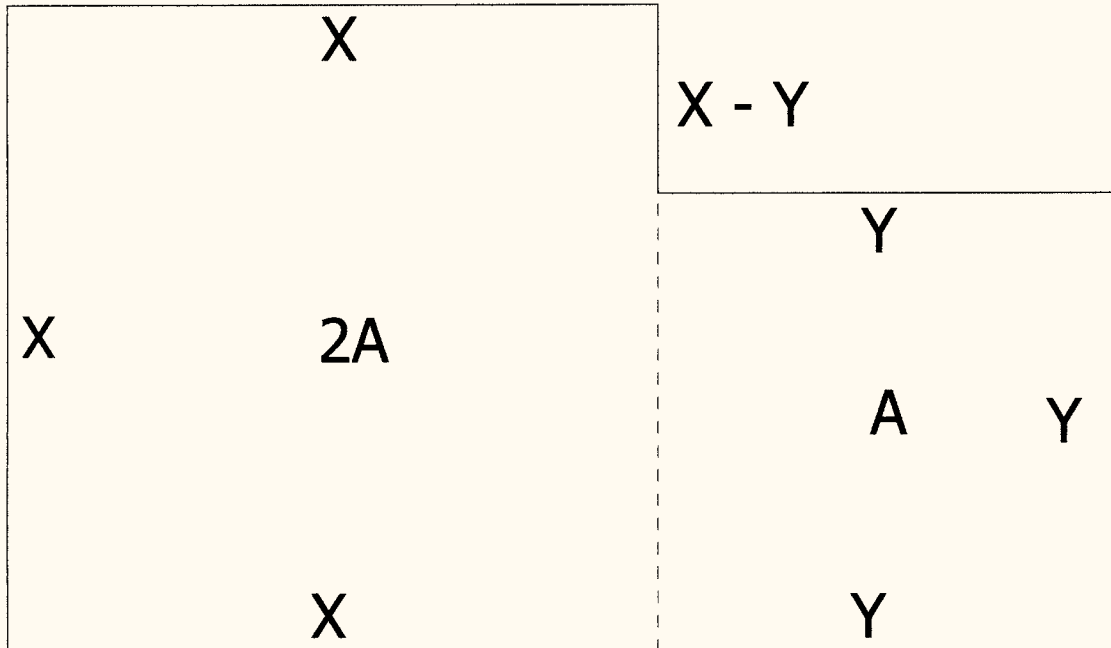
$$546,349.0177 = 546,349.0222$$

Close enough!





## Solution to Problem 120



$$X^2 = 2A$$

$$Y^2 = A$$

$$X^2 = 2Y^2$$

$$X = \sqrt{2}Y$$

$$3X + X - Y + 3Y = 5280'$$

$$4X + 2Y = 5280'$$

$$2X + Y = 2640'$$

$$2\sqrt{2}Y + Y = 2640'$$

$$(1 + 2\sqrt{2})Y = 2640'$$

$$Y = 2640' / 3.828427125 = 689.578'$$

$$X = (\sqrt{2})(689.578) = 975.211'$$

NOTE THAT  $X^2 = 951,036.27 \text{ ft}^2$  AND  $Y^2 = 475,518.135 \text{ ft}^2$

