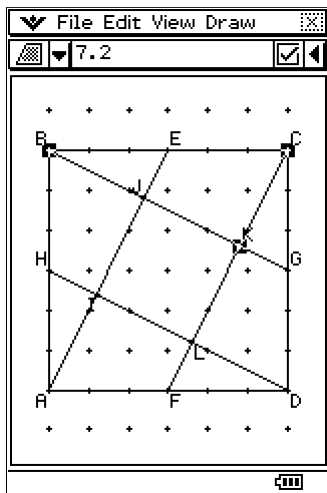
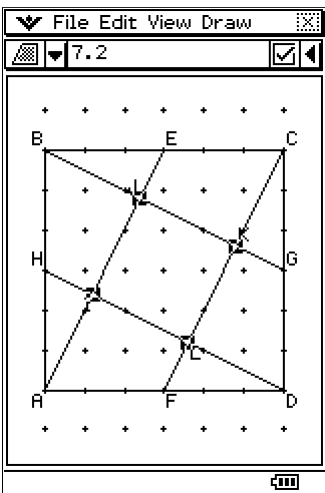
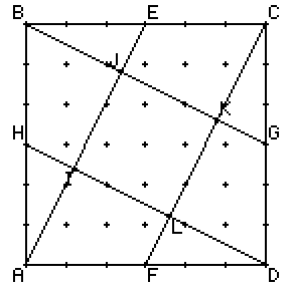


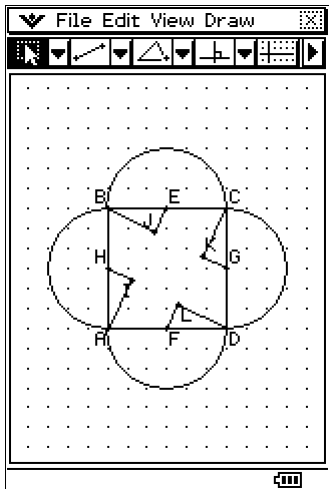
Why are these areas equal or are in a ratio each other?

This resource was written by Derek Smith with the support of CASIO New Zealand. It may be freely distributed but remains the intellectual property of the author and CASIO.

Why do areas $\Delta BKC = \Delta AJB = \Delta CLD = \Delta DIA = \square IJKL$?



As illustrated above $\square IJKL = \Delta BKC (= 7.2 \text{ mu}^2)$ and by construction $\Delta BKC = \Delta AJB = \Delta CLD = \Delta DIA$.



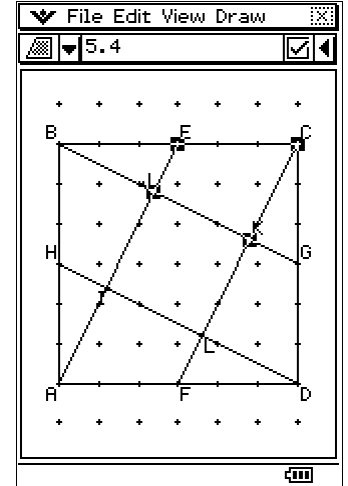
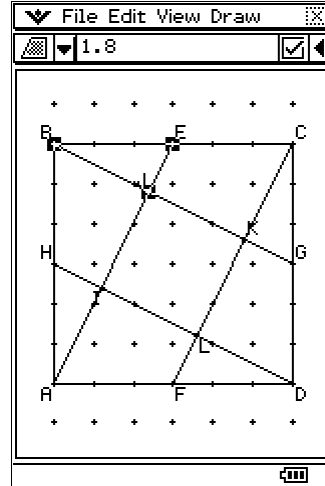
Rotate triangle ΔBJE about the point E clockwise thru' 180° . Similarly, rotate triangle ΔCKG about the point G thru' 180° clockwise and rotate triangle ΔDLF about the point F clockwise thru' 180° and lastly rotate point ΔAIH about the point H clockwise thru' 180° .

There are now five squares formed, each having an area of 36 mu^2 .

[Note: Original square = $6 \times 6 = 36 \text{ mu}^2$.]

Can you prove that $\Delta BKC = 4 \times \Delta BJE$?

Can you prove that $\square KJEC = 3 \times \Delta BJE$?



Can you prove for all squares dissected in this way?

Let $x = \frac{1}{2}$ length of the sides of the square, $y = BL$ and $z = LE$.

By construction $x^2 = y^2 + z^2$ (Pythagoreas Theorem)

$$\rightarrow (2x)^2 = (2y)^2 + (2z)^2$$

$$\rightarrow 4x^2 = 4y^2 + 4z^2$$

$$\rightarrow 4 \times (x^2 = y^2 + z^2)$$

$$\text{Area } \Delta BLE = \frac{1}{2} BL \times LC = \frac{1}{2} \times y \times z$$

$$= \frac{1}{2} yz$$

$$\text{Area } \square KJEC = \frac{1}{2} (BL + KC) \times JK = \frac{1}{2} \times (z + 2z) \times y$$

$$= \frac{1}{2} (3z)y$$

$$= 3 \times (\frac{1}{2} yz)$$

Area $\square IJKK = y \times 2z = 2yz$ and is a square, so $y = 2z$.

$$\text{Therefore, } x^2 = y^2 + (\frac{1}{2}y)^2 = \frac{\sqrt{5}}{2} y^2$$

$$\text{Ratio of sides: } x : y : z = \frac{\sqrt{5}}{2} : 1 \frac{1}{2}, \text{ i.e. } \sqrt{5} : 2 : 1$$

For further tips, more helpful information and software support visit our websites

www.casio.edu.monacocorp.co.nz or <http://graphic-technologies.co.nz>