

Figures

For Donald B. Wagner: ‘The development of the classical Chinese algebra of polynomials’.

13 August 2025

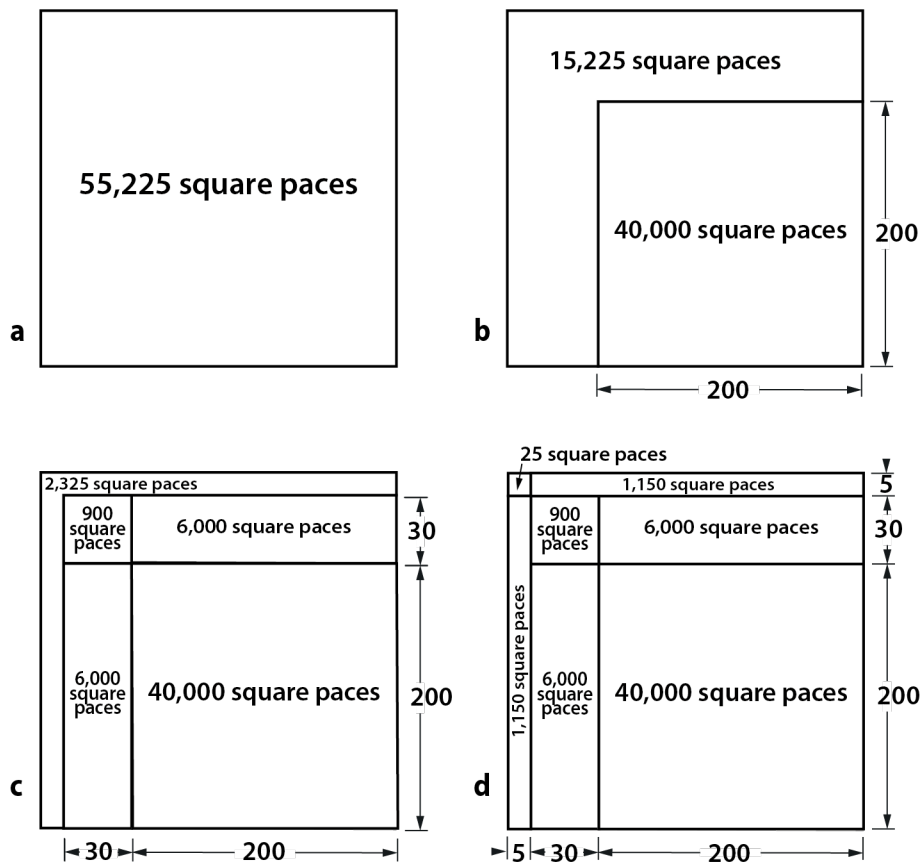


Figure 1. The geometric interpretation of the square-root algorithm in the *Nine chapters*. **a:** The given number; **b:** after determining the first digit of the square root, 2; **c:** after the second digit, 3; **d:** after the third and last digit, 5. The result is 235 paces.

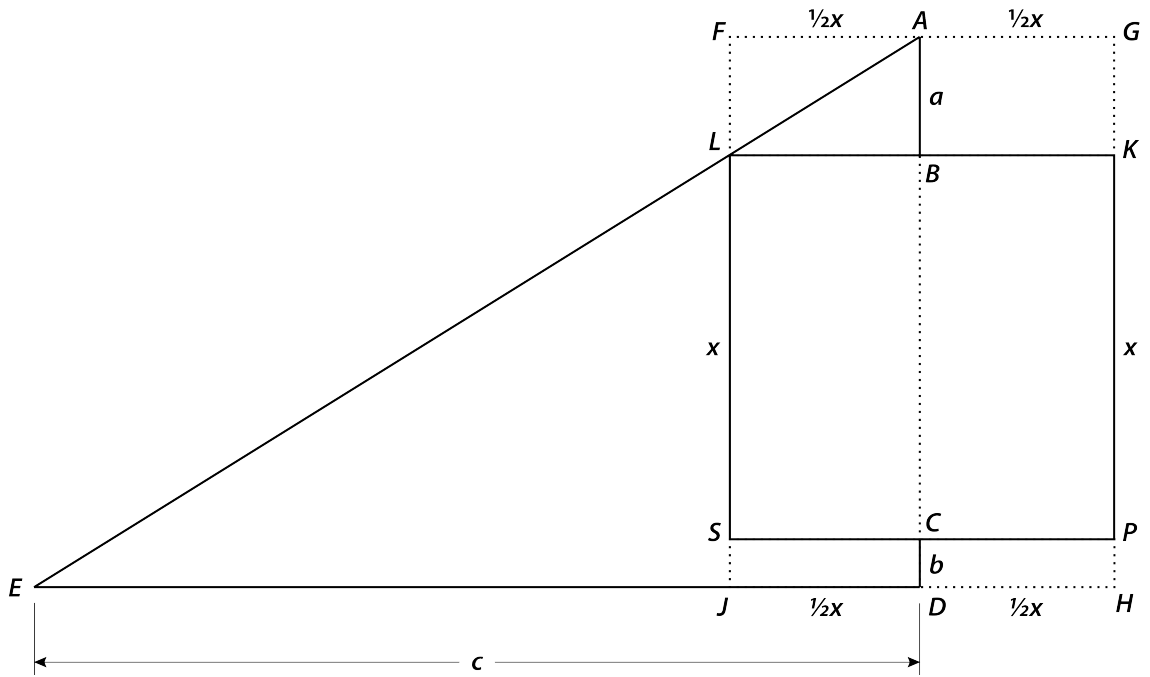


Figure 2. To illustrate Problem 20 of Chapter 9 in the *Nine chapters*.

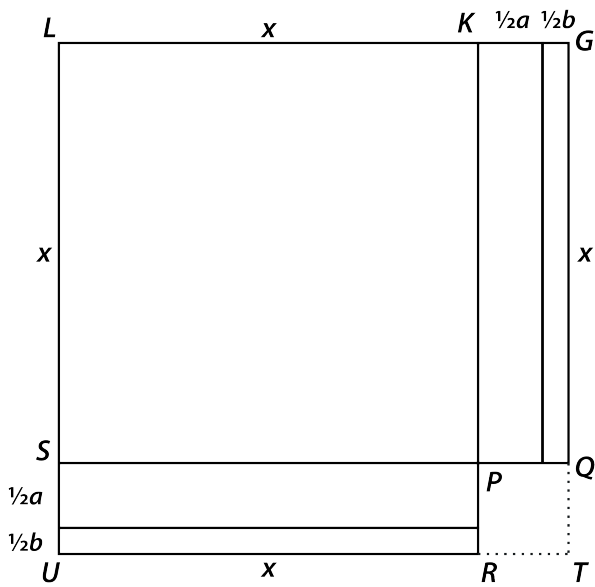


Figure 3. The result of dissecting and rearranging parts of Figure 2.

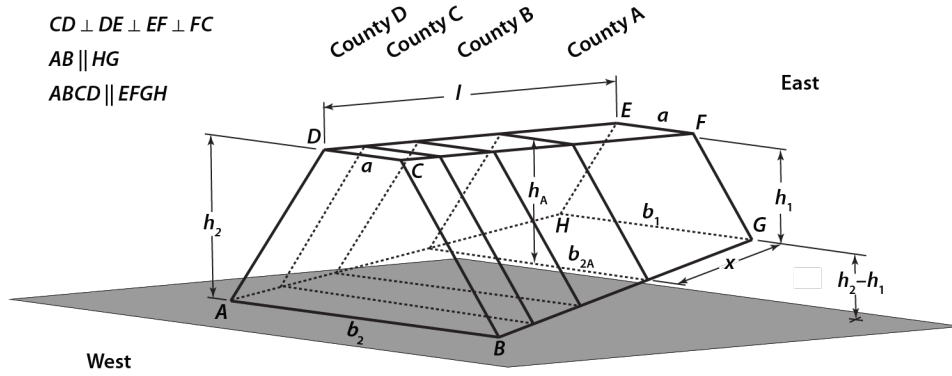


Figure 4. To illustrate the second part of Problem 3 of Wang Xiaotong's *Continuation*.

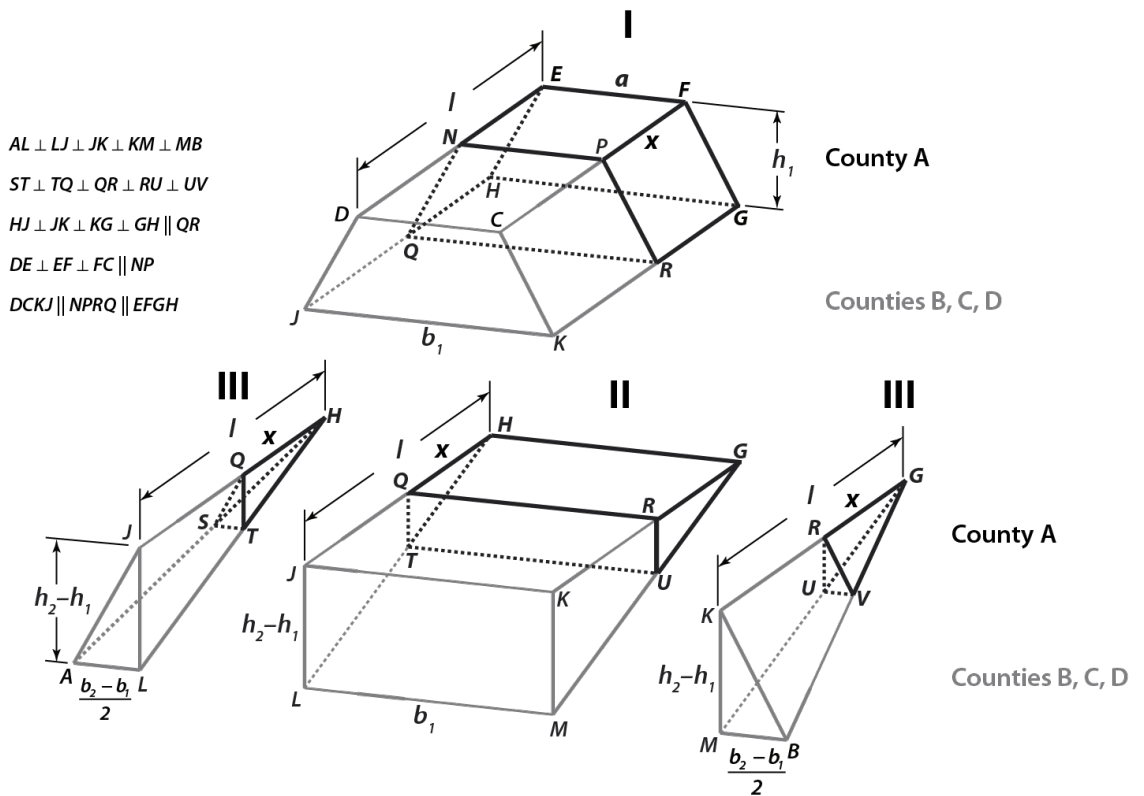


Figure 5. Dissection of Figure 4 to derive the contribution of County A.

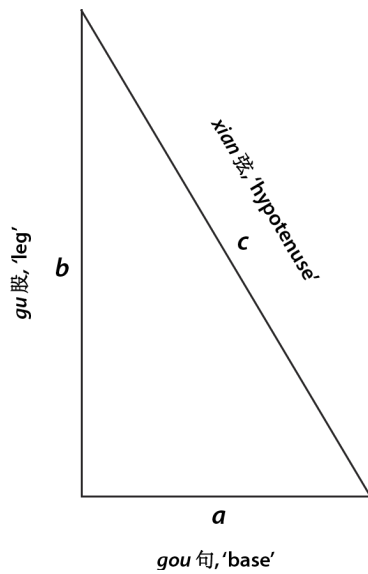


Figure 6. A right triangle, with the classical Chinese names for its parts and their commonest English translations.

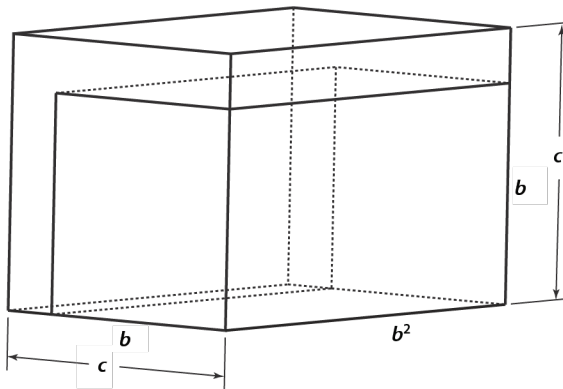
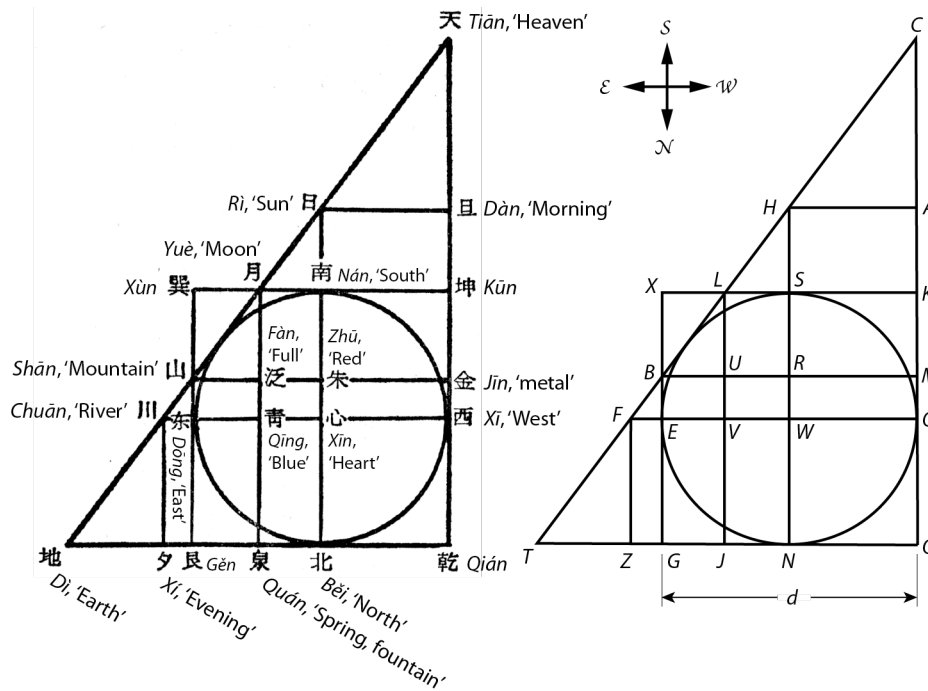


Figure 7. Proposed construction to derive the leg of a right triangle in Problem 19 of Wang Xiaotong's *Continuation*.

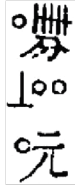


Qián, Xùn, Gèn, and Kūn are the names of four of the eight trigrams of the *Book of Changes*: ☰, ☷, ☴, ☳, associated with 'Heaven', 'Wind', 'Mountain', and 'Earth'.

Figure 8. *Left:* The diagram at the start of Li Ye’s *Sea mirror*, with translations added for the characters used to mark points. *Right:* a representation of this diagram using letters to mark points. For the convenience of readers the letters used here are the same as those used by Chemla (1982) in her diagrams.

1	2	3	4	5	6	7	8	9	0
—	==	≡	≡≡	≡≡≡	⊥	⊥	≡	≡≡	
					⊥	⊥	≡	≡≡	

Figure 9. The two series of counting-rod numerals. Numerals of the two series are used alternately to allow closer spacing on the counting board.




A circle represents a blank space on the counting board, which represents a zero.

Horizontal and vertical straight lines represent counting rods.

A slanted line through the counting rods indicates a negative number.

The character *fen* 分, 'tenths', functions like a decimal point.



The character *yuan* 元, 'unknown', when present, marks the coefficient of the linear term.

Thus the two polynomials can be translated as

$$-0.5x^3 + 600x^2$$

$$0.5x^3 - 1200x^2 + 427,200x - 40,320,000$$

Figure 10. Two examples of the use of counting rods (*chou* 筹) to represent polynomials.