NCTM Boston 2015. Session 33: What? You mean MY ancestors helped invent Math?

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1. Multiply 23*21 the Egyptian way.

2. Divide 483 / 23 the Egyptian way.

3. Divide 15 / 4 the Egyptian way.

4. Find a unit fraction decomposition for 2/21.

5. Multiply 2/3 + 1/30 * 10 the Egyptian way.

6. Solve x + x/7 = 16 the Egyptian way.

7. Solve x + x/7 = 19 the Egyptian way.

8. Convert 1/8 to a Babylonian base 60 'decimal'.

9. Multiply 26*19 using a table of squares.

10. Use the Babylonian method to solve the system x-y=7, xy=60.

11. Solve x^2-7x=60 using the Babylonian method.

12. Solve 3z^2-7z=20 using the Babylonian method.

13. Create a Pythagorean triple using the Plimpton 322 method with x=5/4.

14. Solve the Chinese problem: Now given a bamboo 10 chi high, which is broken so that its tip touches the ground 3 chi away from the base. Tell: what is the height of the break?

15. Solve the Chinese problem: Now given a tree 20 chi high, and 3 chi in circumference. A kudzu vine winds around it 7 times from its root to its top. Tell: what is the length of the vine?

16. Solve the Chinese problem: Set up two poles of the same height, 5 bu, the distance between the two poles being 1000 bu. Move away 123 bu from the front pole and observe the peak of the island from ground level; it is seen that the tip of the front pole coincides with the peak. Move backward 127 bu from the rear pole and observe the peak of the island from ground level; the tip of the back pole also coincides with the peak. What is the height of the island?

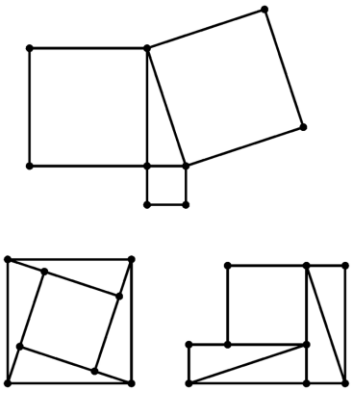
17. Find the square root of 1369 using the Chinese algorithm.

18. Find the square root of 56169 using the Chinese algorithm.

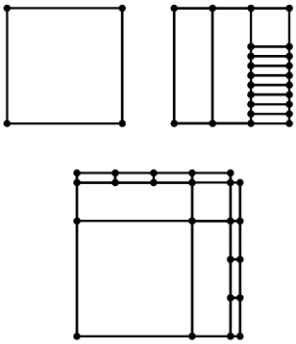
19. Find an approximation of Pi using Liu Hui's method with a 12-gon and a 24-gon.

20. Find a number that has remainder 2 when divided by 3, remainder 3 when divided by 5, and remainder 2 when divided by 7.

21. How does this Indian picture ‘prove’ the Pythagorean Theorem?



22. Find an approximation of the square root of two with this Indian diagram.



23. What is the smallest integer that can be written as the sum of two cubes in two different ways?

24. Verify that the first two terms of this series are very nearly the reciprocal of Pi.

$$\frac{1}{\pi} = \frac{\sqrt{8}}{9801}\sum_{n=0}^{\infty}\frac{(4n)!(26390n+1103)}{(n!)^4 396^{4n}}$$

Resources:

garyrubinstein.com/nctm15 has links to videos and teaching materials related to this presentation.

youtube.com/nymathteacher has videos of this presentation and past NCTM presentations.

Katz, Victor, The Mathematics of Egypt, Mesopotamia, China, India, and Islam: A Sourcebook.

Joseph, George Gheverghese, The Crest of the Peacock: Non-Euorpean Roots of Mathematics.

Rudman, Peter S., The Babylonian Theorem: The Mathematical Journey to Pythagoras and Euclid.

Swienciki, Lawrence, The Ambitious Horse: Ancient Chinese Mathematics Problems.

Gillings, Richard J., Mathematics in the Time of the Pharaohs.