Reading

- Euclid's *Elements* online: Book I, Propositions 47, 48. Book X Proposition 29 (especially Lemma 1 and the guide).
- Stillwell, Chapter 1
- Joseph, pages 1-12 (but feel free to finish Chapter 1)
- Joseph, Chapter 4 (Mesopotamia).

Exercises

Constructible Polygons List all constructible regular polygons with less than 300 sides (there are 37, or 38 if you include the one with two "sides").

Fermat Primes Show that $2^n + 1$ is composite when n is not a power of 2. Hint: If n is not a power of two, then it has an odd factor k. Factor out the term $(a - b)$ from $(a^k - b^k)$ and choose $b = -1$.

Stillwell: # 1.2.3, 1.2.4, 1.4.2 (read the text above the diagram, too).

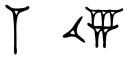
Pythagorean triples Show that every odd integer larger than one is the short leg of a right triangle with integer sides.

Three squares *Three squares in arithmetic progression* are numbers a^2, b^2, c^2 with $b^2 - a^2 = c^2 - b^2$. For example, $a = 1, b = 5, c = 7$ give rise to the squares 1, 25, and 49, where the progression is by adding 24. Show that solutions correspond to rational points $(a/b, c/b)$ on the circle $x^2 + y^2 = 2$. Find a formula that given a rational slope p/q produces a, b, c so that a^2, b^2, c^2 are in arithmetic progression (hint: draw the line through $(-1, -1)$). Use your formula to produce a few more examples in addition to $(1, 25, 49)$.

Baylonian 1. Translate these from Babylonian:

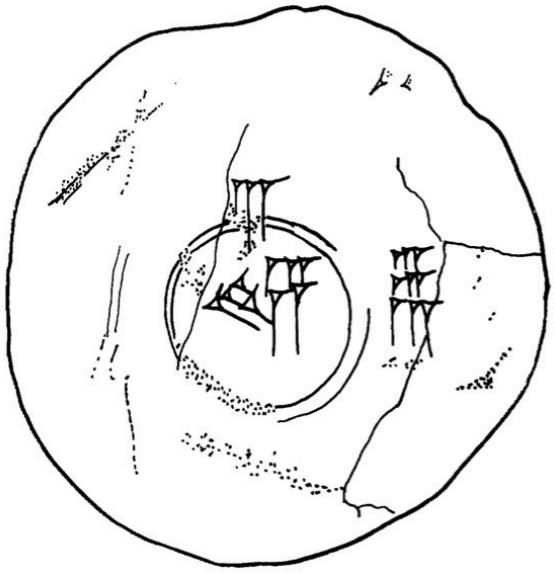
(a) 

(b) 

(c) 

2. Suppose you knew the number in part (c) should be in the thousands. What two possible values could it have?
3. Suppose you knew the number in part (c) was a fractional value between 1 and 2. What would it be?
4. Translate these into Babylonian: a) 32; b) 100; c) 3600; d) 3/4; e) $365\frac{1}{4}$.

YBC 7302 This is a clay disk[1] from c1900-1600BC. There is also a photo on our web page.



There are three numbers on it: One on the circle, giving its circumference, one inside the circle giving its area, and one outside the circle, giving the square of the circumference. What are the three numbers? What value of π does this imply?

[1]Sketch by Eleanor Robson, 2002