Wed. Week 2

Today: From the Babylonians to Euclid

(HW!)

3(a): Show # occurances of any prime in p. factorization of m^2 is even

ex $12^2 = 144 = 3^2 \cdot 2^4$

$12 = 3 \cdot 2^2$ even # occurance

once twice

Let $m = P_1^{k_1} \cdot P_2^{k_2} \cdot \ldots \cdot P_n^{k_n}$ w/ P_i distinct primes

k_i # of occurances

3(b): Show $\sqrt{2} \neq \frac{a}{b}$ for $a, b \in \mathbb{Z}$

assume $\sqrt{2} = \frac{a}{b}$

$2b^2 = a^2$

Babylonian Mathematics
- valued virtuosity over curiosity
  valued technique over insight

They loved:
Find a number which minus its reciprocal equals 7.

$$n - \frac{1}{n} = 7 \quad \text{get} \quad n^2 - 1 = 7n, \quad n^2 - 7n - 1 = 0$$

$$n = \frac{7 \pm \sqrt{49+4}}{2}$$

Let's solve a similar eq'n the Babylonian way -
Sexigessimal System! $\frac{60}{n}$ was their reciprocal of n.

we'll solve:

$$x - \frac{60}{x} = 7$$

$x^2 - 60 = 7x$
$x^2 - 7x - 60 = 0$
$(x-12)(x+5) = 0$
$x = 12$

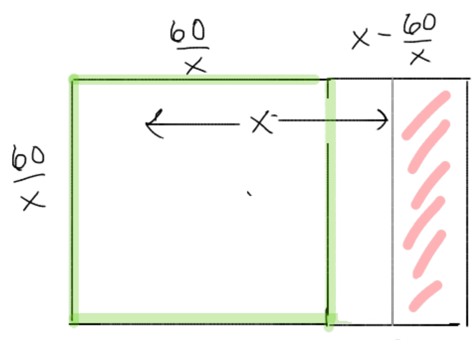
$60/x$

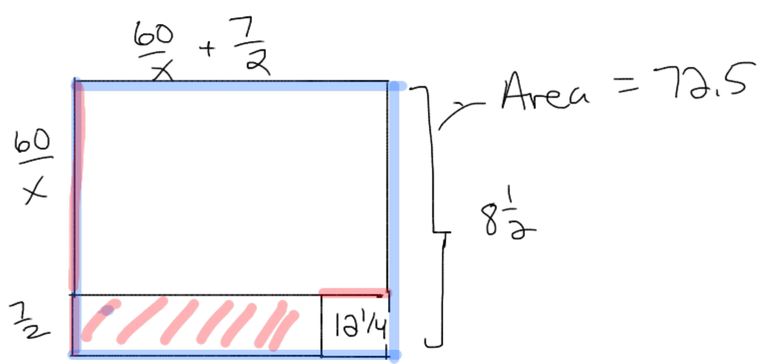
1. square $\square$
2. add breadth to line
3. divide new addition in ½
4. add small $\square$
5. Area of Original Square $= 60$
   New Addition $= 12.25$
   Area Big $\square$ $= 72.25$
6. From tables $\sqrt{72.25} = 8\frac{1}{2}$
7. $\frac{60}{x} + \frac{7}{2} = 8\frac{1}{2}$

single x:

$\frac{60}{x} = 5$

$x = 12$



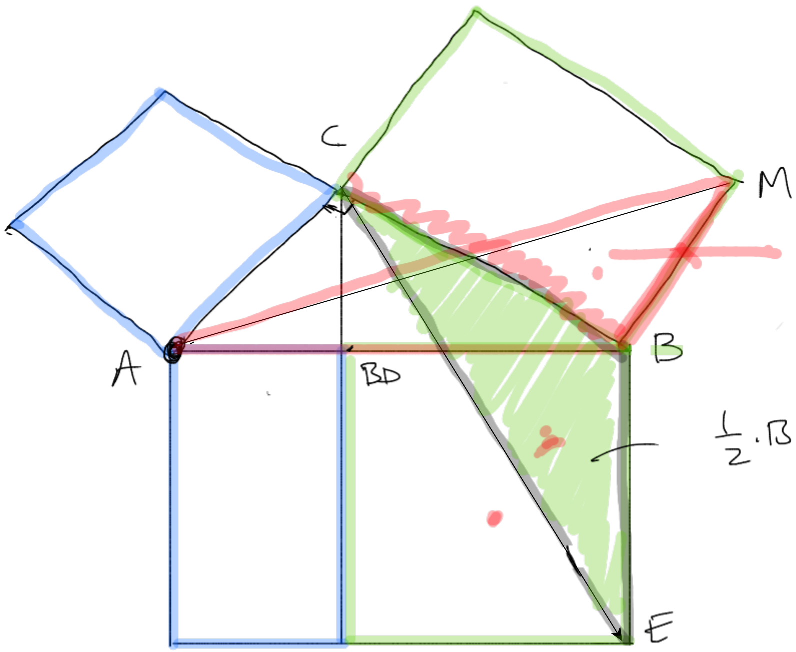


The Elements

- Built from ground up
- Beginnins w/ definitions & common terms all of geometry (Euclidean)
- Next Wednesday, come prepared to present a proof of the Pythagorean theorem.
- Euclid's:

$\triangle ABM \cong \triangle EBC$

Area $= \frac{1}{2}$ Base $\cdot$ Height



$\frac{1}{2} \cdot MB \cdot BC$

$\frac{1}{2} \cdot BE \cdot BD$