Historical Roots of Mathematics Homework 1

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1. Write the follwing problems in hieroglyphics and then perform the addition:

   a. $46 + 23$

   b. $64 + 28$

   c. $4297 + 1351$

2. a. Show that

$$\frac{2}{n} = \frac{1}{3n} + \frac{5}{3n}$$

hence that $2/n$ can be expressed as a sum of unit fractions whenever n is divisible by 5.

That is If $n = 5k$ $k \in \mathbb{Z}$, then $\frac{2}{n} = \frac{1}{3n} + \frac{1}{3k}$.

Proof. Let $n, k \in \mathbb{Z}$ s.t. $n = 5k$. Then

$$\begin{aligned} \frac{2}{n} &= \frac{6}{3n} \\ &= \frac{1}{3n} + \frac{5}{3n} \\ &= \frac{1}{3n} + \frac{5}{3(5k)} \\ &= \frac{1}{3n} + \frac{1}{3k} \end{aligned}$$

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b. Note: $25 = 5(5)$

$$\frac{2}{25} = \frac{1}{75} + \frac{1}{15}$$

Note: $65 = 5(13)$

$$\frac{2}{65} = \frac{1}{195} + \frac{1}{39}$$

Note: $85 = 5(17)$

$$\frac{2}{85} = \frac{1}{255} + \frac{1}{51}$$