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INTD290: Number Systems in pre-Columbian Context

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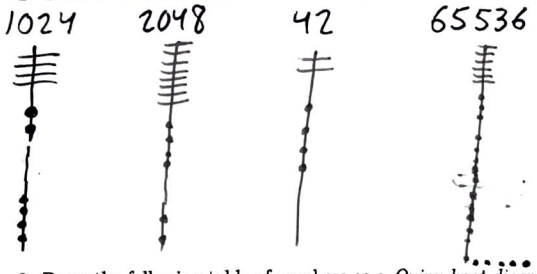
1 How to Submit this Assignment

Once you answer the questions, take a picture of your work and convert it to a PDF. Submit the PDF to the assignment link on Moodle.

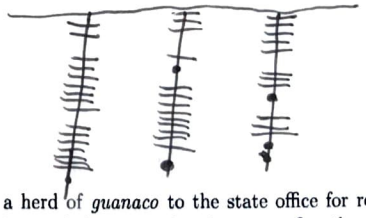
2 Review of Bases

1. In the first video, we reviewed the base-10 number system. As a warm up, express each of these numbers in *expanded form*. That is, show how each number is a sum of digits times powers of 10 (the first one is done as an example).
   - $1024 = 1 \times 10^3 + 0 \times 10^2 + 2 \times 10^1 + 4 \times 10^0$
   - $2048 = 2 \times 10^3 + 0 \times 10^2 + 4 \times 10^1 + 8 \times 10^0$
   - $42 = 4 \times 10^1 + 4 \times 10^0$
   - $65,536 = 6 \times 10^4 + 5 \times 10^3 + 5 \times 10^2 + 3 \times 10^1 + 6 \times 10^0$
2. Draw each of the numbers above as *Quipu knot diagrams,* as shown in the first video.



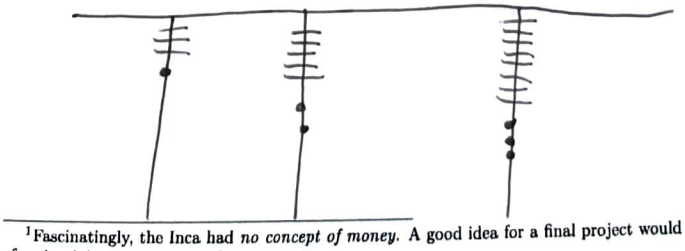
3. Draw the following table of numbers as a *Quipu knot diagram,* as discussed in the first and second videos.

2	3	5
7	11	13
17	19	23



3 Accounting Problems

1. Suppose you are an Incan citizen who speaks Quechua, bringing a herd of *guanaco* to the state office for re-distribution[1]. You are adding thirteen guanaco to the office stables, and there are already twenty-five there. How many are there in total? *Write the calculation in the Quipu notation.*



Quipu is convenient for addition.

[1] Fascinatingly, the Inca had *no concept of money.* A good idea for a final project would be to report on the Inca economic innovation of maintaining an empire without money.

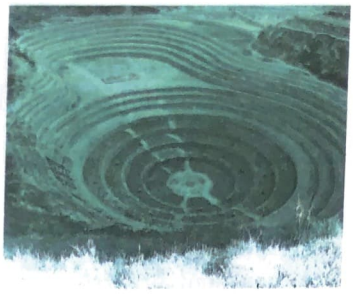


Figure 1: An example of Incan terraces.

2. Suppose you are an Incan agricultural planner who is tasked with designing a farm terrace on a cliffside. The architect informs you that there will be six plots of flat land created, each five by ten meters. The six plots are at two altitudes, three high, three low. The higher altitude is optimal for growing potatoes, while the lower altitude is better for squash. A potato requires a square of earth one-half a meter on a side, while a squash requires a square of earth one-quarter a meter on a side. *Use Quipu knot notation* as a spreadsheet to determine how many squashes and how many potatoes can be planted. *There are many ways to create spreadsheets. Just make sure to tell me how you would interpret your knots.*

800 squash and 200 potatos.

6 plots w/ 5×10 m

3 hi 3 lo

↑ potato ↑ squash

0.5m×0.5m 0.25m×0.25m

Calculation will be expressed in cm, ~~then~~.

∴ 500 cm × 1000cm 6 plots

3 hi 50cm×50cm

3 lo 25cm×25cm

Total area for potatos.

50 × 50 = 2500 × 3 = 7500

Total Squash Area

25 × 25 = 625 × 3

11

1875

Total Area for plot for each

500 × 1000 = 500000 ×3

1500000

# of potatos

1500000 ÷ 7500 = 200

# of squash

1500000 ÷ 1875 = 800