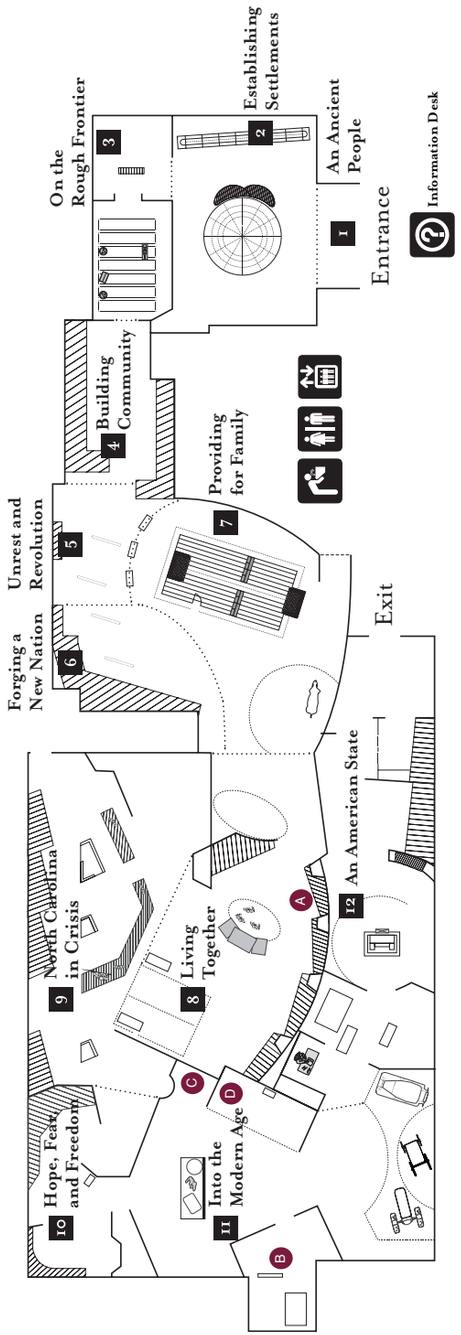


Hints for Currency

Addition: Combinations of Currency

Using coins that you have with you might be helpful. If you don't have any change, ask kids to draw the coins.

Answers: $1,$2.5, and $5

No, 6=5+1 (two ways, one per choice for $1)
6=2.5+2.5+1 (two options)

Equations: Balancing weights

Using the picture provided, ask the children to remove objects from both sides until there are only bags on one side and only coins on the other. If the kids are old enough, ask them to write an equation that represents the problem.

Hints for Mills

Multiplication and Symmetry: A room with mirrors

There are actually only two power looms. The effect that you see is obtained by placing mirrors in all our walls of the room.

Try it yourself: Place objects between the mirrors, and look at the multiple images produced.

Two parallel mirrors: notice the pattern in the orientation and spacing of the images.

Two hinged mirrors: open the mirrors to different angles, and notice that the number of images you see in the mirrors depends on the angle that the mirrors form. Try 180°, 90°, 60°, 45°, 36°, 30°, and 20° and count the number of images.

Three mirrors forming half a box: tape two mirrors to 90° and rest them on the third to form a half cube. Place chopsticks between them, or ask a responsible adult to safely point a laser at different places.

Hints for Tobacco

Symmetry and Multiplication: Warehouses

Use one of the given pictures to imagine an answer to the question. To divide the L-shaped block into 12 pieces, notice that 12=3x4. Then either use the division into 3 pieces, or the division into 4 pieces. Use this idea and the factorization of 15 to solve the second question. Find more ways of making the division!

Parity: Bonsack machine

There are at least six cylinders, of three different sizes.

Adjoining gears move in opposite directions. To complete the arrow diagram, start at the point where the gears meet.

Draw an arrow where the finished cigarettes are going out. From there, find the orientation of the cylinders.

This guide was developed by Juanita Pinzon-Caicedo, and Amanda Young, in collaboration with BJ Davis and Susan Horton.

Some of the problems in this guide appear in the book *"Avoid Hard Work"*, by Maria Droujkova, James Tanton, and Yelena

NORTH CAROLINA MUSEUM OF HISTORY
A Smithsonian Affiliate

Mathematics in the Museum of History?

Revealing the Math behind historical objects.

Welcome chaperones!

Thank you for visiting the North Carolina Museum of History. Your role as a chaperone is essential to ensuring that your group has a positive experience. This guide will help children see the math that is present in the exhibition, and relate it to the math that they already know.

This guide is also an invitation to explore, rather than a collection of math problems. The goal is not to finish the problems or to find correct answers, the goal is to allow kids to be curious and think mathematically. The focus is on their journey and not on the end result.

We hope you enjoy your visit!

Currency

A

What is a Mint? How many mints were there in North Carolina?

Addition: Combinations of Currency

Both the Charlotte Mint and the Bechtler Mint produced gold coins. While the Charlotte Mint was a branch of the US Mint, the Bechtler Mint was privately operated. Nevertheless, the coins made by the Bechtler Mint were not considered counterfeit.

- What are the three values of coins made by those mints?

Suppose that you have one coin with value $5, three with value $2.5, and two of value $1.

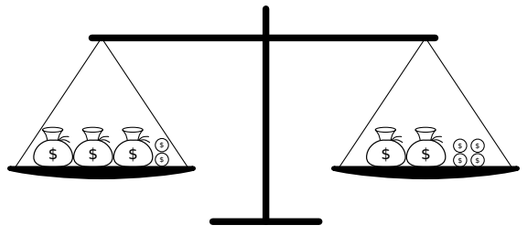
- Can you get $3 using only those coins? How about $6 or $8.5?
- Can you get those values in more than one way? In how many ways?

Scavenger Hunt: Find more examples of currency at the museum! Take pictures and try to produce different dollar amounts that you can get using them.

Equations: Balancing weights

A worker at a mint was bagging coins but forgot how many they put inside each bag! They do know each bag contains the same number of coins. You decide to use the balance scale from the mint to help you. On one side you put three bags of coins and two single coins. On the other side you put two bags of coins and six single coins. This results in equilibrium of the balance.

- Can we remove objects from both sides of the scale without affecting the balance?
- How many coins are in one bag?



Cotton Mills

B

Between cotton mills and gristmills, which one uses millstones?

Symmetry: A room with mirrors

Cotton and cotton textiles have been among North Carolina's most important products.

- How many power loom machines do you see?

Imagine you are allowed inside the room.

- How many machines and mirrors would you be able to touch?
- Where are all the images of the machines coming from?

Stand in front of the power looms.

- Can you see your image in the back wall?
- Point a light or something reflective to the back wall. Can you see its image?
- Why can you see the light reflected in the back but not your image?
- How many mirrors surround the power looms?

Try it at home: Put objects between mirrors! Try different options: parallel mirrors, multiple mirrors meeting at different angles. Does the number of images of the objects change when you change the angle?

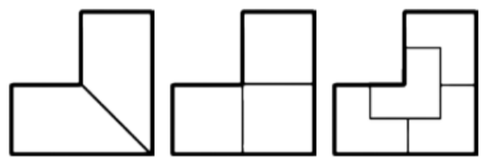
Tobacco

Why is tobacco important in North Carolina?

Symmetry and Multiplication: Warehouses

Tobacco farmers sold their tobacco at auctions, usually at urban centers. Before the auction started, farmers lined up their tobacco row by row in the warehouses.

Imagine a warehouse whose floor is shaped like the letter “L”. To keep track of the number of pounds sold, farmers organized their tobacco in pieces of the same shape. The L-shaped floor can be divided in two, three or four identical pictures as shown in the picture.



- How would you divide the floor of the warehouse into 12 pieces?
- Can you now divide the floor into 15 pieces.
- Think of a shape that would be easy to divide into squares.

Listen: Press the button to hear the program.

Can you talk as fast as they did?

C

Parity: Bonsack machine

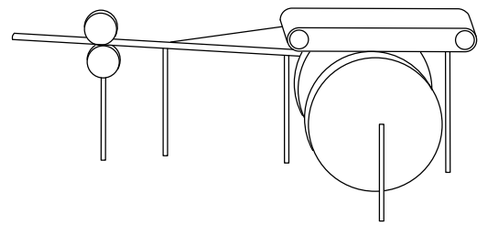
D

The Bonsack machine contains multiple cylindrical pieces connected to one another.

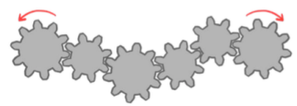
- Count the number of cylinders, are they all of the same size?

To get a patent for his machine, Mr. Bonsack needs a diagram of his machine.

- Complete the following diagram of the Bonsack machine.



All the cylinders in the machine move and the direction of their individual movements are related. Look at the following picture showing adjacent gears that turn.



- In which direction does each one of the gear spins?
- In which direction is each one of the the cylinders in the Bonsack machine moving?

Scavenger Hunt: Look for other objects in which something that moves in one direction causes something connected to move in the opposite direction.