Outline - of the actual circle

- Gratuitous advertisement for Beast Academy
- A question about trees.
- Prof. Grok's question about coins.
- More stuff
- Reflection

https://beastacademy.com/about
Pirate Math

Sunday, March 1, 2021 2:13 PM

Andrea asked me, "What's in the bag?"

"Today, you'll help me count 'em, the old pirate way!"

Andrea Captain Leander asked me, "What's the old pirate way?"

"We draw a round mark for each coin in the satchel!"

"After we put the coins back in the satchel, we can still count the marks!"

"Here's the rest of the coins. How many coins be there in the treasure?"

We couldn't put the marks into rows.

"And, 'Tis a terrible way to keep track of coins!"

"How can we be improve the old pirate way?"

"Good heavens! Here's the same number of marks, but put into rows."

"How many coins be there?"

And if every row had the same number of marks.

"How many marks would be best for each row?"

It would be better if there were so many marks in each row.
Excellent idea.

Here's a new record, with equal columns of ten instead of rows.

Now who can be counted on to answer?

With groups of ten, the marks are easier to count:

ten, twenty, thirty, forty, fifty, sixty...

...plus four, more makes sixty-four.

So there were sixty-four coins in your first treasure.

Now let's record the number of coins in the next treasure.

The game: you each take some coins. Record the number of coins on your pile.

Now let's record the number of coins in the next treasure.

Well... I didn't draw a card for every single coin.

Already?

How will we be able to tell how many coins you counted?
Did you notice? Long ago, pirates began using symbols to represent groups of coins. Instead of a tall one, pirates used an X for ten coins, ’n a dot for one coin.

How many coins be in each of these groups?

And Captain Knap counted, seventy-five. Excellent. Now, inside papers ’n make sure you can read each other’s counts. That was much faster than drawing a dot for every coin. And inside papers, you can draw a bar for every ten coins.

Excellent. Now, inside papers, ’n make sure you can read each other’s counts.

Inside a book, you can draw a bar for every ten coins. Outside a book, you can draw a bar for every one coin.

Inside a book, you can draw a bar for every ten coins.

Outside a book, you can draw a bar for every one coin.
"It's easiest to count the tens first. So, we put all of the tens together on the left, and the ones together on the right.

Then we can count ten, twenty, thirty, forty, fifty, and sixty more.

Now, I think there is a better way to write this.

...Snorg could have written a.

Then, we can count ten, twenty, thirty, forty, fifty, and two more makes one hundred.

Ask: Well done.

With bigger numbers, sometimes we need to use a symbol for 100 coins.

Why did pirates choose "C" for one hundred?

Because the only thing a true pirate loves as much as one hundred coins is the C!

Math Team

Only the hundred.

No Math team practice.

My name is Fiona.

Bigger is better.

Math teams.

This year, I was asked to be the coach.

I'm thrilled to get started.

OneNote
Today, we're going to talk about digits.

A digit is just a fancy word for number, right?

That's right. When most monsters talk about digits, they mean these ten symbols:

<table>
<thead>
<tr>
<th>Digit</th>
<th>Sound for</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>zero</td>
</tr>
<tr>
<td>1</td>
<td>one</td>
</tr>
<tr>
<td>2</td>
<td>two</td>
</tr>
<tr>
<td>3</td>
<td>three</td>
</tr>
<tr>
<td>4</td>
<td>four</td>
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<tr>
<td>5</td>
<td>five</td>
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<tr>
<td>6</td>
<td>six</td>
</tr>
<tr>
<td>7</td>
<td>seven</td>
</tr>
<tr>
<td>8</td>
<td>eight</td>
</tr>
<tr>
<td>9</td>
<td>nine</td>
</tr>
</tbody>
</table>

That's a lot of symbols! Pirates only used three: Why do we need so many?

Using ten symbols, we can write even big numbers using only a few digits.

Let's look at Alex's coin count, for example. It takes three X's and seven digits to stand for thirty-seven coins.

Using digits, we can write a 3 and a 7 to mean the same thing.

What do the 3 and the 7 in 37 stand for?

That is a lot shorter.
A question about trees

Qi: How many lines of trees are there?
A question about trees - after an actual circle.

Q: How many lines of trees are there?

First observation: Question is a

1) Line is a row of 5 trees: 3
2) Segment joining adjacent trees
3) Straight line joining any 2 trees.
4) Curved lines look at what order intersect trees?
5) Need 3 trees for a line? including 0
6) Horizontal, vertical and diagonal yes
7) Smalike paths through all the trees? Or
8) Poths goin north (east from bot left
9) Any way to connect 2 trees ✓

\[ 14 + 13 + 12 - 3 + 2 + 1 = 15 \]

"Random tree answer"

**Orchard planting 9**

Sylvester - late 1800s
- Plant n trees
- How many lines of 2 trees

\[ n \left( \frac{n(n-3)}{6} \right) + 1 \]

Ben Green, Terry Tao 2014 answer
in most cases, but no specific

What is the most line?
Q: Use 10 coins to make 5 r.

4 coins each. Then you will
where to find your professor.

Method: Epiphany.
Method 2: Work up from small case.

<table>
<thead>
<tr>
<th>Coins</th>
<th>Lines of 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>
Different answers? Classify? They
<table>
<thead>
<tr>
<th>Math</th>
<th>Problem Solving</th>
<th>Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometry!</td>
<td>Open ended/let's you try everything</td>
<td>Positive attitude</td>
</tr>
<tr>
<td></td>
<td>Approaches from new angle</td>
<td>Encourage don't give up</td>
</tr>
<tr>
<td></td>
<td>Pattern recognition</td>
<td>Breakout groups/cheer in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hints are good motivators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Key is stretchy...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>was it good for zoom?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Language is important</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Models</td>
</tr>
</tbody>
</table>

*Productive Struggle*