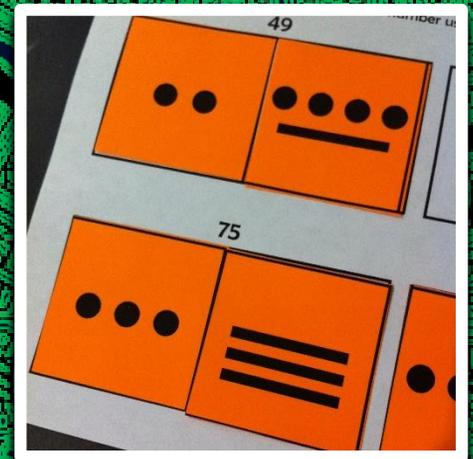
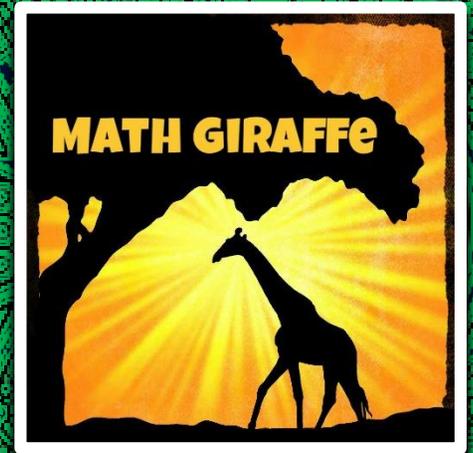
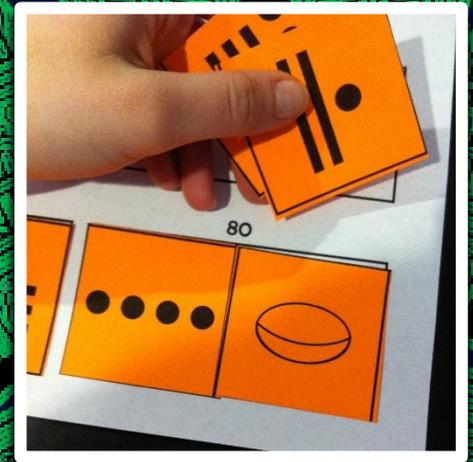
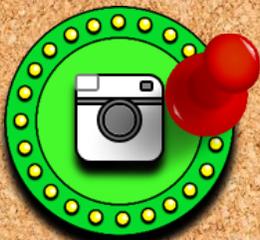


Investigating Different Bases

Mayan Number System



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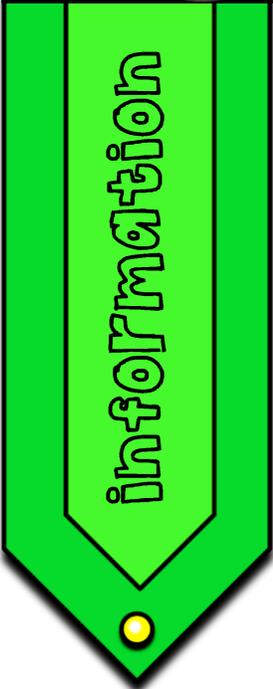
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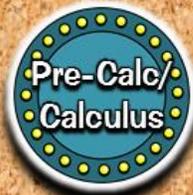
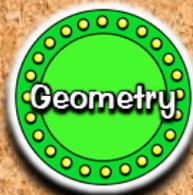
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How to Use

Printing

Print the three worksheets for each student or pair (pgs 8-10).

Choose one set of Mayan Number Cards to print on colored cardstock. One set has numbers marked (pg 13-14) and the other does not (pg 11-12). You can laminate these to re-use each year.

You can also print the explanation pages (pg 6-7), but to save paper, you may want to project them onto the board/wall instead.

Ideas for Implementation

This is a fun challenge for a math club or gifted group.

You can also insert it as a stand-alone lesson at any time.

Start with the introduction to Mayan Numbers (pg 6-7).

Extension Ideas

Have students practice working with the cards. One student can set out two cards and the other can determine what number is represented by the two digits. You can also have students play games with the cards. Try a "war" style game where each student flips two (or three) cards and states the number. The winner takes all the cards that are laid down.

To lead into other base systems, ask students to write the numbers from 1 to 100 in base 8 (with standard numerals as digits).

Distribute or project these and hand out the card sets. Then, do your best to sit back and allow some investigation! (giving help as needed)

Allow some inquiry-based exploration. Let students use the explanation pages as reference while they work with the cards.

The last worksheet (pg. 10) can be cut into thirds to use as warm-ups or quick extensions on different days.

When students learn through hands-on inquiry experiences, they acquire valuable critical thinking skills.

Inquiry-based learning encourages students to develop self-motivation.

Student-driven lessons teach students to apply knowledge from one situation to another.

Students who discover a principle on their own are more capable of retaining the information.

When you use an inquiry-based approach in your classroom, students discover mathematical properties for themselves. Instead of presenting students with a theorem, formula, or rule, you guide them through an investigation. Inquiry learning is often done in a hands-on way.

When students develop a rule for themselves, they understand the concept behind it more deeply. Also, since they have produced the rule or formula themselves, they do not need to memorize it. They know how it was developed and can reproduce it at any time. This deeper understanding of mathematical properties helps them to approach new problems in the future.

In my inquiry lessons, I like to have students write patterns and observations in complete sentences, then develop a rule for the property they have observed. This helps them to internalize what is happening. Then, I lead them into writing a mathematical formula or rule to represent their words. The students learn to look for connections. They also develop valuable skills such as the ability to self-direct and the ability to clearly express their discoveries in both words and mathematical language.

If you are interested in learning more about inquiry-based learning in the math classroom, head over to mathgiraffe.com and browse my blog. While you're there, you can also sign up for my email list. Your welcome email will contain links to some other great inquiry websites.



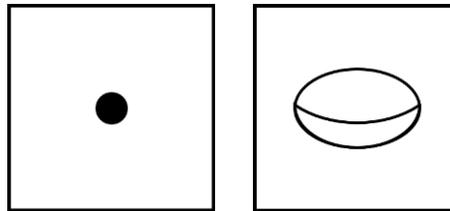
We use ten digits in our number system, representing numbers from 0 to 9.
The Mayans used twenty “digits” to represent numbers from 0 to 19.

The Mayan Number System:

A shell represents “zero,” a dot represents “one,” and a bar represents “five.” So the digit for the number “seven” would include one bar plus two dots. A “sixteen would be represented by three bars plus one dot.

Place Value:

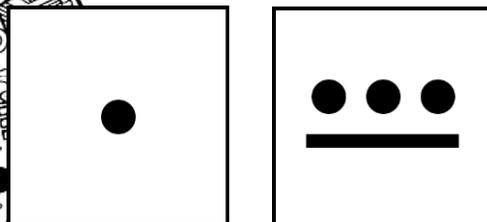
When we want to represent ten, we shift our digit for “one” into the “tens place.”
The Mayans used base twenty, so when they shifted their “one” dot to the left, it represented “twenty.”



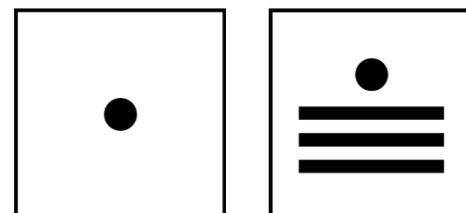
The “zero” shell was used as a placeholder (just as we do).

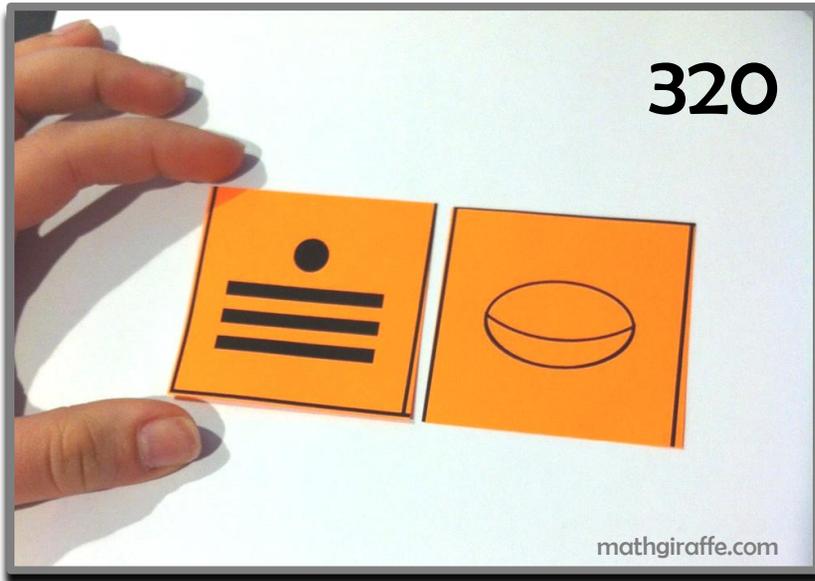
Here are some examples of the Mayan Number System:

28



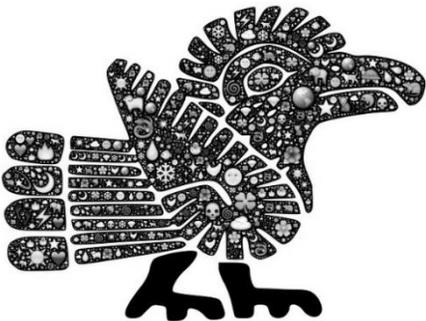
36





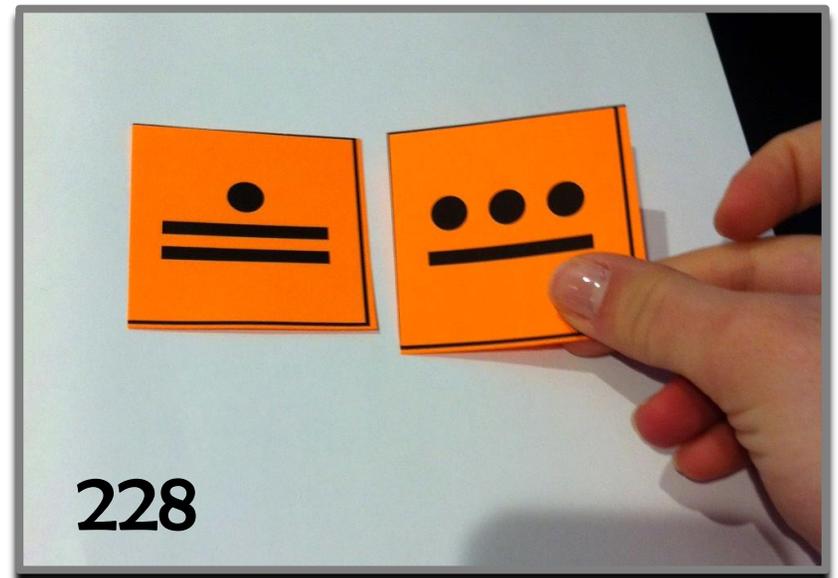
A sixteen in the
“twenties place” is
worth 320
(16 x 20)

The zero in the
“ones place” is just a
place holder.

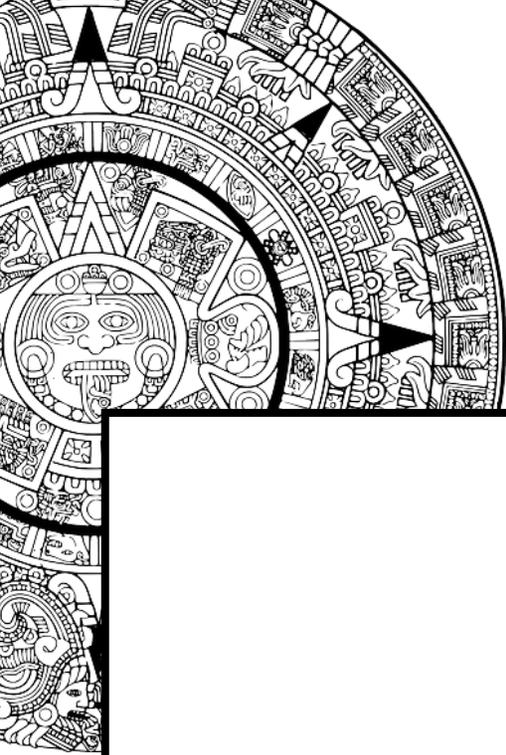


An eleven in the “twenties
place” is worth 220
(11 x 20)

An eight in the “ones
place” is worth 8.



How would you determine the value of the first digit in a three-digit number? (What we call the “hundreds place”)?



Try to represent each number using the
Mayan number cards.



49

107

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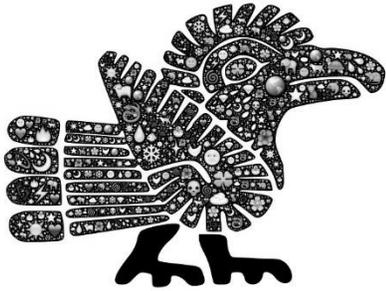
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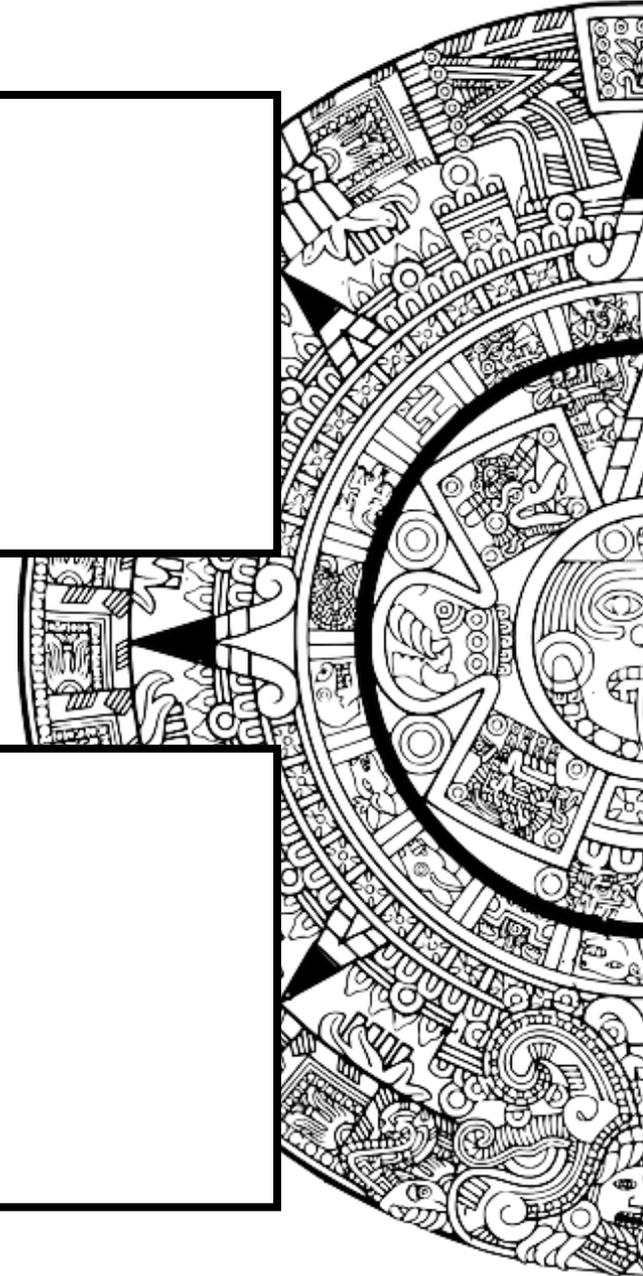
Challenge: Try to represent each number using the Mayan number cards.

467

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920

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Use Mayan numerals
to write each
number in base 20.

44

315

30

400

428

Use our normal
numerals to write each
number in base 8.

44

315

30

400

428

Use our normal
numerals to write each
number in base 6.

44

315

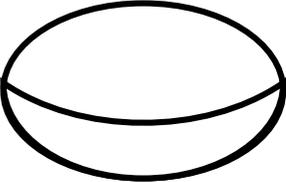
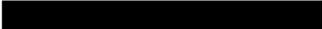
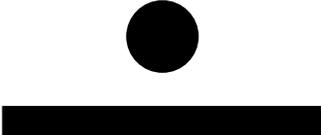
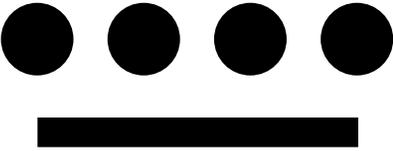
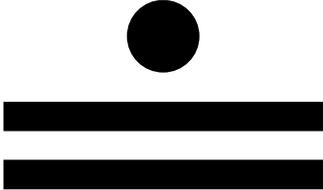
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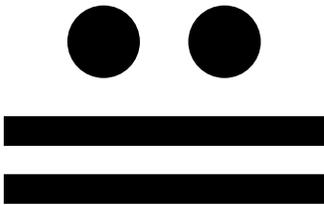
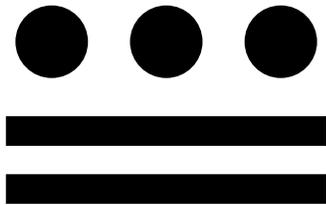
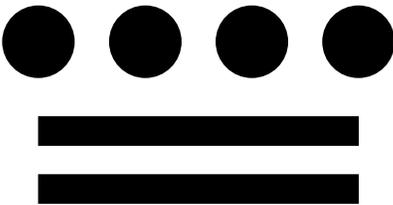
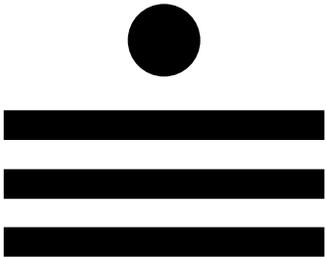
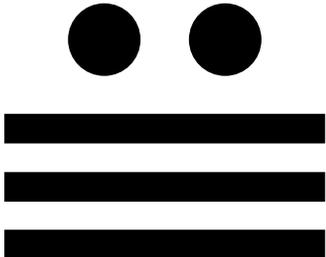
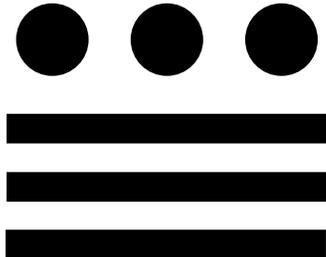
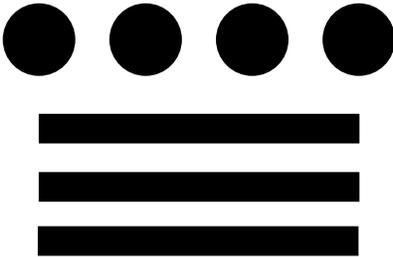
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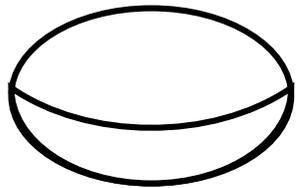
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Name: _____





0



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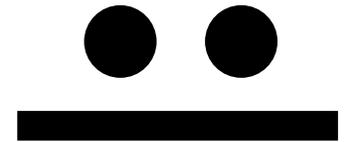
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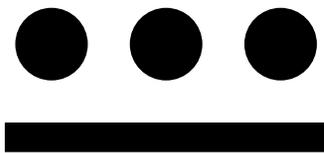
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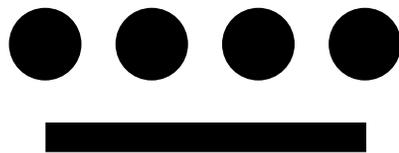
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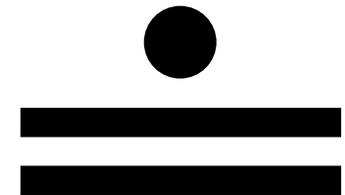
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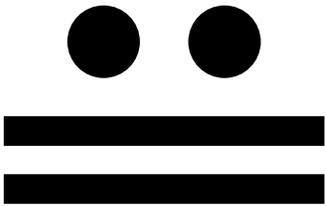
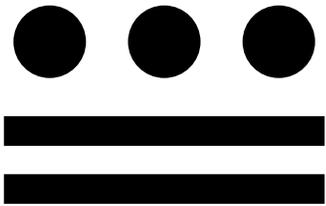
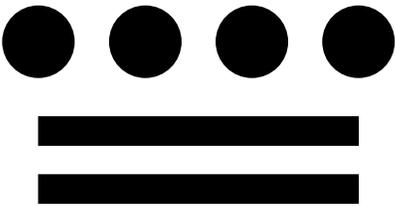
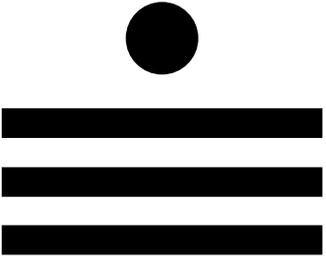
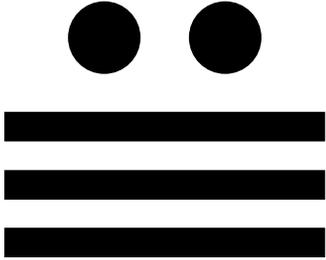
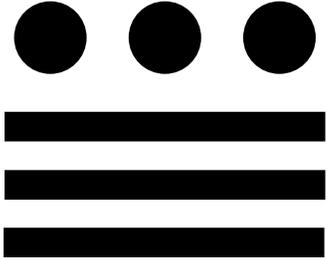
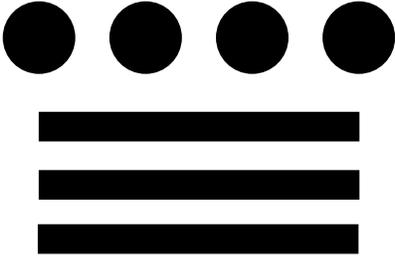
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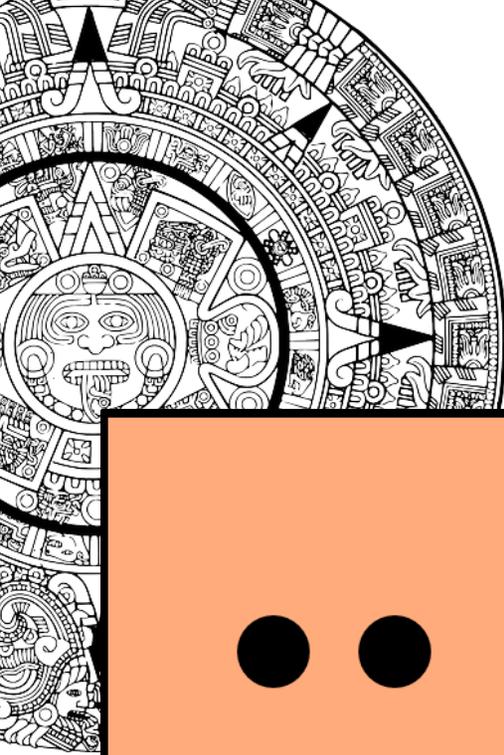


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 <p>12</p>	 <p>13</p>	 <p>14</p>	 <p>15</p>
 <p>16</p>	 <p>17</p>	 <p>18</p>	 <p>19</p>



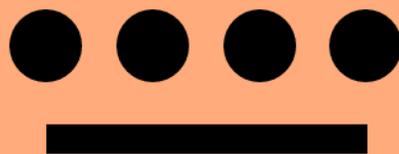
Try to represent each number using the
Mayan number cards.



49

ANSWER KEY

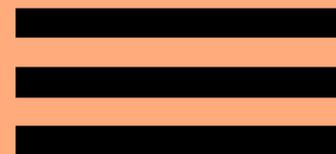
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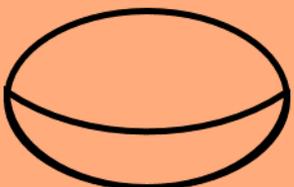
	
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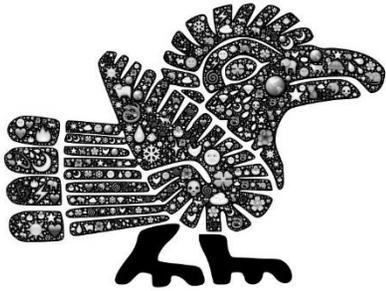
	
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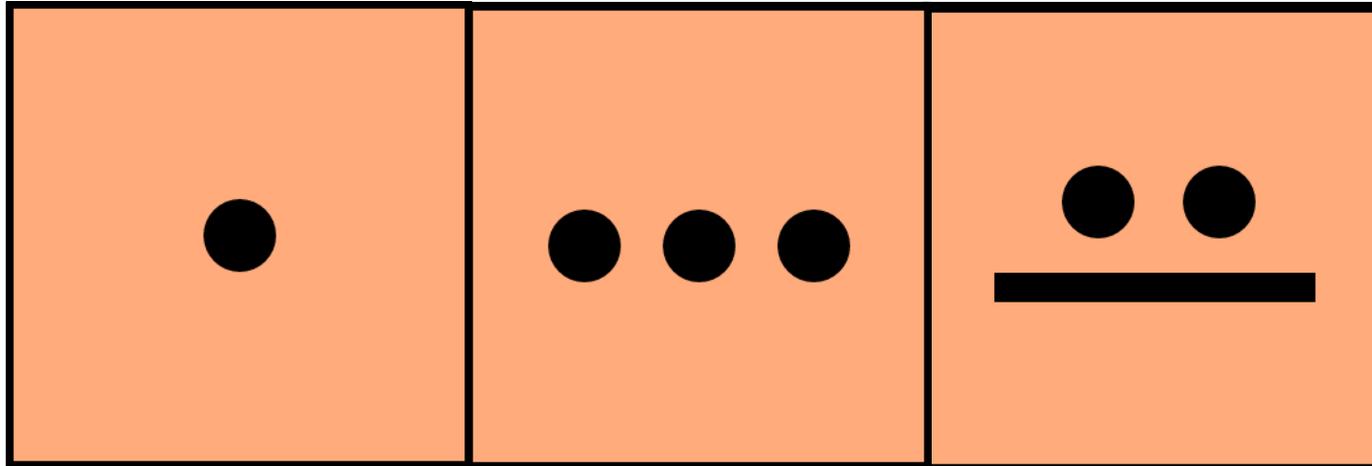
	
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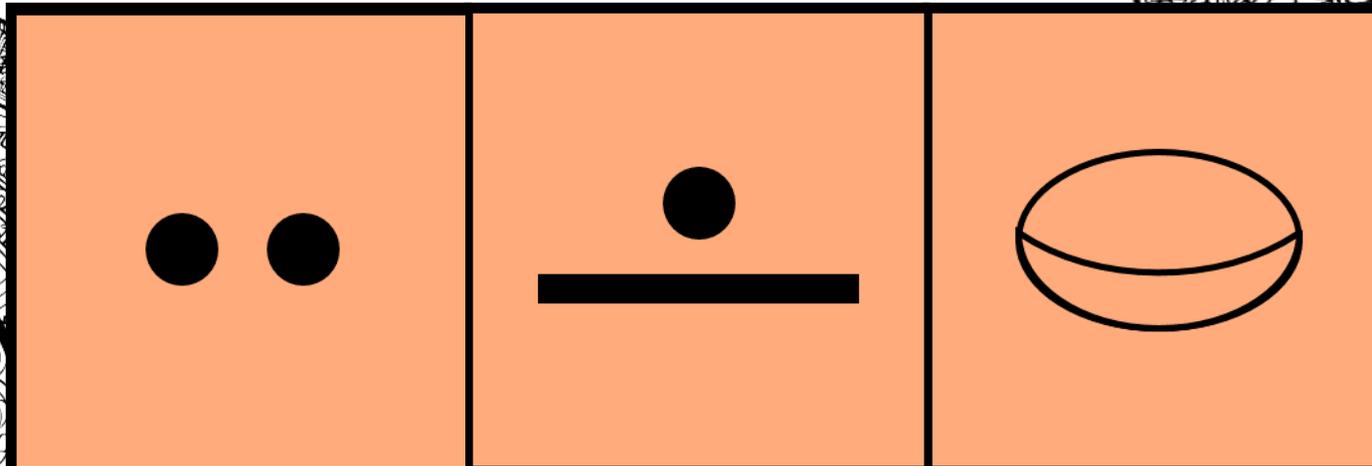
Challenge: Try to represent each number using the Mayan number cards.

ANSWER KEY

467



920



Use Mayan numerals to write each number in base 20.

44

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315

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428

• • •••

Use our normal numerals to write each number in base 8.

44

54

315

473

30

46

400

620

428

654

Use our normal numerals to write each number in base 6.

44

112

315

1243

30

50

400

1504

428

1552



Name:

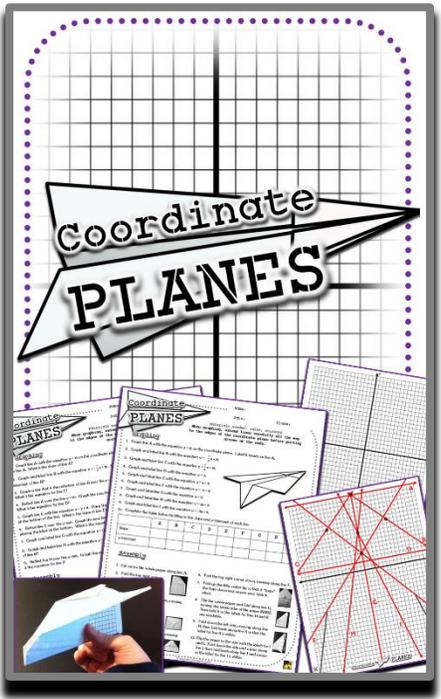
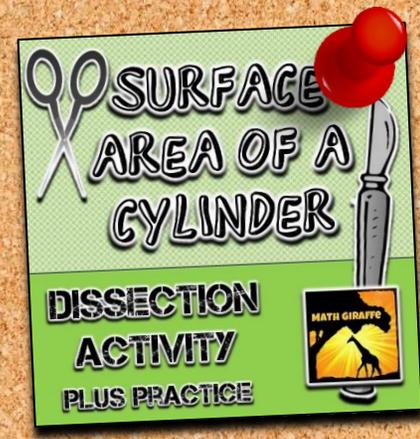
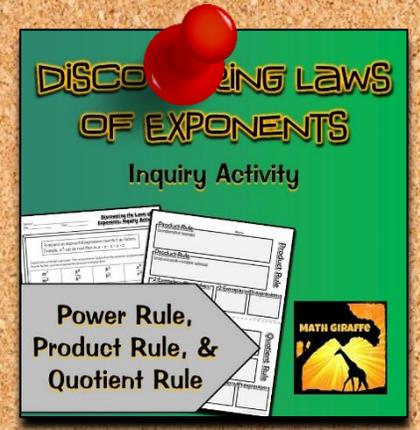
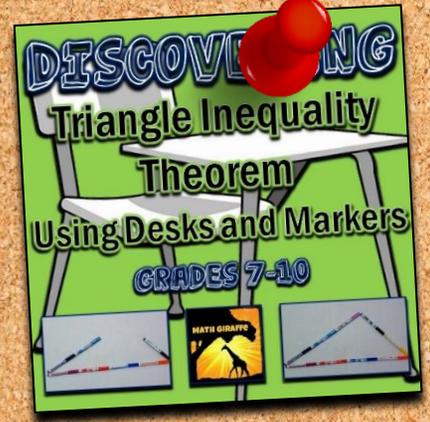
ANSWER KEY



Similar Items

Based on your purchase, I've gathered links to some materials that may also be a good fit for your classroom. Click on the images to take a closer look.
- Brigid

Students conquer territories while solving equations.



When all lines are graphed correctly, the page folds up into a paper airplane!

