

# Building a Strong Foundation in Math

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February 2019

# Goal

- Less about doing math than thinking mathematically

# Goal

- Answer your questions as well as suggest some ideas for you to consider

# Counting is fundamental

But what's involved

Not just doing it over and over (although we do that, too), but watch for and make kids aware of :

# Counting principles

1-1

Stable order

Cardinal

Abstraction

Order-irrelevance

# Play “Mistake”

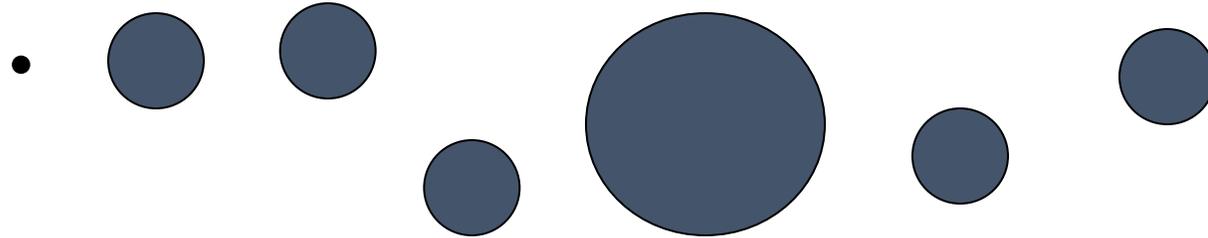
- Count a set of objects incorrectly (on purpose):



- 1, 2, 3, 5, 6, 7, 8 OR
- 1, 2, 3, 4,  
5, 6, 7, 8, 9, 10, 11

# Play “Mistake”

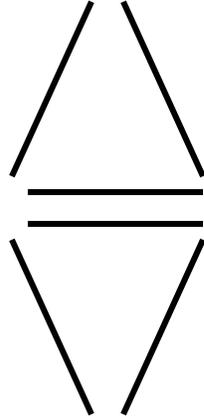
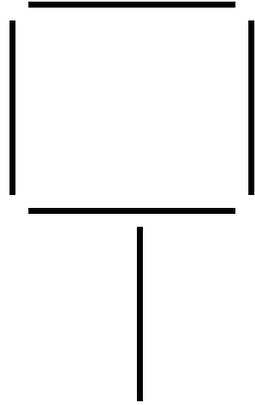
- Include one really big item



# Important number ideas

Subitizing directly

Subitizing by decomposing



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Try to knock down lots of the 10 bowling pins.

Look at how many pins are left.

How are they arranged?

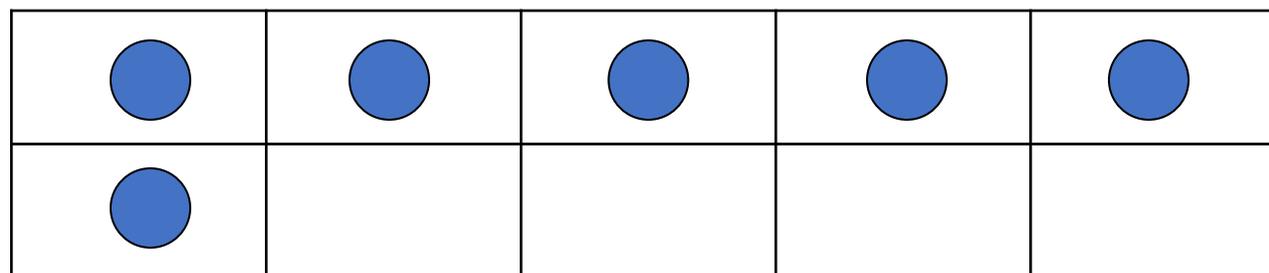


# Important number ideas

Anchoring to 5 and 10

Using ten-frames and number lines

# Ten-frames



# Number path

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
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# Numerals

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Encourage parents to create numeral “jigsaw puzzles” for children to play with.



# Numerals

- Board games involving dice

# Numerals

- Concentration games
- Follow-the-dot puzzle games

# Thinking about the numbers

- Representing them different ways.
- How might you show 7? What do you see each time?

# Thinking about the numbers

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Choose a number between 5 and 10. You can use 5 or 10 if you wish.  
Tell why your number is special.

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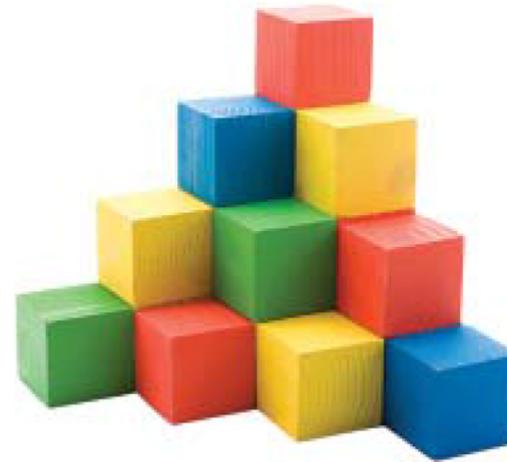
# Twin Time

- Set out two rugs or mats.
- Ask 4 children to sit on one mat. The mat is the cookie and they are the chocolate chips.
- Tell them that two twins are going to have the cookies and they want exactly the same number of chips in each.
- Have several students become the chips for the other cookie.

# Thinking about the numbers

Choose a number.

Use that number of blocks to build a block structure.



# Thinking about the numbers

Choose a number.

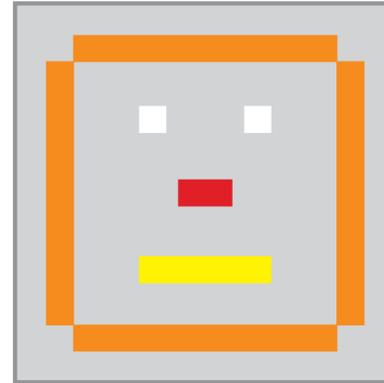
Make a bug with that number of legs.



# Thinking about the numbers

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Choose a number of Cuisenaire rods of different sizes.  
Use the rods to create a picture.



# Illustrate your own book

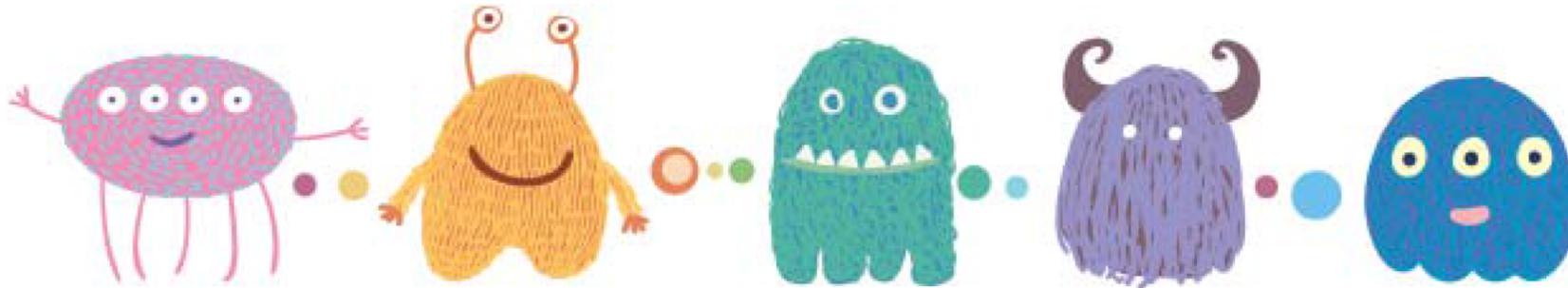
- Read Ten Black Dots.

# Illustrate your own book

- Ask students to draw pictures for a new class book called Ten Red Squares.

# Thinking about the numbers

You are going to make a monster.



Roll a die to tell how many heads your monster needs.

Roll to tell how many eyes.

Roll to tell how many noses.

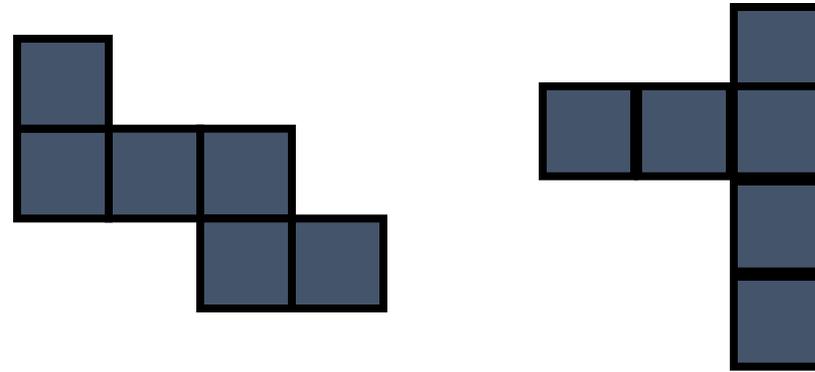
Roll to tell how many arms.

Roll to tell how many legs.



# Some activities

- Have students find six ways to arrange six square tiles.



# Thinking about the numbers

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Choose a number. Use that number of different shapes to make the core of a pattern. Show enough shapes that it is easy to see how many make the core.

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# More challenging

There is 1 MORE **red** counter than **blue** ones.

There are 2 FEWER **green** counters than **red** ones.

If there are 5 **greens**, how many **reds** and **blues** are there?

# Estimating games

- Guessing how many xxxs are in a container using a referent.

# Ordinal numbers

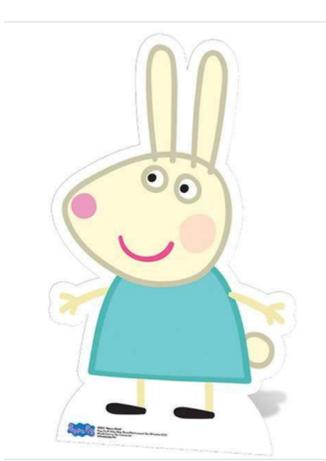
- Talking about 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, ...

# Tubes of Cubes

- Have students watch you put a red, green and yellow cube in a tube (first transparent and later cardboard).
- Say ordinals as you put the cubes in.
- Tilt the cube (first one way, then the other) and they predict which colour will come out first, second,...

# Perspective

- Is the pig 2<sup>nd</sup> or 3<sup>rd</sup>?



# Subtraction

- How would you model the problem?
- On a number path and with counters
  
- I had 5 apples and we ate 2. How many are left?

# Subtraction

- How would you model the problem?
- On a number path and with counters
  
- Mom already had 1 egg but needed 3. How many more does she need?

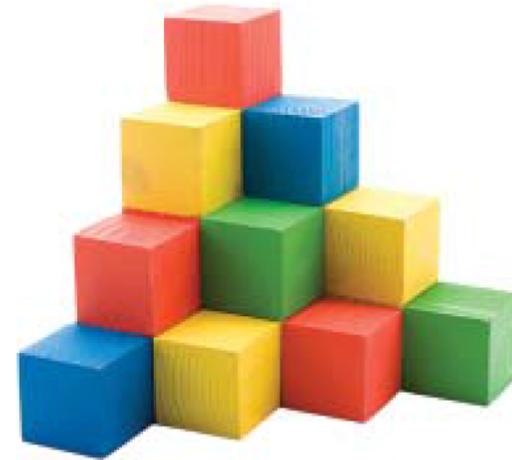
# Subtraction

- How would you model the problem?
- On a number path and with counters
  
- My sister is 8 and I am 6. How much older is she?

# Activities

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Choose fewer than 5 blocks and start a tower.  
Now add more blocks so that you use  
10 blocks altogether.



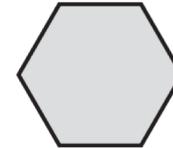
# Activities



Choose two lines in a song you like and tell how many words you would say when you sing those two lines.

What song might have two lines where the total number of words is 9 words?

# Activities



Choose a value for each shape. You must make sure that:

One shape is worth 2 more than another one.

One shape is worth 3 less than another one.

There are two shapes that are worth 6 together.

Create a design with your shapes.

# Activities

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## **Making Ten**

Two players play using a deck of cards made up of four copies each of the numbers 1 to 9.

Each player gets four cards.

On your turn, you draw a card.

Whenever two cards add to 10, you can put them out.

After putting out your pairs, you can get rid of a card of your choice.

The first person who gets rid of all of his or her cards wins the game.

# Activities

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## **More Than Seven**

Two players play.

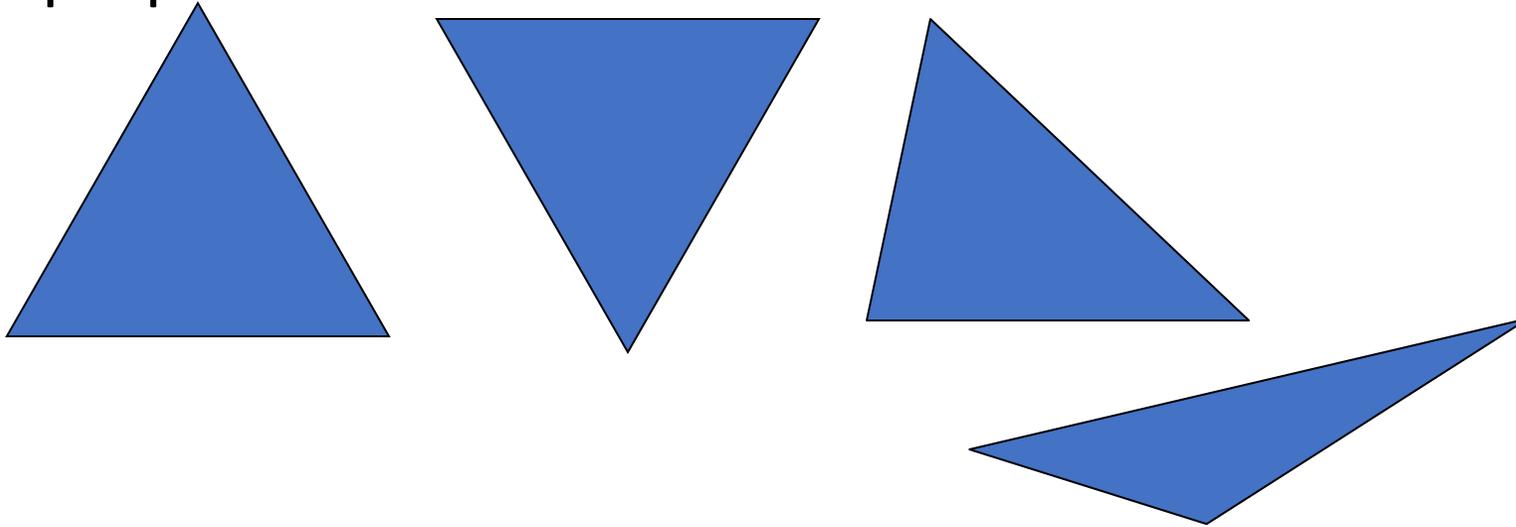
Taking turns, each player rolls two dice.

If the sum is more than 7, the player get a point.

The first person with 5 points wins the game.

# Geometry

- Naming shapes may be less important than using shapes in unfamiliar orientations and exploring properties.



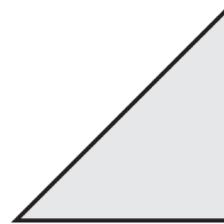
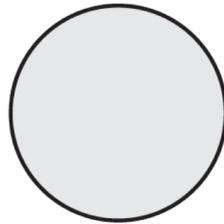
# Which one doesn't belong?

- Let's look at some which one doesn't belong images.

# Other activities

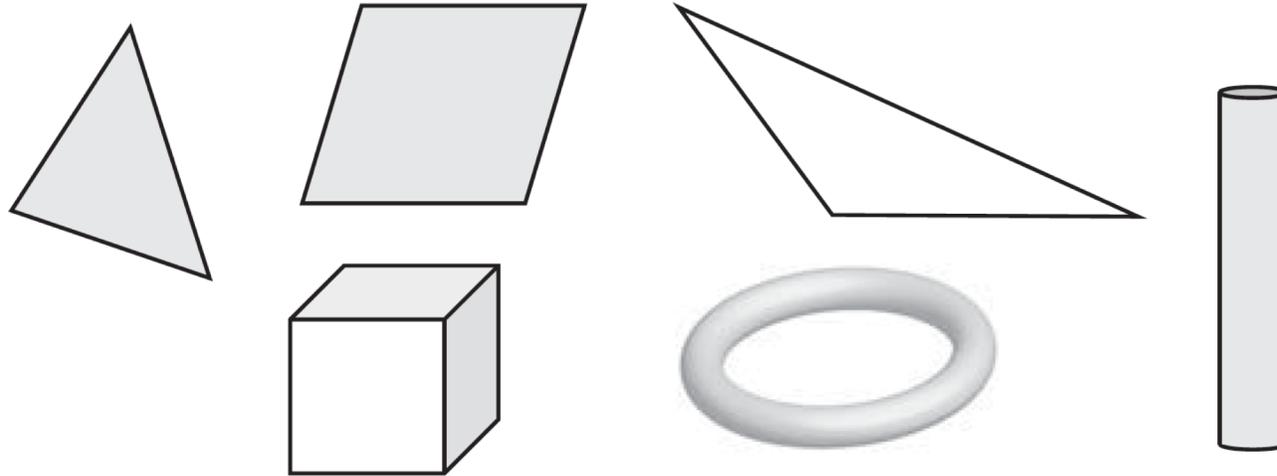
Choose one of these shapes.

Describe another shape (not already here) that is just like the one you chose except in one way.



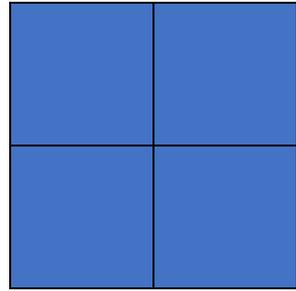
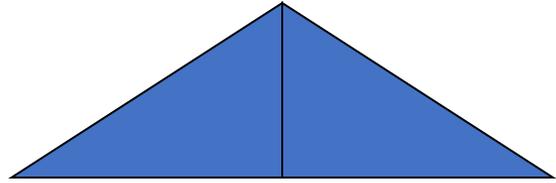
# Other activities

How might you sort these shapes in two completely different ways?



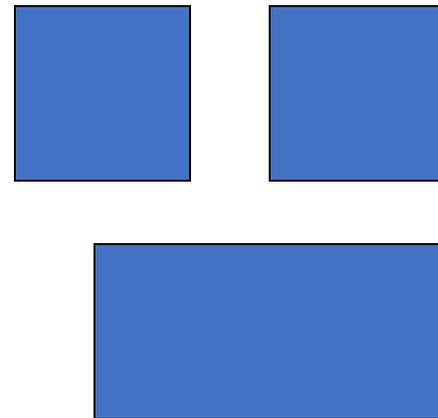
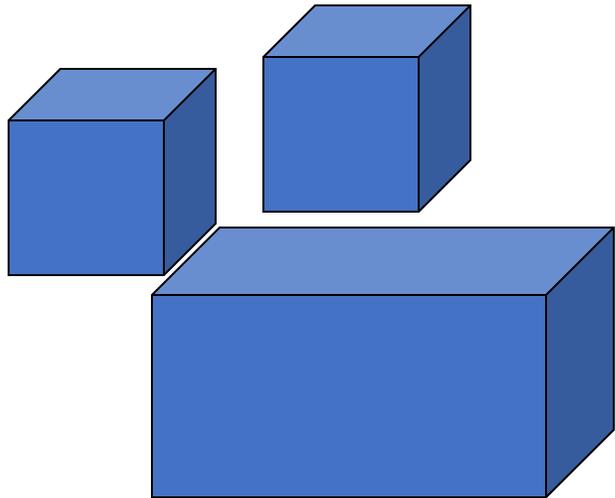
# Making & Testing Conjectures

- Example: If you put together two shapes that are the same, can you always get a bigger shape that is just like it?



# Geometry

- Importance of composing and decomposing in both 3-D and 2-D

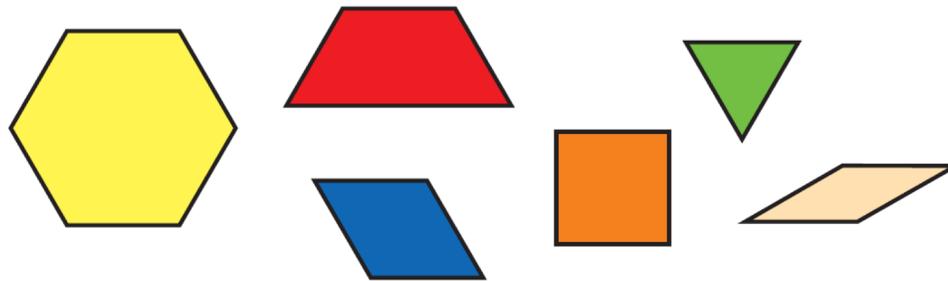


# Activity

Use 2 pattern block shapes to make a different pattern block shape.

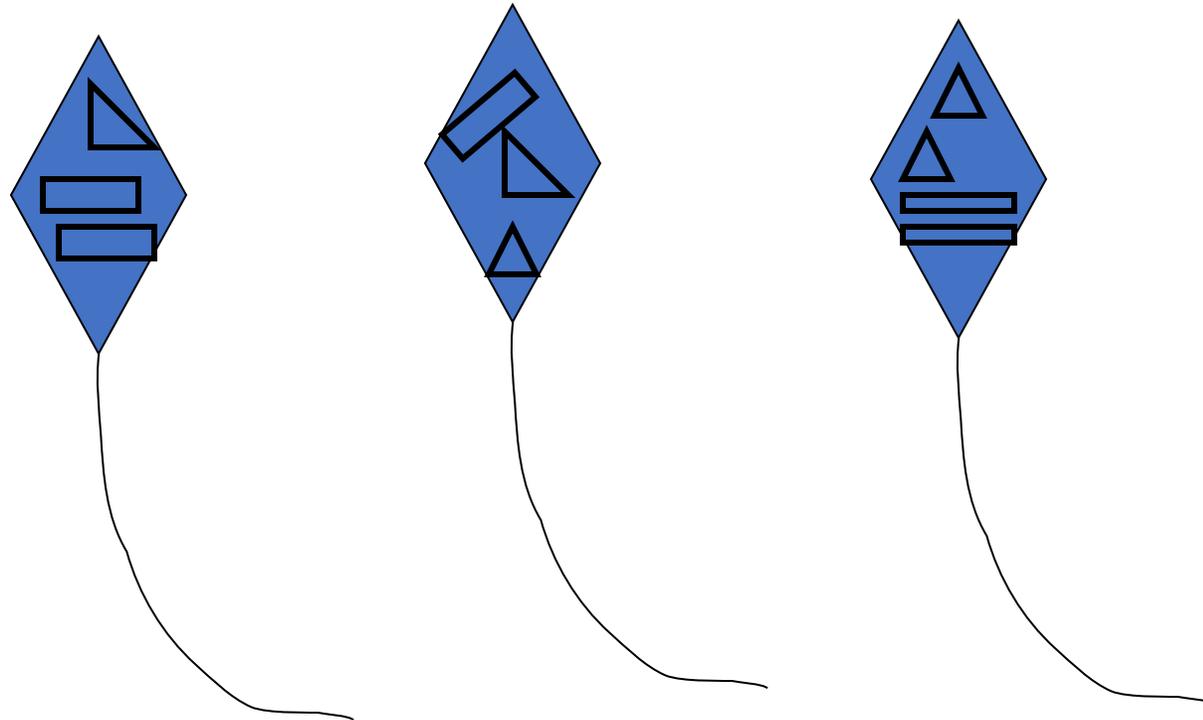
Use 3 pattern block shapes to make a different pattern block shape.

Use 6 pattern block shapes to make a different pattern block shape.



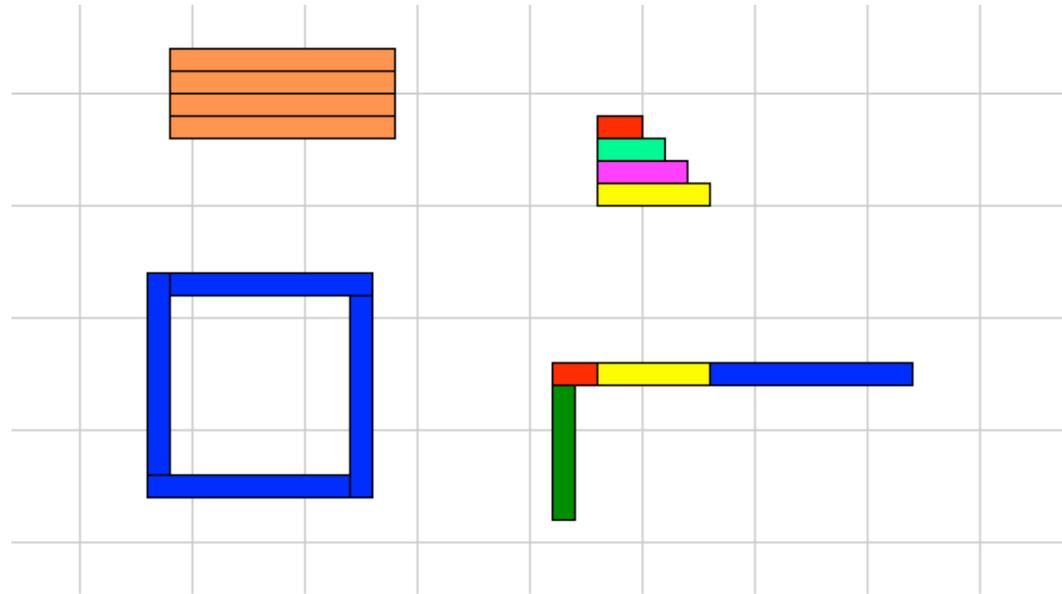
# Which kite is Liam's?

- It has 2 triangles and a rectangle on it.



# Using Cuisenaire rods

- Use 4 rods. What different shapes can you make?



# Give directions

- The teacher creates a maze with some classroom furniture.
- Students imagine there is a robot at the start of the maze. Ask:
- What directions would you give him?
- How do you know they would work?

# Measurement

- Bring attention to the fact that all measurement is comparison.

# Measurement

- Measuring activities can be useful even before students can conserve.
- Idea that a bigger unit leads to a smaller measurement is independent of the idea that we need to use the same unit repeatedly

# Measurement

- The many words we use for length (distance, height, width, etc.) are confusing.



- It is important that units you suggest manifest the attribute being measured
- Using the words “big” or “small” is problematic, but forces students to think about what attribute to measure

# Activities to Try

- Giant Step, Baby Step
- Snake Imprints

# Activities

Investigate the sizes of various animal footprints.

Which footprint is bigger? Is it also longer?



Cat



Bear



Hippopotamus

# Activities

You are planning a meal for a GIANT.  
How big a container will it take to hold all the food you'll need?



# Activities

Stand next to a friend to decide who has longer legs.

Then both of you run as fast as you can across the room.

Do people with longer legs run faster?



# Activities

- Which box will hold more?
- Which sponge holds more water?
- Which bowl will hold the popcorn?

# What can you do?

- Ask richer questions; with wait time
- Observe more; talk less
- Respond to strategies rather than initiating
- Look at expectations in a more informed way

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