

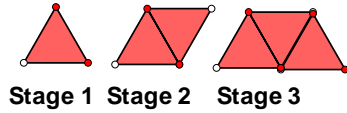
LessonTitle: Trains and Staircases		Pre 6.1
Utah State Core Standard and Indicators: Algebra Standards 2.1, 2.3 Process Standards 1-5		
Summary		
In this lesson, students build and analyze patterns with blocks. They build polygon trains with pattern blocks and staircases with linking cubes. Then they develop the rules for the growth of the patterns and make predictions using the rules.		
Enduring Understanding	Essential Questions	
Working with patterns is at the heart of mathematics. Generalizing and communicating about patterns enables problem solving, reasoning and critical thinking.	How do we use patterns to make predictions and solve problems?	
Skill Focus	Vocabulary Focus	
<ul style="list-style-type: none"> Finding and communicating about patterns and sequences. Making predictions and problem solving 	“area, perimeter, surface area, volume, patterns, ordered pairs, coordinate plane”	
Assessment		
Materials: Pattern Blocks, Linking Cubes,		
Launch ideas: “We wanted to talk to students how patterns are everywhere in life. . . show them pictures of nature/golden ratios, fibonacci numbers, and stress that all patterns can be represented by numbers”		
Explore ideas: “Here we wanted students to use the manipulatives and do hands on figuring of the patterns they could see in the shapes.” “This will be a great lead in to linear equations!”		
Summarize		
Apply		

Directions: See the worksheets below. Allow students to figure out the patterns and rules on their own. Guide from the side-- don't give the answers to them. Their learning depends on their own thinking.

Polygon Trains

1) Build a polygon train with triangles.

- Keep track of the area and the perimeter. Find a pattern.
- Predict the perimeter of a train with 100 triangles
- Find a rule. Perimeter = _____



2) Create a graph to show the growth. Mark and label the axes.

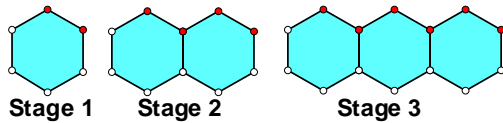
Stage # or area	Perimeter
1	3
2	
3	
4	
5	
10	
100	
x	



3) Describe the growth of the perimeter.

4) Build a polygon train with hexagons.

- Keep track of the area and the perimeter. Find a pattern.
- Predict the perimeter of a train with 100 hexagons.
- Find a rule. Perimeter = _____



100

5) Create a graph to show the growth. Mark and label the axes.

Stage # or area	Perimeter
1	6
2	
3	
4	
5	
10	
100	
x	

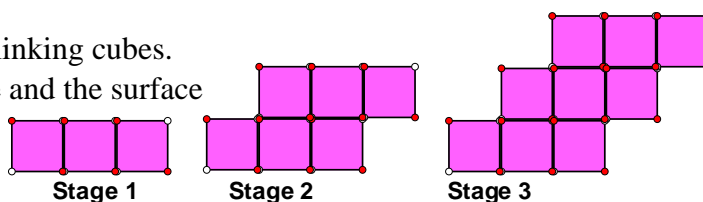


6) Describe the growth of the perimeter.

Build a Staircase

1) Build a 3 unit staircase using linking cubes.

- Keep track of the volume and the surface area. Find a pattern.
- Predict the surface area step step staircase.
- Find rules. Volume = _____ Surface Area = _____



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2) Create a graph to show the growth. Mark and label the axes.

Stage #	Volume	Surface Area
1		
2		
3		
4		
5		
10		
25		
x		



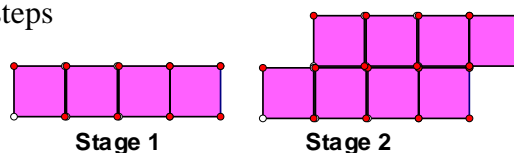
3) Describe the growth of the volume and the perimeter.

4) Build a 4 unit staircase. Follow the same steps

Find rules:

Volume = _____

Surface Area = _____



Stage #	Volume	Surface Area
1		
2		
3		
4		
5		
10		
25		
x		



5) Describe the growth of the volume and the perimeter.

6) Build a 5 unit staircase. Follow the same pattern and steps

Find Rules

Volume = _____

Surface Area = _____

Stage #	Volume	Surface Area
1		
2		
3		
4		
5		
10		
25		
x		



7) Describe the growth of the volume and the perimeter.

8) Can you predict the numbers and rules for a six unit staircase without building the steps?. Use the patterns from the previous staircases!

Find Rules

Volume = _____

Surface Area = _____

Stage #	Volume	Surface Area
1		
2		
3		
4		
5		
10		
25		
x		



9) Describe the growth of the volume and the perimeter.