

Unit 3: Patterns and Rules - Project Checklist

Assignments	Completed (date)	Teacher Initial
RQI - Whole Class Activity	N/A	N/A
Next 3 Phases - Space Stations 1 - 5		
Complete <u>tables</u> on each of the 5-section-sheets (one for each station)		
Complete <u>graphs</u> on each of the 4-section-sheets (one for each station)		
Complete <u>written description</u> on each of the 4-section-sheets for construction process		
Complete <u>algebraic expression</u> on each of the 4-section-sheets (one for each station)		
Write each algebraic expression in words on each of the 4-section-sheets		
Add an equivalent expression to each of the 4-section-sheets (one for each station)		
Create presentation for space station _____ with _____ & _____		
Extension: Find an algebraic expression for the perimeter of each of the space stations.		
Extension: Find an equivalent algebraic expression for the perimeters		
Extension: Create your own space station layout and fill in a 4-section-sheet		
Presentations		



Expandable Space Stations

I can use algebraic expressions to describe the space stations

- I complete each part of the project before moving on
- I check in with a teacher before moving on
- I use notes from class to help me with the project

Written by Josh Gold

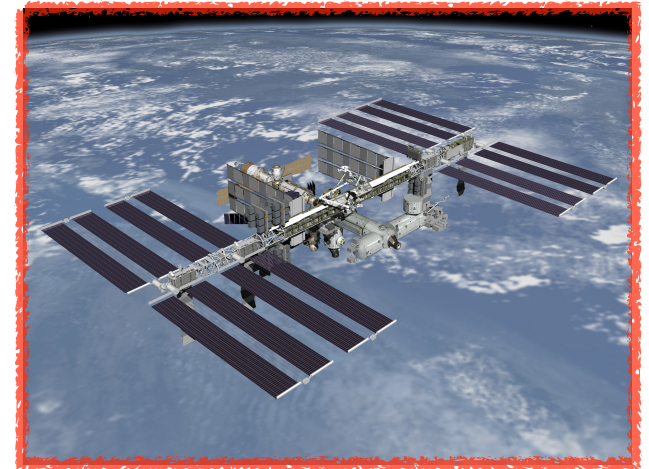
Math Teacher at Hanscom Middle School

Facebook: <http://goo.gl/gCzPqA>

Blog: <http://killercatfish.com>

The Situation

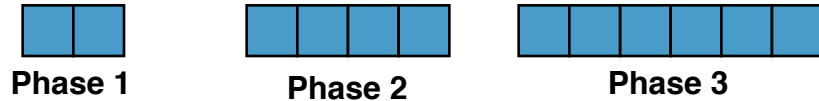
The United States government wants to build a new school that orbits the earth. It will be modular and developed in phases. So far the US government has had five companies submit plans. It is going to be your job to research and defend one of these blueprints.



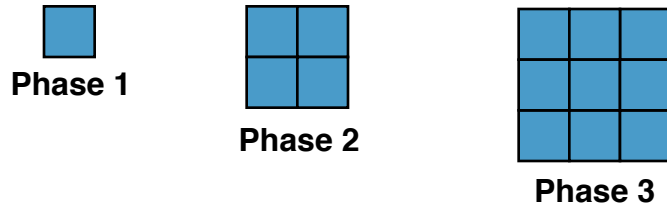
Driving question

How many rooms will there be in a particular phase?

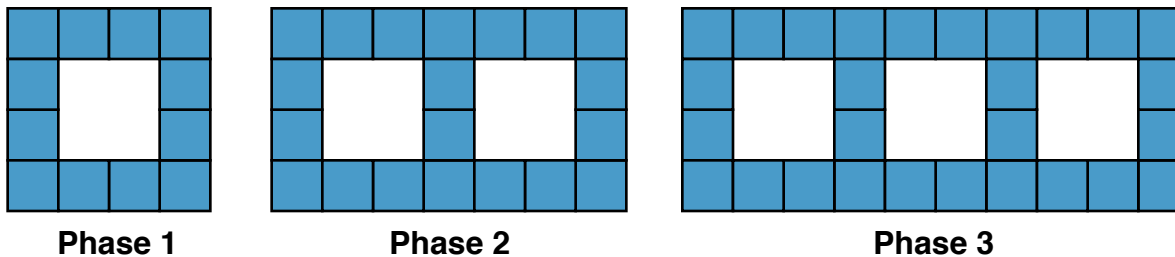
Company 1



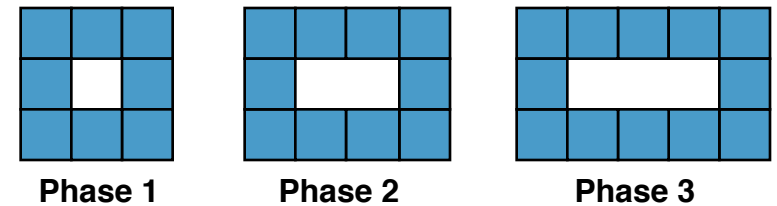
Company 2



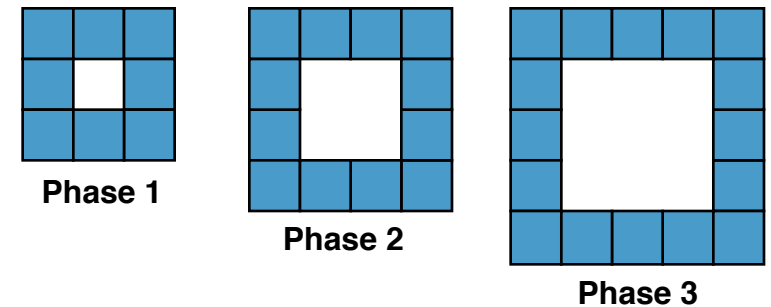
Company 5



Company 3

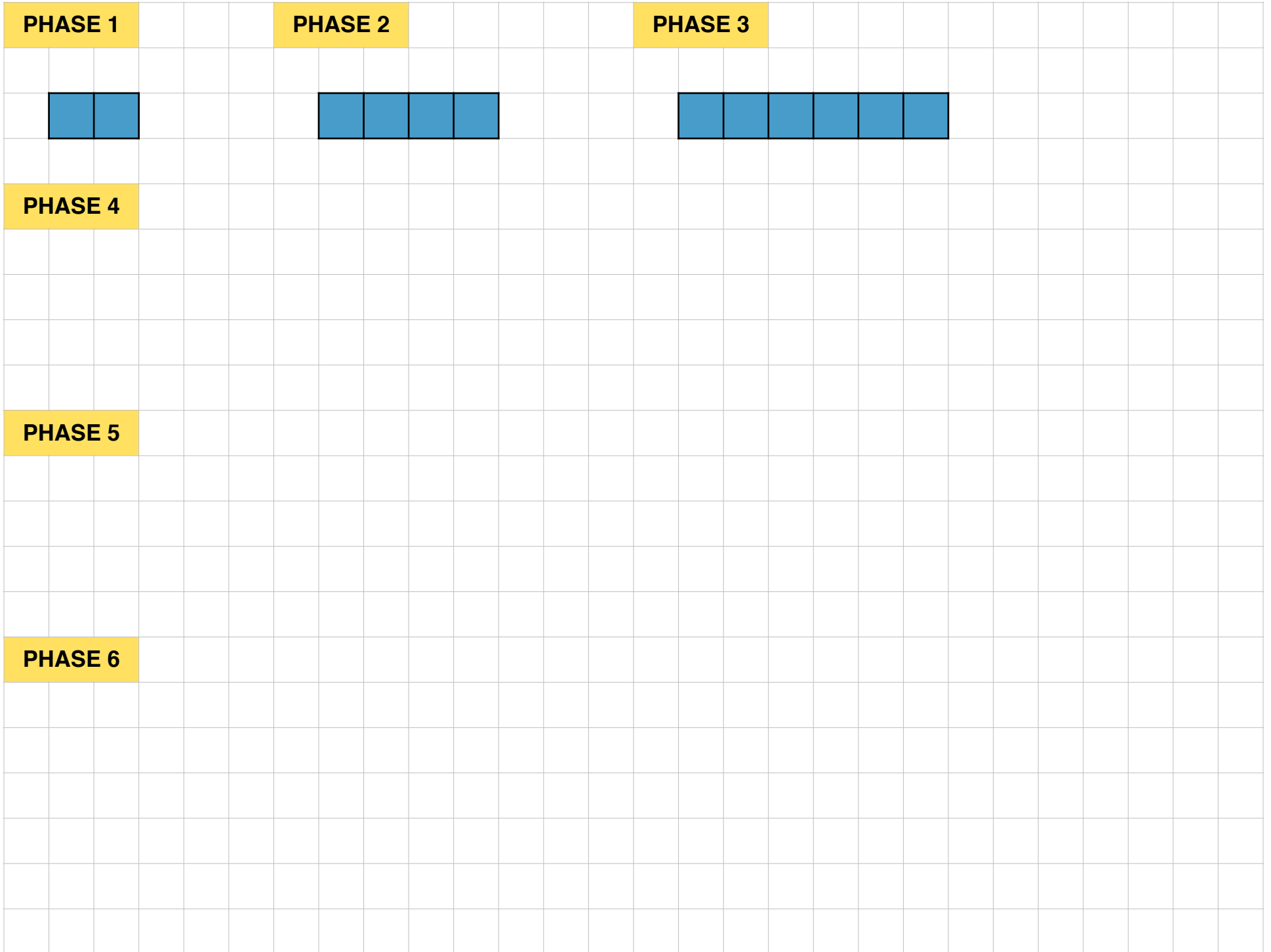


Company 4

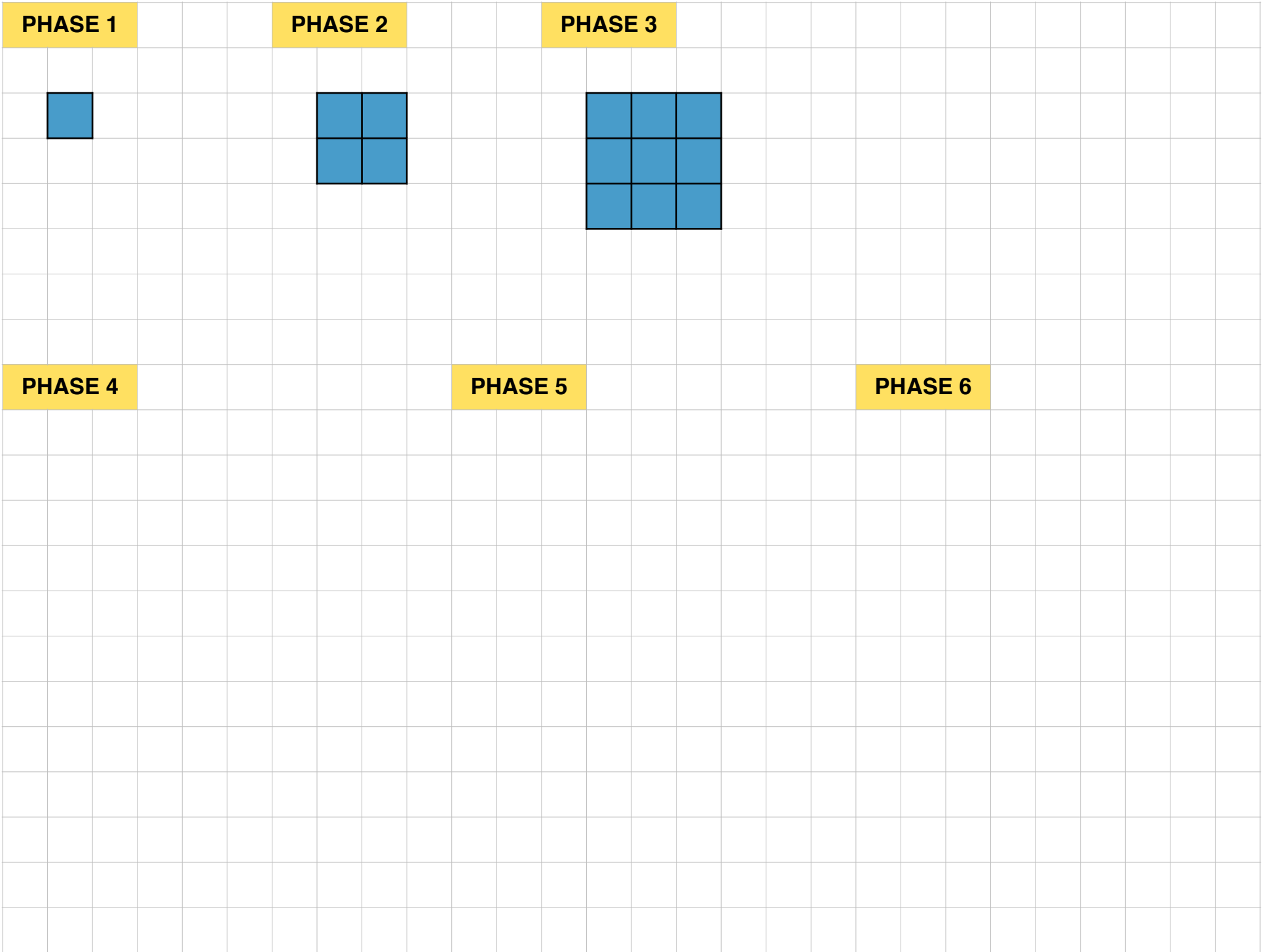


Each square represents a classroom, office, bathroom or any other type of space in the school.

Company 1: Draw the next three phases of this space station.

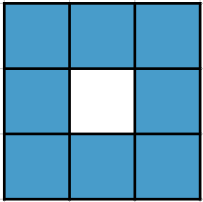


Company 2: Draw the next three phases of this space station.

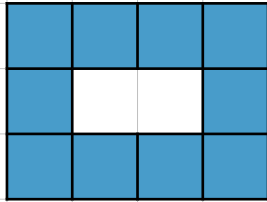


Company 3: Draw the next three phases of this space station.

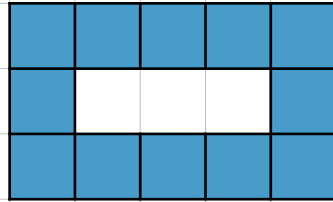
PHASE 1



PHASE 2



PHASE 3



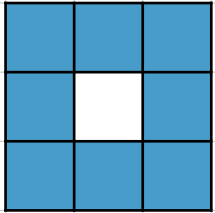
PHASE 4

PHASE 5

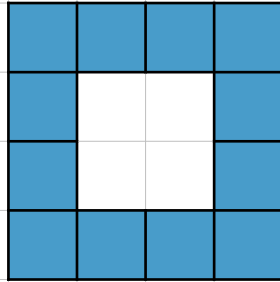
PHASE 6

Company 2: Draw the next three phases of this space station.

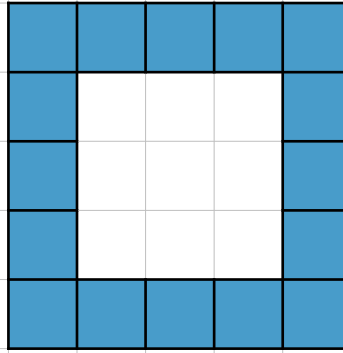
PHASE 1



PHASE 2



PHASE 3



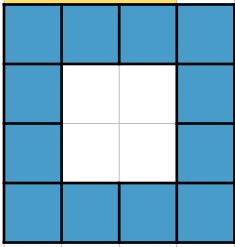
PHASE 4

PHASE 5

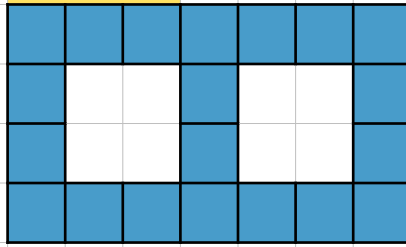
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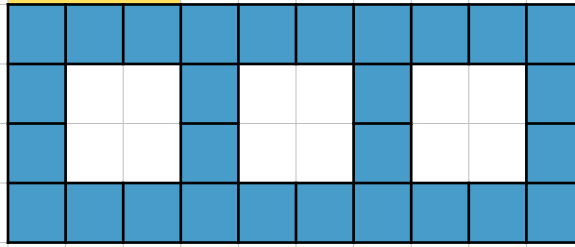
PHASE 1



PHASE 2



PHASE 3



PHASE 4

PHASE 5

PHASE 6

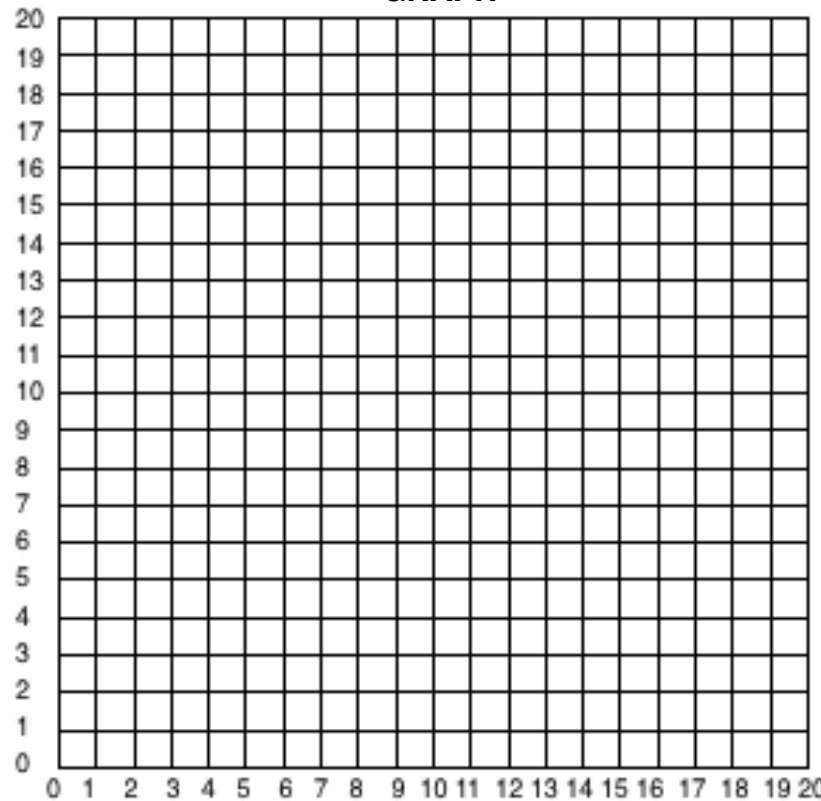
Instructions: Complete the table. Create an ordered pair (Phase #, Rooms). Graph the points and connect them. Written description is how to construct the next phase of the space station. Then write an algebraic expression. Then find an equivalent expression.

TABLE and Ordered Pairs

Phase #	Rooms
1	
2	
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Ordered Pairs
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GRAPH



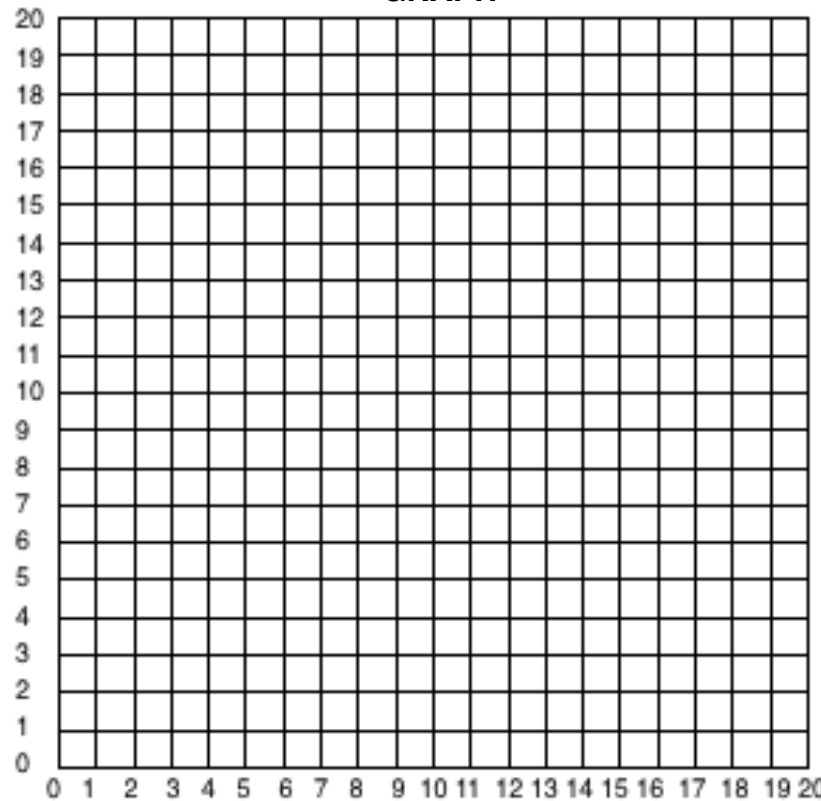
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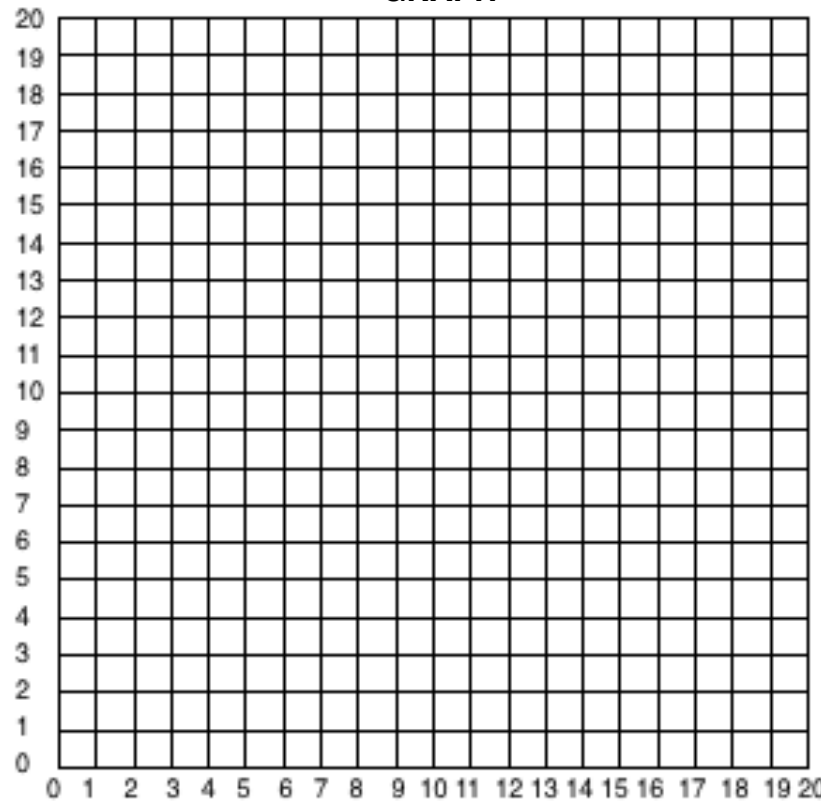
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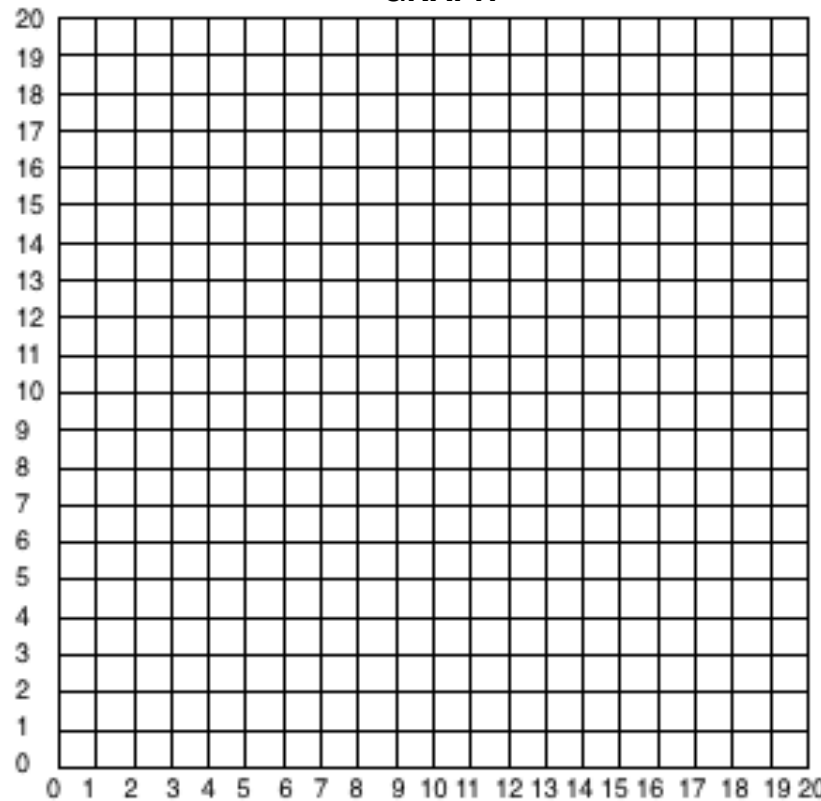
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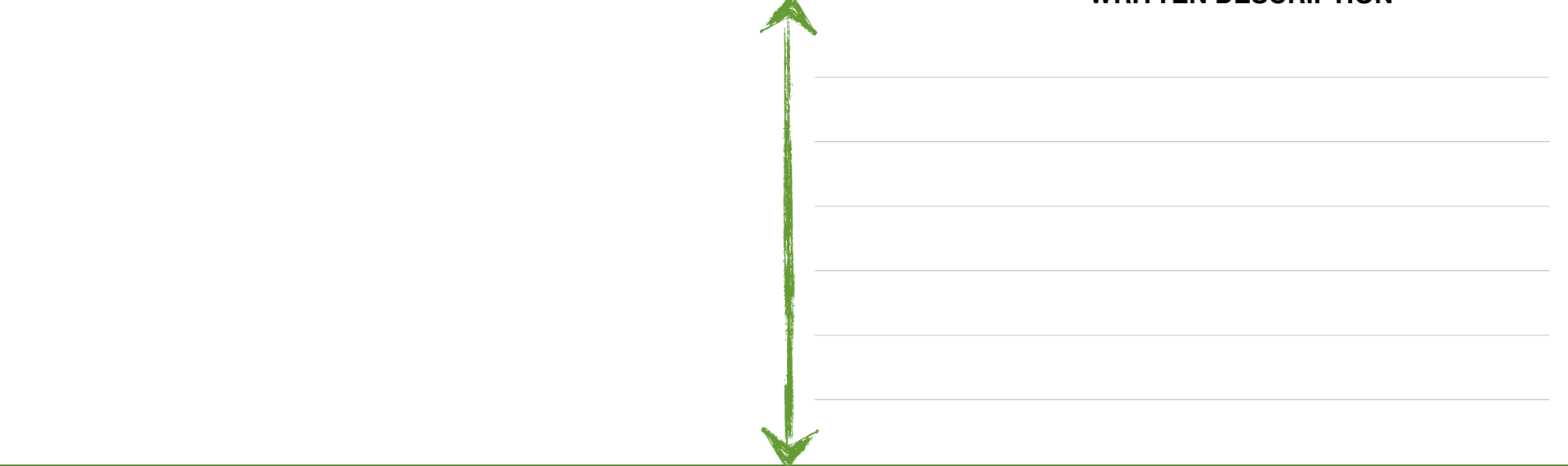
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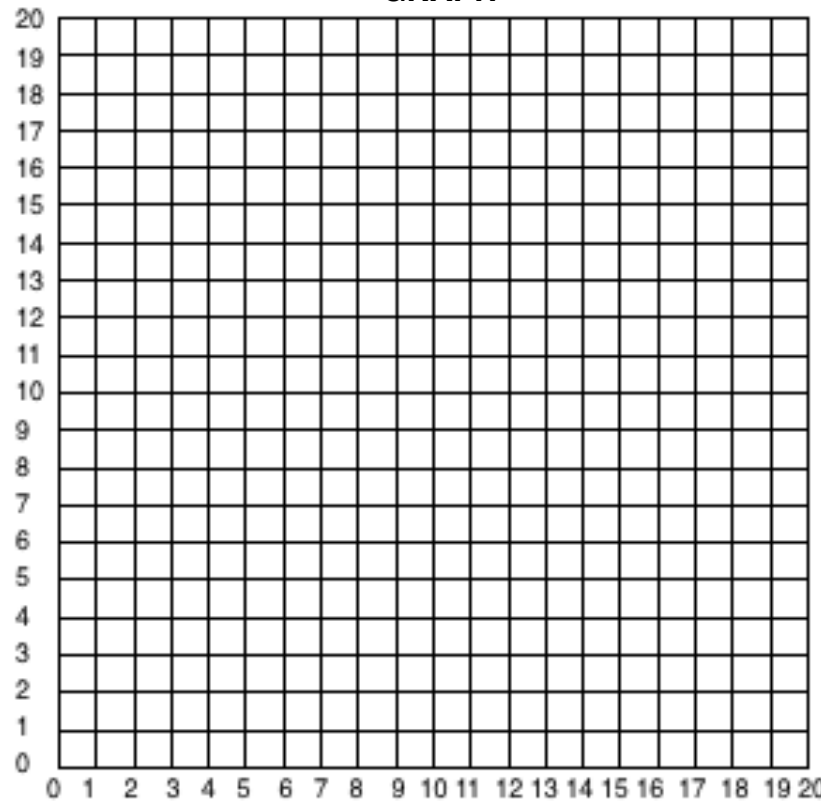
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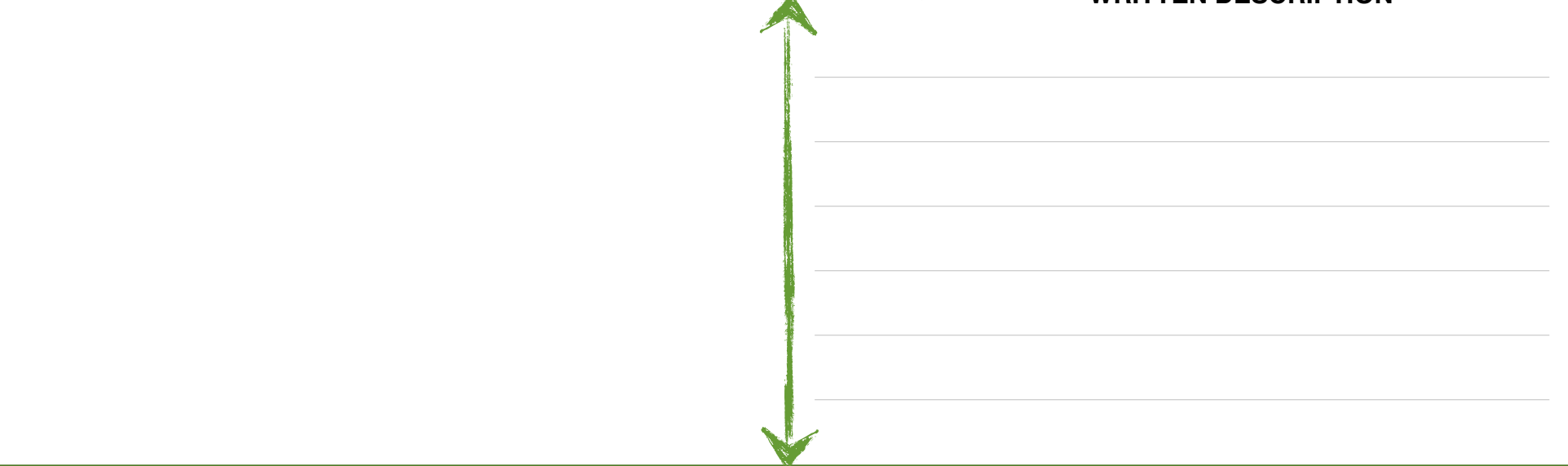
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Ordered Pairs
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Presentation

Now it is time to make a presentation. You will be assigned one of the 5 space stations. Your job is to make a 5 minute presentation explaining the technical details of your blue print, as well as make an argument why the US Government should choose your company's blueprint.

Parts of the Presentation

- Include all information from the 4-section-sheet for your company's space station.
- Also include the pictures of 6 phases.
- Add in a sales pitch: why your space station layout is the best. Why it is good for a school.
- Answer the question: How many rooms at a particular phase?
- You should be creative and create a keynote or explain everything or poster.

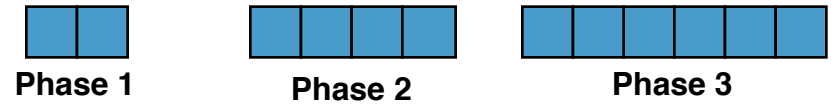
Group

- I am working on company _____'s space station blue print.
- My partners are _____ & _____
- We will use (circle one) **Keynote** or **Explain Everything** or **Poster** or **Other**

Extension: Outer Perimeter of Space Station

TABLES

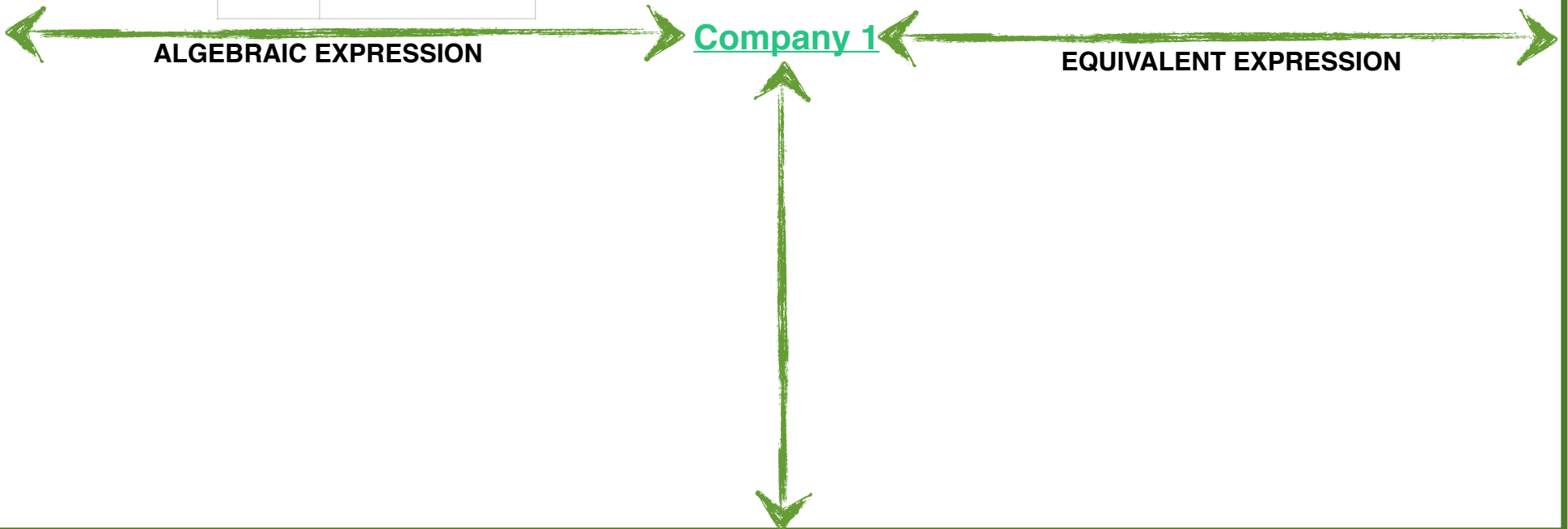
Phase #	Perimeter
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Company 1

ALGEBRAIC EXPRESSION

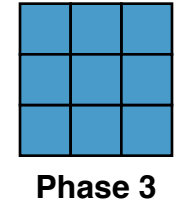
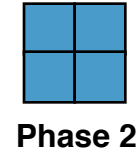
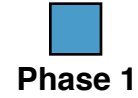
EQUIVALENT EXPRESSION



Extension: Outer Perimeter of Space Station

TABLES

Phase #	Perimeter
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Company 2

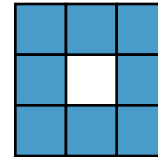
ALGEBRAIC EXPRESSION

EQUIVALENT EXPRESSION

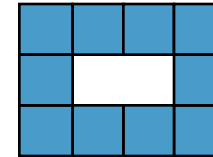
Extension: Outer Perimeter of Space Station

TABLES

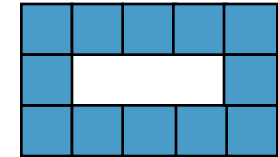
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Phase 1



Phase 2



Phase 3

Company 3

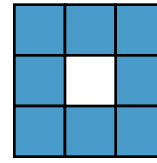
ALGEBRAIC EXPRESSION

EQUIVALENT EXPRESSION

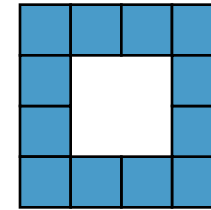
Extension: Outer Perimeter of Space Station

TABLES

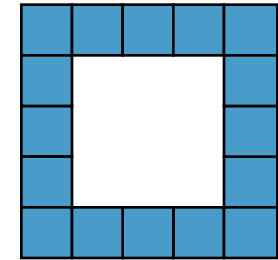
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Phase 1



Phase 2



Phase 3

Company 4

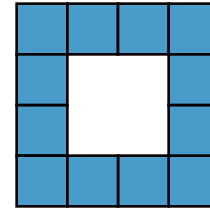
ALGEBRAIC EXPRESSION

EQUIVALENT EXPRESSION

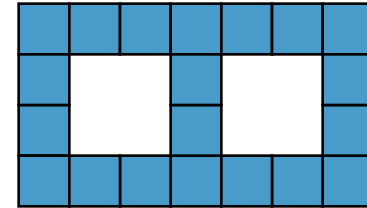
Extension: Outer Perimeter of Space Station

TABLES

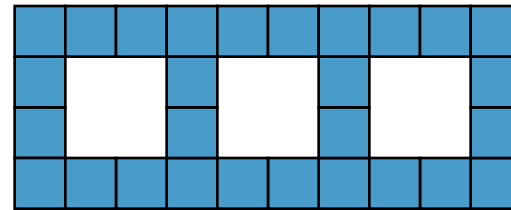
Phase #	Perimeter
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Phase 1



Phase 2



Phase 3

Company 1

ALGEBRAIC EXPRESSION

EQUIVALENT EXPRESSION

Extension: Create Your Own Space Station

PHASE 1

PHASE 2

PHASE 3

PHASE 4

PHASE 5

PHASE 6

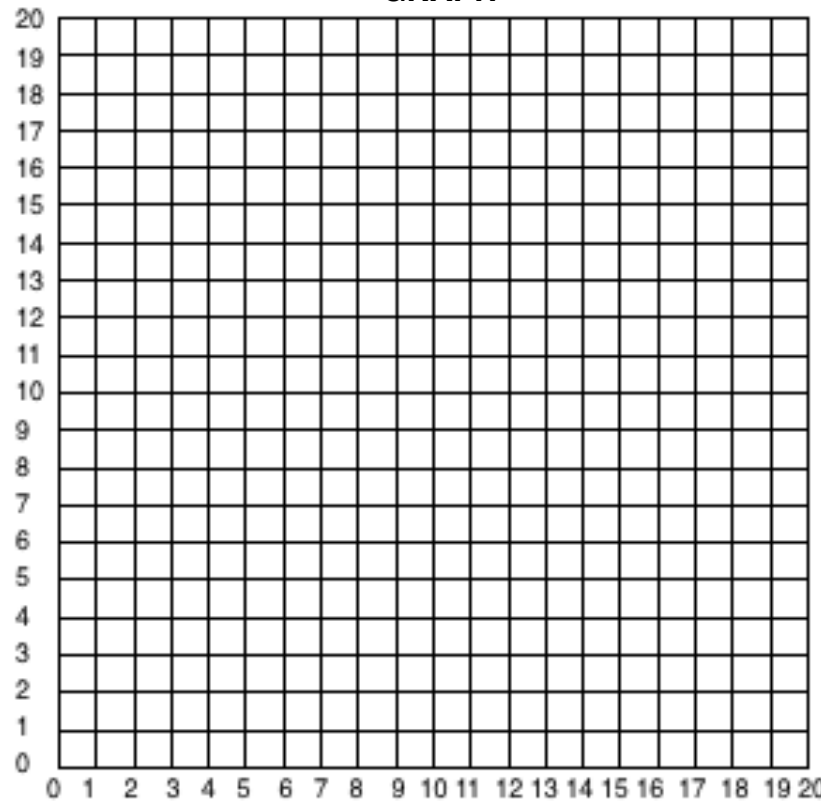
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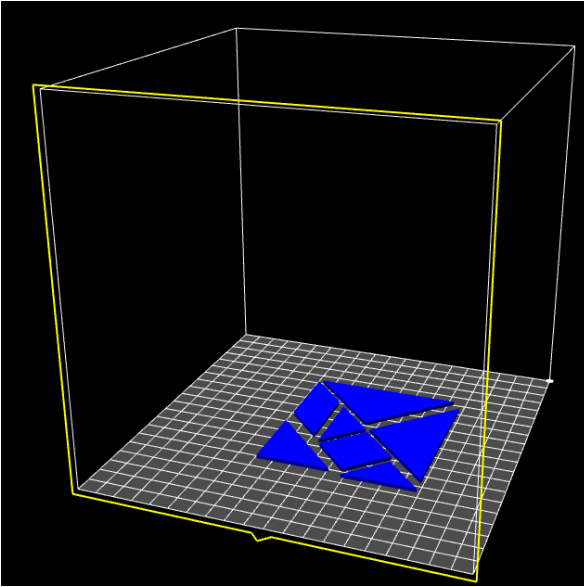
GRAPH



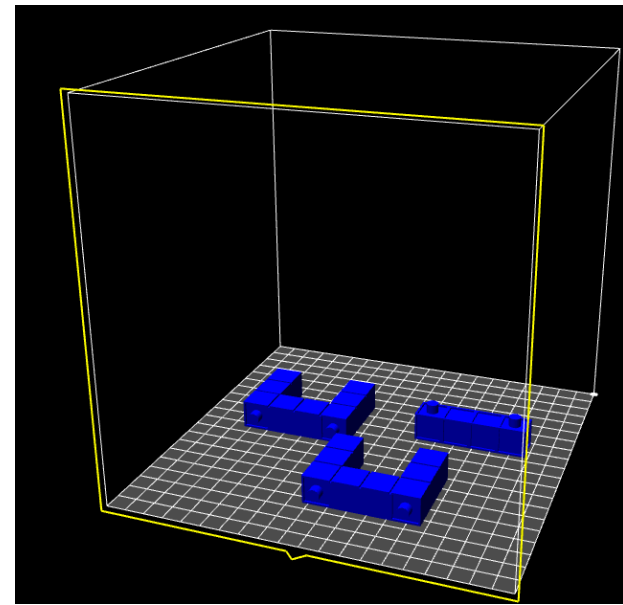
Yours!

ALGEBRAIC EXPRESSION

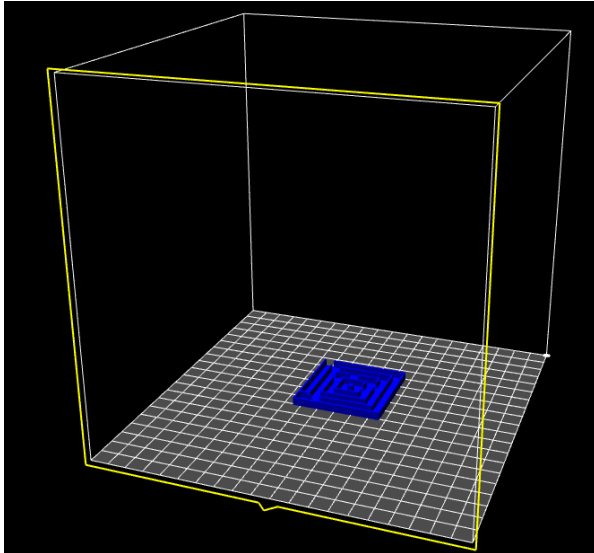
WRITTEN DESCRIPTION



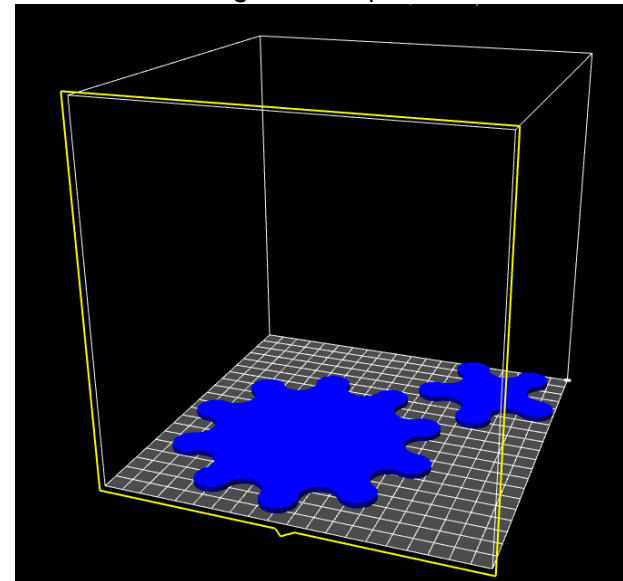
Above is a ready to print tangram puzzle created by a student. This aligns to all 6th grade geometry standards. As well as many of the numbers and operations standards.



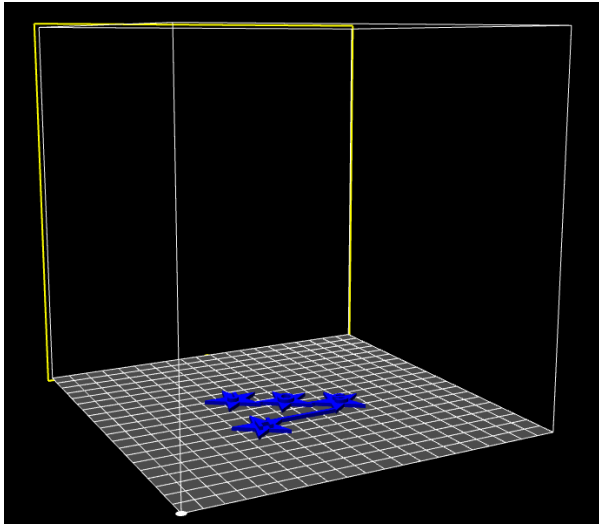
Above is a ready to print modular space station created by a student. This project aligns to the patterns, rules and expressions topics covered in 6th grade. Students are able to visualize the parts of an algebraic expression.



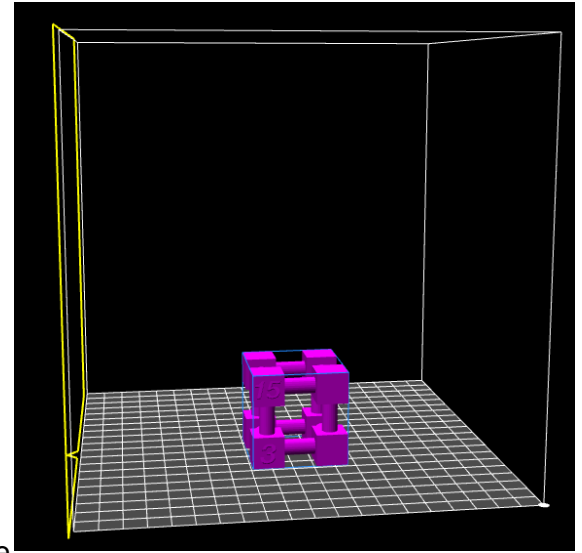
Above is a ready to print maze. This is a fan favorite, since its fun and interactive! Play it with a marble. This aligns to equations and inequalities. In order to design this maze, students needed to write an inequality from the constraints of the problem: $5x+1 \leq 51$.



Above is a ready to print pair of gears in a 2:1 ratio. For each rotation of the big gear, the small gear turns twice. Students create these to form a gear puzzle. To create a set of gears you use circle formulas and ratios of radii as well.



Above is a ready to print name constellation. Students plot their name on a grid as a re-introduction to plotting. This is also used as an icebreaker in tutorial for designing in 3D.



Above is another example of a factor lattice.

Below is a ready to print factor lattice. This is the challenge version that clicks together and can be made modular with additional pieces. The factor lattices are used to visualize factors of a number and prime factorization.

