

# **3rd Grade**

# **Learning**

# **Guide**

# **Math**

**Topics:**

- Using strategies to fluently add, subtract, and multiply
- Solving problems involving money by using skip counting
- Telling time to the nearest minute, and solve problems involving time intervals
- Identifying, comparing and classifying shapes and their attributes
- Solving problems to find the perimeter of polygons

**What Your Student is Learning:**

- Numbers can be broken down into equal groups, and also into rows and columns (arrays). Organizing concrete objects in this way helps us to understand multiplication. Students are learning how to multiply two one-digit numbers using these models at the moment; later, they will use these models to multiply 2- and 3-digit numbers.
- We can use concrete models such as number lines to help us calculate elapsed time.

**Background and Context for Parents:**

Page	Notes
1	This puzzle allows students an opportunity to practice fluently adding and subtracting and to use the relationship between addition and subtraction to determine which numbers should go where. Ask: Is there only one possible answer? How do you know?
2-3	Students' word problems will vary here; focus on having students show and explain their work to you. Note: Students are not expected to use the standard algorithm to add and subtract the way we did while growing up until 4th grade! Encourage them to show you the strategies they have been learning in school. Ask them to explain them. Ask why it makes sense. Can they draw place value blocks? Can they use number lines? What strategies do they know?
4-5	Skip count with coins: one way to extend this activity is to have students create and solve their own problems with real coins. How many different ways can they make 60 cents? Pull out real change to help them model their ways.
6	By the end of third grade, students should be able to tell and write times to one minute increments on an analog clock. Provide additional practice for students here by creating a daily schedule, and having students create analog clocks to go along with each time. Note: Many people ask, "What's the point of learning analog clocks?" One benefit is that it helps with fractional thinking. I can see the hour as a whole circle that can be broken into equal parts (quarters, halves, etc).
7	Elapsed Time: students will use open number lines here to calculate elapsed time (the amount of time that has passed). Open number lines allow students to count in easier increments (i.e. 5 or 10 minutes at a time), or jump to easy times first. For example, if the start time is 1:35 and the end time is 2:00, it might be easier for students to jump from 1:35 to 1:45 (10 minutes), and then 1:45 to 2:00. This is a topic many students struggle with and not a lot of time is spent here in school. The number lines should be a helpful and flexible tool to solve.
8-9	Circles and Stars/Patterns in equal groups: these problems help students to

	<p>practice the concept that ___ groups of ___ is another way of talking about multiplication. For part 2, be sure to discuss what patterns they notice. Why do they think those patterns exist?</p> <p>Note: by the end of 3rd grade students should understand multiplication and division and should know their facts through 9x9. Emphasize equal groups.</p>
10-11	<p>Arrays and multiplication/More arrays: these two pages help students practice how to visualize multiplication as an array (___ rows of ___). Ask students to tell you how they could figure out the total number of dots without counting by 1s.</p> <p>One pattern students may notice is that <math>3 \times 6</math> is double <math>3 \times 3</math>. Why is that?</p>
12	<p>Situations, Groups, Arrays, and Equations: this page asks students to figure out what makes the most sense based on the situation: visualizing it as an array, or as equal groups. This helps reinforce that the concepts of multiplication and division may mean different things based on the context of the problem. Ask students to explain how the words match the picture and the equation.</p>
13	<p>Patterns with number lines: students will use open number lines to show multiplication as a series of “jumps” as they skip count to find the answer. Many students find number lines to be more challenging than equal groups or arrays. It is important to explore them, though, because number lines will continue to be a helpful tool as they progress through school. In this case, they can see the equal sized jumps.</p>
14	<p>Polygons vs. not polygons: The definition of a polygon is a closed two-dimensional shape made of straight lines. Students should be able to sort and draw the shapes based on this. Ask them to explain how they determined which were which.</p>
15	<p>Geoboards: See the answer key for definitions of each of these shapes. Notice that samples are drawn but there are multiple possible answers. Discuss what the shapes have in common and how they are different. For example, is a rhombus a square? It can be but does not have to be. Is a square a rhombus?</p>
16-17	<p>Perimeter: students should be using their knowledge of the different kinds of shapes (i.e., that a square has four sides that are all equal) to be able to add all sides to find the perimeter in these problems. It is possible that your student did learn about area but not perimeter yet. If this is the case, you will have to be sure to explain it, but also to help them compare and contrast it with area. Don't skip over the explaining parts of the worksheets. They are important.</p>
18-21	<p>Penny Arrays: have students use pennies or other small objects to practice finding all the factors of a given number. Having students transfer these concrete models to the drawing of an array box (see answer key) builds a foundation for students to be able to use partial products to complete multi-digit multiplication at a later stage. It is not important that they can define “factor” and “multiple” right now, but working with them helps them to practice and explore these multiplication and area concepts.</p>
22-25	<p>How Close to 100: have students play this game on their own, with you, or with a sibling to create arrays based on the numbers they spin using the spinner. You can roll dice instead of a spinner, or get playing cards 1-6 and randomly draw them. You might want to make more grids and play more times so they can practice</p>

	developing strategy to place the rectangles smartly.
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**Ways to support your student:**

- Read the problem out loud to them.
- Remember, focus on strategies instead of answers. We want students to understand and be flexible with numbers.
- Before giving your student the answer to their question or specific help, ask them “What have you tried so far? What do you know? What might be a next step?”
- After your student has solved it, and before you tell them it’s correct or not, have them explain to you how they got their solution and if they think their answer makes sense.

**Online Resources for Students:**

- Interactive site to play with quadrilaterals  
<https://www.mathsisfun.com/quadrilaterals.html>
- Interactive Geoboards  
<https://apps.mathlearningcenter.org/geoboard/>
- Games to practice 3rd grade math  
<https://www.splashlearn.com/math-skills/third-grade>
- Song about area and perimeter  
<https://www.flocabulary.com/unit/area-and-perimeter/>
- Explanation of some strategies for addition (The traditional method is the one that we learned. The Common Core does not require this until 4th grade). Do you and your students understand the other methods?  
[https://www.youtube.com/watch?v=\\_oPqIF\\_3cPM](https://www.youtube.com/watch?v=_oPqIF_3cPM)

### Learning Support for Mathematics

For students that are approaching grade level and have learning gaps/ differences in mathematics, provide numerous opportunities for explorations at the concrete (manipulatives) and representational (visual) levels before progressing to the abstract (numbers) level. Students that need learning supports should be provided with:

- Intensive Direct Instruction and daily guided practice
- scaffolded supports
- the use of visuals as models and aids
- numerous opportunities to think out loud
- support to help them understand the why
- use of manipulatives and tools to support understanding
- Bar Modeling Representations to decode word problems
- the use of mnemonics to enhance retention of skills
- daily practice with basic facts
- the presentation of content in varied contexts and varied levels
- opportunities to use diagrams and draw math concepts
- graph paper to support understanding
- numerous opportunities to draw pictures of word problems
- the use of smaller numbers to address number operations
- opportunities for success to build a growth mindset

- computer time to allow for needed practice
- opportunities to engage in metacognition (the building and reinforcing of thinking and reasoning) skills

**See examples for each bulleted item below:**

- **Intensive Direct Instruction and daily guided practice**

(Intensive Direct Instruction means to explain the skill / concept to the student with several examples repeatedly to help them understand)

[https://youtu.be/F\\_HzrRBOU7I](https://youtu.be/F_HzrRBOU7I) / [https://youtu.be/OJJkkUPC\\_yM](https://youtu.be/OJJkkUPC_yM)

- **Scaffolded Supports**

(Scaffolded supports means to introduce the skill one step at a time – allowing the student to understand one section part, before moving on to

the next part) ex.  $5+1=6$ ,  $9+1=10$ ,  $24+1=25$ - it is the same as “what number comes after 5, after 9, after 24

[https://youtu.be/5hWDbSx\\_kdo](https://youtu.be/5hWDbSx_kdo)

- **Visuals as models and aides**

(Pictures of objects that can be used to help students understand the math)

<https://studentsatthecenterhub.org/resource/helping-struggling-students-build-a-growth-mind-set/>

- **Thinking out loud**

(Allows students to talk and think about the skills they are learning, which allows them to better remember the skill)

<https://youtu.be/f-4N7OxSMok>

- **Understanding the why**

(When students understand why a strategy works, they will apply it to other skills) ex.  $5x = 5$ ,  $45x1=45$ ,  $320x1=320$

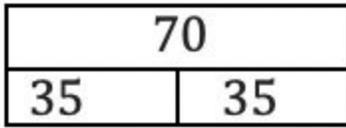
- **Manipulatives and Tools**

(Manipulatives can be counters, beans, blocks, etc. – Tools can be rulers, calculators, scales, etc.) <https://youtu.be/uWBZF-Lyq58>

- **Bar Modeling Representations**

(Bar Modeling Representations consist of visuals that help students understand the skill they are learning.)

Ex.



[https://youtu.be/TbayTZvS\\_bc](https://youtu.be/TbayTZvS_bc)

- **Mnemonics**

(Mnemonics consist of strategies to help students remember skills – ex.)



<https://youtu.be/dXvvGc9TIdY>

- **Basic Facts**

(Basic facts include addition, subtraction, division, multiplication facts – ex.  $8+2=10$ ,  $2+8=10$ ,  $10-2=8$ ,  $10-8=2$  /  $2 \times 5=10$ ,  $5 \times 2=10$ ,  $10/2=5$ ,  $10/5=2$ )

[https://youtu.be/TbayTZvS\\_bc](https://youtu.be/TbayTZvS_bc)

- **Content with varied contexts and varied levels**

Means to show student how to solve a problem different ways to allow them to use the skill that way they understand best

<https://youtu.be/FVg9n0IGf0>

- **Diagrams**

(Diagrams provide students with visuals / pictures that help them solve the problem and they help them read the problem with less words)

[https://youtu.be/TbayTZvS\\_bc](https://youtu.be/TbayTZvS_bc)

- **Graph paper**

(Graph paper helps students to solve the problem by making it visual / easier to see the answer)

<https://youtu.be/mX43cn3IASI>

- **Drawing Pictures**

(Drawing pictures allow students to show they can solve the problem without using words that they may not know or be able to write)

[https://youtu.be/TbayTZvS\\_bc](https://youtu.be/TbayTZvS_bc)

- **Smaller Numbers**

(The use of smaller numbers can help students understand the process of a skill, so that when they move on to bigger numbers, they will see that the process is still the same, they acquire understanding of the skill) ex.  $5x = 5$ ,  $45x1 = 45$ ,  $320x1 = 320$

- **Growth Mindset**

(A growth mindset is a process that helps to improve intelligence (thinking), ability (skill) and performance (actions). This means that by helping students to develop a growth mindset, we can help them to learn to think and be problem solvers. This is a process that occurs over time by helping them improve by building success over time.

<https://studentsatthecenterhub.org/resource/helping-struggling-students-build-a-growth-mind-set/>

- **Computer Time**

(Computer time allows students to use websites, games, activities that will help them learn math skills and concepts)

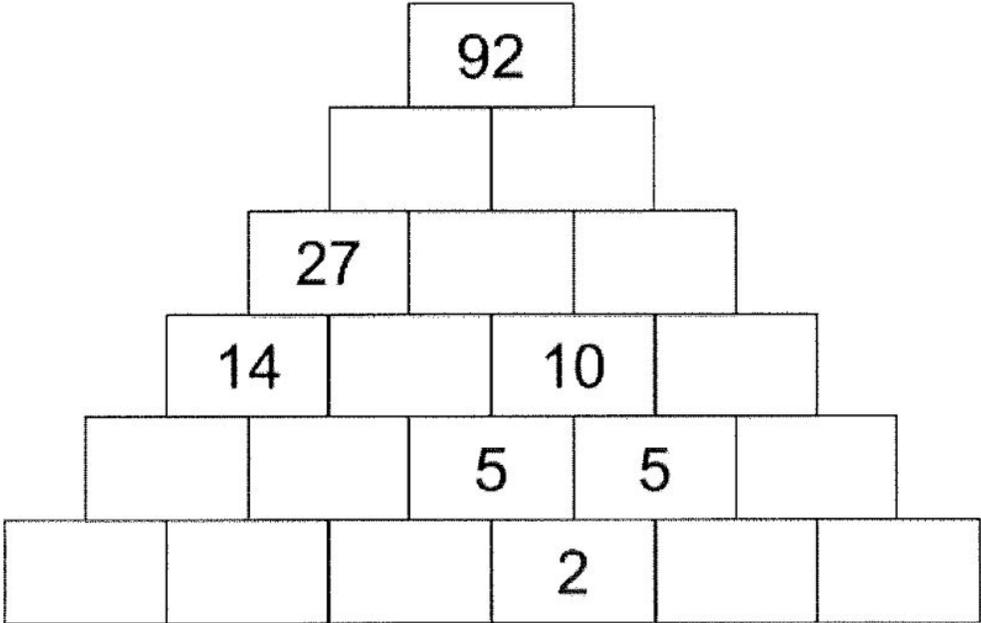
[mathgametime.com](http://mathgametime.com), [pbs.com](http://pbs.com), [bestkidsolutions.com](http://bestkidsolutions.com), [firstinmath.com](http://firstinmath.com), [helpingkidsrise.org](http://helpingkidsrise.org)

- **Metacognition**

(Metacognition means to help students think about what they are thinking, the steps they are using, the words and numbers that they are using- It helps students to better focus on the skills they are using- it is a process that occurs over time) / <https://youtu.be/HKFOhd5sMEc/>

<http://www.spencerauthor.com/metacognition/>

Part 1: Use Addition and/or Subtraction to fill in the puzzle. The number in each block is the *sum* of the two numbers directly below it.



What strategies did you use?

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**Part 2: Write word problems:**

Write a word problem for this addition equation and then solve it. Show your work!

$$434 + 218 = ?$$

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Write a word problem for this subtraction equation and then solve it. Show your work!

$$434 - 218 = ?$$

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What helped you solve the problem?

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**Part 1: Skip count with the coins.**

<b>quarter - 25¢</b>	<b>dime - 10¢</b>	<b>nickel - 5¢</b>	<b>penny - 1¢</b>
			

*example*

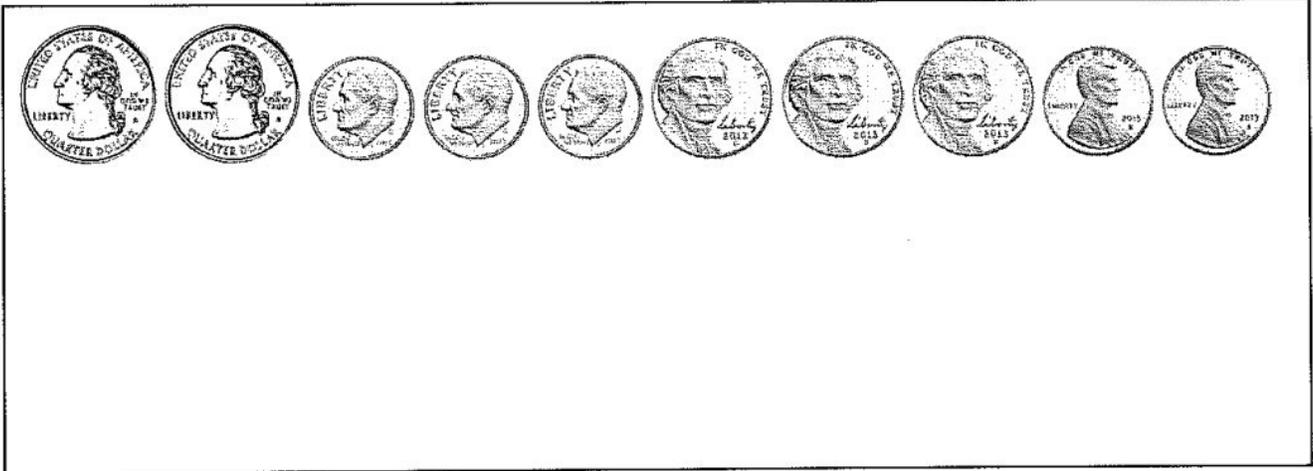


10, 20, 30, 40, 50

10      20      30      40      50



**Part 2: Find the total for each group of coins:**



**What strategies did you use?**

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Part 1: Label each clock with the correct time:



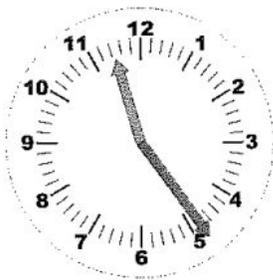
\_\_\_\_ : \_\_\_\_



\_\_\_\_ : \_\_\_\_



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\_\_\_\_ : \_\_\_\_



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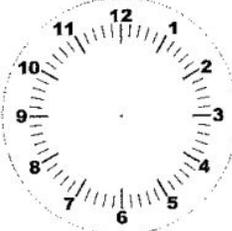
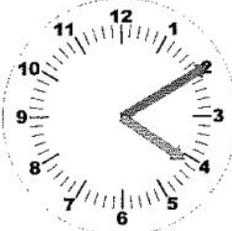


\_\_\_\_ : \_\_\_\_

Answer the questions and show the time on the clock:

<p>What time is it 5 minutes <b>after</b> 5:05? _____</p>	
<p>What time is it 5 minutes <b>before</b> 6:30? _____</p>	

**Part 2: Show the elapsed time on the clocks and number line:**

Start time	Stop time	Elapsed time
 _____ : _____	 _____ : _____	
 <b>4:15</b>	 <b>4:52</b>	
 _____ : _____	 _____ : _____	
<p>Recess starts at 10:30 and ends at 10:47. How long is recess?</p>		



**What strategies did you use?**

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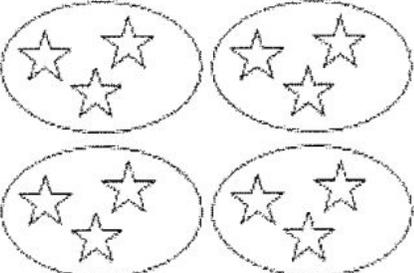
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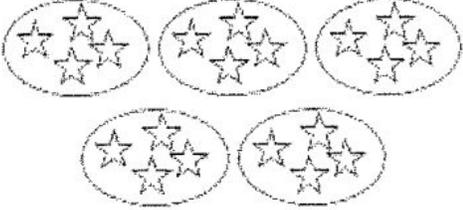


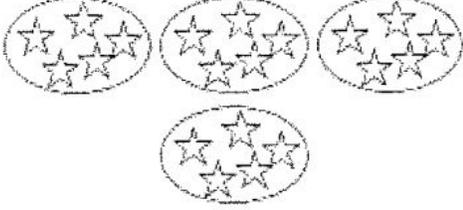
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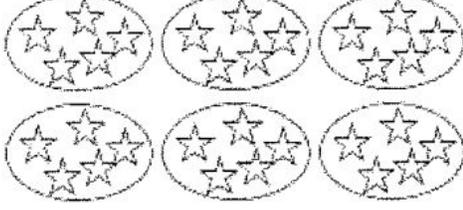
## Part 1: Circles and Stars

Find the total number of stars in each row. Write a multiplication equation!

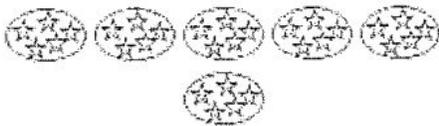
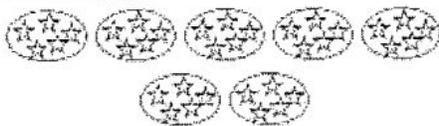
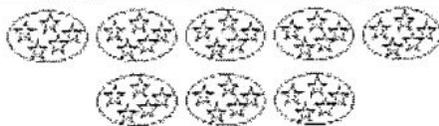
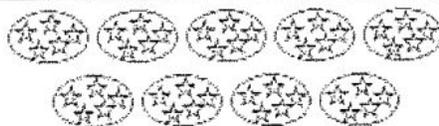
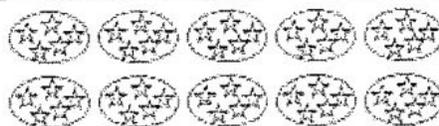
	How many circles?	How many stars in each circle?
	<b>4</b>	<b>3</b>
	How many stars altogether?	
	<b><math>4 \times 3 = 12</math></b>	

	How many circles?	How many stars in each circle?
	How many stars altogether?	

	How many circles?	How many stars in each circle?
	How many stars altogether?	

	How many circles?	How many stars in each circle?
	How many stars altogether?	

## Part 2: Patterns in equal groups

	Circles	Stars in each circle	Stars altogether
	<b>1</b>	<b>5</b>	<b><math>1 \times 5 = 5</math></b>
	Circles	Stars in each circle	Stars altogether
	Circles	Stars in each circle	Stars altogether
	Circles	Stars in each circle	Stars altogether
	Circles	Stars in each circle	Stars altogether
	Circles	Stars in each circle	Stars altogether
	Circles	Stars in each circle	Stars altogether
	Circles	Stars in each circle	Stars altogether
	Circles	Stars in each circle	Stars altogether
	Circles	Stars in each circle	Stars altogether



What patterns do you see?

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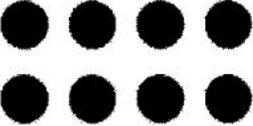
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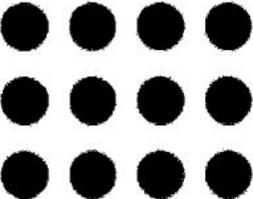
## Part 1: Arrays and Multiplication

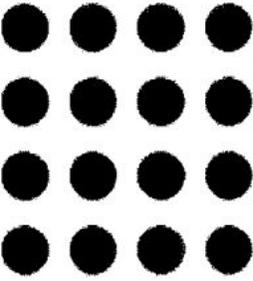
Look at the rows of dots. Each row has 4 dots.

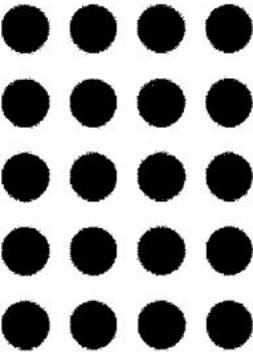
How many rows are there? How many dots altogether?

	How many rows?	How many dots altogether?
	<i>1</i>	<i>1 \times 4 = 4</i>

	How many rows?	How many dots altogether?

	How many rows?	How many dots altogether?

	How many rows?	How many dots altogether?

	How many rows?	How many dots altogether?



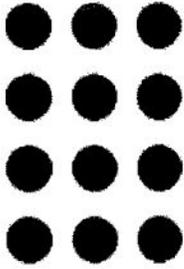
What patterns do you see?

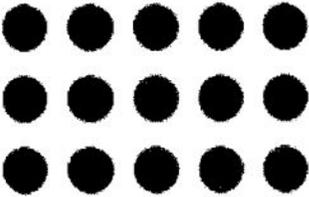
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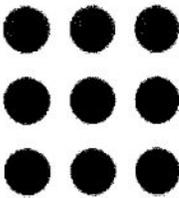
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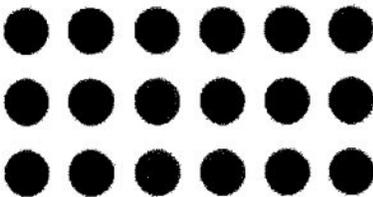
## Part 2: More arrays

Write a multiplication equation for each array:

	rows	columns	total

	rows	columns	total

	rows	columns	total

	rows	columns	total



What patterns do you see?

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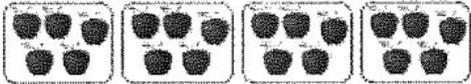
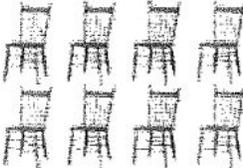
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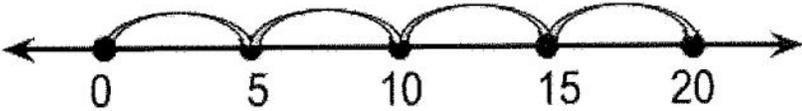
**Part 1: Situations, Groups, Arrays, and Equations,**

For each situation, draw equal groups or an array. Then write an equation

situation	group or array?	equation
4 boxes. 5 apples in each box.		$4 \times 5 = 20$
2 rows of chairs. 4 chairs in each row.		$2 \times 4 = 8$
4 packs of juice. 4 cans in each pack.		
3 bags of balls. 4 balls in each bag.		
5 rows of plants. 3 plants in each row.		
4 people. Each person eats 2 oranges.		
5 dogs. Each dog has 4 legs.		

## Part 2: Patterns with number lines

Draw each multiplication equation as jumps on a number line

equation	Jumps on a number line
$4 \times 5 = 20$	4 jumps. Each jump is 5 long.  <p>A horizontal number line with arrows at both ends. It has five tick marks labeled 0, 5, 10, 15, and 20. Four curved arrows (jumps) are drawn above the line, starting at 0 and ending at 5, 5 and ending at 10, 10 and ending at 15, and 15 and ending at 20.</p>
$2 \times 4 = 8$	
$4 \times 4 = 16$	
$3 \times 4 = \underline{\quad}$	
$5 \times 3 = \underline{\quad}$	



What patterns do you see?

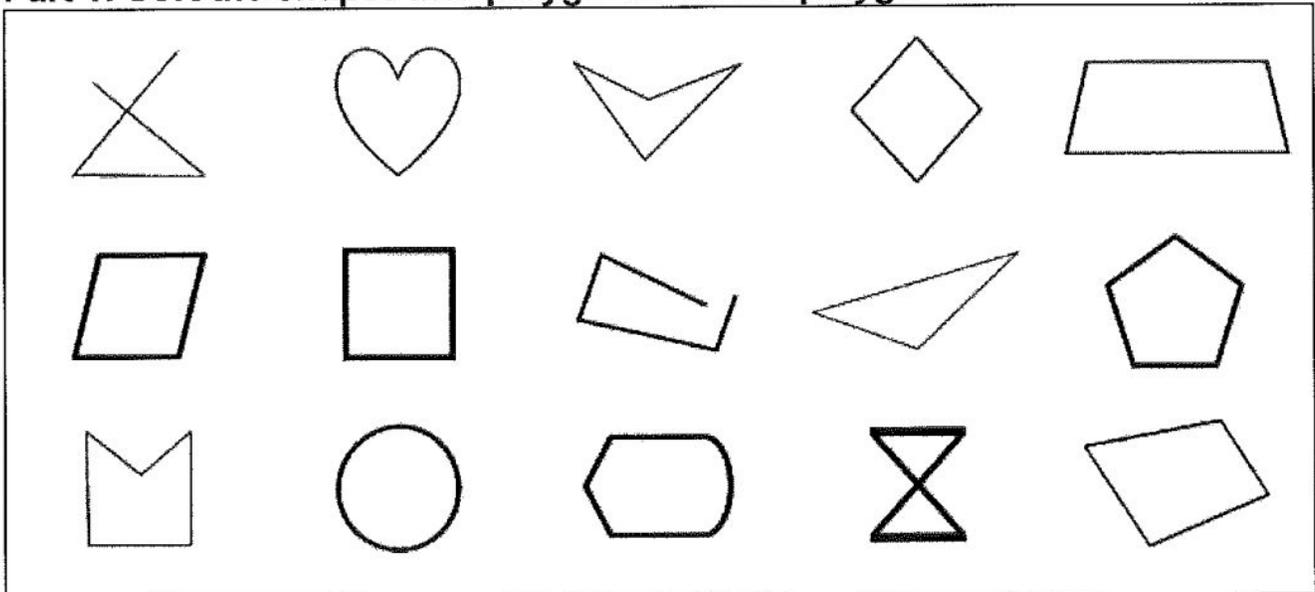
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**Part 1: Sort the shapes into polygons and not polygons:**



Polygons	Not Polygons



**Pick one shape and tell how you know that it is a polygon.**

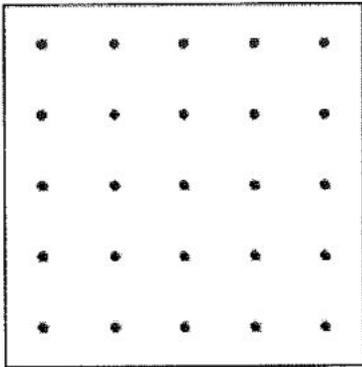
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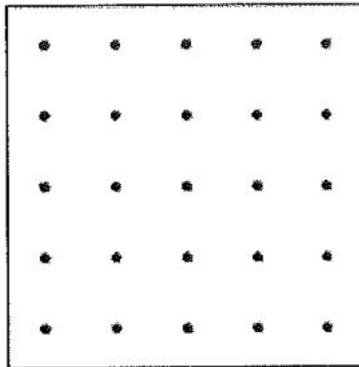
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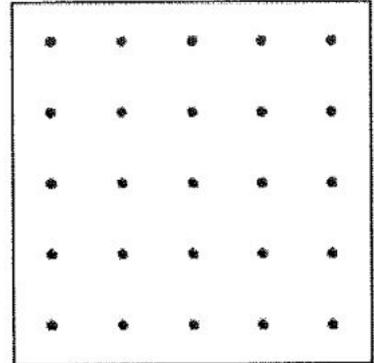
**Part 2: Draw each shape on the Geoboard:**



**rhombus**



**rectangle**



**square**



**Pick one shape and tell how you know what it is:**

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**Part 3: Describe this shape. Tell about its sides and angles.**



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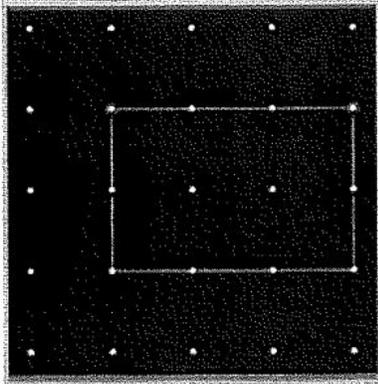
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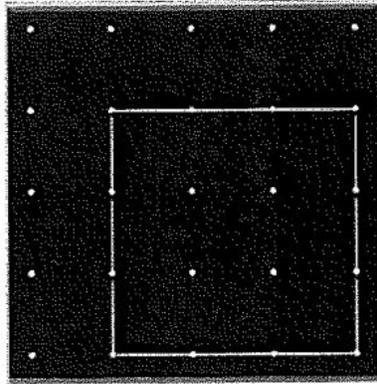
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**Part 1: Find the perimeter of each shape:**

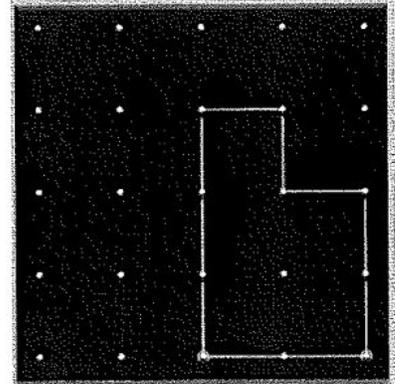


**Perimeter:**

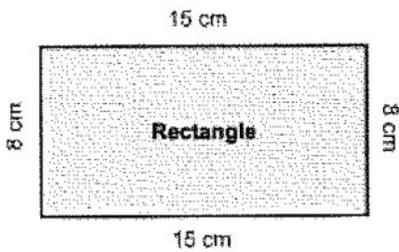
$$3 + 2 + 3 + 2 = 10$$



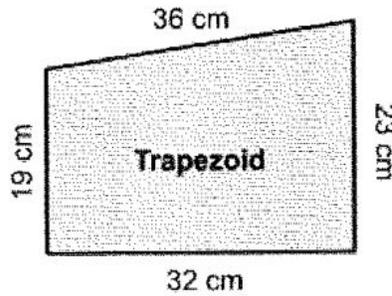
**Perimeter:**



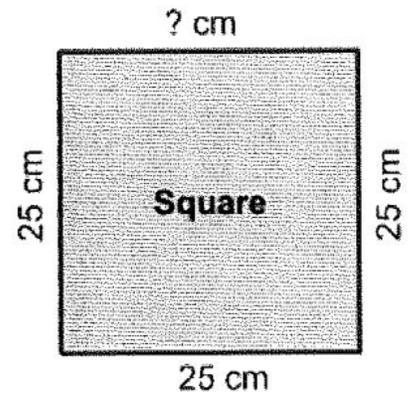
**Perimeter:**



**Perimeter:**



**Perimeter:**



**Perimeter:**



**Pick one shape and tell how you found its perimeter.**

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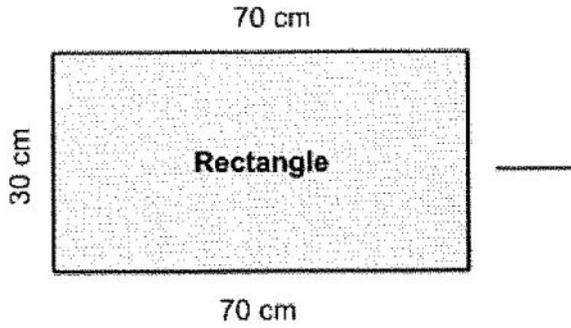


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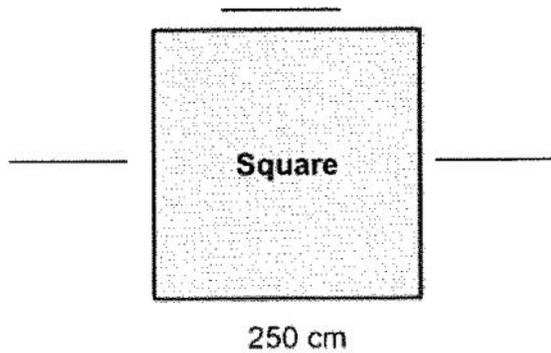
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**Part 2: Find the missing length and/or perimeter:**



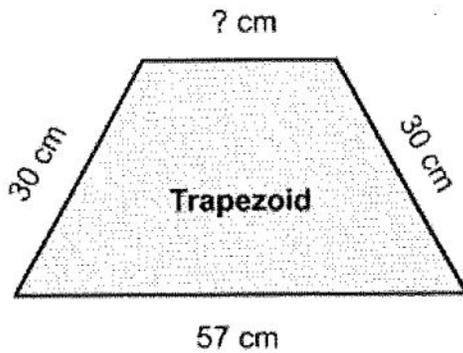
The missing length is \_\_\_\_\_

The perimeter is \_\_\_\_\_



The missing length is \_\_\_\_\_

The perimeter is \_\_\_\_\_



The perimeter is 130 cm.

The missing length is \_\_\_\_\_



**Pick one shape and tell how you found the missing length.**

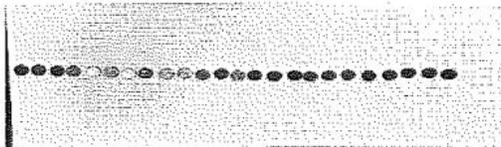
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Use 24 pennies (or other objects) and make all the possible arrays. Record the number of rows and columns in the table below.



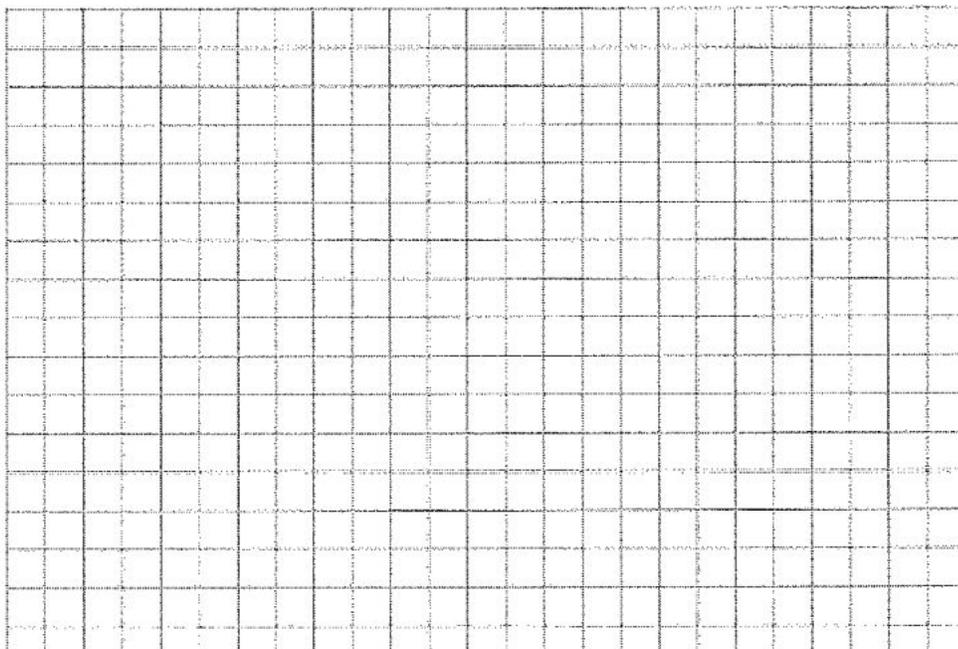
Number of Rows	Number of Columns	Factors	Product
1	24	1, 24	24
			24
			24
			24
			24
			24
			24
			24

List all the factors of 24: \_\_\_\_\_

Choose 1 of the arrays you created with pennies and draw it below.



Choose 1 of the arrays you created with pennies and draw it below.



The multiples of a number are the numbers you get when you multiply by that number. For example:

The multiples of 2 are:

2, 4, 6, 8, 10, 12, 14, 16, 18, 20

List the multiples of 4:

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List the multiples of 8:

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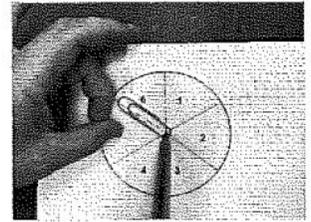
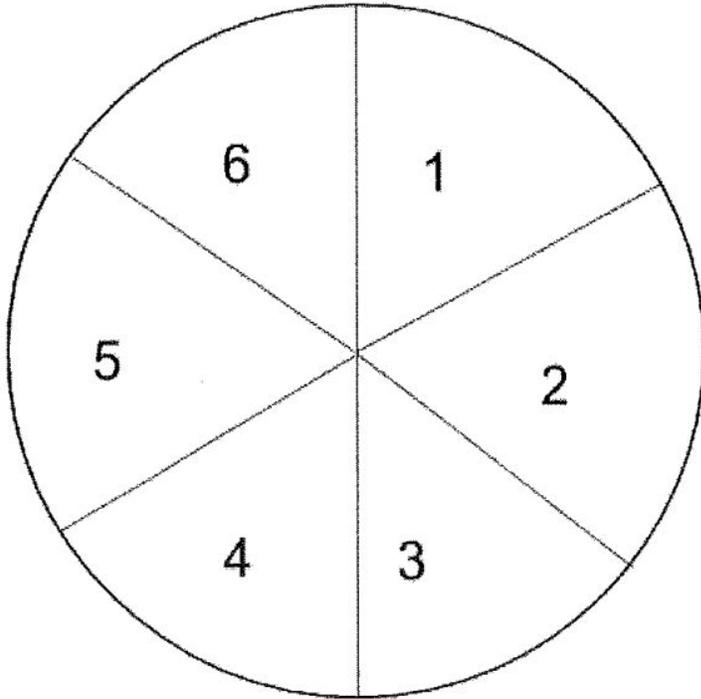
Are there numbers that are multiples of 2 and of 4 and of 8. In other words these numbers are in all three rows.

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# Part 1: How Close to 100



1. Use the spinner to generate two factors for the array.

2. Next draw the array on the grid and record the multiplication equation.



The goal is to get as close to 100 as possible by filling in the entire grid with your arrays.



## How Close to 100


1. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

6. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

2. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

7. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

3. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

8. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

4. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

9. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

5. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

10. \_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_

## Exploring arrays

Use the 100 grids on the next two pages to draw these array:

1 x 1

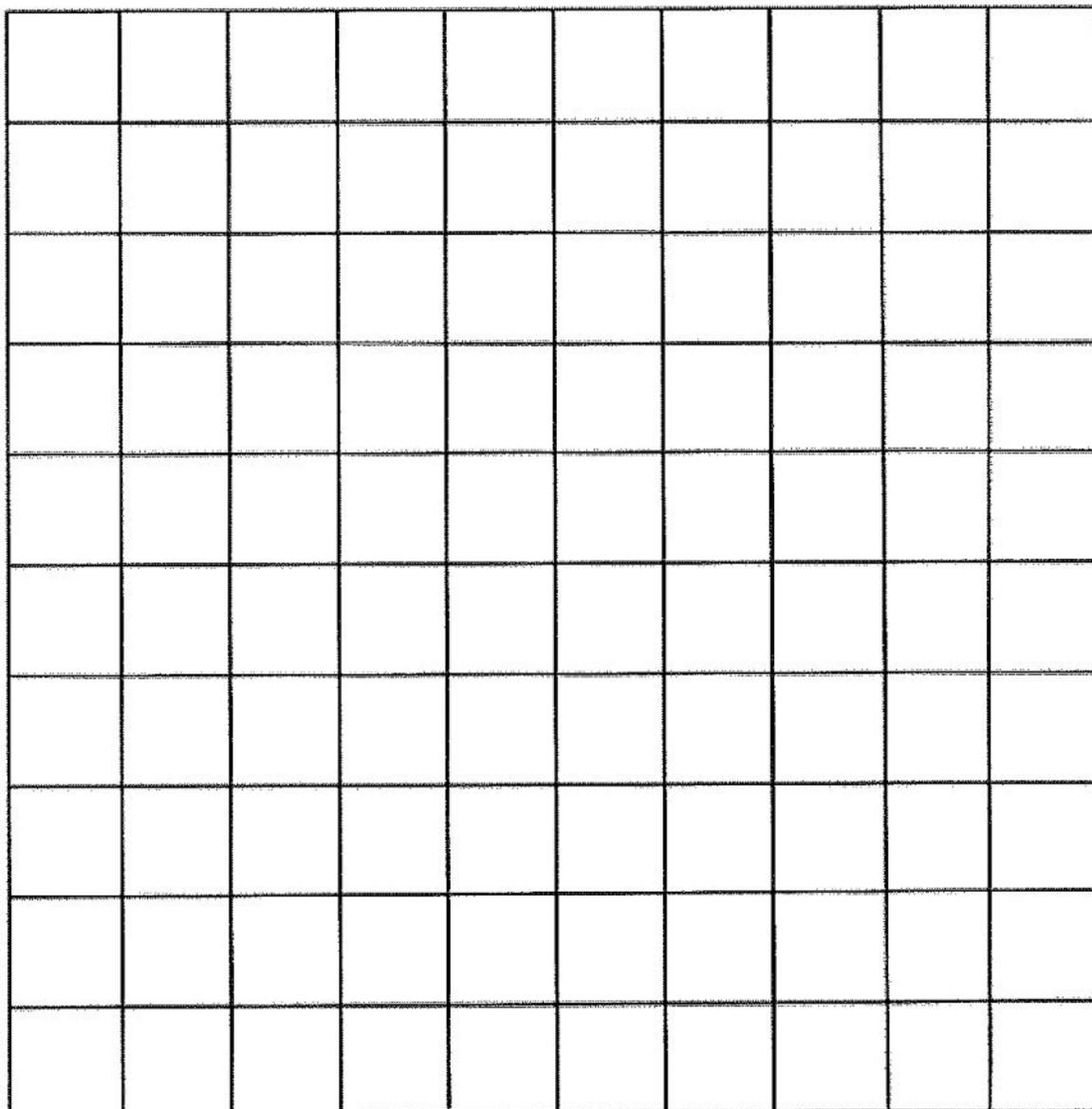
3 x 3

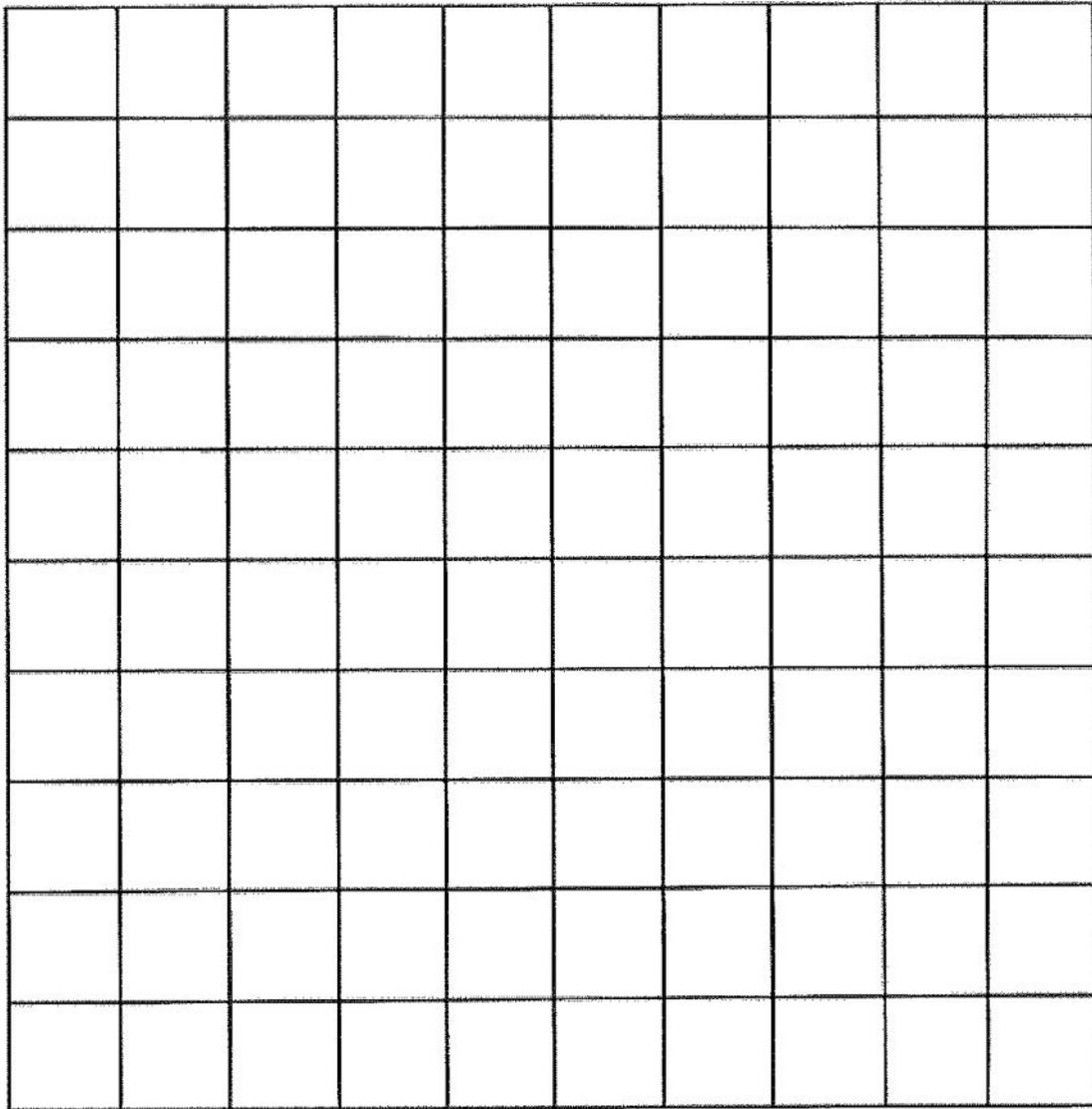
5 x 5

2 x 2

4 x 4

6 x 6





What patterns do notice in these arrays. Without making it what do you know about an 8 x 8 array.

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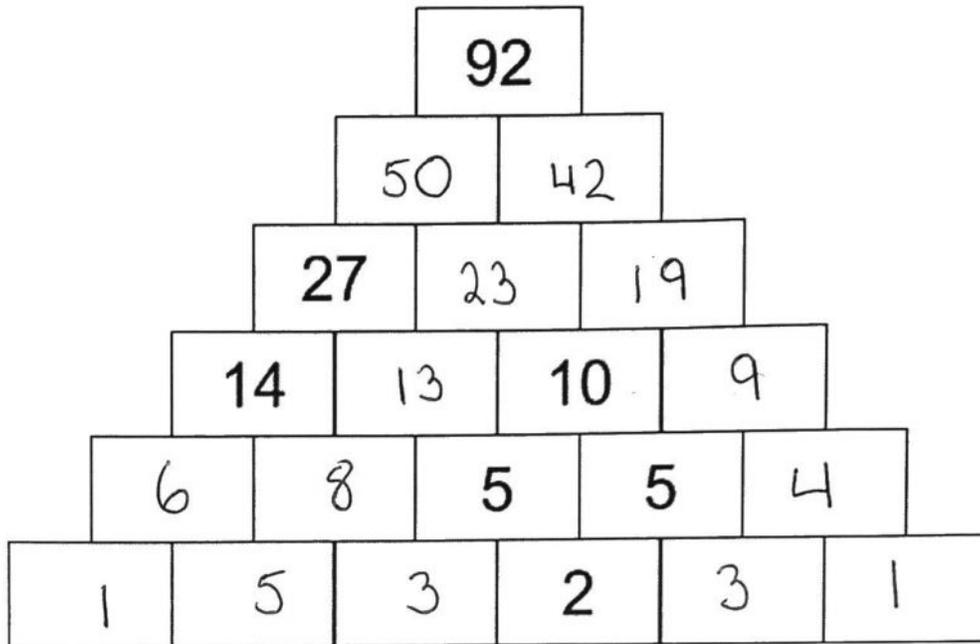
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**ANSWER**

**KEY**

Part 1: Use Addition and/or Subtraction to fill in the puzzle. The number in each block is the *sum* of the two numbers directly below it.



What strategies did you use?

(strategies may vary)

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**Part 2: Write word problems:**

Write a word problem for this addition equation and then solve it. Show your work!

$$434 + 218 = ?$$

[Word problems and strategies will vary. See below for example]

Hermione has 434 gum drops. Ron has 218 gum

drops. How many gum drops do they have together?

$$\begin{array}{r} 434 \\ + 218 \\ \hline 652 \end{array}$$

$$400 + 30 + 4$$

$$200 + 10 + 8$$

$$600 + 40 + 12$$

$$600 + 40 + 10 + 2$$

$$600 + 50 + 2$$



Write a word problem for this subtraction equation and then solve it. Show your work!

$$434 - 218 = ?$$

[word problems and solving strategies will vary]

Miguel and Fred are playing a video game together.

Miguel earns 434 points in the game, and Fred

earns 218. How many more points does Miguel

earn than Fred?

$$\begin{array}{r} 434 \\ -218 \\ \hline 216 \end{array} \quad \begin{array}{r} 400 + \overset{20}{\cancel{30}} + \overset{14}{\cancel{4}} \\ - 200 + 10 + 8 \\ \hline 200 + 10 + 6 \end{array}$$

←



What helped you solve the problem?

(strategies may vary)

**Part 1: Skip count with the coins.**

<i>quarter - 25¢</i>	<i>dime - 10¢</i>	<i>nickel - 5¢</i>	<i>penny - 1¢</i>
			

*example*



10



20



30



40



50

10, 20, 30, 40, 50



10



20



30



40



50



60



70



80



5



10



15



20



25



30



35



25



50



75



100



125



150



10



20



30



35



40



45



50

Part 2: Find the total for each group of coins:

25 50 60 70 80 85 90 95 96 97

97¢

10 20 30 40 50 55 60 65 70 75 80 81 82 83 84

\$1.84



What strategies did you use? (may vary)

Skip counting, grouping coins, grouping amounts, etc.

**Part 1: Label each clock with the correct time:**



5 : 00



2 : 45



12 : 45



11 : 24



10 : 41



10 : 58

**Answer the questions and show the time on the clock:**

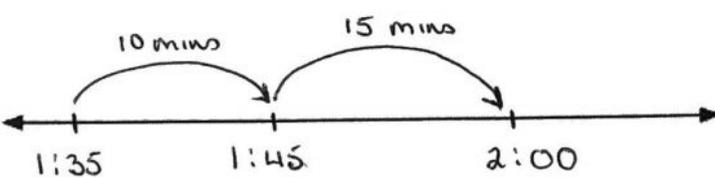
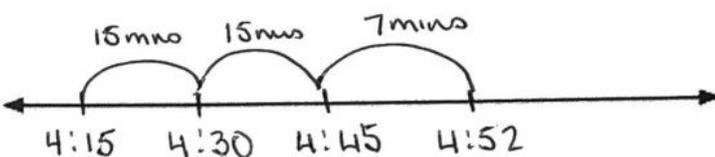
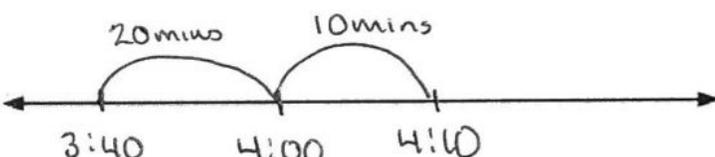
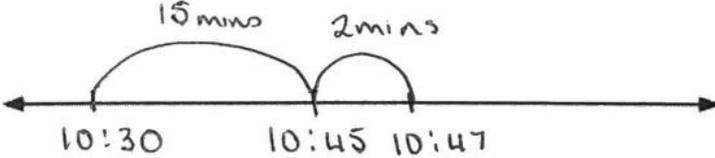
What time is it 5 minutes after 5:05? 5:10



What time is it 5 minutes before 6:30? 6:35



**Part 2: Show the elapsed time on the clocks and number line:**

Start time	Stop time	Elapsed time
 <p><u>1 : 35</u></p>	 <p><u>2 : 00</u></p>	 <p>Elapsed time: 25 minutes</p>
 <p><b>4:15</b></p>	 <p><b>4:52</b></p>	 <p>Elapsed time: 37 minutes</p>
 <p><u>3 : 40</u></p>	 <p><u>4 : 10</u></p>	 <p>Elapsed time: 30 minutes</p>
<p>Recess starts at 10:30 and ends at 10:47. How long is recess?</p> <p>Recess is 17 minutes long.</p>		



**What strategies did you use?**

(strategies will vary)

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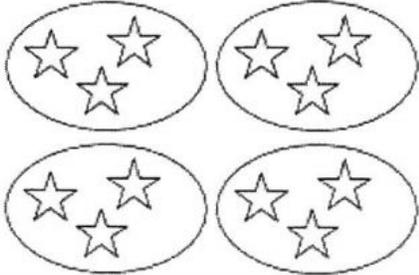
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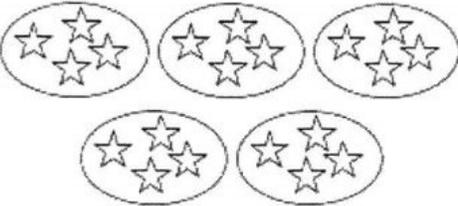


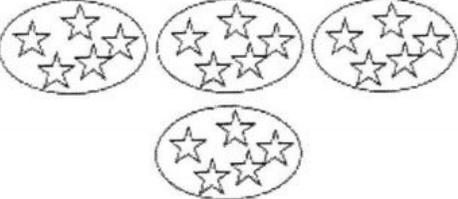
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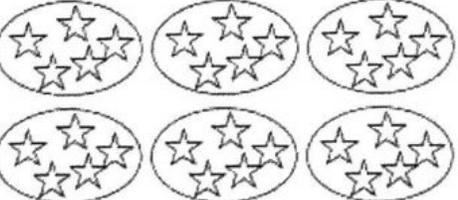
## Part 1: Circles and Stars

Find the total number of stars in each row. Write a multiplication equation!

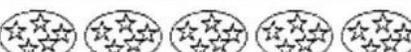
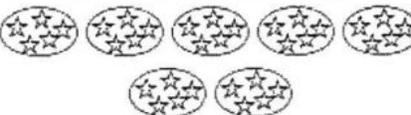
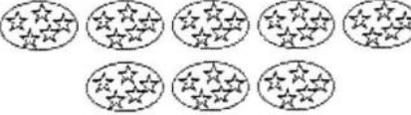
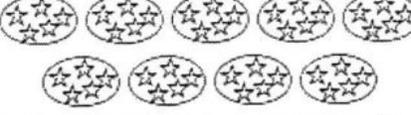
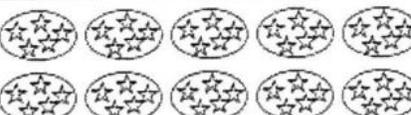
	How many circles?	How many stars in each circle?
	4	3
	How many stars altogether?	
	$4 \times 3 = 12$	

	How many circles?	How many stars in each circle?
	5	4
	How many stars altogether?	
	$5 \times 4 = 20$	

	How many circles?	How many stars in each circle?
	4	5
	How many stars altogether?	
	$4 \times 5 = 20$	

	How many circles?	How many stars in each circle?
	6	5
	How many stars altogether?	
	$6 \times 5 = 30$	

## Part 2: Patterns in equal groups

	Circles	Stars in each circle	Stars altogether
	1	5	$1 \times 5 = 5$
	Circles	Stars in each circle	Stars altogether
	2	5	$2 \times 5 = 10$
	Circles	Stars in each circle	Stars altogether
	3	5	$3 \times 5 = 15$
	Circles	Stars in each circle	Stars altogether
	4	5	$4 \times 5 = 20$
	Circles	Stars in each circle	Stars altogether
	5	5	$5 \times 5 = 25$
	Circles	Stars in each circle	Stars altogether
	6	5	$6 \times 5 = 30$
	Circles	Stars in each circle	Stars altogether
	7	5	$7 \times 5 = 35$
	Circles	Stars in each circle	Stars altogether
	8	5	$8 \times 5 = 40$
	Circles	Stars in each circle	Stars altogether
	9	5	$9 \times 5 = 45$
	Circles	Stars in each circle	Stars altogether
	10	5	$10 \times 5 = 50$



What patterns do you see? May include:

- The products increase by 5 each time
- The number we multiply by 5 increases by 1 each time

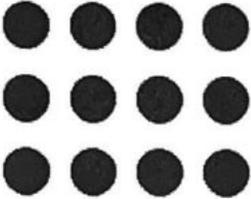
## Part 1: Arrays and Multiplication

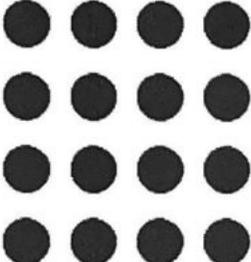
Look at the rows of dots. Each row has 4 dots.

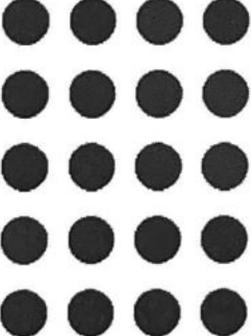
How many rows are there? How many dots altogether?

	How many rows?	How many dots altogether?
	1	$1 \times 4 = 4$

	How many rows?	How many dots altogether?
	2	$2 \times 4 = 8$

	How many rows?	How many dots altogether?
	3	$3 \times 4 = 12$

	How many rows?	How many dots altogether?
	4	$4 \times 4 = 16$

	How many rows?	How many dots altogether?
	5	$5 \times 4 = 20$

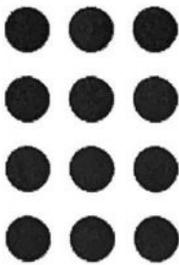


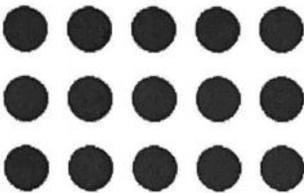
What patterns do you see?

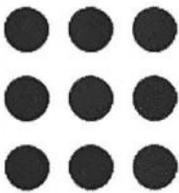
The products (4, 8, 12, 16, 20) are skip  
counting by 4s.

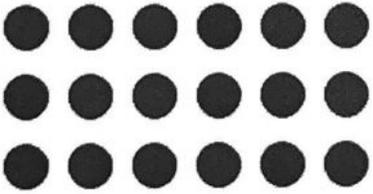
## Part 2: More arrays

Write a multiplication equation for each array:

	rows	columns	total
	4	3	$4 \times 3 = 12$

	rows	columns	total
	3	5	$3 \times 5 = 15$

	rows	columns	total
	3	3	$3 \times 3 = 9$

	rows	columns	total
	3	6	$3 \times 6 = 18$



What patterns do you see?

*(Patterns may vary)*

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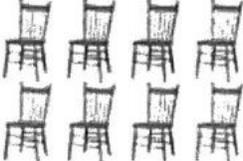
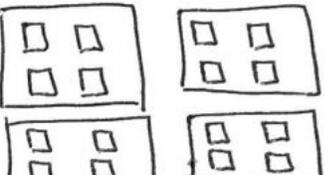
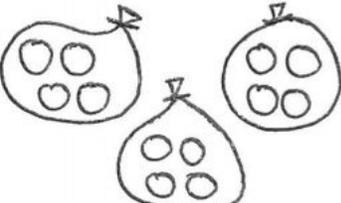
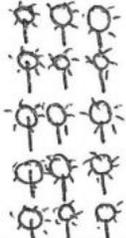
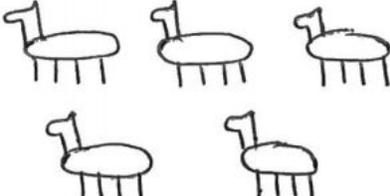
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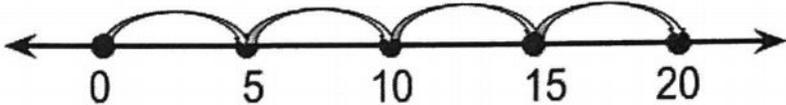
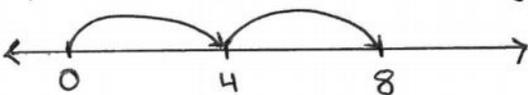
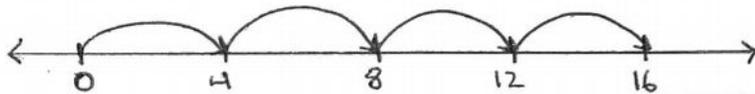
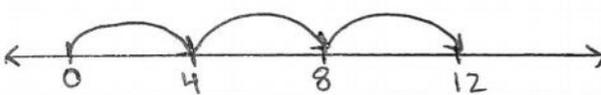
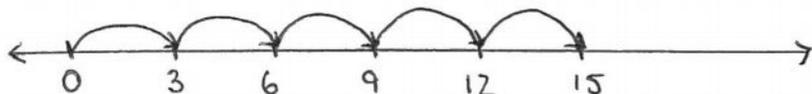
### Part 1: Situations, Groups, Arrays, and Equations,

For each situation, draw equal groups or an array. Then write an equation

situation	group or array?	equation
4 boxes. 5 apples in each box.		$4 \times 5 = 20$
2 rows of chairs. 4 chairs in each row.		$2 \times 4 = 8$
4 packs of juice. 4 cans in each pack.		$4 \times 4 = 16$
3 bags of balls. 4 balls in each bag.		$3 \times 4 = 12$
5 rows of plants. 3 plants in each row.		$5 \times 3 = 15$
4 people. Each person eats 2 oranges.	<p>person #1 ○ ○</p> <p>person #2 ○ ○</p> <p>person #3 ○ ○</p> <p>person #4 ○ ○</p>	$4 \times 2 = 8$
5 dogs. Each dog has 4 legs.		$5 \times 4 = 20$

## Part 2: Patterns with number lines

Draw each multiplication equation as jumps on a number line

equation	Jumps on a number line
$4 \times 5 = 20$	<p>4 jumps. Each jump is 5 long.</p> 
$2 \times 4 = 8$	<p>2 jumps. Each jump is 4 long.</p> 
$4 \times 4 = 16$	<p>4 jumps. Each jump is 4 long.</p> 
$3 \times 4 = \underline{12}$	<p>3 jumps. Each jump is 4 long.</p> 
$5 \times 3 = \underline{15}$	<p>5 jumps. Each jump is 3 long.</p> 



What patterns do you see?

[Patterns will vary]

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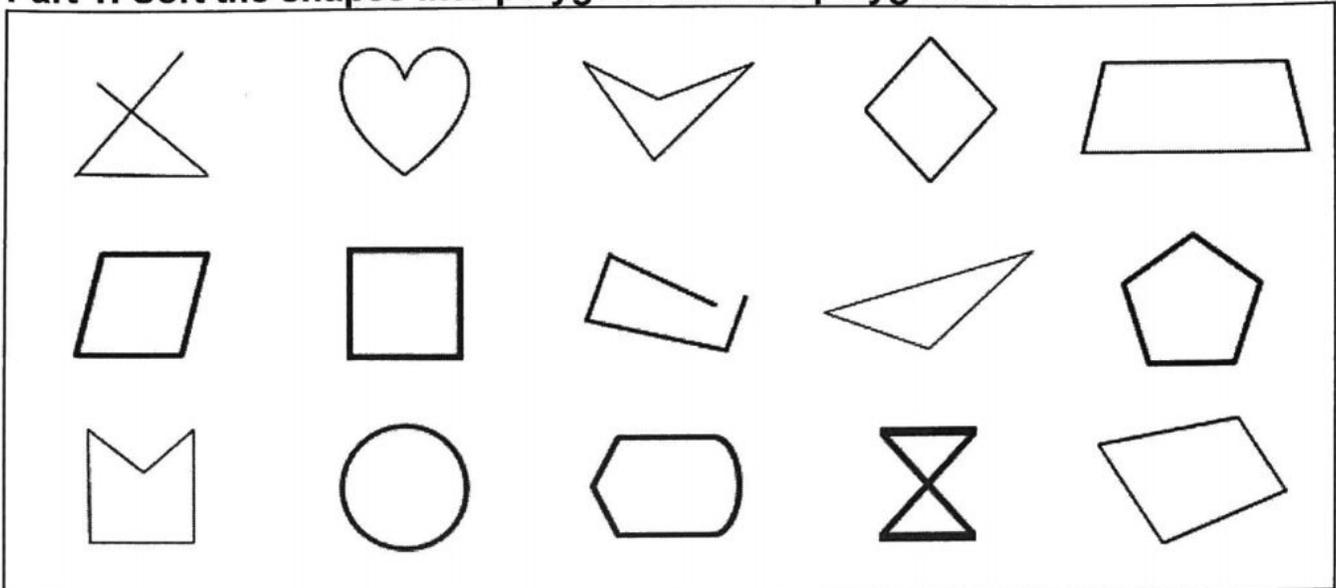


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**Part 1: Sort the shapes into polygons and not polygons:**



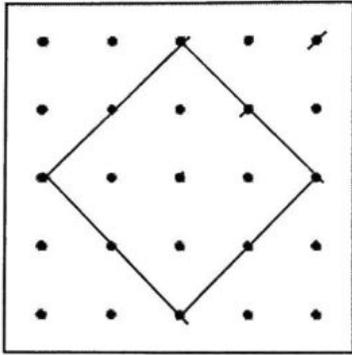
Polygons	Not Polygons



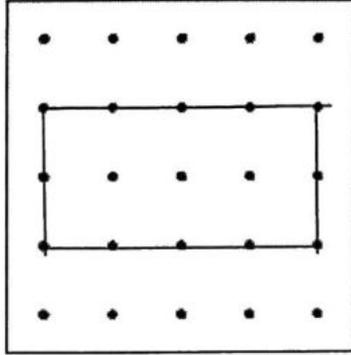
**Pick one shape and tell how you know that it is a polygon.**

 I know that this is a polygon because  
 it is a closed shape that is made of straight  
 lines.

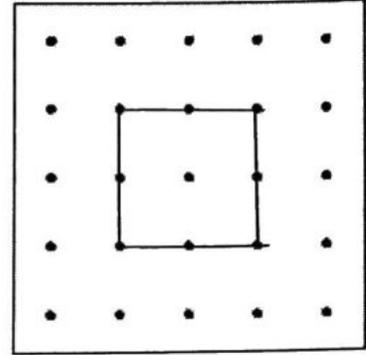
**Part 2: Draw each shape on the Geoboard:**



**rhombus**



**rectangle**



**square**



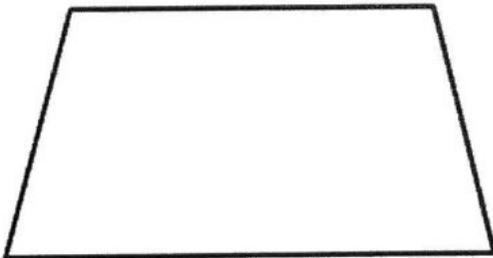
**Pick one shape and tell how you know what it is:**

Rectangle: 4 sides, opposite sides equal

Square: All four sides are equal; all angles are right angles

Rhombus: All four sides are equal.

**Part 3: Describe this shape. Tell about its sides and angles.**



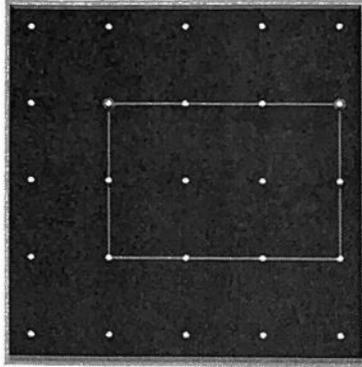
This is a trapezoid. It has

four sides (so it's also a

quadrilateral), and only two

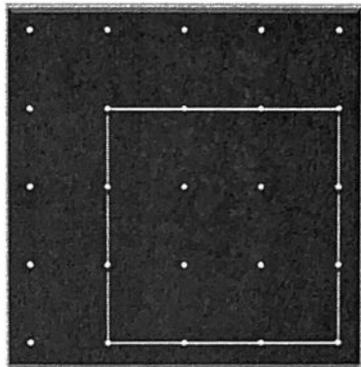
of its sides are parallel.

**Part 1: Find the perimeter of each shape:**



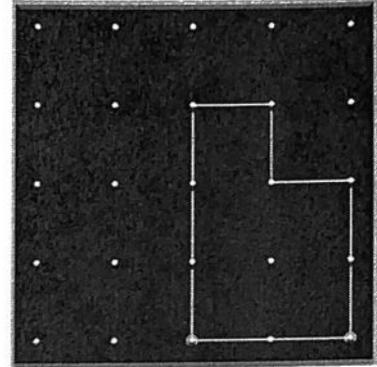
**Perimeter:**

$$3 + 2 + 3 + 2 = 10$$



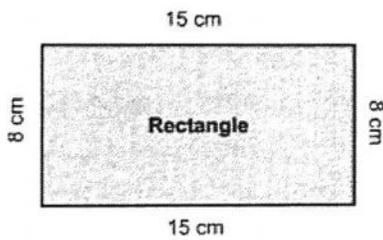
**Perimeter:**

$$3 + 3 + 3 + 3 = 12$$



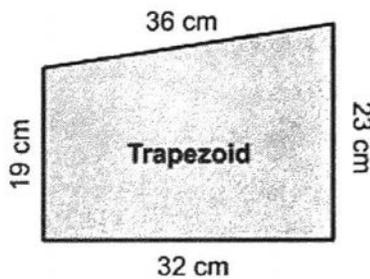
**Perimeter:**

$$1 + 1 + 1 + 2 + 2 + 3 = 10$$



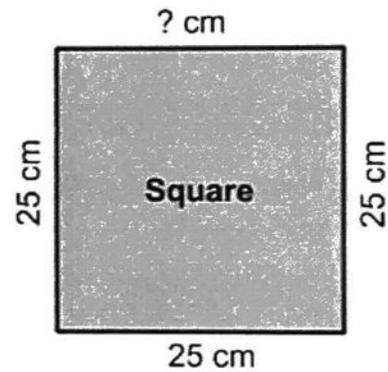
**Perimeter:**

$$8\text{ cm} + 15\text{ cm} + 8\text{ cm} + 15\text{ cm} = 46\text{ cm}$$



**Perimeter:**

$$19\text{ cm} + 36\text{ cm} + 23\text{ cm} + 32\text{ cm} = 110\text{ cm}$$



**Perimeter:**

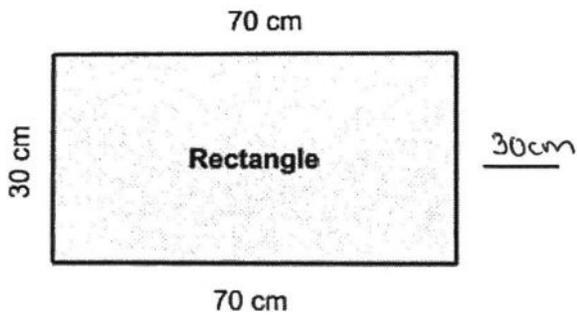
$$25\text{ cm} + \underline{25\text{ cm}} + 25\text{ cm} + 25\text{ cm} = 100\text{ cm}$$



**Pick one shape and tell how you found its perimeter.**

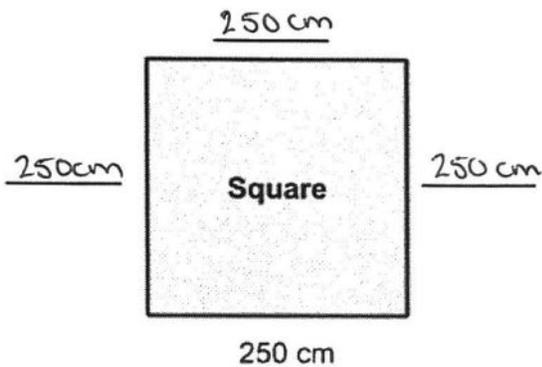
For any shape: I added the lengths of all the sides to find the perimeter

**Part 2: Find the missing length and/or perimeter:**



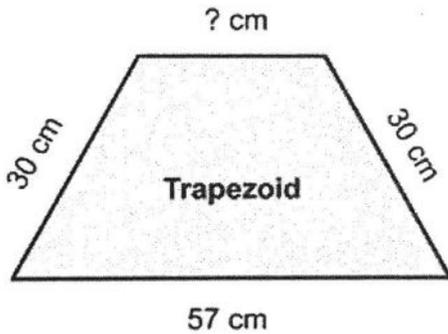
The missing length is 30cm

The perimeter is 200cm



The missing length is 250 cm

The perimeter is 1000 cm



The perimeter is 130 cm.

The missing length is 13 cm



**Pick one shape and tell how you found the missing length.**

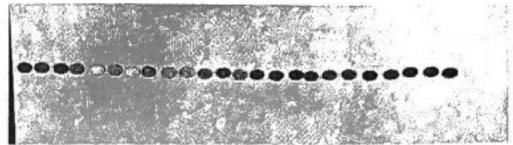
Rectangle: opposite sides are equal, so it was 30cm

Square: all sides are equal so each side is 250cm

Trapezoid: add up the three known sides, then

subtract that sum from 130cm.

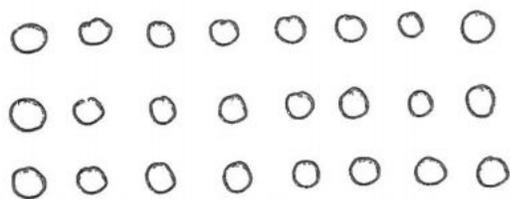
Use 24 pennies (or other objects) and make all the possible arrays. Record the number of rows and columns in the table below.



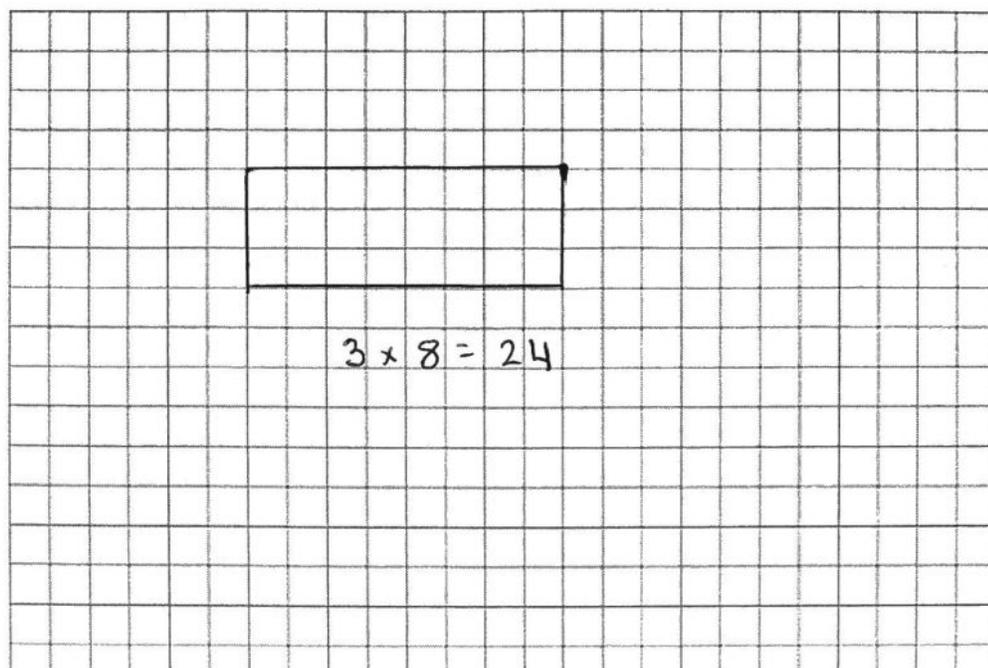
Number of Rows	Number of Columns	Factors	Product
1	24	1, 24	24
2	12	2, 12	24
3	8	3, 8	24
4	6	4, 6	24
6	4	6, 4	24
8	3	8, 3	24
12	2	12, 2	24
24	1	24, 1	24

List all the factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

Choose 1 of the arrays you created with pennies and draw it below.



$$3 \times 8 = 24$$



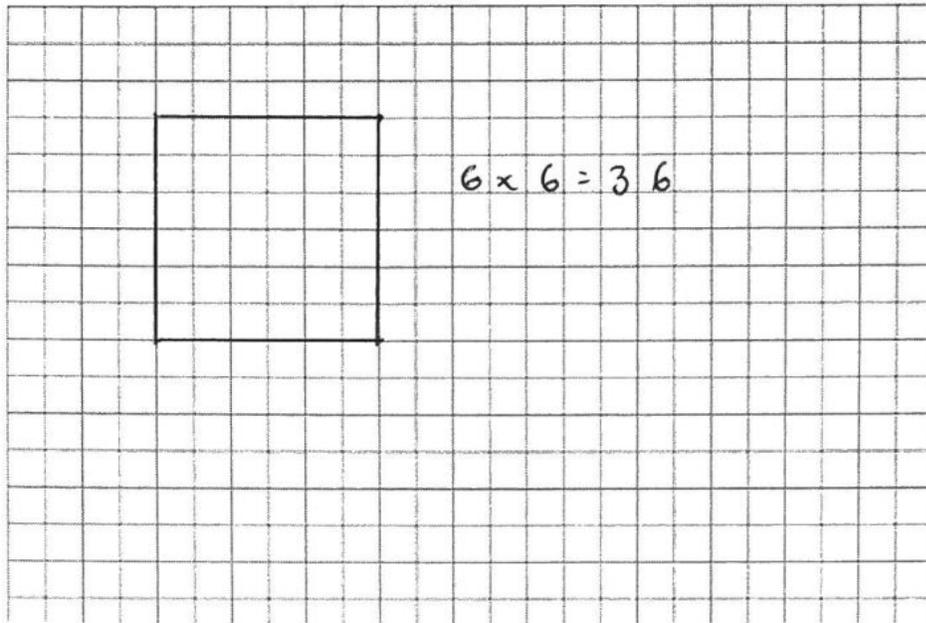
[see diagram on previous page]

Use 36 pennies or other small objects and make all the possible arrays.

Number of Rows	Number of Columns	Factors	Product
1	36	1, 36	36
2	18	2, 18	36
3	12	3, 12	36
4	9	4, 9	36
6	6	6, 6	36
9	4	9, 4	36
12	3	12, 3	36
18	2	18, 2	36
36	1	36, 1	36

List the factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36

Choose 1 of the arrays you created with pennies and draw it below.



The multiples of a number are the numbers you get when you multiply by that number. For example:

The multiples of 2 are:

2, 4, 6, 8, 10, 12, 14, 16, 18, 20

List the multiples of 4:

4, 8, 12, 16, 20, 24, 28, 32, 36, 40

List the multiples of 8:

8, 16, 24, 32, 40, 48, 56, 64, 72, 80

Are there numbers that are multiples of 2 and of 4 and of 8. In other words these numbers are in all three rows.

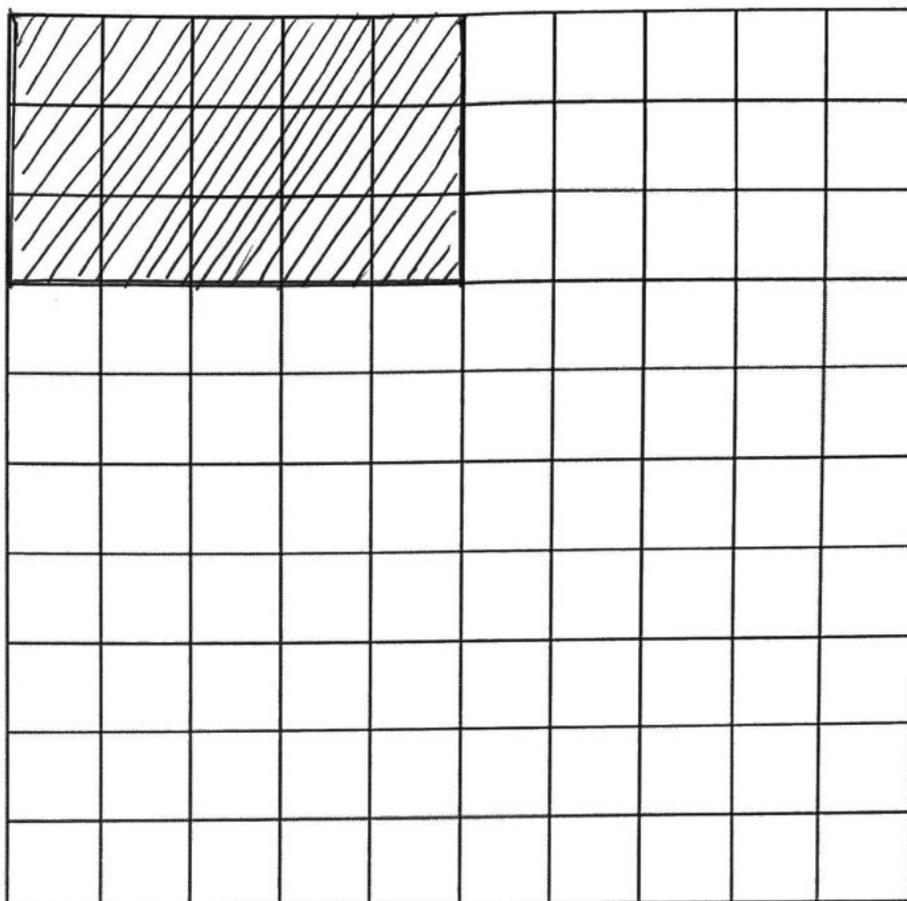
The multiples of 2, 4, and 8 include : 8, 16, 24, 32...

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## How Close to 100



[1 example shown]

1.  $3 \times 5 = 15$

6. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

2. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

7. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

3. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

8. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

4. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

9. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

5. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

10. \_\_\_\_\_  $\times$  \_\_\_\_\_ = \_\_\_\_\_

## Exploring arrays

Use the 100 grids on the next two pages to draw these array:

1 x 1

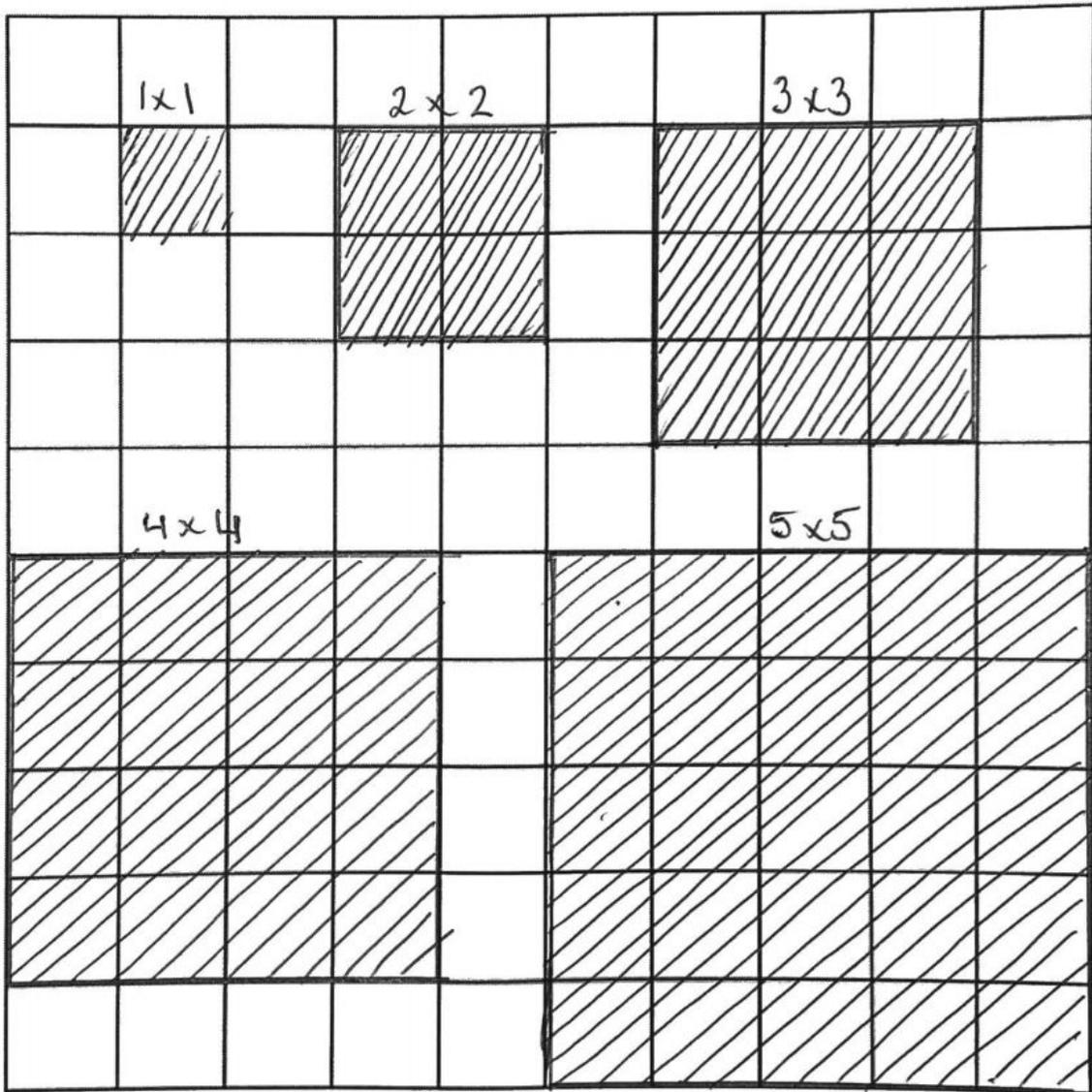
3 x 3

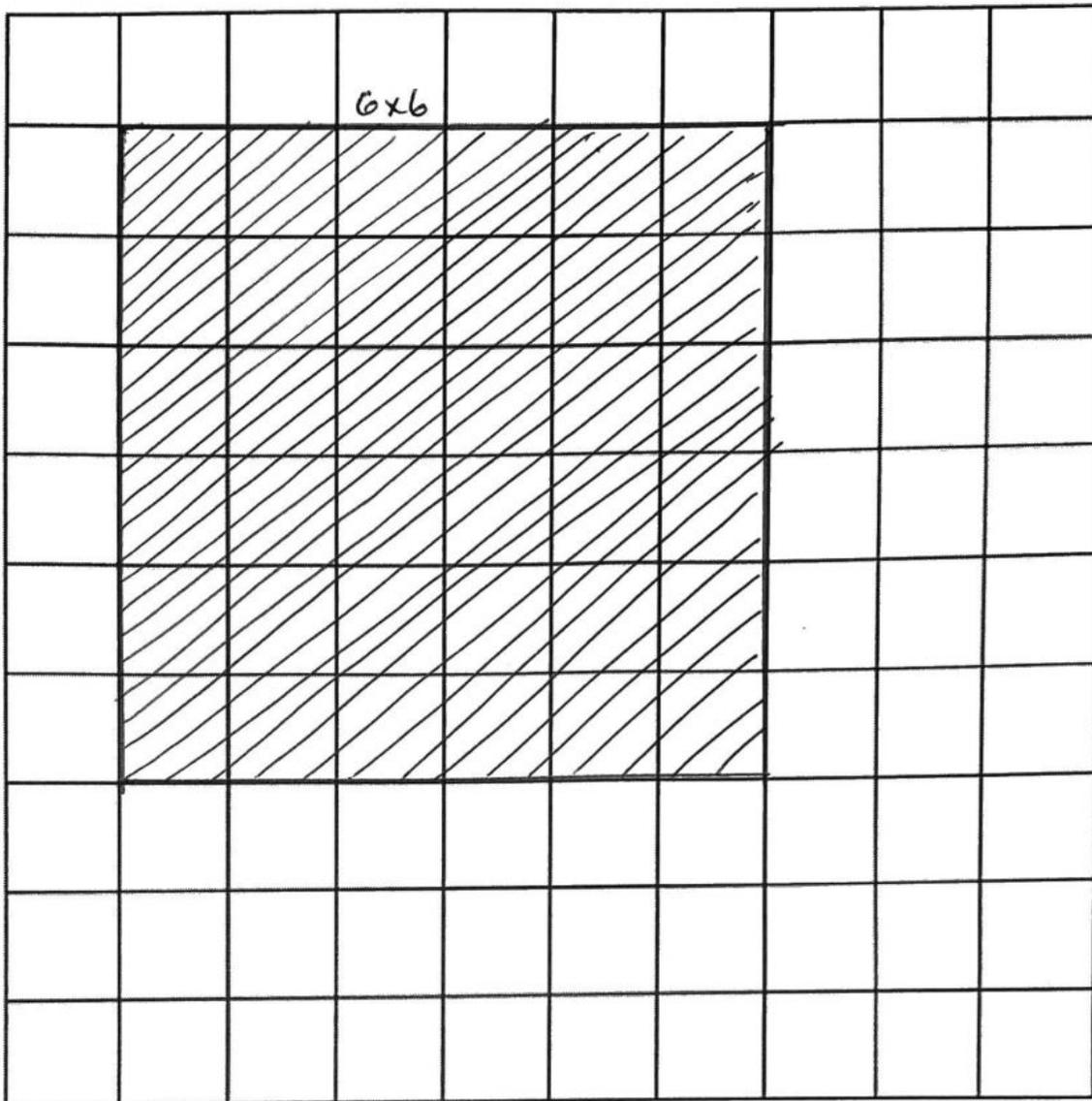
5 x 5

2 x 2

4 x 4

6 x 6





What patterns do notice in these arrays. Without making it what do you know about an 8 x 8 array.

Answers may include: the arrays increase in size; you could

fit 4 of the 2x2 arrays inside the 4x4 array. If we

made the 8x8 array, it would be 4 times the size

of the 4x4 array.