

## Grade 4+: Patterning

Names: \_\_\_\_\_

Date: \_\_\_\_\_

### Collaborative Task

AUGUST 2018						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Project the above August calendar as an example to help students understand the following instructions:

1. Students will choose a day in August from the middle of the array of numbers and circle it.
2. Next, students will draw an oval around that number, together with the number before and the number after it.
3. Then, students will draw a rectangle around the circled number together with the number above and the number below it.
4. Students will add the three numbers in the oval and then the three numbers in the rectangle and compare the two sums.
5. Now students compare these two totals with the middle number that was chosen first.  
“What do you notice?”  
“How are the sums related to the middle number?”  
“Why does this work?”

Photocopy the page that follows for students to use when working in teams. Have students select another “middle” number and mark the two sets of numbers in the same way. Have students record their thinking.

Ask students, “What did you notice? What do you think? What do you wonder?”. Give them a few minutes in pairs or groups to devise an explanation that they can share with the class.

Extension: have students apply “calendar patterns” to different hundreds charts (we’ve included a sample of a ‘bottoms up’ hundreds chart ~ Graham Fletcher). See examples: page 7 Waterloo Patterns Resource. <https://www.cemc.uwaterloo.ca/resources/invitations-to-math/Patterns-Grade4.pdf>

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4. Add the three numbers in the oval and then the three numbers in the rectangle and compare the two sums.
5. Now compare these two totals with the middle number that was chosen first.

**What do you notice?**

**How are the sums related to the middle number?**

**Why does this work?**

August 2019						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

111	112	113	114	115	116	117	118	119	120
101	102	103	104	105	106	107	108	109	110
91	92	93	94	95	96	97	98	99	100
81	82	83	84	85	86	87	88	89	90
71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
1	2	3	4	5	6	7	8	9	10

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Name: \_\_\_\_\_

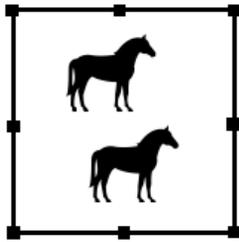
Date: \_\_\_\_\_

Assessment Question	Answer Key														
<p>1. What numbers go in the boxes below to make the following equations true?</p> <div style="text-align: center; margin: 20px 0;"> <math>\square + 4 = 15</math> </div> <div style="text-align: center; margin: 20px 0;"> <math>15 - \square = 11</math> </div>	<p><math>11 + 4 = 15</math></p> <p><math>15 - 4 = 11</math></p>														
<p>2. If the pattern continues, what are the next three numbers?</p> <p style="text-align: center; margin: 20px 0;">1 372, 1 472, 1 572, _____, _____, _____</p>	<p><math>1\ 672, 1\ 772,</math></p> <p><math>1\ 872</math></p>														
<p>3. You read 26 pages of your book on Sunday night, 30 pages on Monday night, 34 pages on Tuesday night, and 38 pages on Wednesday night. If this pattern continues, how many pages will you read on Saturday night? Show your thinking in the space provided using pictures, numbers or words.</p> <div style="margin-top: 20px;">  </div>	<p><math>50</math></p> <p>Create a table:</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td>Sun.</td><td>26</td></tr> <tr><td>Mon.</td><td>30</td></tr> <tr><td>Tues.</td><td>34</td></tr> <tr><td>Wed.</td><td>38</td></tr> <tr><td>Thurs.</td><td>42</td></tr> <tr><td>Fri.</td><td>46</td></tr> <tr><td>Sat.</td><td>50</td></tr> </table>	Sun.	26	Mon.	30	Tues.	34	Wed.	38	Thurs.	42	Fri.	46	Sat.	50
Sun.	26														
Mon.	30														
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Wed.	38														
Thurs.	42														
Fri.	46														
Sat.	50														
<p>4. There are 20 hockey sticks lined up at a bench. Every fourth stick has a white-taped blade. How many hockey sticks have white-taped blades? Show your thinking below in pictures, an equation, or words.</p> <div style="margin-top: 20px;">  </div>	<p><math>5</math></p> <p><math>4 \times 5 = 20</math></p>														

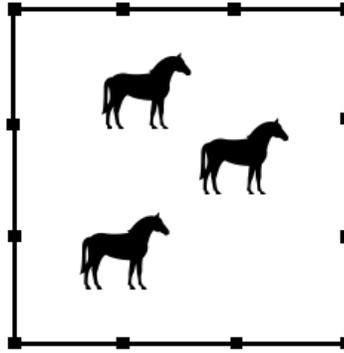
5. A farmer uses lengths of fencing to corral his horses.



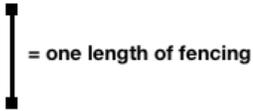
This pen holds one horse



This pen holds two horses



This pen holds three horses



How many lengths of fencing will the farmer need for 8 horses? Represent your thinking using the T table provided.

Number of horses	Lengths of fencing
1	4
2	8
3	
4	
5	
6	
7	
8	

6. Adam and Teri each bring stickers to school on Monday. Adam begins with 36 stickers. Teri begins with 30 stickers. Each school day Adam gives away 5 stickers and Teri gives away 3.

How many stickers will Adam and Teri each have left on Friday? If they keep giving out stickers into the next week, who will run out of stickers first? Show your thinking.

32

Some students will need to continue the table to 8 horses to determine the number of lengths of fencing needed.

Others will realize that the number of fencing lengths is 4 times the number of horses.

Adam's pattern begins at 36 and decreases by 5 each day.

Teri begins with 30 and decreases by 3.

On Friday Adam will have 16 stickers, and Teri will have 18.

7. Tara was making patterns one day with rubber stamps. The picture below shows the first three terms.

Look for a pattern and complete the table. Describe how you used the pattern to determine how many cats and bunny stamps would be in each.



Term 1



Term 2



Term 3

Term	1	2	3	4	5	10	100
Bunny	2	3					
Cat	1	2					

Term 10 would be 10 cats and 11 bunnies.

Term 100 would be 100 cats and 101 bunnies.

Some students will see that the number of bunny stamps is one more than the number of cat stamps.

The number of cats is always the same as the term number.

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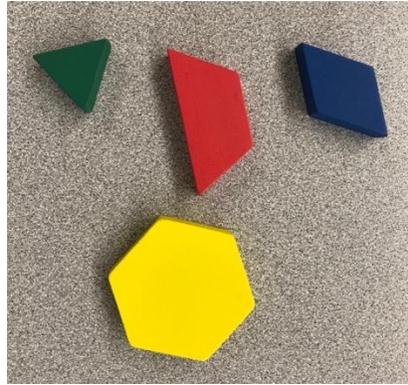
Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Performance Task:

Your teacher wants your help creating a new arrangement of tables for the learning space in your classroom.

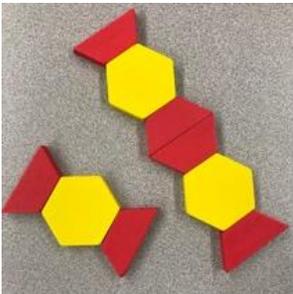
Pick 2 different shapes of tables from the choices below. Imagine arranging the tables to seat a total of 28 students.



A minimum of two tables in your arrangement must be joined.  
Only one student can sit at each side of a table.

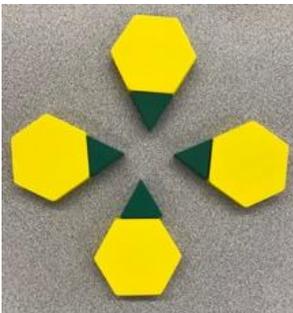
Record the shapes of tables you chose, the number of tables required and the number of students at each table in your arrangement. Organize your information into a chart or drawing.

Two examples of possible table arrangements:



Students need to represent the number and type of table and the number of students sitting at each table/pod.

Students are invited to use pattern blocks to explore and represent their thinking. Students could use iPads to capture their table arrangements and explain their thinking.



[The Doorbell Rang](#) Pat Hutchins & [Spaghetti and Meatballs for All](#) Marilyn Burns (in the back of each of these books is an example of a table problem).

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## Performance Task: Patterning Think Mat:

Students work independently to represent what they know about patterns. Students use the open space to record their thinking in response to the prompt, "Represent as much as you know about patterns." The images in the middle of the mat, fractals, are simply meant to spark thinking.

Students can use the prompts around the perimeter of the mat to stimulate ideas and represent their thinking in pictures, numbers, words.

The page that follows shows the mat enlarged on 8.5 X 11 and can be photocopied for each student.

Describe a pattern found in nature.      Where do you see patterns in the world around you??      Are there rules for patterns?

Where else do you find patterns?

Describe an increasing pattern...

Describe a decreasing pattern...

Can you identify, extend and create a pattern?

**Represent as much as you know about patterns...**



How do you know a pattern is a pattern?      How would you label a pattern?      How do tables and charts help us understand number patterns?

We hope for multiple representations of understanding of patterns. Where do children see patterns in the world around them?

Change in patterns can be represented in a variety of ways (i.e tables, charts, graphs, pictures, numbers, real life context).