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Checkerboards & More
Day 5

Introduction

This activity allows students to explore number patterns they make on a grid. By changing the size of the grid and the number they count by students discover different patterns that are made on the grid. After exploring with pictures they begin to generalize and make conjectures as to how to create different patterns. Exploring and generalizing through visuals are an important aspect of mathematics.

Agenda

Activity	Time	Description/Prompt	Materials
Mindset Message	10 min	Play the mindset video, ***Brains Grow and Change***, https://youcubed.org/weeks/week-4-grade-3-5/	Mindset Video day 5, ***Brains Grow and Change***
Launch	10 min	• Give students a hundred chart and ask them to identify different patterns they see in the numbers. • Discuss as a class the different patterns students found • Show the "What pattern is this?" sheet and ask students to share what they think this pattern could be. • Discuss student conjectures about the pattern.	• Hundred chart for display • Colored pencils or pens • "What pattern is this?" Sheet to display
Explore	20 min	• Give students a copy of Checkerboards and More handout • Give students time to explore different sized grids and count-by numbers.	• Checkerboards & More Handout • Graph paper • Math journals • Pencils • Colored pencils or pens
Discuss	10 min	Invite students to share their findings: • What patterns do you notice? • What conjectures can you make if you extended the grid?	
Debrief Mindset Message	5 min	Remind students of the video messages they heard – that there is no such thing as a math brain or a math person! Anyone can learn any level of math with hard work and effort!	

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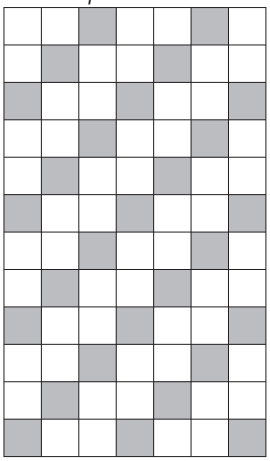
Activity

Launch the activity by asking students to explore and share any patterns they notice on a hundred chart. After the class discussion show students the "What pattern is this?" page. Ask them to share their ideas about what numbers the think the pattern shows. They will most likely see it as multiples of 3. Ask them if their answer would be different if they knew what numbers were in the grid. For example, what if the grid was counting by 2's.

What pattern is this?



What if the grid counts by 2's?

2	4	6	8	10	12	14
16	18	20	22	24	26	28
30	32	34	36	38	40	42
44	46	48	50	52	54	56
58	60	62	64	66	68	70
72	74	76	78	80	82	84
86	88	90	92	94	96	98
100	102	104	106	108	110	112
114	116	118	120	122	124	126
128	130	132	134	136	138	140
142	144	146	148	150	152	154
156	158	160	162	164	166	168

Introduce the problem and distribute the Checkerboards & More handout to students and give them graph paper and colored pens or pencils. Allow them to work in partners or groups as they sketch different grids and explore their patterns.

As students are working, notice how students are counting. It can be challenging for students to color the same number every time. You might check in with students by asking them what number they are using to count by and what size grid they are using.

As students work, encourage them to record their findings. What are they noticing? Do they see any patterns as they try different sized grids and different ways of counting? Students will approach this activity in many ways. Some students may explore the same size grid and change the counting number; others may explore the same counting number on different sized grid. It is helpful to notice these different approaches so that in the class discussion you can share all the different methods and strategies students used.

After students have time to explore different grids and make conjectures about how to make different patterns on different sized grids, invite students to share their findings. Record their conjectures on the board. Share with students that part of being a mathematician involves exploring problems, finding patterns and making conjectures.

When wrapping up the discussion, encourage students to continue exploring these patterns on their own.

Extensions

- What designs can you make if you count by one number and then a different number on the same grid? What if you use a third number? What if you use different colors? What if you use the same color?

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Hundred Chart

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	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

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What pattern is this?

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What pattern is this if the grid is counting by 2's?

2	4	6	8	10	12	14
16	18	20	22	24	26	28
30	32	34	36	38	40	42
44	46	48	50	52	54	56
58	60	62	64	66	68	70
72	74	76	78	80	82	84
86	88	90	92	94	96	98
100	102	104	106	108	110	112
114	116	118	120	122	124	126
128	130	132	134	136	138	140
142	144	146	148	150	152	154
156	158	160	162	164	166	168

Checkerboards & More

Make some checkerboard patterns of your own;

- Explore what numbers make vertical and diagonal lines on different sized grids.
- Explore what sized grids and numbers make vertical and diagonal lines on your checkerboards.
- Explore what grid sizes and numbers make checkerboard patterns.
- What other patterns can you create?