


Grade 8 Mathematics

Patterns, Relations, and Functions: Lesson 5

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol () by them.

Purpose of Lesson 5:

- In this lesson, the tutor and the students will
 - ✓ look for patterns in multiples of numbers on a hundreds chart, and
 - ✓ look for patterns in a calendar.

Equipment/Materials Needed:

- Copies of Student Sheet 121
- Paper and pencils
- Chalkboard

Preparations before beginning Lesson 5:

- Run one copy of Student Sheet 121 for each student.
- Have paper and pencils available.

Lesson 5: Patterns, Relations, and Functions

📄 Give students Student Sheet 121.

Say:

Shade numbers in each hundred's chart using the multiple given. Remember, you say the multiples of a number when you skip count by that number.

What patterns do you see in the multiples of two? (These patterns are some that you should make sure the students see. Only even numbers are shaded. Every other column is shaded. The one's digit is 2, 4, 6, 8, or 0. Every other number is colored.)

What patterns do you see in the multiples of three? [In the rows, I left two spaces uncolored; then I colored one space; I left two spaces uncolored, etc. The same coloring scheme happens in the columns. Diagonals are shaded. In the diagonals, when viewed from right to left, the ten's digit increases and the one's digit decreases. The sum of the digits of each number shaded can be divided evenly (is divisible) by three.]

What patterns do you see in multiples of eight? (The one's digit is 2, 4, 6, 8, or 0. I see diagonals. I skip three in every column. Not many numbers are shaded.)

What patterns do you see in the multiples of seven? (The one's digit can be any number. There are no more than two numbers shaded in any row or column.)

What patterns do you see in the multiples of four? (The one's digit is either 2, 4, 6, 8, or 0. This pattern was the same as the multiples of 2 and 8. In rows, I shaded every fourth number. In columns, I shaded every other number. In a diagonal, going from right to left, the ten's digit increases by one and the one's digit decreases by 2.)

Say:

Look at all the charts. Do you see any common patterns in them? (Only the multiples of two (2) have entire rows shaded. The multiples of 2, 4, and 8 have only even number shaded. The multiples of three (3) have two numbers not shaded between shaded numbers in each column. There are many other patterns. I discover new ones every time I do this activity.)


Say:

Look at the calendar. There are patterns in calendars, as well as hundreds charts. Look at the Fridays in the month. List the dates. (2, 9, 16, 23, 30) Do you see a pattern in these numbers? (add 7)

List the dates of all of the Thursdays? (1, 8, 15, 22, 29) Do they follow the same pattern? (Yes. Add 7.) Look at the four numbers in the square, 1, 2, 8, and 9. Find a shortcut to add these four numbers. (One way is to add 1 and 9, or 2 and 8, and double it.) Choose four other numbers in a square. Does your shortcut work? (Answers will vary, but get students to explain their shortcuts.) Look at 16, 17, 23, and 24. If you add $16 + 24$, you get 40. You get the same thing (40) if you add $17 + 23$, so you could add one pair of numbers and double it.

Say:

I am thinking of three numbers. My three numbers are adjacent (next to one another) in a row, column, or diagonal. The sum of these three numbers is six. What three numbers am I thinking about? (1, 2, and 3) I am thinking of three numbers that again are adjacent in a row, column, or diagonal. The sum of the 3 numbers is 39. What are my three numbers? (12, 13, 14 or 6, 13, 20; or 5, 13, 21; or 7, 13, 19) Give a few more problems such as these. The sum of the numbers is 66. What are the three numbers? (21, 22, 23; or 14, 22, 30; or 16, 22, 28) The sum of the numbers is 45. What are the three numbers? (8, 15, 22; or 7, 15, 23; or 9, 15, 21) The trick is to think of a number and then to multiply it by three. This operation will give you the sum: for example, think of 12. Multiply 12 by three. This operation gives a sum of 36. The other two numbers will be the one adjacent to 12 on a diagonal such as 4, 12, 20 or 6, 12, 18 or in a column such as 11, 12, 13. The reason this operation works is that, if you take 1 from the 13 and give it to the 11, you have 12, 12, 12, or 12×3 .

 Have one student summarize today's lesson. Having students search for patterns improves their number sense and their flexibility with numbers.

Student Sheet 121 (Patterns: Lesson 5)

Multiples of 2

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

Multiples of 3

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

Multiples of 8

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

Student Sheet 121 (Patterns: Lesson 5) continued

Multiples of 7

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

Multiples of 4

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

Calendar

June						
S	M	T	W	TH	F	S
				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	