LESSON 5

Using Patterns in a Multiplication Chart

The **row** and **column** for the same factor have the same numbers.
The factors 6 and 7 are highlighted.
They show that:
$6 \times 7 = 42$ and $7 \times 6 = 42$

Column

x	1	2	3	4	5	6	7
1	1	2	3	4	5	6	7
2	2	4	6	8	10	12	14
3	3	6	9	12	15	18	21
4	4	8	12	16	20	24	28
5	5	10	15	20	25	30	35
6	6	12	18	24	30	36	42
7	7	14	21	28	35	42	49

Explore

Look at this multiplication chart.
How is it the same as the chart above? How is it different?
Use the chart to write ten multiplication facts.

x	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81

Show and Share

Share your facts with another pair of students.
What patterns do you see in products with factors of 2?
With factors of 5?
What other patterns can you find?

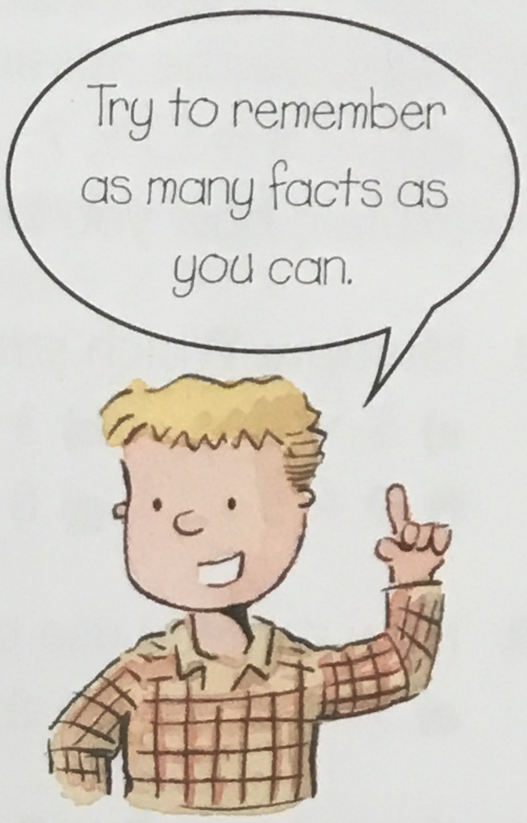
Connect

You can use patterns to remember multiplication facts.

- In a multiplication chart, there are matching numbers on each side of the diagonal from 0 to 81.

You can use these numbers to help you remember multiplication facts.

x	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	18
3	0	3	6	9	12	15	18	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	18	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	18	27	36	45	54	63	72	81



If you know:

$7 \times 6 = 42$
$8 \times 5 = 40$
$9 \times 4 = 36$

then you know:

$6 \times 7 = 42$
$5 \times 8 = 40$
$4 \times 9 = 36$

➤ You can use patterns to remember multiplication facts with 9.

The number multiplied by 9 is always 1 more than the tens digit in the product; for example:

6 is 1 more than 5. → **6** × 9 = **54**

7 is 1 more than 6. → **7** × 9 = **63**

$1 \times 9 = 9$
$2 \times 9 = 18$
$3 \times 9 = 27$
$4 \times 9 = \mathbf{36}$
$5 \times 9 = \mathbf{45}$
$6 \times 9 = \mathbf{54}$
$7 \times 9 = \mathbf{63}$
$8 \times 9 = 72$
$9 \times 9 = 81$

The digits in the product always add to 9; for example:

$3 + 6 = 9$

$4 + 5 = 9$

Practice

1. What are the missing numbers?
   a) $7 \times 6 = \square \times 7$ **b)** $8 \times 3 = 3 \times \square$ **c)** $\square \times 9 = 9 \times 6$ **d)** $4 \times \square = 6 \times 4$
   Explain how you know.

2. Multiply. Which strategies did you use?
   a) 5×8 **b)** 3×9 **c)** 4×4 **d)** 6×7 **e)** 2×7
   f) 9×5 **g)** 8×8 **h)** 8×6 **i)** 1×7 **j)** 4×7

3. How can you use patterns to find each product?
   a) 7×9 **b)** 8×9 **c)** 9×9 **d)** 9×6 **e)** 5×9

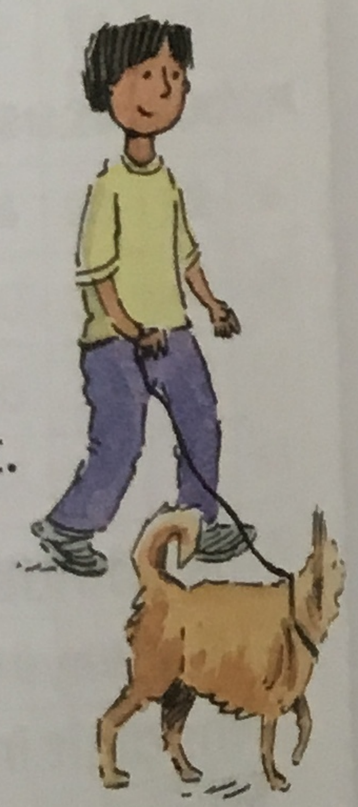
4. If you know 7×8, what else do you know?

5. Show how you know each product.
   a) 8×5 **b)** 8×6 **c)** 6×9 **d)** 7×8 **e)** 6×3

6. How many days are there in 8 weeks? 9 weeks? How do you know?

7. Write a multiplication fact for each product.
   How many different facts can you find for each product?
   a) 12 **b)** 16 **c)** 18 **d)** 24 **e)** 36

8. Use a copy of the multiplication chart.
   Colour a design on the chart.
   Write a multiplication fact for each product you coloured.
   Exchange your facts with a classmate.
   Draw your classmate's design on another multiplication chart.



9. Yana walks his dog every day for 2 hours.
   How many hours does Yana walk his dog in 5 weeks?
   Show your work.

Reflect

A student cannot remember that $9 \times 7 = 63$.
What strategy might the student use to remember this fact?
Use words, pictures, or numbers to explain.