

Unit 4: Use Patterns to Multiply by 0,1,2,5, and 10

4-1 Use Patterns to Multiply by 2

Learn

Melanie will double the salsa recipe.

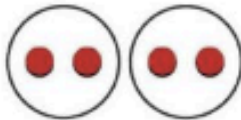
How can you determine how much of each ingredient she needs?

Salsa recipe

1 onion
2 cloves of garlic
3 wedges of lime
4 peppers
5 tomatoes

► **One Way** You can represent each ingredient with counters and double the amount.

2 groups of 2 cloves of garlic



► **Another Way** Multiply each ingredient by 2. Use a multiplication fact table to determine multiples of 2.

X	0	1	2	3	4	5
0	0	0	0	0	0	0
1	0	1	2	3	4	5
2	0	2	4	6	8	10
3	0	3	6	9	12	15
4	0	4	8	12	16	20
5	0	5	10	15	20	25

There is a pattern with multiples of 2.

$$1 \times 2 = 2 \quad 2 \times 2 = 4 \quad 3 \times 2 = 6 \quad 4 \times 2 = 8 \quad 5 \times 2 = 10$$

Multiplying by 2 is the same as doubling.

The multiples of 2 always have a 0, 2, 4, 6, or 8 in the ones place.

Math is... Connections

How is multiplying by 2 related to doubling?

Work Together

Melanie packs 1 yogurt, 7 baby carrots, and 9 grapes. She packs the same lunch for her brother. How can you find the number of each item she needs to pack 2 lunches? **Multiply each number by 2: 2 yogurts, 14 baby carrots, and 18 grapes.**

Unit 4: Use Patterns to Multiply by 0,1,2,5, and 10

4-2 Use Patterns to Multiply by 5

Learn

Ryo puts photos in an album.
He puts 5 photos on each page.

How can you determine the number of photos he uses to fill 3, 4, 5, and 6 pages?



► **One Way** You can use an array to represent the problem. **Skip count** by 5s to find multiples of 5.



5, 10, 15, 20, 25, 30
6 rows of 5 equal 30

► **Another Way** You can multiply each number by 5. Use a multiplication fact table to find the products.

X	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6
2	0	2	4	6	8	10	12
3	0	3	6	9	12	15	18
4	0	4	8	12	16	20	24
5	0	5	10	15	20	25	30
6	0	6	12	18	24	30	36

$$3 \times 5 = 15 \quad 4 \times 5 = 20$$
$$5 \times 5 = 25 \quad 6 \times 5 = 30$$

There is a pattern with multiples of 5.
Multiples of 5 have a 0 or 5 in the ones place.

Math is... **Modeling**

How does the array represent the problem?

Work Together

Cho is giving each of her friends 5 trading cards. What do you know about the total number of cards Cho will give away?

Sample answer: The total number of cards will have a 0 or 5 in the ones place.

Unit 4: Use Patterns to Multiply by 0,1,2,5, and 10

4-3 Use Patterns to Multiply by 10

Learn

Joon has a collection of dimes.

How can you find the value of Joon's dimes?



► **One Way** You can skip count by 10s to find the value in cents of different numbers of dimes.



► **Another Way** Multiply 10 by the number of dimes. Use a multiplication fact table to find the product.

$$\begin{array}{ll} 1 \times 10 = 10 & 6 \times 10 = 60 \\ 2 \times 10 = 20 & 7 \times 10 = 70 \\ 3 \times 10 = 30 & 8 \times 10 = 80 \\ 4 \times 10 = 40 & 9 \times 10 = 90 \\ 5 \times 10 = 50 & 10 \times 10 = 100 \end{array}$$

\times	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

When you multiply 10 by a digit, the product has the same digit in the tens place and a 0 in the ones place.

Math is... **Structure**

How can you use the multiplication fact table to skip count by 10?

Work Together

Cornell says he knows the product of 8×10 is 80 without skip counting or multiplying. What pattern might have helped Cornell find the product? **Sample answer: When you multiply 10 by a digit, the product has the same digit in the tens place and a 0 in the ones place. 80 has 8 in the tens place and 0 in the ones place.**

Unit 4: Use Patterns to Multiply by 0,1,2,5, and 10

4-4 Use Patterns to Multiply by 1 and 0

Learn

Quinn has two pencil cases. In each case is one pencil.



How many pencils are in the two pencil cases?

Multiply to find the number of pencils in two pencil cases.



2 cases each with 1 pencil

$$2 \times 1 = 2$$

2 pencils

Multiply to find the number of pencils in two pencil cases.



2 cases each with 0 pencils

$$2 \times 0 = 0$$

0 pencils

There are patterns with multiples of 1 and 0.

$$3 \times 1 = 3 \quad 4 \times 1 = 4 \quad 5 \times 1 = 5 \quad 6 \times 1 = 6$$

$$3 \times 0 = 0 \quad 4 \times 0 = 0 \quad 5 \times 0 = 0 \quad 6 \times 0 = 0$$

Any number multiplied by 1 equals itself.

Any number multiplied by 0 equals 0.

Math is... Explaining

How is 2×1 related to 1×2 ?

Work Together

There are 3 blue eggs, 2 white eggs, 1 spotted egg, and 0 brown eggs in each nest. How many of each type of egg are in 4 nests?

Sample answer: There are $3 \times 4 = 12$, 12 blue eggs; $2 \times 4 = 8$, 8 white eggs; $1 \times 4 = 4$, 4 spotted eggs; $0 \times 4 = 0$, 0 brown eggs.

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Unit 4: Use Patterns to Multiply by 0, 1, 2, 5, and 10

4-5 Multiply Fluently by 0, 1, 2, 5, and 10

Learn

Zion fills each of 4 gift bags with 10 stickers, 2 cars, 5 sticky hands, and 1 bottle of bubbles. He puts 0 stamps in the gift bags.



How can he use patterns to determine the number of each type of toy he needs?

When you multiply a digit by 10, the product has the same digit in the tens place and a 0 in the ones place.

$$4 \times 10 = 40 \quad 40 \text{ stickers}$$

Math is... Patterns

How are multiplying with 2 and multiplying with 10 the same? How are they different?

Multiples of 2 have a 0, 2, 4, 6, or 8 in the ones place.

$$4 \times 2 = 8 \quad 8 \text{ cars}$$



Multiples of 5 have a 0 or 5 in the ones place.

$$4 \times 5 = 20 \quad 20 \text{ sticky hands}$$



The product of any number and 0 is 0.

$$4 \times 0 = 0 \quad 0 \text{ stamps}$$



The product of any number and 1 is itself.

$$4 \times 1 = 4 \quad 4 \text{ bottles of bubbles}$$



You can use patterns to help recall facts with factors 0, 1, 2, 5, and 10.

Work Together

Dina arranges her stickers into 10 equal rows. Each row has fewer than 7 stickers. How many stickers might Dina have in all?

Sample answer: Dina might have 0, 10, 20, 30, 40, 50, or 60 stickers.

Unit 4: Use Patterns to Multiply by 0,1,2,5, and 10

4-6 Solve Problems Involving Equal Groups

Learn

There are 20 children in 5 equal groups on the sky ride.

How many children are in each group?

► **One Way** Use multiplication to represent the problem.

$$5 \times ? = 20$$



$$5 \times 4 = 20$$

► **Another Way** Use division to represent the problem.

$$20 \div 5 = ?$$



$$20 \div 5 = 4$$

There are 4 children in each group.

You can use a multiplication equation or a division equation to represent and solve problems involving equal groups.

Math is... Patterns

How can you use multiplication patterns to check that your solution is correct?

Work Together

Ten more children join the group. How can you find the number of children in each of the five carts on the sky ride if there are the same number of children in each cart?

Sample answer: $20 + 10 = 30$; $30 \div 5 = ?$;
Use counters to make 5 equal groups of 6.
There are 6 children in each cart.

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