

Dear Family,

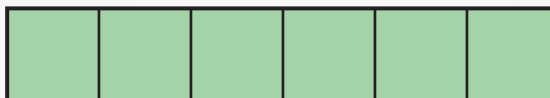
This week your child is exploring multiplication as scaling.



Scaling is changing the size of a quantity by increasing or decreasing it by a certain amount. You can think of scaling as stretching or shrinking.

You can multiply by a number greater than 1 to *increase* the size of a quantity. Multiply by a number less than 1 to *decrease* the size of a quantity.

Look at the size of the rectangle at the right. It has an area of 6 square units.

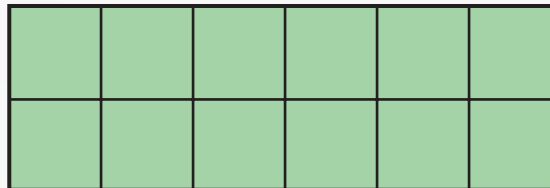


$$1 \times 6 = 6 \text{ square units}$$

If you multiply by 2, you double the size of the rectangle.

$$2 \times 6 = 12 \text{ square units}$$

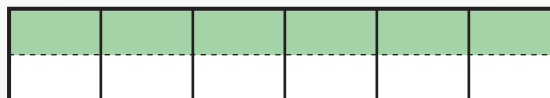
This rectangle is twice as big as the first rectangle.



If you multiply by $\frac{1}{2}$, you shrink the rectangle to half its original size.

$$\frac{1}{2} \times 6 = \frac{6}{2} = 3$$

The shaded rectangle is half as big as the first rectangle.



Your child is learning to generalize about multiplication and scaling. Multiplying by a number . . .

- greater than 1 increases the quantity.
- less than 1 decreases the quantity.
- equal to 1, such as $\frac{4}{4}$, means that the quantity stays the same.

Invite your child to share what he or she knows about multiplication as scaling by doing the following activity together.

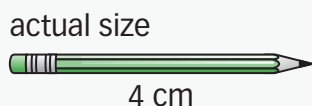


Multiplication as Scaling Activity

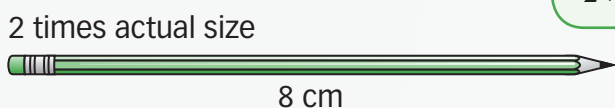


Use the examples below to talk with your child about multiplication as scaling.

- This is the actual size of a pencil that is 4 centimeters long.

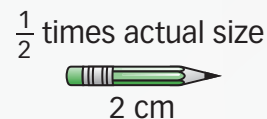


- What if the pencil were twice as long? How long would it be? It would be two times the size of the original pencil. It would be longer because multiplying by 2 is multiplying by a number greater than 1.



$$2 \times 4 \text{ cm} = 8 \text{ cm}$$

- What if the pencil were half as long? How long would it be? It would be half the size of the original pencil. It would be shorter because multiplying by $\frac{1}{2}$ is multiplying by a number less than 1.



$$\frac{1}{2} \times 4 \text{ cm} = 2 \text{ cm}$$

- Ask your child these questions.
 - What if the pencil were 3 times as long? Would it be shorter or longer than the original pencil? How do you know? (longer, because 3 is greater than 1; $3 \times 4 \text{ cm} = 12 \text{ cm}$)
 - What if the pencil were $\frac{3}{4}$ as long? Would it be shorter or longer? How do you know? (shorter, because $\frac{3}{4}$ is less than 1; $\frac{3}{4} \times 4 = 3 \text{ cm}$)
 - What if the pencil were $\frac{4}{4}$ as long? How would the length of the pencil compare to the original pencil? ($\frac{4}{4} = 1$; multiplying by 1 means the pencil would be the same size.)
 - What would it mean to multiply the size of the pencil by $\frac{7}{4}$? How would the size of the pencil change? (It would be longer because $\frac{7}{4}$ is more than 1; $\frac{7}{4} \times 4 = 7 \text{ cm}$.)

