

Topic 01 / Overview

TOPIC 1

Understand Multiplication and Division of Whole Numbers

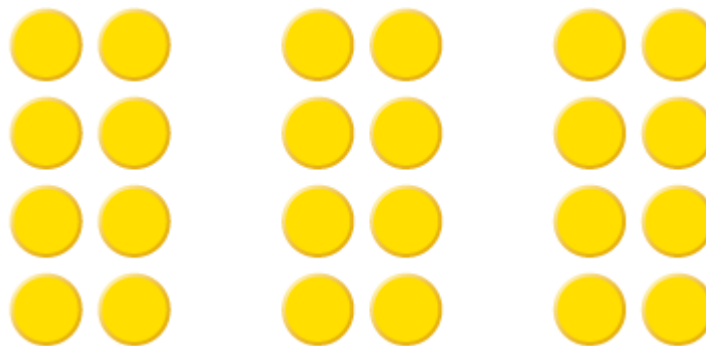


OVERVIEW

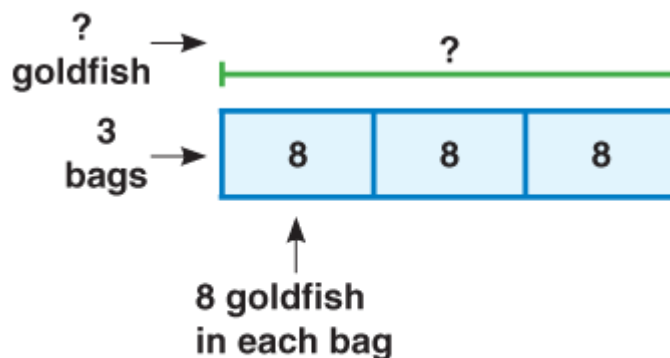
Topic 1 focuses on developing understanding of multiplication and division.

MULTIPLICATION SITUATIONS

Equal-Group Situations Equal-group situations build on the important connection between addition and multiplication. Any expression describing equal groups can be written as repeated addition or as multiplication. These counters represent 3 bags with 8 goldfish in each.



A bar diagram can be used to represent the situation. Then use addition to find the total number of goldfish.



$$8 + 8 + 8 = 24$$

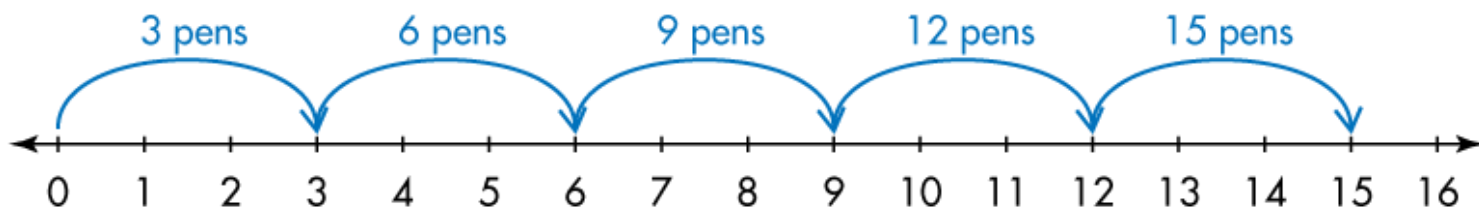
When the groups are equal, the situation can also be expressed as multiplication.

3 times 8 equals 24

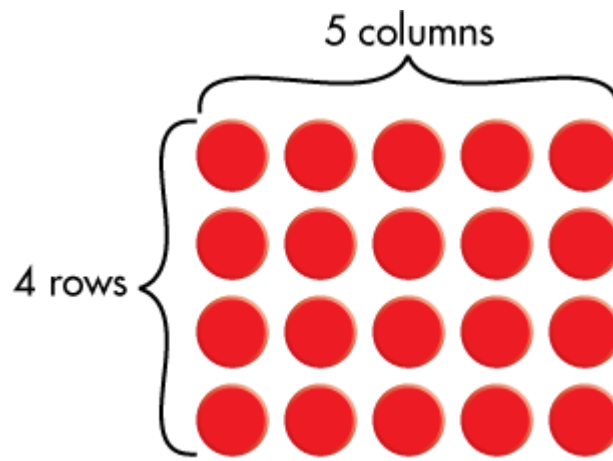
$$\begin{array}{ccccccc}
 3 & \times & 8 & = & 24 \\
 \uparrow & & \uparrow & & \uparrow \\
 \text{factor} & & \text{factor} & & \text{product}
 \end{array}$$

Skip Counting Equal groups can also be represented by skip counting on a number line.

There are 5 sets of 3 glitter pens. How many pens in all? The total can be found by skip counting: 3, 6, 9, 12, 15. The total can also be found using multiplication: $3 \times 5 = 15$.



Arrays An array is a special equal-group situation that is a rectangular arrangement of objects in rows and columns. Your child will find the total number of counters, squares, or other objects based on the number of rows and the number in each row. Both repeated addition and multiplication can be used to find the total number in an array. Arrays illustrate the Commutative Property of Multiplication, which states that numbers can be multiplied in any order and the product will be the same. In other words, you can multiply the number of rows by the number of columns or the number of columns by the number of rows. This array shows 4 rows with 5 counters in each row.

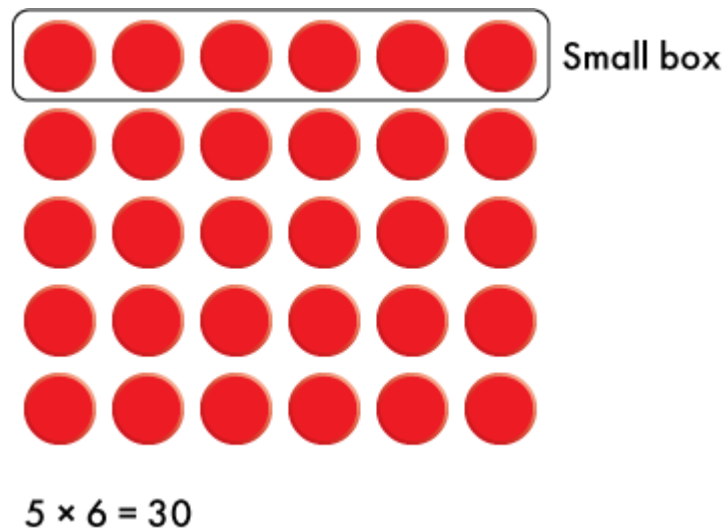


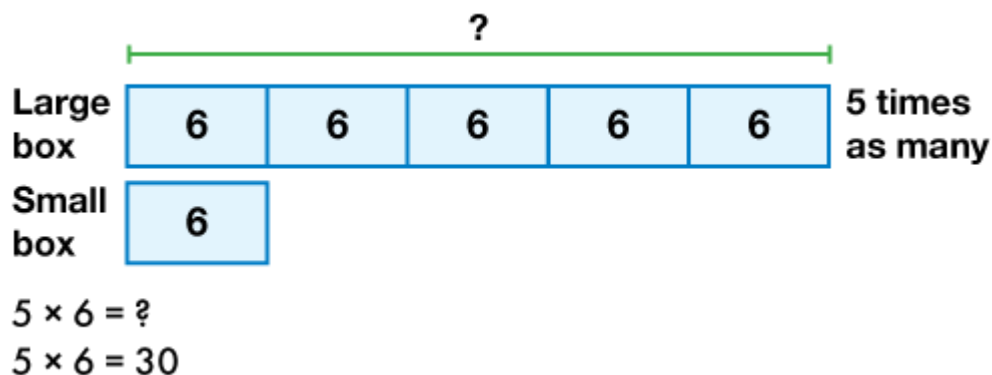
Addition: $5 + 5 + 5 + 5 = 20$

Skip counting: 5, 10, 15, 20

Multiplication: $4 \times 5 = 20$

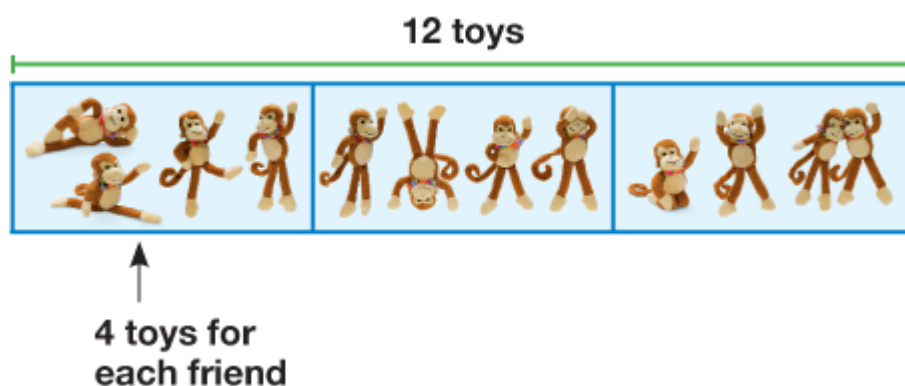
Multiplication to Compare Multiplication can be used to compare quantities, for example, when you say, "There are 4 times as many today than there were yesterday." Here are two ways your child will represent and use multiplication to solve the problem "There are 6 crackers in a small box. There are 5 times as many crackers in a large box. How many crackers are in a large box?"





DIVISION SITUATIONS

Equal Groups: Group Size Unknown Your child will explore division as sharing. In this division situation, a given quantity is shared equally among a given number of groups, and your child will find the number in each group. Here is how your child might represent division into equal groups for the problem "Three friends have 12 toy monkeys to share equally. How many will each friend get?"



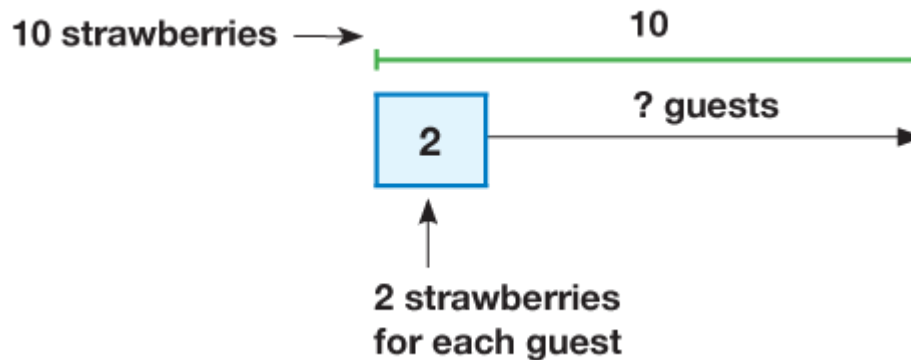
A division equation can be used to show the number in each group.

$$\begin{array}{ccccccc}
 12 & \div & 3 & = & 4 \\
 \uparrow & & \uparrow & & \uparrow \\
 \text{Total} & & \text{Number of equal groups} & & \text{Number in each group}
 \end{array}$$

Equal Groups: Number of Size Unknown Your child will also use division to solve problems in which the number in each group is known, but the number of groups is

unknown. This type of problem can illustrate the relationship between division and repeated subtraction. Here is how your child might represent the problem “June has 10 strawberries to serve to her guests. If each guest gets 2 strawberries, how many guests can June serve?”

Ask, “Ten divided by 2 equals what number?”



To find the number of guests June can serve, see how many times 2 can be subtracted from 10.

$$10 - 2 = 8$$

$$8 - 2 = 6$$

$$6 - 2 = 4$$

$$4 - 2 = 2$$

$$2 - 2 = 0$$

You can subtract 2 five times, so June can serve 5 guests. This can be expressed as division: Ten divided by 2 equals 5, $10 \div 2 = 5$.

Relate Multiplication and Division Your child will learn that related multiplication facts can be used to help with division facts. This array of 3 rows and 10 columns of drums can show the relationship between multiplication and division.



The related multiplication and division is known as a fact family.

$$3 \times 10 = 30 \quad 30 \div 3 = 10$$

$$10 \times 3 = 30 \quad 30 \div 10 = 3$$



CONNECT THE MATH

You can connect the math in this topic to everyday experiences. Look for equal groups at home and when you are out with your child, such as pairs of socks, tires on cars, paper towel rolls in a package, etc. Ask your child to find the total number using repeated addition or multiplication. For example, ask “Each of the 3 cars parked here has 4 tires. How many tires are there in all?” Do the same for division situations, which can be thought of as sharing. If you have to divide up quantities of food among a known number of people, ask how many items each person will receive. If you know how many items you have and how many make a serving, ask how many people you can serve.

TOPIC 1 LESSONS

- Lesson 1-1** [Relate Multiplication and Addition](#)
- Lesson 1-2** [Multiplication on the Number Line](#)
- Lesson 1-3** [Arrays and Properties](#)
- Lesson 1-4** [Use Multiplication to Compare](#)

Lesson 1-5[Division: How Many in Each Group?](#)**Lesson 1-6**[Division: How Many Equal Groups?](#)**Lesson 1-7**[Relate Multiplication and Division](#)**Lesson 1-8****MATH THINKING AND REASONING**

Represent Problems in Multiple Ways