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1 Introduction

1.1 Multiplication

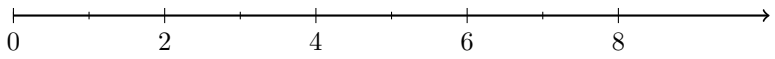
This equation $5 \times 3 = 15$ means 5 groups of 3 is 15.

Examples

1. $2 + 2 + 2 + 2 + 2 + 2 = 6 \times 2 = 12$
2. $4 \times 3 = 3 + 3 + 3 + 3 = 12$
3. $3 \times 4 = 4 + 4 + 4 + 4 = 12$

Exmaple with number line

$4 \times 2 = 8$ is represented by the following number line.



1.1.1 Commutative property of multiplication

3 groups of 4 is equivalent with 4 groups of 3: $3 \times 4 = 4 \times 3 = 12$

1.1.2 Distributive property of multiplication

$4 \times 7 = 4 \times (5 + 2) = (4 \times 5) + (4 \times 2) = 28$

This techniques could be break down an complex problem into eaiser one.

1.1.3 Associative property of multiplication

$4 \times 5 \times 2 = (4 \times 5) \times 2 = 4 \times (5 \times 2) = 40$

The order of multiplication does not matter, but simplify the equation.
Such As:

$$5 \times 18 = 5 \times (2 \times 9) = (5 \times 2) \times 9 = 10 \times 9 = 90$$

1.2 Division

$12 \div 3 = 4$

The relationship between division and multiplication can be described as inverse operations.

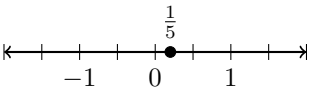
1.3 Fraction

$\frac{1}{4}$ one over four or one fourths, or the division of 1 whole into 4 equal parts.

$\frac{1}{3}$ $\frac{1}{5}$

1.4 Fractions on a number line

$\frac{1}{5}$



$\frac{2}{2} = 1$ whole

$18 + 19 = 37$ happens **regrouping** 1 ten from 8 ones and 9 ones.