

Properties

1-6

Commutative Properties of Addition and Multiplication

Addition

The order in which numbers are added does not change the sum.

$$4 + 7 = 7 + 4$$

For any number a and b ,

$$a + b = b + a$$

Multiplication

The order in which numbers are multiplied does not change the product.

$$6 \cdot 4 = 4 \cdot 6$$

For any numbers a and b ,

$$a \cdot b = b \cdot a$$

Associative Properties of Addition and Multiplication

Addition

The way in which addends are grouped does not change the sum.

$$(4 + 3) + 5 = 4 + (3 + 5)$$

For any numbers a , b , and c .

$$(a + b) + c = a + (b + c)$$

Multiplication

The way in which factors are grouped does not change the product.

$$(4 \cdot 2) \cdot 3 = 4 \cdot (2 \cdot 3)$$

For any number a , b , and c .

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

Identity Properties of Addition and Multiplication

Addition

The sum of an number and zero is the original number.

$$5 + 0 = 5$$

For any number a ,

$$a + 0 = a$$

Multiplication

The product of a factor and one is the factor.

$$7 \cdot 1 = 7$$

For any number a ,

$$a \cdot 1 = a$$

Multiplicative Property of Zero

The product of a factor and zero is zero.

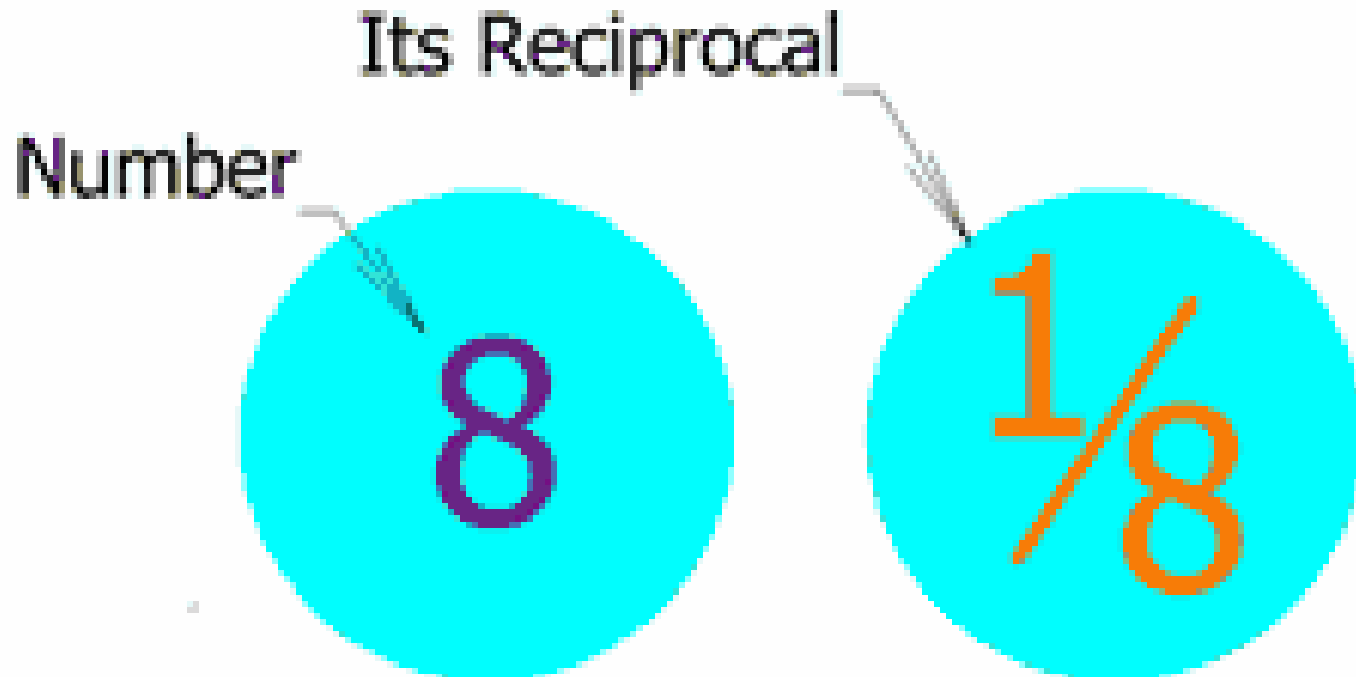
$$2 \cdot 0 = 0$$

For any number a ,

$$a \cdot 0 = 0$$

Reciprocal = Flip it!!!!

- **Reciprocal**
- *If you have a number, the reciprocal is $1 / \text{number}$*
- *If it's a fraction, flip the fraction*



Reciprocal

Find the reciprocal of $\frac{3}{4}$.

$\frac{3}{4}$ and $\frac{4}{3}$ are reciprocals since

$$\frac{3}{4} \times \frac{4}{3} = \frac{12}{12} = 1$$

Reciprocal

Solution: $\frac{110}{7}$ and $\frac{7}{110}$ are reciprocals since

$$\frac{110}{7} \times \frac{7}{110} = 1$$

–

Distributive property

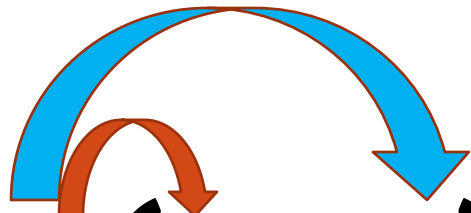
Click for video

Distributive Property

$$6(2 + 5)$$

$$6(7)$$

$$42$$



A diagram illustrating the distributive property. It shows the expression $6(2 + 5)$ with two curved arrows. A blue arrow starts from the 6 and points to the 5, and a red arrow starts from the 6 and points to the 2.

$$6(2 + 5)$$

$$6(2) + 6(5)$$

$$12 + 30$$

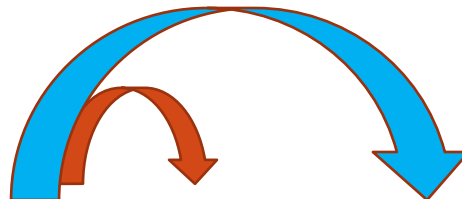
$$42$$

Distributive Property

$$5 (3 + 4)$$

$$5(7)$$

$$35$$

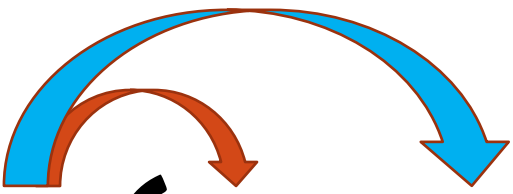

$$\begin{aligned} &5 (3 + 4) \\ &5(3) + 5(4) \\ &15 + 20 \\ &35 \end{aligned}$$

Distributive Property

$$2(10 + 3)$$

$$2(13)$$

$$26$$



A diagram illustrating the distributive property. It shows the expression $2(10 + 3)$ with two curved arrows originating from the number 2. One arrow is blue and points to the 10, while the other is orange and points to the 3. This visualizes the process of distributing the 2 to both terms inside the parentheses.

$$2(10 + 3)$$

$$2(10) + 2(3)$$

$$20 + 6$$

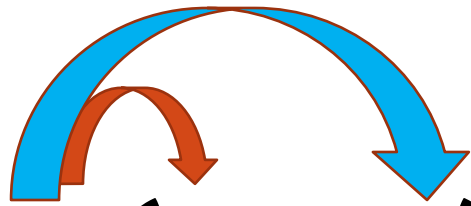
$$26$$

Distributive Property

$$6(2 + 5)$$

$$6(7)$$

$$52$$


$$6(2 + 5)$$

$$6(2) + 6(5)$$

$$12 + 30$$

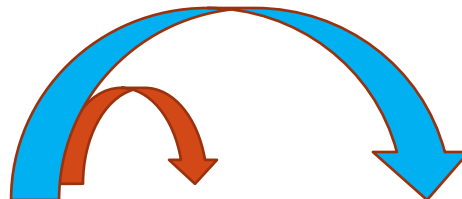
$$52$$

Distributive Property

$$4(2 + 3)$$

$$4(5)$$

$$20$$

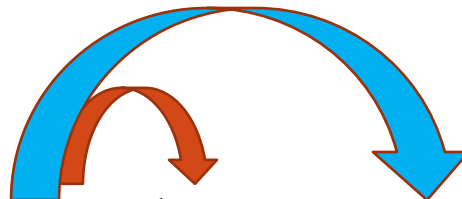

$$\begin{aligned} &4(2 + 3) \\ &4(2) + 4(3) \\ &8 + 12 \\ &20 \end{aligned}$$

Distributive Property

$$a(3 + 5)$$

$$a(8)$$

$$8a$$

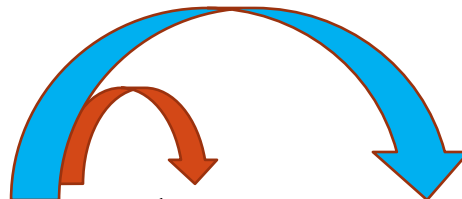

$$\begin{aligned} &a(3 + 5) \\ &a(3) + a(5) \\ &3a + 5a \\ &8a \end{aligned}$$

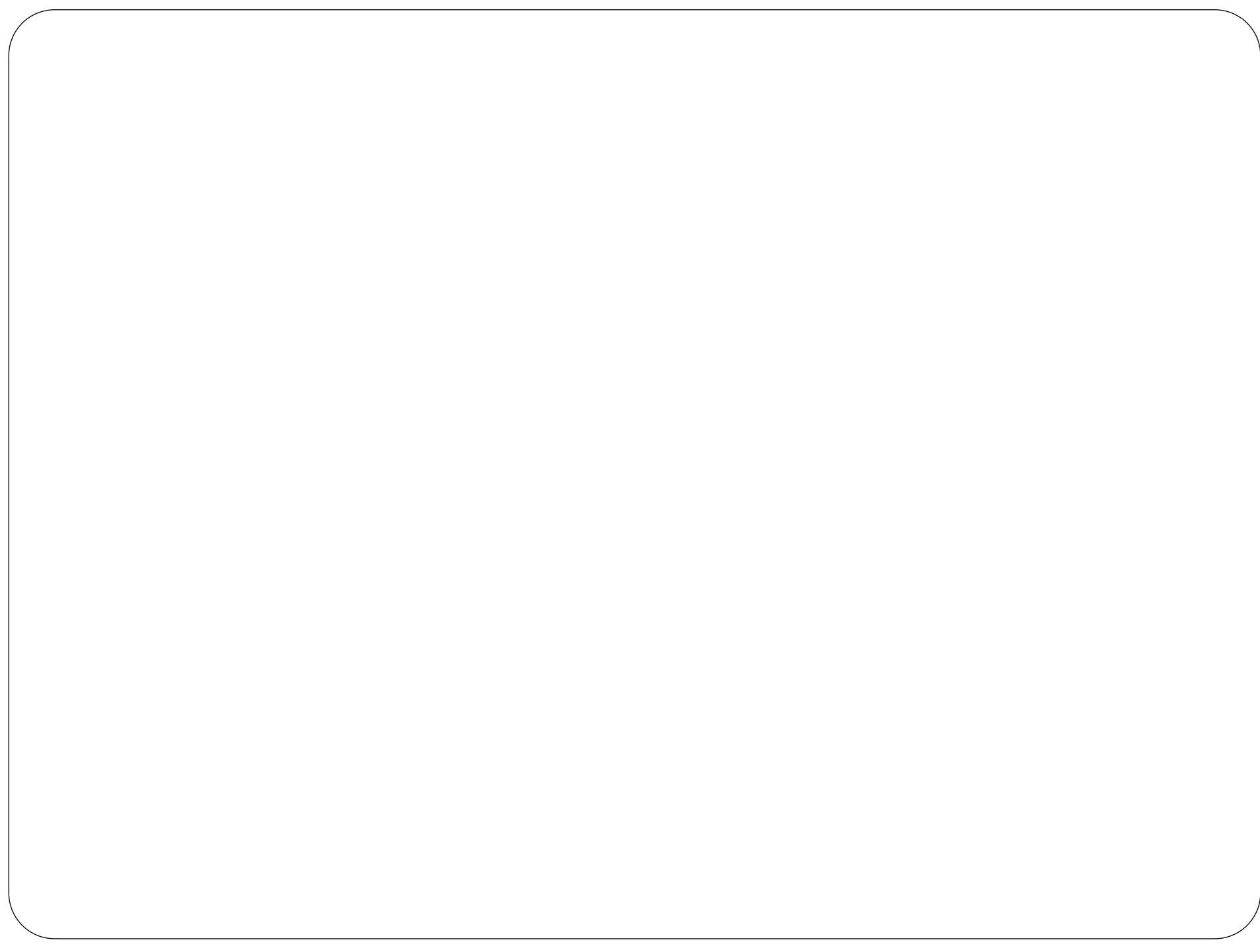
Distributive Property

$$b(4 + 2)$$

$$b(6)$$

$$6b$$


$$\begin{aligned} &b(4 + 2) \\ &b(4) + b(2) \\ &4b + 2b \\ &6b \end{aligned}$$



Distributive Property –

- Multiply numbers by breaking apart one of the numbers and writing it as a sum or difference.

1. $8 (14) = 8 (20 - 6) = 8 \cdot 20 - 8 \cdot 6 = 160 - 48 = 112$

2. $6 (23) = 6 (20 + 3) = 6 \cdot 20 + 6 \cdot 3 = 120 + 18 = 138$

3. In algebra – we multiply the **a** times both things in the parenthesis.

4. $a \cdot (b + c) = a \cdot b + a \cdot c = ab + ac$

5. $2 (a + b) = 2 \cdot a + 2 \cdot b = 2a + 2b$

Name the Property

1) $14 + 5 + 16 = 16 + 5 + 14$

Commutative Property of Addition

2) $25 \cdot 9 \cdot 4 = 4 \cdot 25 \cdot 9$

Commutative Property of Multiplication

3) $(y + 2) + 3 = y + (2 + 3)$

Associative Property of Addition

1) $4(5m) = (4 \cdot 5)m$

Associative Property of Multiplication

1) $3 \cdot 5 \cdot 0 = 0$

Multiplicative Property of Zero

1) $z \cdot 1 = z$

Identity Property of Multiplication