

INPUT 2.05 PROPERTIES

Facts and Notation

The list below gives four properties of arithmetic with names you will see in other math books. This book refers to these as the any-order, any-grouping properties.

- **Commutative Property of Addition** For any numbers a and b ,

$$a + b = b + a$$

- **Associative Property of Addition** For any numbers a , b , and c ,

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

- **Commutative Property of Multiplication** For any numbers a and b ,

$$ab = ba$$

- **Associative Property of Multiplication** For any numbers a , b , and c ,

$$a(bc) = (ab)c$$

You will also see the following names for the properties about identities and inverses.

- **Additive Identity** For any number a ,

$$a + 0 = a$$

- **Additive Inverse** For any number a ,

$$a + (-a) = 0$$

$$\text{If } a + b = 0, \text{ then } b = -a.$$

- **Multiplicative Identity** For any number a ,

$$a \cdot 1 = a$$

- **Multiplicative Inverse** For any nonzero number a ,

$$a \cdot \frac{1}{a} = 1$$

$$\text{If } ab = 1, \text{ then } b = \frac{1}{a}.$$

Finally, the Distributive Property relates addition and multiplication.

- **Distributive Property** For any numbers a , b , and c ,

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