

$$100 = 100$$

$$\cdot 10$$

Ex 1) Name each property in the statements below.

- a. If $3x + 7 = 28$, then $x = 21$
- b. If $4x - 5 = 3$, then $4x - 5 = 30$
- c. If $5(x - 4) = 2x + 5$, then $5x - 20 = 2x + 5$
- d. If $15 = 3x$, then $3x = 15$
- e. If $y = 2x - 1$ and $y = x + 3$, then $2x - 1 = x + 3$
- f. If $\frac{4x - 8}{4} = \frac{12}{4}$, then $x - 2 = 3$

Sub. prop. Eq

Mult. prop. Eq

Dist. prop

Symm prop. Eq

Trans. Prop/Sub. Prop.

Div. Prop. Eq

Ex 2) Given: $5x - 18 = 3x + 2$ Prove: $x = 10$

- $5x - 18 = 3x + 2$
- $2x - 18 = 2$
- $2x = 20$
- $x = 10$

| Math Steps. | Reason |
|--|-------------------|
| 1) $5x - 18 = 3x + 2$ $\frac{-3x}{-3x} \quad \frac{-3x}{-3x}$ | 1) Given |
| 2) $2x - 18 = 2$ $\frac{+18}{+18} \quad \frac{+18}{+18}$ | 2) Sub. Prop. Eq |
| 3) $\frac{2x}{2} = \frac{20}{2}$ | 3) Add. Prop. Eq. |
| 4) $x = 10$ | 4) Div. Prop. Eq. |

Ex 3) Given: $55z - 3(9z + 12) = -64$ Prove: $z = -1$

- $55z - 3(9z + 12) = -64$
- $55z - 27z - 36 = -64$
- $28z - 36 = -64$
- $28z = -28$
- $z = -1$

| Math Steps. | Reason. |
|--|----------------------|
| 1) $55z - 3(9z + 12) = -64$ | 1) Given |
| 2) $55z - 27z - 36 = -64$ | 2) Dist. Prop. |
| 3) $28z - 36 = -64$ $\frac{+36}{+36} \quad \frac{+36}{+36}$ | 3) Comb. Like Terms. |
| 4) $28z = -28$ | 4) Add. Prop. Eq. |
| 5) $\frac{28z}{28} = \frac{-28}{28}$ $z = -1$ | 5) Div. Prop. Eq. |

Ex 4) Given: $139 = x + 2x + 10$ Prove: $x = 43$

| Math. Steps. | Reason. |
|---|----------------------|
| 1) $139 = x + 2x + 10$ | 1) Given |
| 2) $139 = 3x + 10$ $\frac{-10}{-10} \quad \frac{-10}{-10}$ | 2) Comb. Like terms. |
| 3) $\frac{129}{3} = \frac{3x}{3}$ | 3) Sub. Prop. Eq. |
| 4) $43 = x$ | 4) Div. Prop. Eq. |

Algebra Properties

| | | |
|--|---|--|
| Addition Property of Equality | If the same number is added to equal numbers, the sums are equal. | $a = b$ $a + c = b + c$ |
| Subtraction Property of Equality | If the same number is subtracted from equal numbers, the differences are equal. | $a = b$ $a - c = b - c$ |
| Multiplication Property of Equality | If equal numbers are multiplied by the same number, the products are equal. | $a = b$ $ac = bc$ |
| Division Property of Equality | If equal numbers are divided by the same nonzero number, the quotients are equal. | $a = b$ $c \neq 0$ $a/c = b/c$ |
| Reflexive Property of Equality | A number is equal to itself. | $a = a$ |
| Substitution Property | If values are equal, one value may be substituted for the other. | $a = b \rightarrow a$ may be substituted for b . |
| Distributive Property | An expression of the form $a(b + c)$ is equivalent to $ab + ac$. | $a(b + c) = ab + ac$ |
| Transitive Property of Equality | For 1 values equals a 2 nd value, and the 2 nd value equals a 3 rd value, then the 1 st value equals the 3 rd value. | If $a = b$, AND $b = c$, then $a = c$ |
| Symmetric Property of Equality | If one value equals a 2 nd , then the 2 nd value equals the 1 st . | If $a = b$, then $b = a$ |
| Combine Like Terms | If two terms are on one side of an equation are have the same variable to the same power | If $3x + 4 + 2x = 9$ then $6x + 4 = 9$ |

3 Types of Proofs

- 2 Column Proofs
- Flow Proof
- Paragraph Proof

Reasons for Proofs

- Given
- Properties
- Definitions
- Postulates
- Conjectures