

Warm up Problem

Solve $2x - 5 = -x + 1$, showing every step.

$+x$

$+x$

$$3x - \cancel{5} = 1$$

$+5$ $+5$

$$\cancel{3}x = \frac{6}{\cancel{3}}$$

$$x = 2$$

Proofs

Def. A proof is a logical argument in which every statement is backed up by an explanation.

→ For our proofs today, we'll be using the Properties of Equality.

Name	Property of Equality
Addition Property	If $a = b$, then $a + c = b + c$
Subtraction Property	If $a = b$, then $a - c = b - c$
Multiplication Property	If $a = b$, then $ac = bc$
Division Property	If $a = b$, then $\frac{a}{c} = \frac{b}{c}$, $c \neq 0$
Distributive Property	If $a(x + b)$, then $ax + ab$
Substitution Property	If $a = b$, then a can be replaced by b

Reflexive Property	$a = a$
Symmetric Property	If $a = b$, then $b = a$
Transitive Property	If $a = b$ and $b = c$, then $a = c$
Simplify	This allows you to combine like terms on the <u>same side</u> of the equal sign.

Statement	Reason
If $4(x + 7)$, then $4x + 28$	Dist.
$\overline{BD} \cong \overline{BD}$	Reflex.
If $2x + 5 = 9$, then $2x = 4$	Subtr. Prop.
If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\angle A \cong \angle C$	Trans. Prop.
If $x - 7 = 2$, then $x = 9$	Add. Prop.
If $\overline{XY} \cong \overline{AB}$, then $\overline{AB} \cong \overline{XY}$	Sym. Prop.
If $4x = 12$, then $x = 3$	Div. Prop.

Ex. Given: $4x - 7 = 6x + 7$

Prove: $x = -7$

Statements	Reasons
1) $4x - 7 = 6x + 7$	1) Given
2) $4x = 6x + 14$	2) Add. Prop.
3) $-2x = 14$	3) Subtr. Prop.
4) $x = -7$	4) Div. Prop.

Ex. Complete the proof:

Given: $3x - 2 = x + 8$

Prove: $x = 5$

Statements	Reasons
1) $3x - 2 = x + 8$	1) Given
2) $-2 = -2x + 8$	2) Subtr. Prop.
3) $-10 = -2x$	3) Subtr. Prop.
4) $5 = x$	4) Div. Prop.
5) $x = 5$	5) Sym. Prop.

Pract. Complete the proof:

Given: $\frac{3x+5}{2} = 7$

Prove: $x = 3$

Statements	Reasons
1. $\frac{3x+5}{2} = 7$	1. Given
2. $3x + 5 = 14$	2. Mult. Prop.
3. $3x = 9$	3. Subtr. Prop.
4. $x = 3$	4. Div. Prop.

Pract. Complete the proof:

Given: $-2x + 5 = 8$

Prove: $x = -\frac{3}{2}$

Statements	Reasons
1) $-2x + 5 = 8$	1) Given
2) $-2x = 3$	2) Subtr. Prop.
3) $x = \frac{3}{-2}$	3) Div. Prop.