Proofs

$2x - 5 = 11$

Properties

Algebraic Proofs

Logical Order

"makes sense"

Two-Column

Step	Justification

Solve for x when $2x - 5 = 11$

1. $2x - 5 = 11$ $+5 \quad +5$	1. given
2. $\frac{2x}{2} = \frac{16}{2}$	2. Addition (5)
3. $x = 8$	3. Division (2)

Algebraic Properties of Equality

a, b, c are real numbers s.t.

if $a = b$ then $a + c = b + c$

Addition prop of =

if $a = b$ then $a - c = b - c$

Subtraction prop of =

if $a = b$ then $ac = bc$

Multiplication prop of =

if $a = b$ and $c \neq 0$ then $\frac{a}{c} = \frac{b}{c}$

Division Prop of =

Reflexive Prop of =

(Everything is equal to itself)

$a = a$

Symmetric Prop of =

If $a = b$ then $b = a$

Transitive Prop of =

If $a = b$ and $b = c$ then $a = c$

Substitution Prop of =

If $a = b$, then b can be replaced by a wherever b appears

Distribution Prop of =

if $a(b \pm c)$ then $ab \pm ac$

if $ab \pm ac$ then $a(b \pm c)$

Solve for x when $3x + 12 = 8x - 18$

1. $3x + 12 = 8x - 18$	1. given
2. $12 = 5x - 18$ ($-3x$, $-3x$)	2. Subtraction prop of = (3x)
3. $30 = 5x$ ($+18$, $+18$)	3. Addition prop of = (18)
4. $6 = x$ ($\frac{30}{5} = \frac{5x}{5}$)	4. Division prop of = (5)

Given the equation $a = \frac{24}{500}c - 1$ solve for c

1. $a = \frac{24}{500}c - 1$	1. given
2. $500(a+1) = \frac{24}{500}c \cdot 500$ ($+1$, $+1$)	2. Addition prop = (1)
3. $\frac{500(a+1)}{24} = \frac{24c}{24}$	3. Multiplication prop = (500)
4. $\frac{500(a+1)}{24} = c$	4. Division Prop = (24)

$3(2z - 4) - 6 = 2z + 7$

1. $3(2z - 4) - 6 = 2z + 7$	1. Given
2. $6z - 12 - 6 = 2z + 7$	2. Distribution Prop of =
3. $6z - 18 = 2z + 7$	3. Simplify like terms
4. $4z - 18 = 7$	4. Subtraction Prop of = (2z)
5. $4z = 25$	5. Addition Prop of = (18)
6. $z = 6.25$	6. Division Prop of = (4)

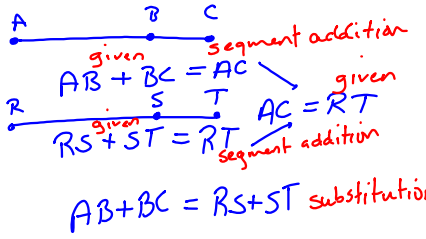
Properties of Equality

	Segment	Angle
Reflexive	$AB = AB$	$m\angle A = m\angle A$
Symmetric	$AB = CD$ then $CD = AB$	if $m\angle A = m\angle B$ then $m\angle B = m\angle A$
Transitive	if $AB = CD$, $CD = EF$ then $AB = EF$	if $m\angle A = m\angle B$, $m\angle B = m\angle C$ then $m\angle A = m\angle C$

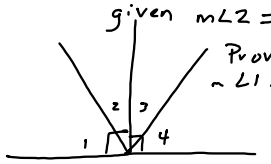
$m\angle A = 30°$, $m\angle A = m\angle B$

$m\angle B = 30°$ Transitive

Segment Addition



AB+BC = RS+ST substitution



∠1, ∠2 are complimentary = def of comp
∠3, ∠4 are complimentary = def of comp
m∠2 = m∠3 given
m∠1+m∠2=90° m∠3+m∠4=90° angle addition
m∠1+m∠3=90° m∠3+m∠4=90° substitution
m∠1=90−m∠3 m∠4=90−m∠3 subtraction
m∠1 = m∠4 Transitive prop of ℓ's

P99 - 101

2 - 34 even