

Geometry 2.6

formal
↓

Use algebra to write 2-column proofs

Use properties of equality to write geometric proofs
algebraic proof

2-column proof (formal proof)

✓ Given (hypothesis)

✓ Prove (conclusion)

Drawing (?)

Quiz Mon. 2.5-2.6

p. 136

KeyConcept Properties of Real Numbers	
The following properties are true for any real numbers a , b , and c .	
Addition Property of Equality	If $a = b$, then $a + c = b + c$.
Subtraction Property of Equality	If $a = b$, then $a - c = b - c$.
Multiplication Property of Equality	If $a = b$, then $a \cdot c = b \cdot c$.
Division Property of Equality	If $a = b$ and $c \neq 0$, then, $\frac{a}{c} = \frac{b}{c}$.
Reflexive Property of Equality	$a = a$
Symmetric Property of Equality $x=3 \quad 3=x$	If $a = b$, then $b = a$.
Transitive Property of Equality	If $a = b$ and $b = c$, then $a = c$.
Substitution Property of Equality	If $a = b$, then a may be replaced by b in any equation or expression.
Distributive Property	$a(b + c) = ab + ac$

State the property that justifies each statement.

13. If $5(x + 7) = -3$ then $5x + 35 = -3$. distrib.

14. If $m\angle 1 = 25$ and $m\angle 2 = 25$ then $m\angle 1 = m\angle 2$. trans.

15. If $AB = BC$ and $BC = CD$, then $AB = CD$. trans. (L.O.S-)

16. If $3\left(x - \frac{2}{3}\right) = 4$, then $3x - 2 = 4$. distr.

Copy and complete

 **ARGUMENTS** Complete each proof.

17. Given: $\frac{8-3x}{4} = 32$

Prove: $x = -40$

Proof:

Statements	Reasons
a. $\frac{8-3x}{4} = 32$	a. Given
b. 4 $\left(\frac{8-3x}{4} \right) = 4(32)$	b. <u>mult.</u>
c. $\frac{8-3x}{4} = 128$ $\frac{8-3x}{4} - \frac{8}{4} = \frac{128}{4}$	c. <u>subs.</u>
d. $\frac{-3x}{4} = \frac{120}{4}$	d. Subtraction Property
e. <u>$x = -40$</u>	e. <u>divis.</u>

$10 = x$
 $x = 10$

Copy and complete

18. ✓ Given: $\frac{1}{5}x + 3 = 2x - 24$

✓ Prove: $x = 15$

Proof:

Statements	Reasons
a. $\frac{1}{5}x + 3 = 2x - 24$	a. Given
b. $5(\frac{1}{5}x + 3) = 5(2x - 24)$	b. <u>Multiplication Property</u>
c. $x + 15 = 10x - 120$ $-x + 120 \quad -x + 120$	c. <u>distr.</u>
d. $\downarrow$	d. <u>Subtraction Property</u>
e. $135 = 9x$ $\frac{135}{9} = \frac{9x}{9}$	e. <u>Subs</u>
f. $15 = x$	f. Division Property
g. $x = 15$	g. <u>Symmetric Property</u>

PROOF Write a two-column proof

19. If $-\frac{1}{3}n = 12$, then $n = -36$.

Given:

To Prove:

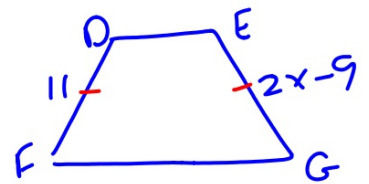
Drawing (if any)

Whiteboards

Given:

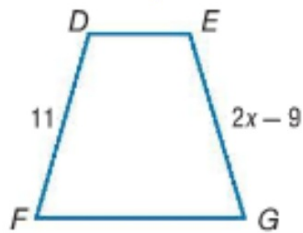
To prove:

Drawing:



PROOF Write a two-column proof.

23. If $\overline{DF} \cong \overline{EG}$, then $x = 10$.

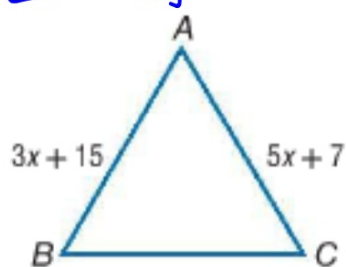


Given: $\overline{DF} \cong \overline{EG}$

Prove: $x = 10$

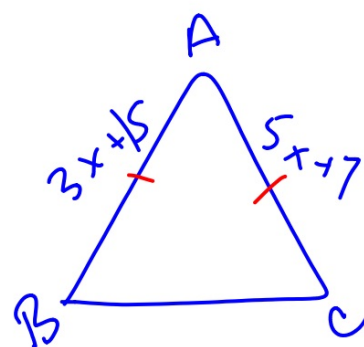
ST	Reas
1. $\overline{DF} \cong \overline{EG}$	1. given
2. $11 = 2x - 9$	2. subs
3. $+9 \quad +9$	3. add
4. $20 = 2x$	4. div.
5. $10 = x$	5. sym

24. If $\overline{AB} \cong \overline{AC}$ then $x = 4$.



Given
Prove
Drawing

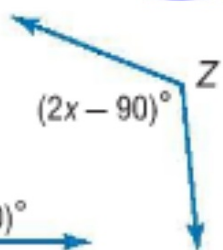
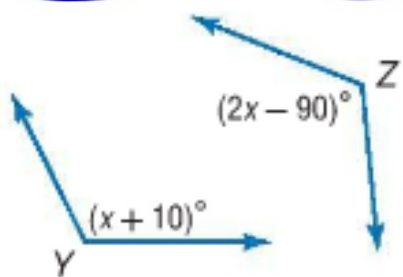
Given $\overline{AB} \cong \overline{AC}$
Prove $x = 4$



$$\begin{array}{l}
 1. \overline{AB} \cong \overline{AC} \\
 2. 3x + 15 = 5x + 7 \\
 3. \begin{array}{r} -5x - 15 \\ \hline -2x = -8 \\ \hline x = 4 \end{array} \\
 4. x = 4
 \end{array}$$

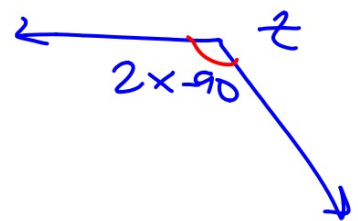
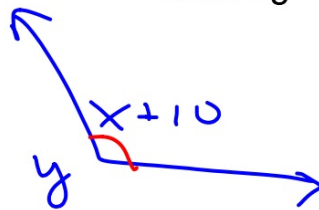
1. given
2. subs
3. add
4. divide

- 25 If $\angle Y \cong \angle Z$, then $x = 100$.

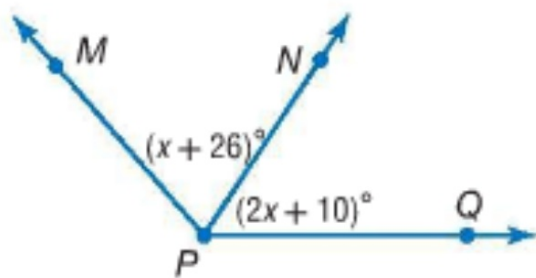


Given
Prove
Drawing

$$\angle Y \cong \angle Z$$
$$x = 100$$



26. If $\angle MPN \cong \angle QPN$, then $x = 16$.

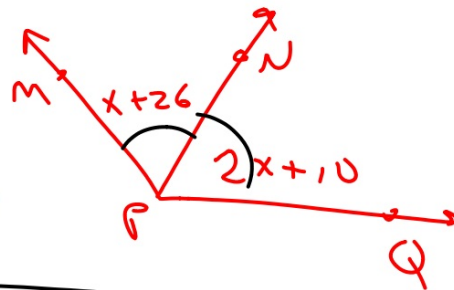


Given

Prove

Drawing

$\angle MPN \cong \angle QPN$
 $x = 16$



$$x = 16$$

$$\text{if } PQ = QS$$

$$QS = ST$$

$$\text{then } PQ = ST$$