

HOMEWORK

WORKSHEET: Algebraic Proof

Name: _____

Solve each equation. Write a reason for every step.

Statement	Reasons
1. $4x = 12x + 32$	
$4x = 12x + 32$	Given
$-12x \quad -12x$	
$-8x = 32$	Subtraction P.
$x = -4$	Division P

Statement	Reasons
2. $28 + 12x = 8x - 4$	
$28 + 12x = 8x - 4$	Given
$-8x \quad -8x$	
$28 + 4x = -4$	Subtraction P
$-28 \quad -28$	
$4x = -32$	Subtraction P
$x = -8$	Division P.

Statement	Reasons
3. $60x + 153 = 9x + 51$	
$60x + 153 = 9x + 51$	Given
$-9x \quad -9x$	
$51x + 153 = 51$	Subtraction P.
$-153 \quad -153$	
$51x = -102$	Subtraction P
$x = -2$	Division P

Statement	Reasons
4. $-4x + 10 = -5x + 18$	
$-4x + 10 = -5x + 18$	Given
$x + 10 = 18$	Addition P
$x = 8$	Subtraction P

Statement	Reasons
5. $-3(x + 2) = 16 - x$	
$-3(x + 2) = 16 - x$	Given
$-3x - 6 = 16 - x$	Distributive P.
$+3x \quad +3x$	
$-6 = 16 + 2x$	Addition P.
$-16 \quad -16$	
$-22 = 2x$	Subtraction P
$-11 = x$	Division P
$x = -11$	Symmetric P

Statement	Reasons
6. $-x - 2(9 - 8x) = 12$	
$-x - 2(9 - 8x) = 12$	Given
$-x - 18 + 16x = 12$	Distributive P
$-18 + 15x = 12$	Combining like terms
$15x = 30$	Addition P
$x = 2$	Division P.

Statement	Reasons
7. $6(x - 6) = x(16 - 7)$	
$6(x - 6) = x(16 - 7)$	Given
$6x - 36 = 9x$	Distributive P
$-6x \quad -6x$	
$-36 = 3x$	Subtraction P
$-12 = x$	Division P
$x = -12$	Symmetric P

Statement	Reasons
8. $\frac{1}{4}x + 10 = 2$	
$\frac{1}{4}x + 10 = 2$	Given
$-10 \quad -10$	
$\frac{1}{4}x = -8$	Subtraction P
$x = -32$	Multiplication P

Worksheet: Algebraic Proofs

Complete the proofs below.

1. **Given:** $3x + 12 = 8x - 18$
Prove: $x = 6$

Statements	Reasons
$3x + 12 = 8x - 18$ $\begin{array}{r} -3x \\ \hline 12 = 5x - 18 \end{array}$ $\begin{array}{r} +18 \\ \hline 30 = 5x \end{array}$ $6 = x$ $x = 6$	<p>Given</p> <p>Subtraction Property</p> <p>Addition Property</p> <p>Division Property</p> <p>Symmetric Property</p>

2. **Given:** $3k + 5 = 17$
Prove: $k = 4$

Statements	Reasons
$3k + 5 = 17$ $3k = 12$ $k = 4$	<p>Given</p> <p>Subtraction P</p> <p>Division P</p>

3. **Given:** $-6a - 5 = -95$
Prove: $a = 15$

Statements	Reasons
$-6a - 5 = -95$ $-6a = -90$ $a = 15$	<p>Given</p> <p>Addition P</p> <p>Division P</p>

Complete the proofs.

4. **Given:** $3(5x+1) = 13x+5$

Prove: $x=1$

Statements	Reasons
$3(5x+1) = 13x+5$	Given
$15x+3 = 13x+5$	Distributive P.
$2x+3 = 5$	Subtraction P.
$2x = 2$	Subtraction P.
$x = 1$	Division P.

5. **Given:** $7y - 84 = 2y + 61$

Prove: $y = 29$

Statements	Reasons
$7y - 84 = 2y + 61$	Given
$5y - 84 = 61$	Subtraction P.
$5y = 145$	Addition P.
$y = 29$	Division P.

6. **Given:** $\frac{3}{5}x = -9$

Prove: $x = -15$

Statements	Reasons
$\left(\frac{5}{3}\right) \frac{3}{5}x = -9\left(\frac{5}{3}\right)$	Given
$x = -15$	Multiplication Property

Write the letter of each property next to its definition. The letters a , b , and c represent real numbers. You may use a property more than once.

F 10. If $5 = x$, then $x = 5$

C 11. If $a = b$, then $2a = 2b$

F 12. $m = n$, so $n = m$

E 13. $7 = 7$

A 14. If $a = b$, then $a + 8 = b + 8$

I 15. $9(x + y) = 9x + 9y$

G 16. If $x = 3$ and $3 = y$, then $x = y$

G 17. $p = q$ and $q = -1$, so $p = -1$

D 18. If $3x = 27$, then $x = 9$

D 19. If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$

H 20. If $a = b$, then b can be replaced by a in an expression.

B 21. If $a = b$, then $a - c = b - c$

- A. Addition Property of Equality
- B. Subtraction Property of Equality
- C. Multiplication Property of Equality
- D. Division Property of Equality
- E. Reflexive Property of Equality
- F. Symmetric Property of Equality
- G. Transitive Property of Equality
- H. Substitution Property
- I. Distributive Property