

Algebraic Proofs Classwork

Instructions: Complete the two-column proofs by giving a reason for each step.

1) Given: $6 + \frac{1}{2}(8x - 22) = -33$

Statements	Reasons
1) $6 + \frac{1}{2}(8x - 22) = -33$	1) Given
2) $\frac{1}{2}(8x - 22) = -39$	2) Subtraction Property of Equality
3) $4x - 11 = -39$	3) Distributive Property of Equality
4) $4x = -28$	4) Addition Property of Equality
5) $x = -7$	5) Division Property of Equality

2) Given: $2x + \frac{2}{3}(-6x - 12) = 6 + 16x - 8$

Statements	Reasons
1) $2x + \frac{2}{3}(-6x - 12) = 6 + 16x - 8$	1) Given
2) $2x + \frac{2}{3}(-6x - 12) = -2 + 16x$	2) Combine Like Terms
3) $\frac{2}{3}(-6x - 12) = -2 + 14x$	3) Subtraction Property of Equality
4) $-4x - 8 = -2 + 14x$	4) Distributive Property of Equality
5) $-18x - 8 = -2$	5) Subtraction Property of Equality
6) $-18x = 6$	6) Addition Property of Equality
7) $x = -6/18$	7) Division Property of Equality
8) $x = -1/3$	8) Simplify the Fraction

Instructions: Solve each equation. Show all of your steps, and give a reason for each step. If your answer is a fraction, write it in simplest form.

3) Given: $5x - 10 + 4x = \frac{2(5x - 1)}{4}$

Statements	Reasons
1) $5x - 10 + 4x = \frac{2(5x - 1)}{4}$	1) Given
2) $9x - 10 = \frac{2(5x - 1)}{4}$	2) Combine Like Terms
3) $9x - 10 = \frac{10x - 2}{4}$	3) Distributive Property of Equality
4) $36x - 40 = 10x - 2$	4) Multiplication Property of Equality
5) $26x - 40 = -2$	5) Subtraction Property of Equality
6) $26x = 38$	6) Addition Property of Equality
7) $x = \frac{38}{26}$	7) Division Property of Equality
8) $x = \frac{19}{13}$	8) Simplify the Fraction

4) Given: $2x - 7(5x - 4) = 3x - 4(8x + 1)$

Statements	Reasons
1) $2x - 7(5x - 4) = 3x - 4(8x + 1)$	1) Given
2) $2x - 35x + 28 = 3x - 32x - 4$	2) Distributive Property of Equality
3) $-33x + 28 = -29x - 4$	3) Combine Like Terms
4) $-4x + 28 = -4$	4) Addition Property of Equality
5) $-4x = -32$	5) Subtraction Property of Equality
6) $x = 8$	6) Division Property of Equality

5) Given: $5x + \frac{3}{4}(20x - 36) = 73$

Statements	Reasons
1) $5x + \frac{3}{4}(20x - 36) = 73$	1) Given
2) $5x + 15x - 27 = 73$	2) Distributive Property of Equality
3) $20x - 27 = 73$	3) Combine Like Terms
4) $20x = 100$	4) Addition Property of Equality
5) $x = 5$	5) Division Property of Equality

Challenge: Solve each equation. Show all of your steps, and give a reason for each step. If your answer is a fraction, write it in simplest form.

6) Given: $\frac{4x - 5}{10} = \frac{3x + 10}{4}$

Statements	Reasons
1) $\frac{4x - 5}{10} = \frac{3x + 10}{4}$	1) Given
2) $4(4x - 5) = 10(3x + 10)$	2) Multiplication Property of Equality
3) $16x - 20 = 30x + 100$	3) Distributive Property of Equality
4) $-14x - 20 = 100$	4) Subtraction Property of Equality
5) $-14x = 120$	5) Addition Property of Equality
6) $x = -\frac{120}{14}$	6) Division Property of Equality
7) $x = -\frac{60}{7}$	7) Simplify the Fraction

7) Given: $\frac{4x}{5} = \frac{x - 7}{8}$

Statements	Reasons
1) $\frac{4x}{5} = \frac{x - 7}{8}$	1) Given
2) $8(4x) = 5(x - 7)$	2) Multiplication Property of Equality
3) $32x = 5x - 35$	3) Distributive Property of Equality
4) $27x = -35$	4) Subtraction Property of Equality
5) $x = -\frac{35}{27}$	5) Division Property of Equality