

Balance It Out

Use models and inverse operations to solve for x .

GRADE 7 • 7.PFA.3.a

7.PFA.3.a "Represent and solve two-step linear equations in one variable using a variety of concrete materials and pictorial representations."

NAME _____

DATE _____

KEEP BOTH SIDES EQUAL

Think of an equation as a balanced scale. Model x with an x -tile and numbers with unit tiles, then undo the number operation first. Whatever you do to one side, do to the other side.

WORKED EXAMPLE

Solve: $2x + 5 = 19$

1. Subtract 5 from both sides: $2x = 14$.
2. Divide both sides by 2: $x = 7$.
3. Check: $2(7) + 5 = 19$.

Answer: $x = 7$

PRACTICE 6 problems

- 1** Tile balance: $[x] [x] [x] + 4$ unit tiles balances 22 unit tiles. Write an equation and solve.

ANSWER _____

- 2** Solve: $4x - 8 = 16$

ANSWER _____

- 3** Bar model: One of 3 equal parts of a bar labeled x , plus 9, is 15. Write an equation and solve.

ANSWER _____

- 4** Solve: $6x - 1 = 23$

ANSWER _____

- 5** Solve: $x/6 + 1 = 4$

ANSWER _____

- 6** Solve: $9x - 1 = 35$

ANSWER _____

APPLY IT Show your work

- 1** An arcade card costs \$11 to activate. Each game costs \$3. Mia spends \$35 total. How many games does she play?

WORK SPACE

ANSWER _____

- 2** A skate park pass has a \$14 registration fee and costs \$8 for each visit. Jay pays \$46 total. How many visits does he make?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Solve and explain your reasoning: $4x - 12 = 3x + 6$

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Tile balance: $[x][x][x] + 4$ unit tiles balances 22 unit tiles. Write an equation and solve.	$3x + 4 = 22$; $x = 6$
2	Solve: $4x - 8 = 16$	$x = 6$
3	Bar model: One of 3 equal parts of a bar labeled x , plus 9, is 15. Write an equation and solve.	$x/3 + 9 = 15$; $x = 18$
4	Solve: $6x - 1 = 23$	$x = 4$
5	Solve: $x/6 + 1 = 4$	$x = 18$
6	Solve: $9x - 1 = 35$	$x = 4$

PART 2 • APPLY IT

- 8 games** Write $3x + 11 = 35$. Subtract 11, then divide by 3 to get $x = 8$.
- 4 visits** Write $8x + 14 = 46$. Subtract 14, then divide by 8 to get $x = 4$.

CHALLENGE

$x = 18$; subtract $3x$ from both sides to get $x - 12 = 6$, then add 12 to both sides.

Accept equivalent equations written from the tile and bar models. Students may use any valid inverse-operation order that keeps both sides of each equation equal.