

Equation Escape Route

Use inverse operations to solve real-world equations.

GRADE 7 • NY-7.EE.4.a

NY-7.EE.4.a "Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution..."

NAME _____

DATE _____

UNDO OPERATIONS IN ORDER

For $px + q = r$, undo the added or subtracted amount first, then divide by p . For $p(x + q) = r$, divide by p first, then undo the operation inside the parentheses. An arithmetic solution follows the same order with numbers, while an algebraic solution shows the same moves on both sides of an equation.

WORKED EXAMPLE

Solve: $4(x + 3/2) = 26$

1. Divide both sides by 4: $x + 3/2 = 13/2$.
2. Subtract $3/2$ from both sides: $x = 5$.

Answer: $x = 5$

PRACTICE 6 problems

1 Solve: $9x - 11 = 43$

ANSWER _____

2 Solve: $-2(x + 12) = -38$

ANSWER _____

3 Solve: $(1/3)x + 14 = 20$

ANSWER _____

4 Solve: $1.25(x - 16) = 15$

ANSWER _____

5 Solve: $-6x + 17 = -31$

ANSWER _____

6 Solve: $(7/9)(x + 22) = 35$

ANSWER _____

APPLY IT Show your work

- 1** A digital sticker shop charges a \$2.75 setup fee plus \$1.25 for each sticker pack. Your total is \$10.25. Let x be the number of sticker packs. Write and solve an equation. Then compare the arithmetic sequence of operations with the algebraic sequence of operations.

WORK SPACE

ANSWER _____

- 2** Twelve robotics club members each pay x dollars for a team patch and \$1 for a name tag. Together, they pay \$96. Write and solve an equation. Then compare the arithmetic sequence of operations with the algebraic sequence of operations.

WORK SPACE

ANSWER _____

CHALLENGE One step up

In a game, a final score is found by multiplying the sum of x points and a 2.5-point adjustment by -1.2. The final score is -18. Solve $-1.2(x + 2.5) = -18$. Then describe an arithmetic sequence and an algebraic sequence that both find x .

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Solve: $9x - 11 = 43$	$x = 6$
2	Solve: $-2(x + 12) = -38$	$x = 7$
3	Solve: $(1/3)x + 14 = 20$	$x = 18$
4	Solve: $1.25(x - 16) = 15$	$x = 28$
5	Solve: $-6x + 17 = -31$	$x = 8$
6	Solve: $(7/9)(x + 22) = 35$	$x = 23$

PART 2 • APPLY IT

- Equation: $1.25x + 2.75 = 10.25$. $x = 6$ sticker packs. Arithmetic: subtract 2.75, then divide by 1.25. Algebra: subtract 2.75 from both sides, then divide both sides by 1.25. The operation order is the same.** Subtract the setup fee from the total, then divide by the price per pack. The equation uses the same two inverse operations on both sides.
- Equation: $12(x + 1) = 96$. $x = 7$ dollars. Arithmetic: divide 96 by 12, then subtract 1. Algebra: divide both sides by 12, then subtract 1 from both sides. The operation order is the same.** Divide the total by the number of members to find each member's combined cost, then subtract the name-tag cost. The algebraic method shows these same operations with an equation.

CHALLENGE

$x = 12.5$. Arithmetic: divide -18 by -1.2 to get 15, then subtract 2.5 to get 12.5. Algebra: divide both sides by -1.2, then subtract 2.5 from both sides. Both methods use division, then subtraction.

Accept equivalent equation forms and correct decimal or fraction forms for solutions. For comparisons, accept wording that clearly identifies the same inverse-operation order in the arithmetic and algebraic methods.