LESSON MAKER PRO

When Costs Match

Solve equations and decide what their solutions mean.

GRADE 8 · PA.A.4.1

PA.A.4.1 "Solve mathematical problems using linear equations with one variable where there could be one, infinitely many, or no solutions. Represent situations using linear equations and interpret solutions in the original context."

NAME _____ DATE _____

THREE POSSIBLE OUTCOMES

Distribute and combine like terms, then move x terms to one side and numbers to the other. If x disappears and the statement is true, every value works. If x disappears and the statement is false, no value works. In a story, write an equation first, then explain what its solution means.

WORKED EXAMPLE

Solve $11(x - 17) = 8x + 5$.

1. Distribute: $11x - 187 = 8x + 5$.
2. Subtract $8x$ and add 187: $3x = 192$.
3. Divide by 3: $x = 64$.

Answer: x = 64

PRACTICE 6 problems

1 Solve $6x + 10 = 2x + 26$.

ANSWER _____

2 Solve $9(x - 2) = 6x + 12$.

ANSWER _____

3 Solve $4(x + 6) = 4x + 24$.

ANSWER _____

4 Solve $2(7x - 9) = 14x - 16$.

ANSWER _____

5 Solve $(x + 10)/2 = x - 7$.

ANSWER _____

6 Solve $12 - 2x = 6(x - 10)$.

ANSWER _____

APPLY IT Show your work

1 Two gaming lounges charge different prices. Lounge A charges $14 to enter and $2 per game. Lounge B charges $6 to enter and $6 per game. Write an equation to find how many games cost the same at both lounges. How much would you pay?

WORK SPACE

ANSWER _____

2 Two music apps charge monthly fees. App A has a $10 sign-up fee and costs $4 per month. App B has a $6 sign-up fee and costs $4 per month. Write an equation to find when their total costs match. Explain what your result means.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A school store uses two methods to calculate the cost of x pins. One method gives 2(4x + 12) - 4x dollars. The other gives 4(x + 6) dollars. Write an equation comparing the costs. Does it have one solution, no solution, or infinitely many solutions? Explain what that means for the cost of any number of pins.

WORK SPACE AND ANSWER

ANSWER KEY

When Costs Match

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve 6x + 10 = 2x + 26.	**x = 4**
2	Solve 9(x - 2) = 6x + 12.	**x = 10**
3	Solve 4(x + 6) = 4x + 24.	**Infinitely many solutions**
4	Solve 2(7x - 9) = 14x - 16.	**No solution**
5	Solve (x + 10)/2 = x - 7.	**x = 24**
6	Solve 12 - 2x = 6(x - 10).	**x = 9**

PART 2 · APPLY IT

1. **14 + 2x = 6 + 6x; 2 games; $18 at either lounge.** Set the total costs equal and solve for x. Substitute 2 into either cost expression to get $18.
2. **10 + 4x = 6 + 4x; no solution. The apps never cost the same after the same number of months.** Subtract 4x from both sides to get 10 = 6, which is false. App A always costs $4 more.

CHALLENGE

2(4x + 12) - 4x = 4(x + 6). Both sides simplify to 4x + 24, so there are infinitely many solutions. The methods give the same cost for any number of pins.

Accept “all real numbers” for an equation with infinitely many solutions. In the challenge, students may say all whole-number quantities of pins work.