LESSON MAKER PRO

When x Disappears

Find out how many solutions an equation has.

GRADE 8 · 8.AF.C.11.a

8.AF.C.11.a "Determine whether linear equations in one variable have one solution, no solution, or infinitely many solutions of the form x = a, a = a, or a = b (where a and b are different numbers)."

NAME _____ DATE _____

THREE POSSIBLE RESULTS

Distribute and combine like terms, then move the x terms to one side. An equation that becomes x = a has one solution. If x cancels, a true statement means infinitely many solutions, while a false statement means no solution.

WORKED EXAMPLE

How many solutions does 11(x - 9) = 6x + 21 have? Find the solution if there is one.

1. Distribute: 11x - 99 = 6x + 21
2. Subtract 6x: 5x - 99 = 21
3. Add 99: 5x = 120
4. Divide by 5: x = 24

Answer: One solution, x = 24.

PRACTICE 6 problems

1 Decide how many solutions 2(x + 8) = 2x + 16 has.

ANSWER _____

2 Decide how many solutions 4(x - 3) = 4x - 10 has.

ANSWER _____

3 Decide how many solutions 3(x + 2) = x + 14 has. Find x if there is one solution.

ANSWER _____

4 Decide how many solutions 8x - 20 = 2(3x - 2) has. Find x if there is one solution.

ANSWER _____

5 Decide how many solutions 10(x - 2) = 10x - 20 has.

ANSWER _____

6 Decide how many solutions 12 + 2(x - 4) = 2x + 7 has.

ANSWER _____

APPLY IT Show your work

1 A gaming lounge charges $8 plus $2 per hour. Another lounge charges $4 plus $3 per hour. Let x be the number of hours. Write an equation for equal costs. Decide how many solutions it has, and find x if there is one solution.

WORK SPACE

ANSWER _____

2 Shop A charges a $10 setup fee plus $2 per sticker. Shop B charges an $8 setup fee plus $2 per sticker. Let x be the number of stickers. Write an equation for equal costs and decide how many solutions it has.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Decide how many solutions $2[3(x + 2) - x] = 4(x + 4) - 4$ has. Explain your reasoning using the simplified equation.

WORK SPACE AND ANSWER

ANSWER KEY

When x Disappears

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Decide how many solutions 2(x + 8) = 2x + 16 has.	**Infinitely many solutions.**
2	Decide how many solutions 4(x - 3) = 4x - 10 has.	**No solution.**
3	Decide how many solutions 3(x + 2) = x + 14 has. Find x if there is one solution.	**One solution, x = 4.**
4	Decide how many solutions 8x - 20 = 2(3x - 2) has. Find x if there is one solution.	**One solution, x = 8.**
5	Decide how many solutions 10(x - 2) = 10x - 20 has.	**Infinitely many solutions.**
6	Decide how many solutions 12 + 2(x - 4) = 2x + 7 has.	**No solution.**

PART 2 · APPLY IT

1. **8 + 2x = 4 + 3x; one solution, x = 4 hours.** Set the two costs equal. Subtract 2x and 4 from both sides to get x = 4.
2. **10 + 2x = 8 + 2x; no solution.** Subtract 2x from both sides to get 10 = 8, which is false.

CHALLENGE

Infinitely many solutions. Both sides simplify to 4x + 12, so the equation is true for every value of x.

Accept equivalent equations for the word problems. For the challenge, accept any correct simplification showing that both sides are equal for every value of x.