Name & Surname: _____ Class: _____ Date: _____

Solving Linear Equations



Keep both sides balanced to find x.

About 40 minutes Level ★★★☆☆

Solving in Steps

A **linear equation** has a variable to the first power only. Solve it by keeping both sides balanced until the variable is alone.

- Simplify each side first: distribute and combine **like terms**.
- Move variable terms to one side and numbers to the other by doing the inverse operation to **both sides**.
- Multiply or divide to get x alone, then **check** by substituting back.
- If you get x = a there is one **solution**; if a = a there are infinitely many solutions; if a = b there is no solution.

Key words

equation: a math sentence with = showing two sides are equal

solution: the value that makes the equation true

like terms: terms with the same variable part that can be combined

variable: a letter that stands for an unknown number

balance: keeping both sides equal by doing the same to each

distribute: multiply outside parentheses by each term inside

Created with LessonDino.com · AI lesson planner with checkable sources

Start Solving

Practice one-step and two-step equations.

Task A

/4

Find the first wrong step in each solution. Explain the mistake, then solve correctly.



Student A

Solve $3(x + 2) = 15$.

1. $3(x + 2) = 15$
2. $3x + 2 = 15$
3. $3x = 13$
4. $x = \frac{13}{3}$

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____



Student B

Solve $5x + 7 = 2x + 16$.

1. $5x + 7 = 2x + 16$
2. $7x + 7 = 16$
3. $7x = 9$
4. $x = \frac{9}{7}$

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____

Created with LessonDino.com · AI lesson planner with checkable sources

Tougher Equations

Solve equations with variables on both sides.

Task B

/12

Solve each equation. Show your steps and check your answer.

WARM UP

1 Solve x + 9 = 18.

Answer: _____

2 Solve x - 6 = 11.

Answer: _____

3 Solve 6x = 42.

Answer: _____

4 Solve $\frac{x}{5} = 7$.

Answer: _____

PRACTICE

5 Solve 2x + 7 = 19.

Answer: _____

6 Solve 5x - 4 = 31.

Answer: _____

7 Solve 3(x + 4) = 27.

Answer: _____

8 Solve $\frac{x}{4} + 3 = 8$.

Answer: _____

PROBLEM SOLVING

9 A student buys 4 packs of pencils at the same **price** plus a $3 eraser for $23 in all. Let p be the price in dollars of one pack. Solve 4p + 3 = 23.

Answer: _____

10 A club charges $9 per visit plus a $12 yearly fee. A student pays $75 in all. Let v be the number of visits. Solve 9v + 12 = 75.

Answer: _____

11 Solve 10 - 2x = 4. Explain how you checked your **solution**.

Answer: _____

12 A rectangle is 8 in wide and x in long. Its perimeter is 44 in, so 2x + 16 = 44. Solve for x.

Answer: _____

Created with LessonDino.com · AI lesson planner with checkable sources

Who Is Right?

Decide which first step keeps the balance.

Task C

/12

Solve each equation. Watch for fractions, decimals, and special cases.

WARM UP

1. Solve 6x + 4 = 4x + 12.

Answer: _____

2. Solve 8x - 5 = 7x + 4.

Answer: _____

3. Solve 3(x + 2) = x + 10.

Answer: _____

4. Solve 5(x - 2) = 3(x + 2).

Answer: _____

PRACTICE

5. Solve $(\frac{2}{3})x + 5 = 13$.

Answer: _____

6. Solve 2.5x - 3 = 17.

Answer: _____

7. Solve 5(x - 3) = 3(x + 1).

Answer: _____

8. Solve 7x + 2 = 4x + 17.

Answer: _____

PROBLEM SOLVING

9. One club charges $15 plus $5 per week. Another charges $10 plus $6 per week. After w weeks the costs are equal, so 15 + 5w = 10 + 6w. Solve for w in **weeks**.

Answer: _____

10. A frame needs 54 in of trim. It is 10 in wide and x in long, so 2x + 20 = 54. Solve for x.

Answer: _____

11. Solve 2x + 7 = 2x + 12. Explain how you know there is no **solution**.

Answer: _____

12. Solve 3(x + 4) = 3x + 12. Explain how you know about the **solutions**.

Answer: _____

Created with LessonDino.com · AI lesson planner with checkable sources

See the Steps

Use bar models and function machines to solve.

Task D

/3

Read the cartoon. Decide what you think about each idea.



Student A

What should I do first to solve 4x + 5 = 21?

Subtract 5 from both sides to keep the **balance**. Then divide by 4.



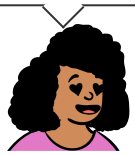
Student B

Divide only 4x and 21 by 4 to get x + 5 = 5.25. Dividing part of the **equation** is enough.



Student C

Add 5 to both sides to get 4x = 26. Then divide by 4 to find the **solution**.



Student D

What do you think of each idea? Why?

Student B: .....

Student C: .....

Student D: .....

Created with LessonDino.com · AI lesson planner with checkable sources

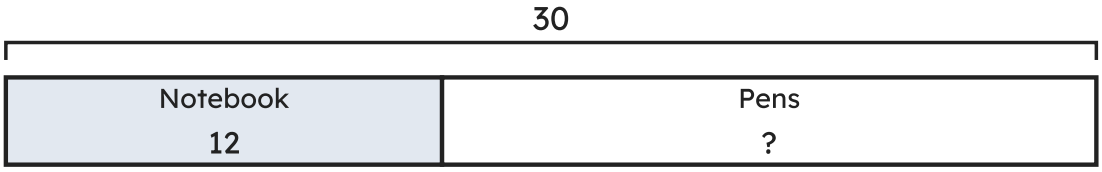
Solving Linear Equations

Task E

/6

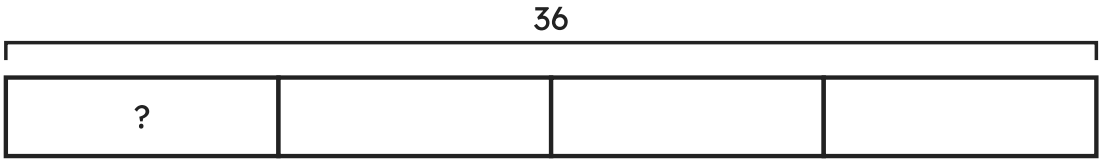
Use each bar model to write and solve an equation.

1 A student has $30. A notebook costs $12. The rest is spent on pens. How much is spent on pens?



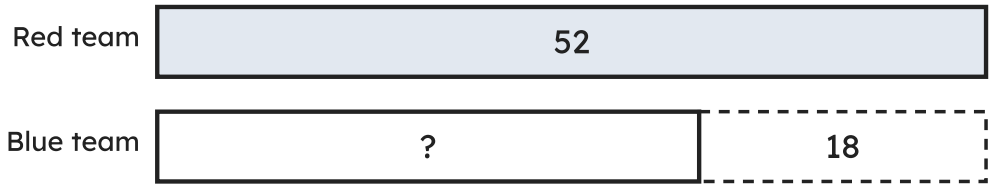
Answer: _____ **dollars**

2 36 pencils are packed equally into 4 boxes. How many pencils are in each box?



Answer: _____ **pencils**

3 The red team scored 52 points. The blue team scored 18 fewer points. How many points did the blue team score?



Answer: _____ **points**

Created with LessonDino.com · AI lesson planner with checkable sources

Solving Linear Equations

Task F

/7

Find the missing inputs and outputs. Going backward means solving an equation.

1 IN → × 4 → + 3 → OUT

In	Out
2	
5	
	31
	15

2 IN → × 2 → − 9 → OUT

In	Out
8	
	13
	1

How did I do?

Circle a face for each line.

I can solve two-step equations in one variable. ☹ 😐 ☺

I can solve equations with variables on both sides. ☹ 😐 ☺

I can tell if an equation has one, none, or infinitely many solutions. ☹ 😐 ☺

Created with LessonDino.com · AI lesson planner with checkable sources

Answer sheet: Solving Linear Equations

Task A

1. Step 2 is wrong: They did not distribute the 3 to the 2. It should be 3x + 6, not 3x + 2. Correct answer: x = 3

2. Step 2 is wrong: They added 2x to the left side instead of subtracting 2x from both sides. Correct answer: x = 3

Task B

1. x = 9
2. x = 17
3. x = 7
4. x = 35
5. x = 6
6. x = 7
7. x = 5
8. x = 20
9. p = 5
10. v = 7
11. x = 3
12. x = 14

Task C

1. x = 4
2. x = 9
3. x = 2
4. x = 8
5. x = 12
6. x = 8
7. x = 9
8. x = 5
9. w = 5
10. x = 17
11. no solution
12. infinitely many solutions

Task D

Student B: right

Student C: not right

Student D: not right

Student B is correct. You must do the inverse operation to both sides. Subtracting 5 gives 4x = 16, so x = 4. Student C is wrong for dividing only part of each side, and Student D is wrong for adding instead of subtracting.

Task E

1. 18 dollars
2. 9 pencils
3. 34 points

Task F

1. 2 → 11; 5 → 23; 7 → 31; 3 → 15
2. 8 → 7; 11 → 13; 5 → 1

Pictures: Microsoft Fluent Emoji (MIT); Characters: Open Peeps by Pablo Stanley (CC0)

Created with LessonDino.com · AI lesson planner with checkable sources