LESSON MAKER PRO

Find the Unknown

Build equations and inequalities from quantities.

GRADE 7 · 7A.AF.C.18

7A.AF.C.18 "Use variables to represent quantities in a real-world or mathematical problem and construct algebraic expressions, equations, and inequalities to solve problems by reasoning about the quantities. a..."

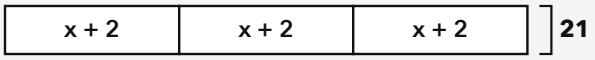
NAME _____ DATE _____

WORK BACKWARD

Let x stand for the quantity you need to find. Write an equation or inequality that matches how the quantities fit together, then undo operations to isolate x. When you divide an inequality by a negative number, reverse its sign.

WORKED EXAMPLE

The tape diagram shows three equal parts. Write an equation and find x.

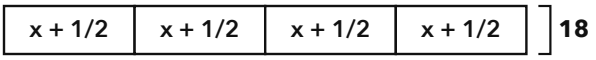


1. Write the equation: 3(x + 2) = 21.
2. Divide by 3: x + 2 = 7.
3. Subtract 2: x = 5.

Answer: x = 5

PRACTICE 6 problems

1 Write an equation for the tape diagram and find x.

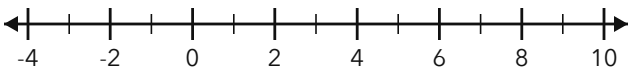


ANSWER _____

2 Solve (3/4)x + 6 = 15.

ANSWER _____

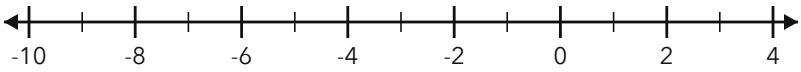
3 Solve (1/2)x + 1 < 4. Graph the solution on the number line.



ANSWER _____

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4 Solve -2x + 7 > 15. Graph the solution on the number line.



ANSWER _____

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5 Solve (4/5)(x - 3) = 8.

ANSWER _____

6 Solve 1.5x - 2.5 = 8.

ANSWER _____

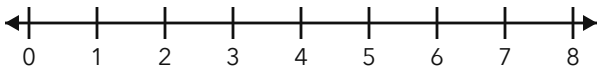
APPLY IT Show your work

1 Four friends each buy a snack for $x and a drink for $1.25. Together they pay $19. Write an equation and find the price of one snack.

WORK SPACE

ANSWER _____

2 A skate center charges $6 to enter and $2.50 per hour. You have less than $21 to spend. Let x be the number of hours you skate. Write and solve an inequality, graph the possible hours on the number line, and list the possible whole numbers of hours.



ANSWER _____

CHALLENGE One step up

A music app charges $2.40 per month plus a one-time $4.80 fee. The total bill is $19.20. Write and solve an equation for the number of months, x. Then show an arithmetic calculation and explain the order of operations in each approach.

WORK SPACE AND ANSWER

ANSWER KEY # Find the Unknown

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Write an equation for the tape diagram and find x.	**4(x + 1/2) = 18; x = 4**
2	Solve (3/4)x + 6 = 15.	**x = 12**
3	Solve (1/2)x + 1 < 4. Graph the solution on the number line.	**x < 6; open circle at 6, shaded left**
4	Solve -2x + 7 > 15. Graph the solution on the number line.	**x < -4; open circle at -4, shaded left**
5	Solve (4/5)(x - 3) = 8.	**x = 13**
6	Solve 1.5x - 2.5 = 8.	**x = 7**

PART 2 · APPLY IT

1. **4(x + 1.25) = 19; one snack costs $3.50** Divide $19 by 4 to get $4.75 per friend. Subtract $1.25 for the drink to get $3.50.
2. **2.50x + 6 < 21; 0 ≤ x < 6. Graph a closed circle at 0 and an open circle at 6, shaded between them. Possible whole numbers of hours: 0, 1, 2, 3, 4, 5.** Subtract 6, then divide by 2.50 to get x < 6. Hours cannot be negative, so include 0 and exclude 6.

CHALLENGE

Equation: 2.40x + 4.80 = 19.20, so 2.40x = 14.40 and x = 6 months. Arithmetic: (19.20 - 4.80) / 2.40 = 6. The bill is made by multiplying the months by $2.40 and then adding $4.80. Both solutions work backward by subtracting $4.80 first, then dividing by $2.40.

Accept equivalent equations and inequalities. On graphs of strict inequalities, the boundary point must be open.