LESSON MAKER PRO

Find the Number

Build and solve equations from products and real situations

HIGH SCHOOL · A2S.AF.D.10

A2S.AF.D.10 "Create equations and inequalities in one variable and use them to solve problems. Extend to equations arising from polynomial, trigonometric (sine and cosine), logarithmic, radical, and general piecewise functions."

NAME _____ DATE _____

FROM WORDS TO EQUATIONS

Let x stand for the unknown number, then write an equation that matches the information given. When the equation is quadratic, move all terms to one side and factor. Check each solution against any limits in the problem, such as x being positive.

WORKED EXAMPLE

The product of a positive number x and a number 19 greater than x is 150. Write an equation and find x.

1. Write the product: $x(x + 19) = 150$.
2. Move all terms to one side: $x^2 + 19x - 150 = 0$.
3. Factor: $(x + 25)(x - 6) = 0$.
4. The solutions are -25 and 6. Since x is positive, use 6.

Answer: $x(x + 19) = 150$; $x = 6$

PRACTICE 6 problems

1 The product of a positive number x and 3 more than x is 10. Write an equation and find x.

ANSWER _____

2 The square of a positive number x is 49. Write an equation and find x.

ANSWER _____

3 A positive number x is multiplied by 5 more than x. The product is 84. Write an equation and find x.

ANSWER _____

4 Solve $x^2 - 11x + 24 = 0$. Give both solutions.

ANSWER _____

5 Solve $x^2 + 10x + 21 = 0$. Give both solutions.

ANSWER _____

6 Two consecutive positive integers have a product of 72. Let x be the smaller integer. Write an equation and find both integers.

ANSWER _____

APPLY IT Show your work

1 A student sells x shirts for $30 - x per shirt. The total revenue is $200. Write an equation and find the possible numbers of shirts sold.

WORK SPACE

ANSWER _____

2 Tickets to a school concert cost $12 each. If the club increases the price by x dollars, it expects to sell 40 - 2x tickets. Write an equation and find the positive price increase that would bring in $480.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student club sells x digital badges for $20 - x each. The club wants to earn at least $96. If x is a whole number between 1 and 19, write and solve an inequality to find every possible number of badges sold.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Number

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The product of a positive number x and 3 more than x is 10. Write an equation and find x.	**x(x + 3) = 10; x = 2**
2	The square of a positive number x is 49. Write an equation and find x.	**$x^2 = 49$; x = 7**
3	A positive number x is multiplied by 5 more than x. The product is 84. Write an equation and find x.	**x(x + 5) = 84; x = 7**
4	Solve $x^2 - 11x + 24 = 0$. Give both solutions.	**x = 3 or x = 8**
5	Solve $x^2 + 10x + 21 = 0$. Give both solutions.	**x = -3 or x = -7**
6	Two consecutive positive integers have a product of 72. Let x be the smaller integer. Write an equation and find both integers.	**x(x + 1) = 72; the integers are 8 and 9**

PART 2 · APPLY IT

1. **x(30 - x) = 200; 10 or 20 shirts** Rearrange to $x^2 - 30x + 200 = 0$, then factor as $(x - 10)(x - 20) = 0$. Both values give a positive shirt price.
2. **(12 + x)(40 - 2x) = 480; an $8 increase** Expanding and simplifying gives $-2x(x - 8) = 0$. The solutions are 0 and 8, but only 8 is a positive increase.

CHALLENGE

x(20 - x) ≥ 96; x = 8, 9, 10, 11, or 12. Rearranging gives (x - 8)(x - 12) ≤ 0, so 8 ≤ x ≤ 12.

Accept equivalent equations and inequalities. For problems that specify positive numbers, reject negative solutions.