LESSON MAKER PRO

Models That Fit

Solve a model, then check what its answers mean.

HIGH SCHOOL · A2S.AF.I.22

A2S.AF.I.22 "Use the mathematical modeling cycle to solve real-world problems involving polynomial, trigonometric (sine and cosine), logarithmic, radical, and general piecewise functions..."

NAME _____ DATE _____

MODEL, SOLVE, CHECK

Turn the given information into an equation, then solve it. Check each solution against the situation: a negative width or a time before an event starts does not fit the model.

WORKED EXAMPLE

A banner's dimensions and area are shown. Find its width in feet.

BANNER MEASUREMENTS

Width (ft)	Length (ft)	Area (sq ft)
x	x + 14	51

1. Area = width × length, so $x(x + 14) = 51$.
2. $x^2 + 14x - 51 = 0$.
3. $(x + 17)(x - 3) = 0$, so $x = -17$ or $x = 3$.
4. A width cannot be negative, so reject -17.

Answer: 3 feet

PRACTICE 4 problems

1 A banner is x feet wide and x + 4 feet long. Its area is 45 square feet. Find its width.

ANSWER _____

2 In a game, a ball's height is $h(t) = -t^2 + 11t + 12$ feet, where t is seconds after a throw. When does it hit the ground?

ANSWER _____

3 A club's profit is $P(x) = -x^2 + 16x - 63$ dollars after selling x passes. At which two sales counts is profit zero?

ANSWER _____

_____

4 A seller charges x dollars per ticket and sells 15 - x tickets. Which two prices bring in $44?

ANSWER _____

_____

APPLY IT Show your work

1 A club's hoodie profit is $P(x) = x(24 - x)$ dollars for whole-number sales x from 0 to 24. Which sales counts earn $95? Check both counts.

WORK SPACE

ANSWER _____

2 For a stunt clip, a ball's height is $h(t) = -5t^2 + 15t + 20$ meters, where t is seconds after a throw. When does it hit the ground? Reject any impossible time.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A club earns $10 per pass and pays x^2 dollars in costs, plus a fee: $4 for $x \leq 4$ passes or $12 for $x > 4$ passes. For which whole-number sales counts is profit $12? Check each count against its fee rule.

WORK SPACE AND ANSWER

Models That Fit

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A banner is x feet wide and x + 4 feet long. Its area is 45 square feet. Find its width.	**5 feet**
2	In a game, a ball's height is $h(t) = -t^2 + 11t + 12$ feet, where t is seconds after a throw. When does it hit the ground?	**12 seconds**
3	A club's profit is $P(x) = -x^2 + 16x - 63$ dollars after selling x passes. At which two sales counts is profit zero?	**7 passes and 9 passes**
4	A seller charges x dollars per ticket and sells 15 - x tickets. Which two prices bring in $44?	**$4 and $11**

PART 2 · APPLY IT

1. **5 hoodies and 19 hoodies** Solving $x(24 - x) = 95$ gives x = 5 or x = 19. Both are whole numbers from 0 to 24, and each gives $95.
2. **4 seconds** Setting $h(t) = 0$ gives $-5(t - 4)(t + 1) = 0$. Reject t = -1 because it is before the throw.

CHALLENGE

2 passes and 6 passes. With the $4 fee, the equation gives 2 and 8, but 8 exceeds 4. With the $12 fee, it gives 4 and 6, but 4 does not exceed 4.

Accept answers with or without units when the units are clear from the question. In the challenge, require students to check each candidate against the fee rule used to find it.