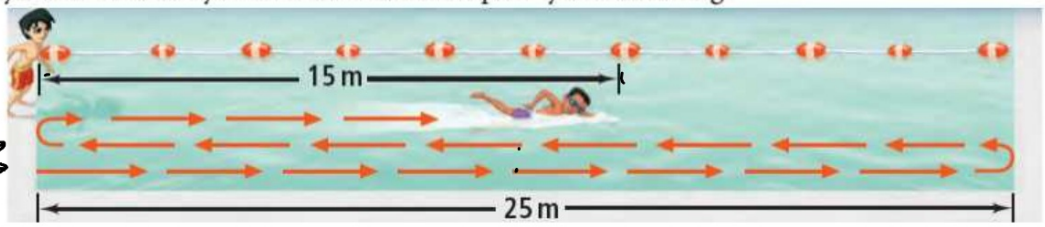
Name _____

4-4 Writing a Function Rule

OBJECTIVE: I can write equations that represent functions

Warm-Up

You and a friend are swimming 20 laps at the local pool. One lap is the distance across the pool and back. You both swim at the same rate. Your friend started first. The trail of arrows shows how far he has already swum. What equation gives the distance you have swum as a function of the number of laps your friend has swum? How far have you swum when your friend finishes? Explain your reasoning.



15 →
25 →
25 →

Lap = 50 m

50 l − 65

50(20) − 65

1000 − 65 = 935 m

Essential Understanding

Essential Understanding Many real-world functional relationships can be represented by equations. You can use an equation to find the solution of a given real-world problem.

Example #1 Writing a Function Rule

Insects You can estimate the temperature by counting the number of chirps of the snowy tree cricket. The outdoor temperature is about 40°F more than one fourth the number of chirps the cricket makes in one minute. What is a function rule that represents this situation?

Relate: Temperature is 40°F more than $\frac{1}{4}$ of number of chirps in 1 minute

Define: Let T = the temperature
Let n = the number of chirps in 1 minute } Important

Write: $T = 40 + \frac{1}{4}n$

Your Turn to Work it Out

1. A landfill has 50,000 tons of waste in it. Each month it accumulates an average of 420 more tons of waste. What is a function rule that represents the total amount of waste after m months?

Let W = total waste

Let m = each month

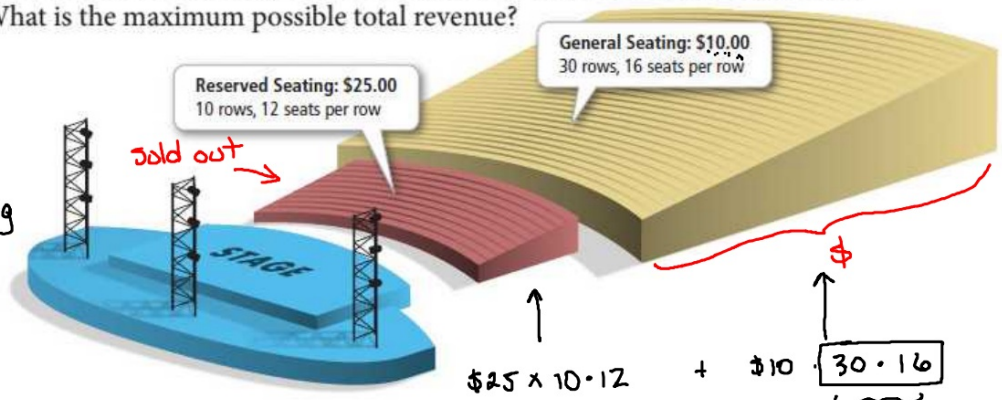
$W = 50{,}000 + 420m$

50,000: started with

420m: Added each month

Example #2 Writing and Evaluating a Function Rule

Concert Revenue A concert seating plan is shown below. Reserved seating is sold out. Total revenue from ticket sales will depend on the number of general-seating tickets sold. Write a function rule to represent this situation. What is the maximum possible total revenue?



Let R = Total Revenue

Let n = number of General Seating seats sold

$25 x 10·12 sold out → $3000

+ $10 · 30·16 → n → 480 seats

$R = 10n + 3000$

$R = 10(480) + 3000$

$R = \$7{,}800$ ← Amount made if all seats are sold

Your Turn to Work it Out

2. A kennel charges $15 per day to board dogs. Upon arrival, each dog must have a flea bath that costs $12. Write a function rule for the total cost for n days of boarding plus a bath. How much does a 10-day stay cost?

Let C = Total Cost

Let d = days

$C = 15d + 12$

$C = 15(10) + 12$

$C = 150 + 12$

$C = \$162$

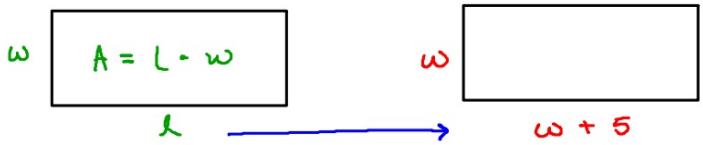
The cost for a dog 10 days stay is $162

Example #3 Writing a Nonlinear Function Rule

Geometry Write a function rule for the area of a rectangle whose length is 5 ft more than its width. What is the area of the rectangle when its width is 9 ft?

$w = ?$

$l = w + 5$



New function

$A = l \cdot w$

$A = (w+5)w$ ← Distribute w

$A = w^2 + 5w$

$A = (9)^2 + 5(9)$ ← Substitute 9 for w

$A = 81 + 45$

$A = 126$

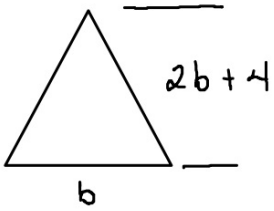
The area of the rectangle is $126\ ft^2$

Do not forget unit

Your Turn to Work it Out

3. Write a function rule for the area of a triangle whose height is 4 in. more than twice the length of its base. What is the area of the triangle when the length of its base is 16 in.?

$A = \frac{1}{2}bh \leftrightarrow A = \frac{b \cdot h}{2}$



Make the function rule

$A = \frac{(2b+4)\,b}{2}$ ← Distribute b

$A = \frac{2b^2 + 4b}{2}$

$A = \frac{2b^2}{2} + \frac{4b}{2}$

$A = b^2 + 2b$

$A = (16)^2 + 2(16)$

$A = 288\ m^2$