

# 1.6 Something to Chew On

Date: \_\_\_\_\_

Learning Target: Use recursive and explicit functions to solve real world problems.

## I.6 Something to Chew On

The Food-Mart grocery store has a candy machine like the one pictured here. Each time a child inserts a quarter, 7 candies come out of the machine. The machine holds 15 pounds of candy. Each pound of candy contains about 180 individual candies.



1. Represent the number of candies in the machine for any given number of customers. About how many customers will there be before the machine is empty?
2. Represent the amount of money in the machine for any given number of customers.
3. To avoid theft, the store owners don't want to let too much money collect in the machine, so they take all the money out when they think the machine has about \$25 in it. The tricky part is that the store owners can't tell how much money is actually in the machine without opening it up, so they choose when to remove the money by judging how many candies are left in the machine. About how full should the machine look when they take the money out? How do you know?

1.  $n = \text{customers}$        $f(n) = \text{number of candies}$

$n$	$f(n)$
0	2700
1	2693
2	2686
3	2679

Since the machine holds 15 pounds and each pound has 180 pieces of candy, there is a total of 2700 candies.  
 $15(180) = 2700$

Equation for any given # of customers:

Explicit:  $f(n) = 2700 - 7n$

Recursive:  $f(n) = f(n-1) - 7, f(0) = 2700$

To know how many customers would empty the machine;

Total divided by groups of 7

$$2700 \div 7 = 385.7$$

385 customers with a few candies left over.

2.  $n$  = customers       $g(n)$  = amount of money

$n$	$g(n)$
0	0
1	.25
2	.50
3	.75

Recursive:

$$g(n) = g(n-1) + .25, \quad g(0) = 0$$

Explicit:

$$g(n) = .25n$$

3. Use  $g(n)$  to find out how many customers it takes to make \$25.

$$\frac{100}{.25} = \frac{.25n}{.25} \rightarrow \boxed{100 = n} \text{ customers}$$

Use  $f(n)$  to find out how many candies remain after 100 customers come through.

$$f(100) = 2700 - 7(100) = 2700 - 700 = 2000$$

When there are 2000 candies left,

74% remains.

$$\frac{2000}{2700} \approx .74 \approx 74\%$$

That is about  $\frac{3}{4}$  so the store owners can take out about \$25 when the machine looks like it has  $\frac{3}{4}$  left.