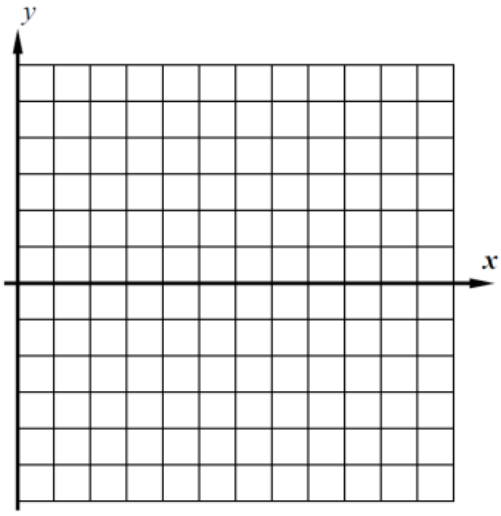
Name: _____ **Date:** _____

Common Core Algebra

Step Functions

1. A step function is defined using the piecewise formula $f(x) = \begin{cases} 2 & 0 \le x < 3 \\ 5 & 3 \le x < 5 \\ -4 & 5 \le x \le 10 \end{cases}$



(a) Evaluate the following:

$f(2.7) =$ $f(5) =$

$f(3.5) =$ $f(0) =$

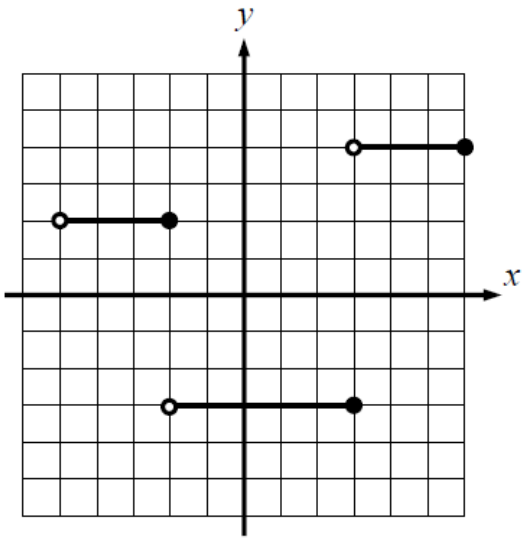
(b) Graph $f(x)$ on the grid to the right.

2. The step function g(x) is shown on the grid to below. Answer the following questions.

(a) Evaluate each of the following:

$f(-4) =$ $f(-2) =$

$f(2) =$ $f(5) =$



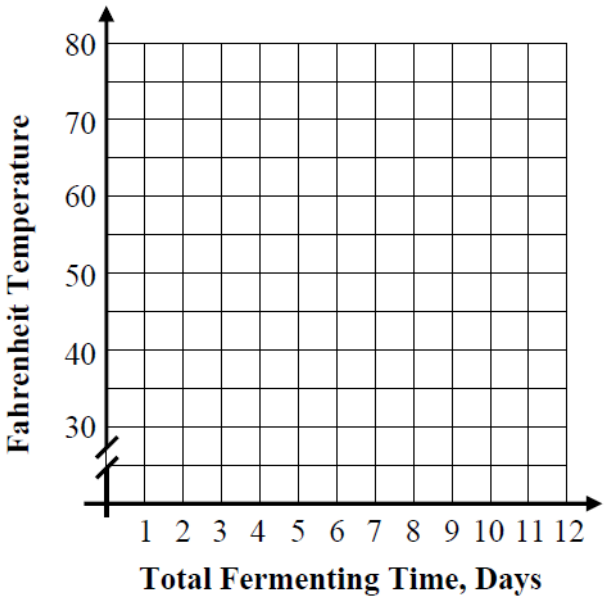
(b) Write an equation for this step function:

$g(x) = \begin{cases} \\ \\ \\ \end{cases}$

3. When kimchi is made, it is initially fermented for the first 3 days at a temperature of 70 degrees Fahrenheit and then immediately moved to a temperature of 50 degrees Fahrenheit for another 3 days after which it is put in a 35 degree refrigerator for 6 days.

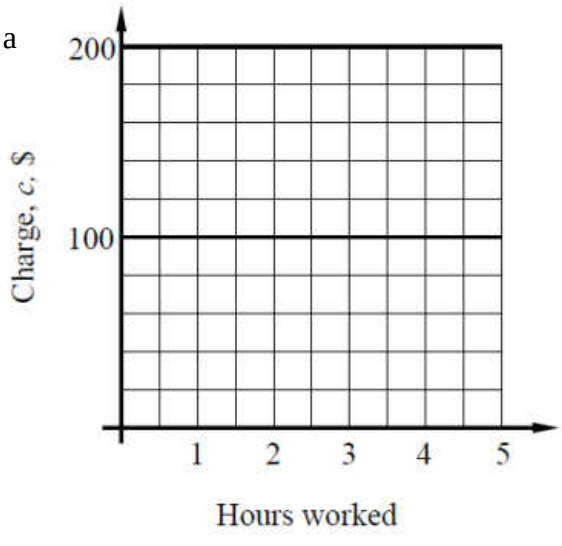
The Fahrenheit temperature, *F*, of the kimchi can be modeled over time, *t*, in days with the equation below. Graph the kimchi's temperature on the grid provided.

$$f(x)=\begin{cases}70 & 0\le x<3\\ 50 & 3\le x<6\\ 35 & 6\le x\le 12\end{cases}$$



4. An electrician works at a job site at a rate of $40 per hour or any portion of an hour. In other words, he will charge you $40 as soon as he comes up to the first hour, and then $40 for the second hour, and so on.

(a) Graph the amount the electrician charges, c, in dollars as a function of the number of hours he works.



(b) How much does he charge for working 3.5 hours? Circle the point on the graph the shows this answer.

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Common Core Algebra

Step Functions Homework

1. Stewart International Airport in Newburgh, New York charges for parking the way many airports do, by the partial hour. Their short-term parking rates are shown below.

(a) Explain why the total amount you will pay for parking at Stewart is a step function based on the number of hours you've parked?

Stewart International Airport Rates & Information

Parking Lots and Rates at SWF Airport (including tax)

Stewart On-Airport Short-Term Lot

1 hr or part thereof	$3
Each additional hour or part thereafter*	$3
24-hr maximum	$30

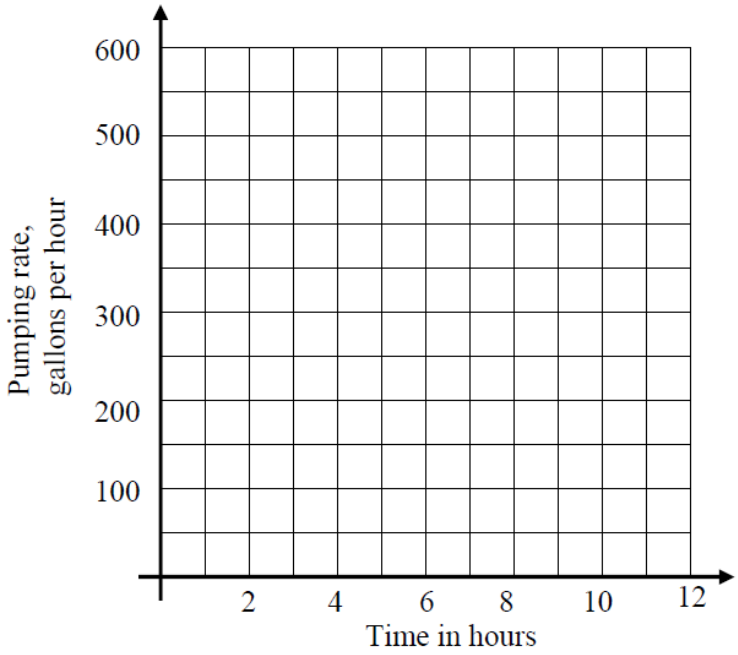
*charges are incurred in hour increments before reaching the daily maximum

(b) How much would you have to pay if you parked for 5 hours and 22 minutes? Show how you determined your answer.

(c) After how many hours of parking will you hit the maximum charge of $30? Explain your reasoning.

2. A pumping station is draining a reservoir with a set of pumps that drain the water at a rate of 250 gallons per hour. After 5 hours, additional pumps are turning on such that they pump at an overall rate of 600 gallons per hour for the next 7 hours.

(a) Draw a graph of the pump rate function on the grid provided.



(b) How many total gallons of water are pumped out of the reservoir over the 12 hour period? Show the calculations that lead to your answer.

(c) The reservoir originally contains 8,250 gallons of water. How much does it contain after 5 hours if water is only pumped out? Show the work that leads to your answer.

(d) Engineers want to turn off the pumps when the reservoir reaches a level of 2,000 gallons. Will they need to turn the pumps off during this 12-hour time period? Show evidence to support your yes/no answer.