Name: _____ Date: _____ **Unit 3 Class Work**

Designing a Linear Model Class Work

Objective: You will be able to design, compare, and make suggestions for linear models of real life situations.

★ ***Activity 1***: A solution for each equation is provided below.
Write the letter of each equation in the appropriate box for its solution.

A: $-3x + 15 - b = 3(-x + 5) + b$

B: $3x - 15 + 2b = 3(x - 5) + b + 1$

b = 1	b = 0	b = -1
☐	☐	☐

★ ***Activity 2***: Mr. and Mrs. Ryan build and sell nesting boxes for small birds. They sell each box for $19.95. So far this month, they have built and sold 74 boxes.

Part A
Let x represent the number of additional boxes they expect to build and sell for the month, and let n(x) represent they amount of money they expect to receive from the entire month's sales. Write an equation for n(x).

Part B
Determine the average rate of change, in dollars per nesting box, of n(x) as x varies from 80 to 110.

Part C
Mr. and Mrs. Ryan can build no more than 450 boxes in one month. Which statement provides the domain of the function n?

A. $0 \le x < 450$, where x is a whole number

B. $0 \le x \le 450$, where x is a whole number

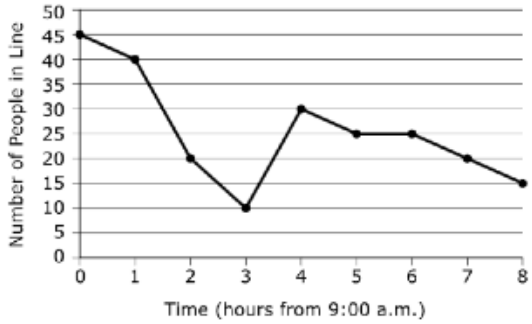
C. $0 \le x < 376$, where x is a whole number

D. $0 \le x \le 376$, where x is a whole number

Part D
The materials for each nesting box cost a total of $11.75. Write a function P(s) for the profit the Ryans earn when they sell s nesting boxes.

★ ***Activity 3***:

A ticket window at a theater opened at 9:00 am and closed at 500pm. At the beginning of each hour, the number of people in line was recorded. The graph shows the number of people in line as a function of the time, where t = 0 represents 9:00 am and t = 8 represents 5:00pm.



Part A
Why does t = 8 represent 5:00 pm?

Part B
According to the graph, how many hours after the ticket window opened did the number of people in line reach a minimum before increasing?

Part C
At 11:00 am, approximately how many less people were in line than were in line before the ticket window opened?

Part D
For what interval(s) of t is the number of people in line increasing?

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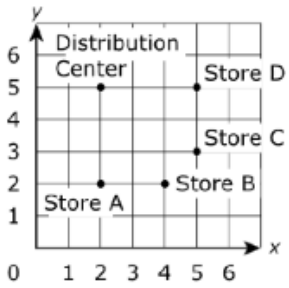
★ ***Linear Modeling Activity 4***:

The arrangement of a distribution center and four stores to which it delivers is shown on the grid. Each unit on the grid represents 5 miles. The grid lines represent the roads.



The distribution center operators will use a single vehicle, either a large truck or a small van. They will base their decision on the following:

Large Truck	**Small Van**
- fuel efficiency: 9 miles per gallon - delivers to al stores in one round trip, using the shortest route through all in alphabetical order - $3.00 fee per for loading the dock at each store	- fuel efficiency: 18 miles per gallon - must return to the distribution center after delivery to each store - uses the shortest route between the distribution center and each store - no fee for loading the dock

Part A

Define the dependent variable. Then define the independent variable on which this relies.

Part B

Create a model (equation) that shows the total cost to deliver to all stores for each type of vehicle, based solely on the provided information. Justify each of your models, including any assumptions you made.

Part C

Determine when it is more cost efficient to use the van for deliveries than it is to use the truck. Thoroughly support your reasoning.