Name _____ Date _____ Hour _____

Problem 2.2 - Equations for Linear Relationships

Cars and trucks are an important part of American life and Culture. There are nearly 200 million licensed drivers and 140 million registered passenger cars in the United States. To help people keep their cars clean, many cities have self-service car washes.

At most self-service car washes, the charge for washing a car and the company's profit depend on the time the customer spends using the car wash. To run such a business efficiently, it helps to have equations relating these key variables.

What do you think the self-service car wash owners consider when they decide how much to charge a customer?

- Sudzo Wash and Wax charges customers **$0.75 per minute** to wash a car. Write an equation that relates the total charge (*c)* to the amount of time (*t)* in minutes.

- Pat's Power Wash charges **$2.00 per car** to cover the cost of cleaning supplies, plus **$0.49 per minute** for the use of water sprayers and vacuums. Write an equation for the total charge *(c)* for any car-wash time *(t)*.

- U-Wash-It charges **$10 for each car**. The business owners estimate that it costs them **$0.60 per minute** to provide soap, water, and vacuums for a car. Write an equation for the profit *(p)* U-Wash-It earns if a customer spends *(t)* minutes washing a car.

- Explain what the numbers and variables in each equation represent.

- What questions can your equation help you answer?

Problem 2.2 - Equations for Linear Relationships

A) The Squeaky Clean Car Wash charges by the minute. This table shows the charges for several different times.

Squeaky Clean Car Washes Charges

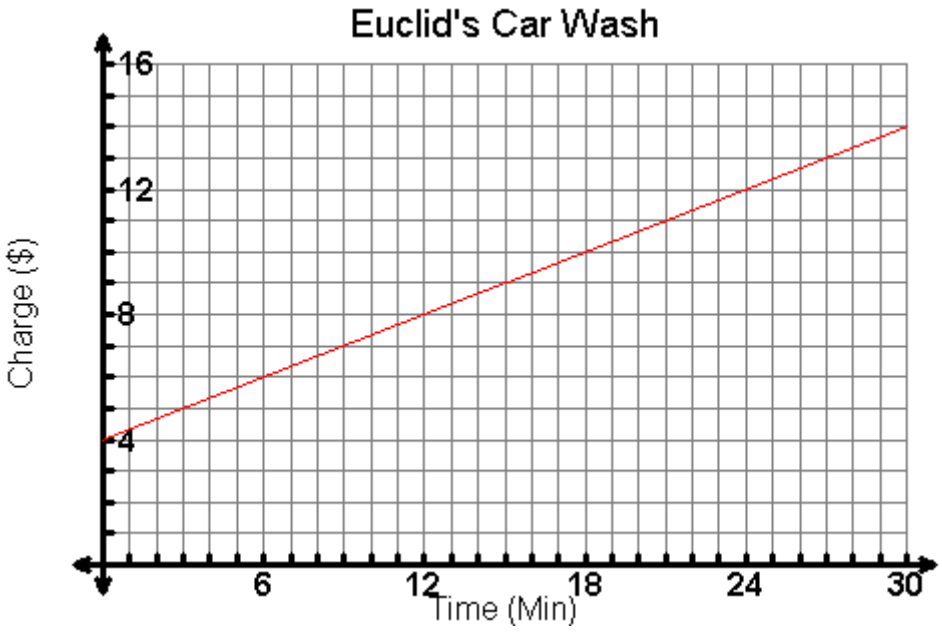
Time (min)	5	10	15	20	25
Charge ($)	8	13	18	23	28

1.) Explain how you know the relationship is linear.

2.) What are the **slope** and **y-intercept** of the line that represents the data?

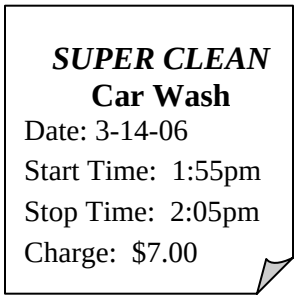
3.) Write an equation relating charge (*c*) to time (*t*) in minutes.

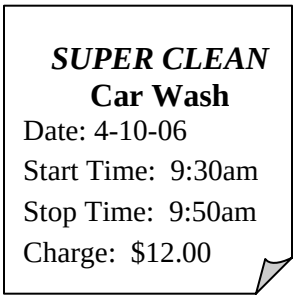
B) Euclid's Car Wash displays its charges as a graph.



1.) **Write an equation** for the charge plan at Euclid's. **Describe** what variables and numbers in your equation tell you about the situation.

C) Below are two receipts from Super Clean Car Wash. Assume the relationship between charge *(c)* and the time used *(t)* is linear.





1.) Each receipt represents a point *(t, c)* on the line. Find the coordinates of the two points.

2.) What are the **slope** and **y-intercept** of the line?

3.) Write an equation relating *(c)* and *(t)*.

D) Write an equation for the line with a slope of -3 that passes through point (4, 3).

E) Write an equation for the line with points (4, 5) and (6, 9).

F) Suppose you want to write an equation in the form of: $y = mx + b$ to represent a linear relationship. What is your strategy if you are given:

1.) A description of the relationship in words?

2.) Two or more (x, y) values or a table of (x, y) values?

3.) A graph showing points with coordinates?