Piecewise-Defined Functions

Mini-Project for Section 1.3
Algebra 2 with Mr. Hartzler

Essential Question

Teacher speak: How do you model a situation in which a function behaves differently over different parts of its domain?

Student speak: Life isn't always consistent and because of that our formulas and graphs are different as time goes on. How do we make sense of these complicated and changing situations?

Examples to look at in the text

Example 1: Sarah wants to know how much money he will earn in one full year. She works during school at Taco Bell and makes $8.55 an hour for 20 hours a week. When she leaves for summer break on June 1st she will quit her job at Taco Bell and work with a neighbor doing lawn care where she makes $12.00 an hour for 40 hours a week. She plans on quitting her lawn job and starting a tutoring job when school starts back up on September 1st. She makes $10 an hour as a tutor and works 8 hours a week.

OBJECTIVES

1. I can write equations related to real world situations
2. I can graph linear functions.
3. I can graph piecewise functions that include linear functions.

Step-by-Step

1. We have to write equations for how much she makes at each job each week.

Taco Bell: $f(x) = 8.55x$

Lawn Care: $f(x) = 12x$

Tutoring: $f(x) = 10x$

2. We have to figure out how much money she saves each month. (Use the table)

Month	How much he made (Assume 4 weeks in a month)	Cumulative Earning
January	$8.55 \cdot 20 \cdot 4 = 684$	684
February	$8.55 \cdot 20 \cdot 4 = 684$	1368
March	$8.55 \cdot 20 \cdot 4 = 684$	2052
April	$8.55 \cdot 20 \cdot 4 = 684$	2,736
May	$8.55 \cdot 20 \cdot 4 = 684$	3,420
June	$12 \cdot 40 \cdot 4 = 1920$	5,340
July	$12 \cdot 40 \cdot 4 = 1920$	7,260
August	$12 \cdot 40 \cdot 4 = 1920$	9,180
September	$10 \cdot 8 \cdot 4 = 320$	9,500
October	$10 \cdot 8 \cdot 4 = 320$	9,820
November	$10 \cdot 8 \cdot 4 = 320$	10,140
December	$10 \cdot 8 \cdot 4 = 320$	10,460

3. Now graph the points created from the table above.

See attached

4. Looking at the graph you'll notice it doesn't match exactly with the equations we found in Step 1. Why do you think that is?

The y-intercepts aren't 0 like in the equations

5. Let's write the equations of each chunk of graph and see how they compare to the equations from step 1.

Taco Bell

$y = 500x + 0$

Lawn Care (Co, 5,340)

$y - y_1 = m(x - x_1)$

$y - 5340 = 1920(x - 3)$

$y = 1920x - 11,520 + 5340$

$y = 1920x - 6180$

Tutoring (11, 10,140)

$y - y_1 = m(x - x_1)$

$y - 10,140 = 320(x - 11)$

$y - 10140 = 320x - 3520$

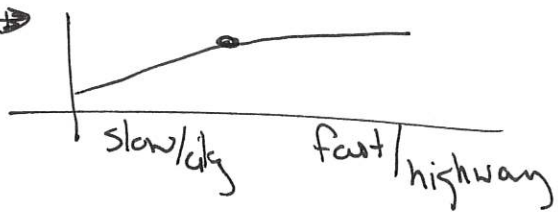
$+10140 \quad +10140$

$y = 320x + 6620$

Conclusion

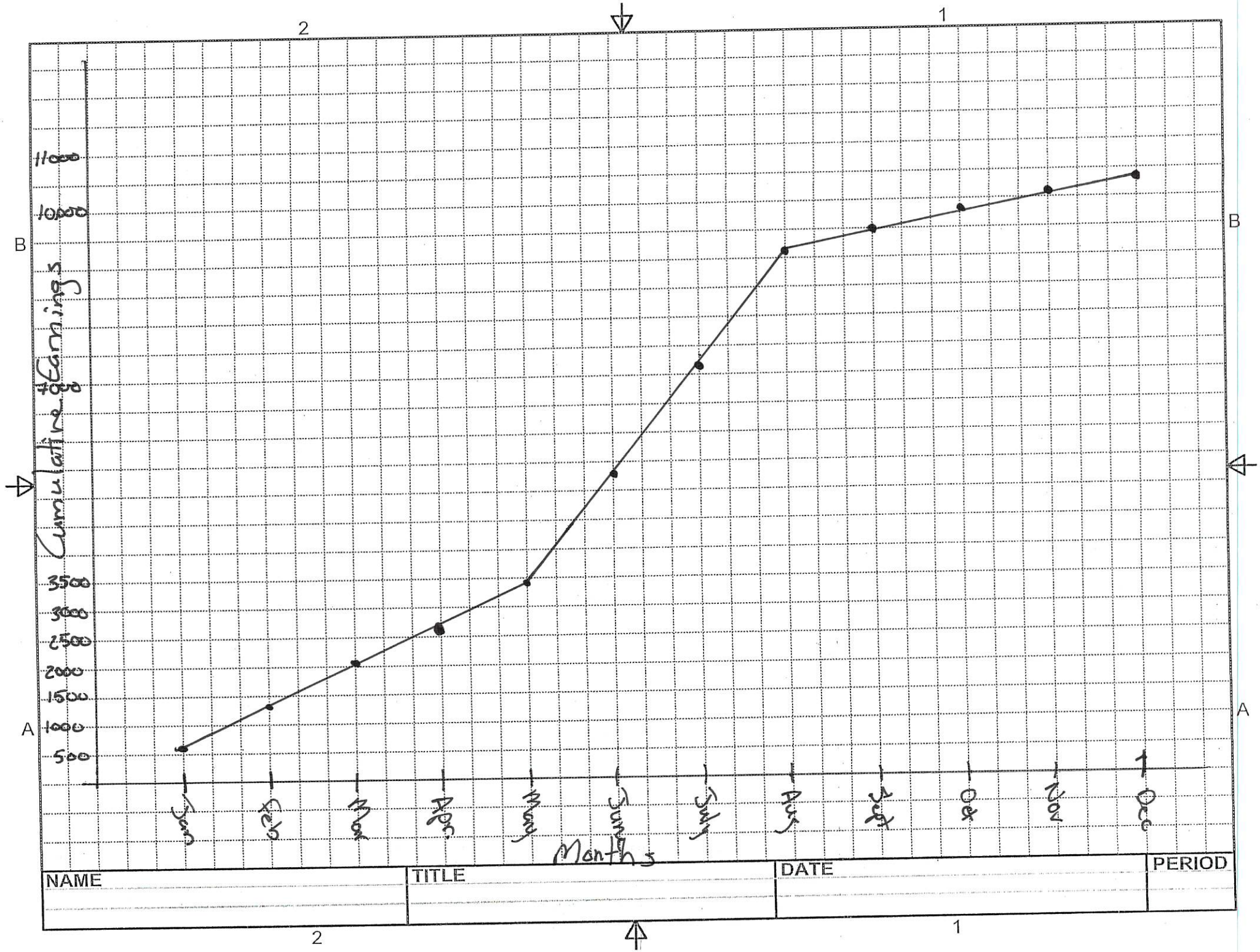
1. What situations in your life could you use a piecewise-defined function?

Gas mileage ~~usage~~ usage based on speed



2. What is the hardest part about this lesson?

finding equations like in #5



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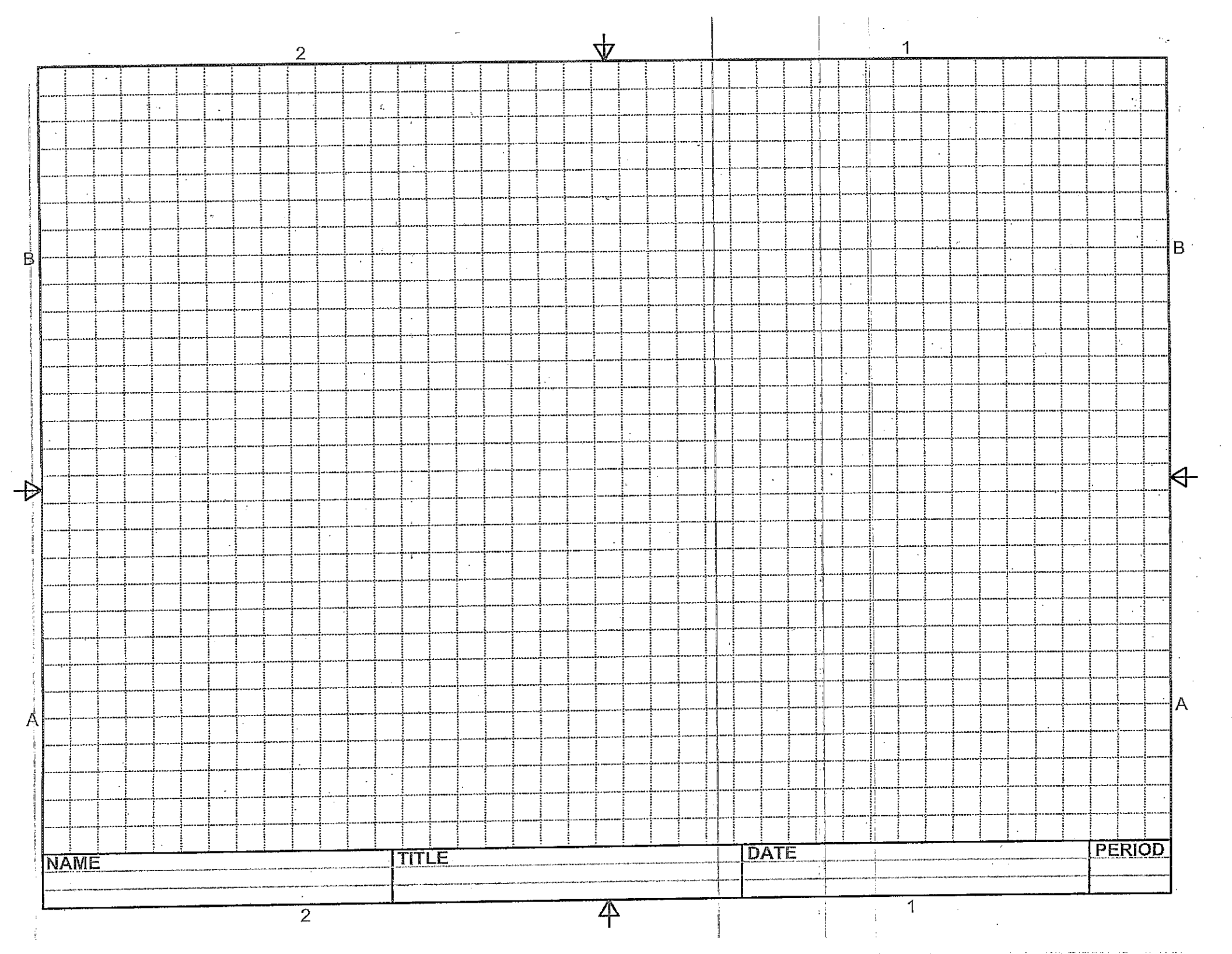
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