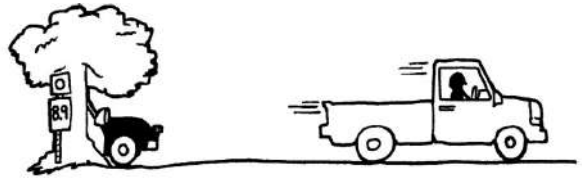NAME _____   DATE _____

Scenario

A truck is traveling at a constant speed of 20 m/s through a school zone. At time $t = 0$ seconds, he passes a hidden police car that is at rest. Five seconds after the truck passes, the police car begins accelerating at a constant rate of 2 m/s² in order to catch the truck.

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Using Representations

PART A: On the axis at right, sketch and label graphs of the velocity of the truck and the police car as functions of time for the first 40 seconds after the truck passes the hidden police car. Use different colors or different lines (e.g., dashed vs. solid) to differentiate between the truck and the police car. Include a key.
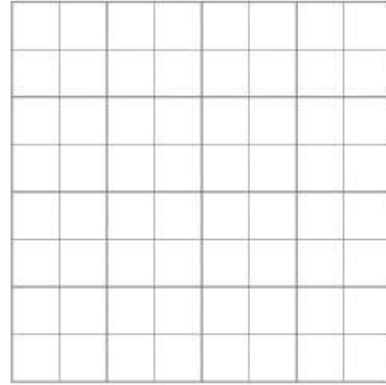
Data Analysis

PART B:

i. Using the graph you made in Part A, determine the time at which the speed of the truck is equal to the speed of the police car. Mark this time as t_1.

ii. How will the positions of the police car and the truck compare when they have the same speed and why?

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PART C: Explain in a short sentence or two how you could use the graph you made in Part A to determine the time at which the truck and the police car are in the same location.

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Argumentation

PART D: Angela and Blake are discussing Carlos's graph of position as a function of time for the police car.
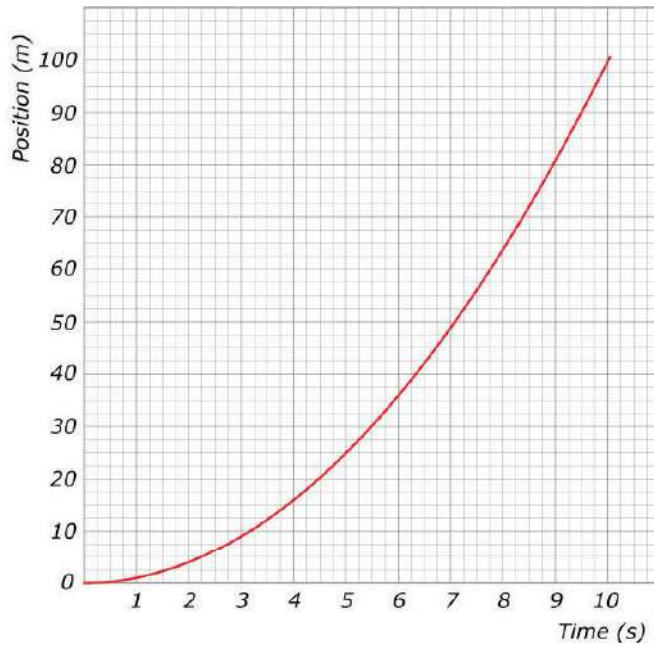
Angela says, "Since the police car is accelerating, the graph of position vs. time should be a curve, showing that the speed is changing. The graph of position vs. time for the police car is correct."

Blake says, "I don't see how that can be. The police car waits for 5 seconds before moving. The graph shouldn't start at $(0, 0)$ but at $(5, 0)$."

Which aspects of Angela's reasoning, if any, are correct? Support your answer with evidence.

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Which aspects of Blake's reasoning, if any, are correct? Support your answer with evidence.

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