Robot Races

Task

Carli's class built some solar-powered robots. They raced the robots in the parking lot of the school. The graphs below are all line segments that show the distance d, in meters, that each of three robots traveled after t seconds.

a. Each graph has a point labeled. What does the point tell you about how far that robot has traveled?

b. Carli said that the ratio between the number of seconds each robot travels and the number of meters it has traveled is constant. Is she correct? Explain.

c. How fast is each robot traveling? How did you compute this from the graph?

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Solution

1. The point $(1,\ 5)$ tells that robot A traveled 5 meters in 1 second.
   The point $(6,\ 9)$ tells that robot B traveled 9 meters in 6 seconds.
   The point $(5,\ 2)$ tells that robot C traveled 2 meters in 5 seconds.

2. Carli is correct. Whenever the ratio between two quantities is constant, the graph of the relationship between them is a straight line through $(0,\ 0)$. We can also say that for each robot, the relationship between the time and distance is a proportional relationship.

3. The speed can be seen as the d-coordinate of the graph when $t = 1$. This is the robot's unit rate:

   Robot A traveled 5 meters per second, as shown by the point $(1,\ 5)$ on its graph.
   Robot B traveled 1.5 meters per second, as shown by the point $(1,\ 1.5)$ on its graph.
   Robot C traveled 0.4 meters per second, as shown by the point $(1,\ 0.4)$ on its graph.

   The speed of each robot can also be seen in the steepness of its graph, which is quantified as slope. But that perspective is not expected until grade 8.

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