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## Distance time graph gizmo quiz answer key

EspañolItalianoEnglishSrpskiPolskiРусскийPortuguêsFrançaisDeutsch Name: Nashita Areeba Date: Directions: Follow the instructions to go through the simulation. Respond to the questions and prompts in the orange boxes. [NOTE TO TEACHERS AND STUDENTS: This lesson was designed as a follow-up to the Distance-Time Graphs Gizmo. We recommend you complete that activity before this one.] Vocabulary: displacement, distance traveled, slope, speed, velocity Prior Knowledge Questions (Do these BEFORE using the Gizmo.) Dora runs one lap around the track, finishing where she started. Clark runs a 100- meter dash along the straight side of the track. Which runner traveled a greater distance? Dora Which runner had a greater change in position, start to finish? Clark Gizmo Warm-up The Distance-Time Graphs Gizmo shows a dynamic graph of the position of a runner over time. The Distance- Time and Velocity-Time Graphs Gizmo includes that same graph and adds two new ones: a velocity vs. time graph and a distance traveled vs. time graph. The graph shown below (and in the Gizmo) shows a runner's position (or distance from the starting line) over time. This is most commonly called a position-time graph. Check that the Number of Points is 2. Turn on Show graph and Show animation for both Runner 1 and Runner 2. Drag the points to create the graph shown to the right. ● Runner 1's line (the red one) should have endpoints at (0, 0) and (4, 40). ● Runner 2's line (the blue one) should have endpoints at (0, 40) and (4, 20). Click the green Start button on the stopwatch. Watch the two runners carefully. In what two ways are the runners' motions different? They are different in speed and distance. Activity A: Velocity-time graphs Get the Gizmo ready: ●Click the red Reset button on the stopwatch. ●Change the Number of Points to 5. ●Turn off Show graph and Show animation for Runner 2. Speed is a measure of how fast an object moves, regardless of direction. Speed can never be negative. Velocity describes both speed and direction, and can be positive or negative. In the Gizmo, make a position-time graph for Runner 1 with the following features:● There is at least one major change in speed. ● There is at least one major change in direction. Click the green Start button and watch the runner run. Adjust your graph if needed to meet the requirements. ⇌ Hand draw in this space or click here to select EDIT to use the drawing tool. Sketch your graph to the right. Where was the runner each second? Based on your graph, fill in all except the final column in the table below. (Leave the velocity column blank for now.) Label any numbers with units. Time Position at end of time interval (m) Distance moved this time interval (m) To the left or right? Velocity this time interval (m/s) 0 - 1 sec 10m 10m right 10 m/s 1 - 2 sec 40m 30m right 30 m/s 2 - 3 sec 30m 10m left -10 m/s 3 - 4 sec 20m 10m left -10 m/s To calculate the velocity for each time interval, first calculate the speed of the runner in that interval (speed = distance ÷ time). If the direction is left to right, velocity is positive. If the direction is right to left, velocity is negative. Fill in the velocity column of the table above. Use units (m/s). When this runner is running to the left (negative velocity), what does his position-time graph look like? If the runner is running to the left and has a negative velocity then the position-time graph will have a negative slope. Slope is the steepness of a graph. To find the slope of a line, divide the change in y -value (rise) by the Activity B: Velocity and position Get the Gizmo ready: ●Set the Number of Points to 3. ●Turn on Show graph and Show animation for both Runner 1 and Runner 2. In the Gizmo, make the position-time graphs shown below. Click the green Start button and watch the runners run. Hand draw in this space or click here to select EDIT to use the drawing tool. Sketch what you think their velocity-time graphs look like on the second set of axes. (If you can, use a red line for runner 1, and a blue line for runner 2.) Then select the VELOCITY-TIME GRAPH tab in the Gizmo. Sketch the actual graph on the third set of axes below. Make any position-time graphs you want for Runners 1 and 2. Hand draw in this space or click here to select EDIT to use the drawing tool. Sketch them below. Then do the same thing – sketch what you think their velocity- time graphs look like, and then check. Compare the velocity- time graphs to their related position- time graphs. A. When do two different position-time graphs have matching velocity-time graphs? Two different position-time graphs have matching velocity- time graphs when they have the same slopes. Position-time graph Velocity-time (predicted) Velocity-time (actual) Position-time graph Velocity-time (predicted) Velocity-time (actual) A. What information is missing from a velocity-time graph? The distance. Activity C: Distance and displacement Get the Gizmo ready: ●Turn off Show graph and Show animation for Runner 2. Create the position-time graph for Runner 1 shown at right. Then fill in the blanks below to describe what you think the runner will do, based on that graph. The runner will run 40 meters in the first 2 seconds, with a velocity of 20 m/s. His direction will be from left to right Then he will run 10 meters in the next 2 seconds, with a velocity of m/s. His direction will be from left to right Click the green Start button and watch the runner go. Were you correct? yes Two students, Gina and Walter, are discussing the runner whose graph is shown above. ● Gina says the runner moved more than 40 meters. ● Walter says the runner moved less than 40 meters. A. Who do you think is right? Gina B. Explain your answer Gina is right because the runner moved more than 40 meters. The runner traveled a total of 50 meters, 40 meters there and 10 meters back. On top of the left half of the Gizmo, select the DISTANCE TRAVELED tab. A. What was the total distance traveled by the runner after 4 seconds? 50 meters. B. Displacement is equal to the difference between the starting and ending positions. Displacement to the right is positive while displacement to the left is negative. What is the displacement shown by the graph at the top of the page 30 meters.

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