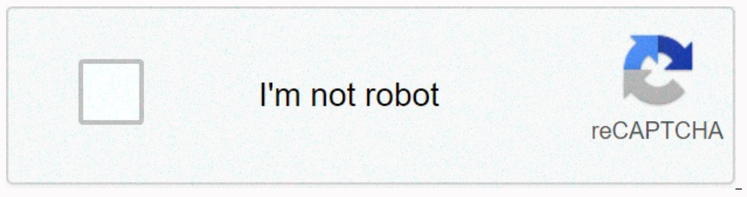

Continue

Distance time and velocity time graphs answer key

Student survey: distance and speed time schedules [NOTE FOR TEACHERS AND STUDENTS: This lesson was intended as a continuation of distance schedules in Gizmo™. We recommend that you complete this activity before then.] Vocabulary: displacement, distance travelled, inclination, speed, speed, speed Questions of prior knowledge (Do them BEFORE using Gizmo.) Dora runs one lap around the track, finishing where she started. Clark runs a 100-yard dash along a straight track. Which runner went a long way? Which runner had a bigger change of position, do you start finishing? Gizmo Warm-upThe Distance-Time Graphs Gizmo shows the dynamic graph of the runner's position over time. Distance and speed timelines Gizmo include the same graph and add two new ones: speed vs. timeline and distance travelled vs. timeline. The graph shown below (and Gizmos) shows the position (or distance) of the runner from the starting line over time. This is most often called the position time graph. Check that the number of points is 2. Turn on Show schedule and Show animation for both Runner 1 and Runner 2. Drag points to create a graph that appears on the right. Runner 1 line (red) should have endpoints (0.0) and (4.40). Runner 2 line (blue) should have endpoints (0.40) and (4.20). In the stopwatch, click the green Start button. Watch the two runners carefully. In what two ways are the movements of runners different? Action A: Get Gizmo ready for speed time schedules: Click the red Reset button on the stopwatch. Change the number of points to 5. Turn off Show schedule and Show runner 2 animation. Speed is the measure of how fast the object moves, regardless of direction. Speed can never be negative. Speed describes both speed and direction, and can be positive or negative. In Gizmo, make a positional time graph for Runner 1 with the following functions:There is at least one big change in speed. There's at least one big change of direction. Click the green Start button and see how the runner works. If necessary, adjust the schedule according to the requirements. Outline your schedule to the right. Where was the runner every second? Fill in everything based on the graph, except for the last column in the table below. (Leave the speed column blank for now.) Mark all numbers with units. To calculate the speed for each time period, first calculate the runner speed in this range (speed = distance ÷ time). If the direction is left-to-right, the speed is positive. If the direction is right-to-left, the speed is negative. Fill in the speed column in the table above. Use units (m/s). If this runner runs left (negative speed), what does his position-time schedule look like? (Activity A continues on the next page) Action A (continues from the previous page) Kalle is steep in the graph. To find the line inclination, divide the change (ascent) of the y-value by the change in the x-value (run). Like speed, the slope can be zero or negative. In the table below, fill in the slope of each segment of your position time graph with the runner's speed for each time period. Check your speeds and the position schedule you've made. How is the slope of the position time schedule related to the speed of the runner? On the left side of Gizmo, select the VELOCITY-TIME GRAPH tab. Use green probes to compare the speed-time graph with the location-time graph. How does the speed-time schedule show that the runner is moving fast? How does the speed-time schedule show that the runner is moving from left to right? On the right is the runner's position time schedule. First, outline what you think his speed time schedule will look like on the empty axes on the right. Then check your answer in Gizmo. Action B: Speed and location Gizmo preparation: Set the number of points to 3. Turn on Show schedule and Show animation for both Runner 1 and Runner 2. In Gizmo, make the positional time graphs shown below. Click on the green startbutton and see how the runners work. Outline what their speed-time schedules will look like on the second set of axles. (If you can, use the red line for runner 1 and the blue line for runner 2.) Then select the VELOCITY-TIME GRAPH tab in Gizmos. Sketch the actual graph for the third set of axles below. Compare speed and time graphs with their associated location-time graphs. When do two different position time schedules have corresponding speed-time schedules? What information is missing from the speed schedule? Action C: Distance and Shift Gizmo Complete: Turn off Show Graph and Show Animation for Runner 2. Create a position time graph for runner 1 on the right. Then fill in the blanks below to describe what you think the runner will do based on this graph. The runner runs metres in the first 2 seconds at m/s. His direction is from ToThen he runs - meters in the next 2 seconds at the speed m/s. His direction is the green start button toClick and see how the runner goes. Were you right? Two students, Gina and Walter, discuss a runner whose schedule is shown above. Gina said the runner moved over 40 meters. Walter said the runner was moving less than 40 meters. Who do you think is right? Explain your answer. At the top left side of the Gizmo, select the DISTANCE TRAVELLED tab. What was the runner's total distance in 4 seconds? Displacement equals the difference between starting and closing positions. Shift to right is positive, while left shift is negative. What does the graph at the top of the page show? (Activity C continued on the next page) Activity C (continued from the previous page) In Gizmo, create a runner position time graph with these characteristics:passes a distance of 60 meters in 4 seconds and moves +10 meters Sketch your schedule to the right of empty axes. See the graph you're looking at Question 4: Think about the speed of this runner. What was the runner's speed for the first two seconds? What was the runner's speed like for the last two seconds? What was the average speed of a runner in all 4 seconds? Now think about the speed of the 4 runners in question. What was the runner's speed for the first two seconds? What was the runner's speed like for the last two seconds? What was the average speed of a runner in all 4 seconds? Suppose you knew the runner's time, the displacement and the whole distance. How would you calculate the average speed of a runner? How would you calculate the average speed of a runner? There's a runner's schedule on the right. Calculate the values below for this runner. Include valid units. Distance travelled: Displacement:Average speed: Average speed: speed: speed: