# Interpreting position vs time graphs worksheet answers

By the end of this section, you will be able to do the following: explain the meaning of slope in position vs. time chart solving problems using the position-for-time chart and the learning goals in this section will help students to master the following criteria: (4) science concepts. The student knows and applies the laws governing movement in a variety of situations. The student is expected to create and interpret graphs and graphs describing different types of motion, including the use of real-time technology such as motion detectors or optical gates. [BL] [OL] Describes a scenario, for example, in which you launch a water rocket into the air. Rise 150 feet and stop and then return to earth. Ask students to assess the situation. Where are they going to put zero? What is a positive trend, and what is the negative trend? Draw a picture of the scenario on the board. Then draw a position against the time graph that describes the transaction. Ask students to help you complete the chart. Is the line straight? Is it curved? Does it change direction? What can we say by looking at the graph? [AL] Once students look at the graph and analyze it, see if they can describe different scenarios where the lines are straight instead of curved? Where will the lines be choppy? The graph, like the picture, is worth a thousand words. The charts not only contain digital information, but also reveal relationships between physical quantities. In this section, we will investigate kinmatica by analyzing the position charts over time. The graphs in this text contain vertical axes, horizontal and vertical axes. When two actual quantities are drawn against each other, the horizontal axis is usually considered an independent variable, and the vertical axis is the dependent variable. In algebra, you have referred to the horizontal axis as the X axis and the vertical axis as the y axis. Here m is the slope, which is defined as the height divided by the range (as seen in the figure) of the straight line. The letter b is the y-intercept which is the point at which the line crosses the vertical axis, y. In terms of physical situation in the real world, these quantities will take on a specific importance, as we'll see below. (Figure 2.10) Figure 2.10 Shows a straight graph. The equation for the straight line is y = mx + b in physics, time is usually the independent variable. Other quantities, such as displacement, are said to depend on it. Thus, the position-versus-time graph will have a position on the vertical axis (a child variable) and time on the horizontal axis (independent variable). In this case, what does the slope and the y-intercept indicate? Let's look back at the original example when you study the distance and The drive to school was 5 km from home. Let's say it took 10 minutes to make the drive and that your parents were driving at a steady speed the whole time. The position against the time graph of this section of the flight will look like figure 2.11. Figure 2.11 shows a chart of position versus time for the drive to school. What would the graph look like if we added the return trip? As we said before, d0 = 0 because we call our home O and start calculating from there. In Figure 2.11, the line starts at d = 0, as well. This is b in the equation of the straight line our initial position in a position opposite the time graph is always the place where the x axis chart crosses in t = 0. What is the slope? Height is a change in position, (i.e. displacement) and range is a change in time. This relationship can also be written this relationship how we determined the average speed. So, the slope in d versus the t graph, is the average velocity. Sometimes, as where we represent both a trip to school and a return trip, the behavior of the chart seems different over different time periods. If the graph looks like a series of straight lines, then you can calculate the average velocity for each interval by looking at the slope. If you then want to calculate the average speed for the entire trip, you can do a weighted average. Let's look at another example. Figure 2.12 shows a position-for-time diagram of a jet-powered car on the bottom of a very flat dry lake in Nevada. Figure 2-12 The graph shows a chart of position versus time for a jet-powered car at the Bonbilly Salt Flats apartments. Using the relationship between child and independent variables, we see that the slope in the graph in figure 2.12 is the average speed, and the intersection is displacement at zero-time, i.e., d0. Replacing these symbols in y = mx + b gives or d = d 0 + vt. d = d 0 + vt . 2.6Thus a position-for-time diagram gives a general relationship between displacement, speed and time, as well as giving detailed digital information on a particular situation. From the figure we can see that the car has a position of 400 meters in t = 0 s, 650 m in t = 1.0 s, and so on. We can learn the speed of the body also helped students learn the shape of different charts of displacement versus time. [Visual] set up stick meter. If you can find a remote control car, you have one student record times as you send the car forward along the stick, then backwards, then forward again with a steady speed. Take recorded times and change the attitude and put them together. Get students to train you to draw a position versus a time graph. Each leg of the journey must be a straight line with a different slope. The parts that the car was going forward must have a positive slope. part where he's going back would Ask if where they take as a zero affects the graph. [AL] Is it realistic to draw any chart of the position that begins to rest without some curve in it? Why might we be able to neglect the curve in some scenarios? [All] discuss what can be revealed from this graph. Students should be able to read the offset net, but they can also use the graph to determine the total mileage. Then ask how the speed or speed is reflected in this graph. Students directly see that the slope of the line (slope) is a measure of speed and that the slope direction is the direction of movement. [AL] Some students may realize that a curve in the line represents a kind of slope, a preview of the acceleration that you will learn about in the next chapter. In this activity, the ball will release down the ramp and graph offset the ball against time. Choose an open location with plenty of space to spread so there is no chance of tripping or falling due to rolling balls. 1 ball 1 board 2 or 3 wrote 1 stopwatch 1 tape measuring 6 pieces of tape masking 1 piece of paper chart 1 pen building ramp by placing one end of the board on top of a pile of books. Adjust the location, as necessary, so that there is no obstacle along the straight line path from the bottom of the slope until at least the next 3 m. Mark distances of 0.5 m, 1.0 m, 1.5 m, 2.0 m, 2.5 m and 3.0 m from the bottom of the slope. Type the spaces on the bar. One person must play the role of the experimentor. This person will release the ball from the top of the slope. If the ball does not reach the 3.0 meter mark, then increase the slope of the slope by adding another book. Repeat this step as necessary. The experimentor fired the ball. Be the second person, and temporary, start the trial timing once the ball reaches down the slope and stop the timing once the ball reaches 0.5 meters. You have a third person, the registrar, recording the time in the spreadsheet. Repeat step 4, stop the times at distances of 1.0 m, 1.5 m, 2.0 m, 2.5 m, and 3.0 m from the bottom of the slope. Use your measurements of time and displacement to make a position versus the time chart of ball motion. Repeat steps 4 to 6, with different people taking the roles of the tried, temporary, and registered. Do you get the same measurement values regardless of who launches the ball, measures time, or scores? Discuss the possible causes of contradictions, if any. True or false: The average ball speed will be lower than the average ball speed. [BL] [OL] To emphasize that the movement in this laboratory is the movement of the ball as it rolls along the ground. Ask students where there should be zero. [AL] Ask students what the graph looks like if they start timing at the top versus the bottom of the slope. Why does the graph look different? Could it represent the difference? [BL] [OL] Make students compare graphs with different individuals taking different roles. Ask them to set the average speeds for each interval and compare it. What are the absolute differences in velocities, and what are the percent differences? Do differences seem random, or are there systematic differences? Why might there be systematic differences between the two sets of measurements with different individuals in each role? [BL] [OL] Make students compare graphs with different individuals taking different roles. Ask them to set the average speeds for each interval and compare it. What are the absolute differences in velocities, and what are the percent differences? Do differences seem random, or are there systematic differences? Why might there be systematic differences between the two sets of measurements with different individuals in each role? So how do we use graphs to solve things that we want to know like speed? Create the average speed of the car that is drawn in figure 1.13. The slope of the d. vs. t graph is the average velocity, because the slope is equal to the height in the range. Slope = Φd Φt = v mile = Φd = v where the slope is constant here, any two points on the graph can be used to find the slope. Choose two points on the line. In this case, we choose the points that are classified on the chart: (6.4 s, 2000 m) and (0.50 s, 525 m). (Note, however, that you can choose any two points.) Replace the d and t values of the selected points in the equation. Remember in the change calculation (Φ) we always use the final value minus the initial value. The government's ability to provide as much as possible to the people of the country is also a key issue. Mile/h: Much larger than the typical highway speed limit of 27 m/o or 96 km/h, but largely shy of the record of 343 m/h or 1,234 km/h, which was developed in 1997. They can use any point on the line that is most convenient. But what if the position graph is more complex than a straight line? What if the object accelerates or turns back? Can we find anything about its speed from a graph of this type of movement? Let's take another look at the jet-powered car. The graph in Figure 2.13 shows the movement as it is getting up to speed after starting the rest. The time starts from scratch for this movement (as if measured with a stopwatch), displacement and speed are initially 200 m and 15 m/s, respectively. Figure 2.13 The graph shows a graph of the position of a jet-powered vehicle during the accelerated period of time. The distance slope versus the time graph is This appears in two points. The instantaneous velocity at any point is the slope of the tangent at that point. Figure 2.14 U.S. Air Force jet vehicle sits down the track. (Matt Trostall, Flickr) The position-versus-time graph in Figure 2.13 is a curve rather than a straight line. The slope of the curve becomes steeper as time progresses, indicating that the speed increases over time. The slope at any point on the position-versus-time graph is the momentary velocity at that point. It is found by drawing a straight line of shadow to the curve at the point of interest and taking the slope of this straight line. The tangent lines are displayed for two points in Figure 2.13. The average speed of net displacement divided by the time it travels. Calculate the instant speed of the jet car at a time of 25s by finding a shadow line ramp at point X in Figure 2.13. The slope of the curve at a point is equal to a straight line slope that is tilted by the curve at that point. Find the shadow line to the curve in t = 25 s t = 25 s. Select the end points of the tangent. This corresponds to a position of 1,300 m at a time of 19 s and a position of 3120 m at a time of 32 s. Connect these final points in the equation to solve the medley, v. The government's approach to the issue of the right to vote is a matter of great importation. The curved line is a more complex example. Define the tangent as a line that touches a curve at only one point. It turns out that as the straight line changes its angle next to the curve, it actually hits the curve several times at the base, but only one line won't touch it at all. This line forms an angle based on the curvature radius, but at this level, it can just kind of eyeball on it. The tendency of this line gives instantaneous speed the most useful part of this line is that students can find out when speed is increasing, low, positive, negative, and zero. [AL] You can find instant velocity at each point along the graph and if you represent each of these points, you'll have a velocity graph. Speed.

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