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Interpreting velocity and acceleration graphs worksheet

With the speed on the y-axis and the time on the X-axis, the speed graph tells us how someone's/something's speed has changed over time. 1) Line gradient = Acceleration 2) Negative gradient = Deceleration 3) A straight section means a constant speed (NOT STOPPED) 4) The area below the graph = Distance Traveled One skill you will need is a description of the time graph of the speed. Example: Speed chart shows 50-second car journey. Describe the 50-second journey. Step 1: Split the graph into separate sections, these can be seen in the picture as A, B, C and D. Step 2: Describe in detail each part of the trip, providing the use of numeric values throughout. Section A – The car accelerated from 0 to 15 m/s in the first 10 seconds (because the line is flat, the acceleration is constant). Section B – The line is flat, which means that the speed of the car did not change for 10 seconds – which means that it was moving at a constant speed. Section C – The car accelerated up to 25 m/s in the next 10 seconds, Section D – Finally, it has been singing back to 0 m/s for the last 20 seconds. Acceleration is calculated as a change in speed over time. For example, the speed graph shows the 50-second path of the car, which part of the graph has the maximum acceleration. We know gradient lines = Acceleration We need to find the gradient of each section. Section \bf{A}: Acceleration between 0s and 10s = gradient=\dfrac{15-0}{10-0}=1.5 m/s^2 Section \bf{B}: Section This is flat, the meaning acceleration will be 0 Section \bf{C}: Acceleration between 20s and 30s = gradient =\dfrac{25-25 15}{30-20}=1 m/s^2 Section \bf{D}: Acceleration between 30s and 50s = gradient =\dfrac{0-25}{50-30}=\dfrac{-25}{20} = -1.25 m/s^2 Section \bf{A} the maximum acceleration is 1.5 m/s^2 Note: units of acceleration are expressed in distance/time\bold{^2}, which in this case is m/s\bold{^2}. Calculating the total distance travelled is one of the most common exam questions you can see. For example, the speed graph shows a 50-second car journey, Calculate the total distance traveled in 50 seconds. We know the area below the graph = Distance Traveled To break down the area below this graph it will be broken down into 4 shapes: A, B, C and D. This gives two triangles, a rectangle and trapezoides, which are all shapes that can be broken down by the area. \text{A}=\dfrac{1}{2}\times10 \times15= 75 m \text{B}=10\times15=150 m C=\dfrac{1}{2}(15+25)\times10=20 0 m D=\dfrac{1}{2}\times20\times25=250 m Total flow distance: 75+150+200+250=675 m Humid average gradient is a gradient over the duration. For example, a graph of the speed of the first 4 seconds of someone running a race is shown. Calculate the average acceleration in 4 seconds. We know: Gradient line = Acceleration To break down the average acceleration in 4 seconds we will draw a line from where the graph is at 0 s, to where the graph is at 4 seconds and find of which. So, we have received an average acceleration, \text{gradient}=\dfrac{6-0}{4-0}=1.5 m/s^2 Finding the current gradient is the gradient tangent at the point. For example, a graph of the speed of the first 4 seconds of someone running a race is shown. Calculate the current acceleration 2 seconds in. This is shown above. Then we get the current acceleration, \text{gradient}=\dfrac{5.8-3.2}{3.5-1.0} = 1,04 m/s^2 (3 sf). So first we will draw straight from the source to (12, 4) because after 12 seconds it reached 4 m/s. Then, for the next part, we said that the deceleration is 0.1 m/s^2 for 20 seconds. So if the speed is reduced by 0.1 every second, after 20 seconds it will be 0.1 \times 20=2 m/s Therefore it is for 32 seconds at a speed of 2 m/s, so we will draw a straight line from (12, 4) to (32, 2). In the end, the constant speed will be represented by a straight line that goes up to 50 seconds, still at 2 m/s. The result must look like the graph below. We need to find the area below the graph. To do this, we will divide it into shapes that we know how to calculate the range as below screenshot shown. A is a triangle, B and C are trapezoidal and D is a rectangle. So, we get \text{A}=\dfrac{1}{2}\times10\times15=75 m \text{B}=\dfrac{1}{2}\times(10+15)\times5=6 2.5 m \text{C}=\dfrac{1}{2}\times(10+20)\times5=75 m \text{D}=30\times20 = 600 m The total distance of the cyclist is 75+62,5+75+600=812.5 m In order to decide the average acceleration, We pull the lynx from the origin to the place of the graph, how it is displayed below. The average acceleration is increated by the gradient of this line. Therefore, the average acceleration, \text{gradient}=\dfrac{4-0}{50-0}= 0.08 m/s^2 Test the revision card on this topic. If you see this message, it means that we are having trouble uploading external resources to our website. If you are behind a web filter, make sure *.kastatic.org and *.kasandbox.org unblocked. If you see this message, it means that we are having trouble uploading external resources to our website. 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Emp Layer.Empty Layer.3 teachers, how this lesson IsPrint LessonStudents, will be able to shvate 5 motion representations for each state, including a colorful description, motion cards and motion graph. Students present and explain several performances of a single accelerated movement through several group activities. The goal of this lesson is to give students more interactions with multiple displays of single accelerated movement. The students have worked and rehearsed with new acceleration graphs and motion maps, and in this lesson my goal is to explain the graphs and what is happening with the accelerator. To start the class, I ask students to take their homework from #1 the evening before. I ask students to take about 15 minutes to talk to their groups and compare the answers. I put a timer on the front screen of the projector and walk around to make sure the students are focused so I can answer all the questions they have. My goal is for students to try to talk to each other more before they ask me questions. I will answer the questions, but I wonder if you have asked everyone in your group. After 15 minutes, I tell the students that each group will be in charge of the board for one problem and a pre-school presentation. I have a board ready for the problem that I made as an example in the last grade to show them what to expect. I present a problem to make sure that I start with a graph of position vs. time and written description, and then move to the speed graph vs. time graph, then the acceleration vs. time graph, and then to the motion map. When I presented my problem, I ask the students if there are any questions. I assign problems by twisting dying and allowing a table group with a rolled-up number to select any problem from a package to a whiteboard. I do this in such a way that students have a choice in determining what problems they pose. After students have completed their #1 Stacks of Motion Graphs worksheet boards, I have to convince students that each person in the group will speak during the presentation by choosing in advance what each member of the group will say. Since there are four members of the group, I suggest that one person explain how they got a written description, a map of movement and each graph (speed vs. time and acceleration vs. time). Then I have a group that poses a problem, #1 gets up at the front of the course and starts presentations. Student whiteboards look like the bottom. In the whiteboard presentation, my expectations are for students when they pose: provide the answer they have found and answer all the questions from students and me. My expectations for students, when they don't pose, are to check their work with a response on the board to see if they agree. If audience members disagree, I expect a question for presentations at the end of the presentation. I want students to ask questions during the presentation and defend themselves when they do not understand. I ask at least one question for each presentation. If there are problems with what the group represents on its board, I ask questions about it. If there are no problems, I ask questions that I prepared earlier for WS #1 key with questions. During whiteboard meetings, I must point out that on speed graphs vs. time, that horizontal line or no inclination means that the object is at constant speed and speed vs. time graphs having an inclination, or accelerating or deceleration. I would also like to point out that acceleration vs. time graphs are always horizontal lines, because we only deal with situations of constant acceleration. After the students have seen the responses to the worksheet, I want to see what they have learned from the worksheet and presentation part by giving them the end of the discussion checkpoint #1 to complete them individually. Because they have been exposed to multiple motion displays, I give them two graphs of speed against time. I give them one that is constant movement of speed and evenly accelerated movement. Given that we've had the whole unit at constant speed, I assume they'll get the first fund right and fight the second more if they fight one of them. When the students hand them over, I rate them after this time of school and hand them over to the pupils during the next class. When students complete their checkpoint, I ask them to work on a worksheet #2: Interpreting graphs of accelerated movement. This worksheet looks at displays of a single accelerated motion in a different way, by viewing only one graph to determine movement. The first problem is that they look at what is happening with the inclination at each point, marked along the croue as shown below. When students have questions about this problem, I tell them that the best way to look at it is to pull their tracks and see if the slope is getting steep or less steep. I chose this problem because I want to see all the different types of acceleration on the position graph vs. time together so that they can start to see the difference between the curve. The second problem is the quantitative speed vs. time graph, which directs them to identify different parts of the mathematical model, such as inclination (acceleration) and y-interception (initial speed). I want students to start seeing a link between our previous units about creating mathematical models with the graphs we see in the current unit. I give them until the end of the period to work on this worksheet and tell them that we will go over this next class with WS #2 KEY. For homework, I ask my students to read the pages in Pearson's conceptual physics textbook (required account) that correspond to I also have them to write down 5 important things about acceleration that they learn by reading this section. They have read this chapter because I want them to have background knowledge before the debate in the next lesson. If students write down 5 important things, it helps them to have in mind the goal of having to extract some facts from reading. Reading.

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