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## Gizmos student exploration distance-time and velocity-time graphs answer key

Student Exploration: Distance-Time Graphs Vocabulary: speed, y-intercept Prior Knowledge Questions (Do these BEFORE using the Gizmo.) Max ran 50 meters in 10 seconds. Who ran farther, Max or Molly? Who ran faster? Explain: Molly ran 6 meters per second while Max ran Gizmo Warm-up The Distance-Time Graphs GizmoTM shows a graph and a runner on a track. You can control the motion of the runner by manipulating the graph (drag the red dots). Check that Number of points is 2, and that under Runner 1 both Show graph and Show animation are turned on. The graph should look like the one shown to the right - one point at (0, 0) and the other point at (4, 40). Click the green Start button on the stopwatch. What happens?. Click the red Reset button on the stopwatch button on the stopwatch. What happens?. What are the coordinates of the point on the graph that tells you this? When was the runner on the 30-meter line? Gizmo ready: Click the red Reset button on the stopwatch. Be sure the Number of points is 2. In the Gizmo, run the "race" many times with a variety of different graphs. (The red points on the graph contains the point (4, 15), what does that tell you about the runner? (Be specific, and answer in a complete sentence.) Look at the graph to the graph to the graph to the graph that lies on the y-axis (vertical axis) is called the y-intercept. What does the y-intercept tell you about the runner? In the Gizmo, set the Number of points to 3. Then create a graph of a runner who starts at the 20-meter line, runs to the 40-meter line, and finishes at the 30-meter line. Sketch your graph to the right. What is the y-intercept of your graph? Activity B: Runner direction and speed Get the Gizmo ready: Click the red Reset button on the stopwatch. Run the Gizmo several times with different types of graphs. (Remember, the red points on the graph can be dragged vertically.) Pay attention to the speed and direction of the runner. 1. Create a graph of a runner that is running forward (from left to right) in the Gizmo. Sketch your graph to the right. If the runner is moving from left to right in the Gizmo, how does the graph always look? Click the red Reset button. Create a graph of a runner that is running from right to left. Sketch it to the right. How does the graph always look if the runner is moving from right to left in the Gizmo? Change the Number of points to 5. Create a graph of a runner that runs left-to-right for one second, rests for two seconds, and then continues running in the same direction. Sketch the graph show you which direction the runner is moving? (Activity B continued on next page) Activity B (continued from previous page) With Number of points set to 3, create the graph shown at right. Your graph should include (0, 0), (2, 10), and (4, 40). Where does the runner start? Where will he be after 2 seconds? -It will be at interval do you think the runner will be moving most quickly? (Circle your answer below.) Click the Start button and watch the animation. What about the runner changed after 2 seconds of running? Speed is a measure of how fast something is moving. To calculate speed, divide the distance by the time. In the Gizmo, the units of speed are meters per second (m/s). In the first 2 seconds, how far did the runner go? - In this time interval, how far did the runner go each second? - Now look at the last 2 seconds, how far did the runner go? In this time interval, how far did the runner go each second? In this time interval, what was the runner's speed? Click the Reset button. Experiment with a variety of graphs, focusing on the speed of the runner by looking at a graph? Activity C: Two runners, two graphs Get the Gizmo ready: Click Reset. Under Runner 2, turn on Show graph and Show animation. Experiment with the Gizmo to create each of the following results. (You can use any number of points in your graphs.) Each time you find a solution, click the image into a blank document. Label all five images. Runner 1 wins the race. Runner 2 wins the race. Runner 2 catches up to and passes runner 1. Each runner 2 is going in the opposite direction as runner gets a head start? How does the graph show which runner is faster? How does the graph show which runner wins the race? How does the graph show a runner going back and forth? What does it mean when the two runners' graphs cross? Challenge: For Runner 2, turn off Show graph. Click New to generate a new random graph that you can't see for Runner 2. Click Start, and watch her run. Then try to adjust the graph for Runner 1 so that his movements match the movements of Runner 2. Turn on Show graph to check each answer. (For a greater challenge, increase the Number of points before selecting New.) (Activity C continued on next page) Challenge, increase the Number of points before selecting New.) word problems. Write the solutions in the spaces below. Sketch the graph you made to solve the question in the space to the right of each question. A dog is chasing a cat towards a tree. The cat has a 10-meter lead and runs at a speed of 8 meters per second. The dog runs at a speed of 8 meters per second. The tree is 30 meters away from the dog's starting position. Which animal will reach the tree first? A police officer is chasing a purse-snatcher down a street. The thief starts 9 meters in 4 seconds (8 m/s). How long will it take the officer to catch the thief? In a football game, one team kicks off to the other. At the moment the receiver catches the ball, he is 40 meters from the receiver go? A tortoise challenges a hare to a four-hour race. The hare is so confident of winning that he allows the tortoise to start with a 10-km lead. The hare runs at a speed of 10 meters per second. How long does it take before they collide? How far does the receiver go? A tortoise challenges a hare to a four-hour race. The hare is so confident of winning that he allows the tortoise to start with a 10-km lead. The hare runs at a speed of 14 km per hour, but stops for a two-hour nap in the middle of the race. The tortoise plods along at 4 km per hour the whole race. Who gets farther in four hours? How are distance-time graphs useful? Explain, and if possible discuss your answer with your teacher and classmates. PHY132 Experiment 1 One Dimensional Horizontal Motion Position vs. time One of the most effective methods of describing motion is to plot graphs of distance, velocity, and acceleration More information Graphing Motion Every Picture Tells A Story Read and interpret motion graphs Construct and draw motion graphs Determine speed, velocity and accleration from motion of an object is occasionally hard to do with words. Sometimes graphs help make motion easier to picture, and therefore understand. Remember: Motion More information Worksheet for Exploration 2.1: Compare Position vs. Time and Velocity vs. Time Graphs Shown are three different animations, each with three toy monster trucks moving to the right. Two ways to describe More information GRAPH MATCHING LAB MECH 6.COMP. From Physics with Computers, Vernier Software & Technology, 2000. Mathematics Teacher, September, 1994. INTRODUCTION One of the most effective methods of describing motion More information Worksheet 1. What You Need to Know About Motion Along the x-axis (Part 1) In discussing motion, there are three closely related concepts that you need to keep straight. These are: If x(t) represents the More information PLOTTING DATA AND INTERPRETING GRAPHS Fundamentals of Graphing One of the most important sets of skills in science and mathematics is the ability to construct graphs and to interpret the information, we should first talk about position where is the object? A position is a vector because it has both a magnitude and a direction: More information Labs for College Physics: Mechanics Worksheet Experiment 2-1 Motion As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact More information Acceleration of Gravity Lab Basic Version In this lab you will explore the motion of falling objects. As an object begins to fall, it moves faster and faster (its velocity increases) due to the acceleration More information LAB 06: Impulse, Momentum and Conservation PURPOSE Investigate the relation between applied force and the change in momentum Investigate how the momentum of objects change during collisions BACKGROUND More information Teacher Notes Parts 1 and 2 of this lesson are to be done on the calculators. Part 3 uses the TI-Navigator System. Part 1: Calculator Investigation of changing the y-intercept of an equation In your calculators. Graphs It is said that a picture is worth a thousand words. The same can be said for a graph. Once you learn to read the graphs of the motion of objects, you can tell at a glance if the object in More information Review. What does slope of a line mean? How do you find the slope of a line? 4. Plot and label the points A (3, ) and B (, ). a. From point B to point A, by how much does the y-value change? b. From point More information Name: Date: Student Exploration: Pulleys Vocabulary: effort, load, mechanical advantage, pulley system Prior Knowledge Questions (Do these BEFORE using the Gizmo.) 1. Suppose you had to haul a More information Ground Rules PC11 Fundamentals of Physics I Lectures 3 and 4 Motion in One Dimension Dr Tay Seng Chuan 1 Switch off your handphone and pager Switch off your handphone and your handphone your ha points of time. The position of an More information The Basics of Physics with Calculus AP Physics C Pythagoras started it all 6 th Century Pythagoras first got interested in music when he was walking past a forge and heard that the sounds of the blacksmiths' More information EXCEL Intermediate Tutorial Summary of important mathematical operations and formulas (from first tutorial): Operation Key Addition + Subtraction - Multiplication \* Division / Exponential ^ To enter a More information A Guide to Using Excel in Physics Lab Excel has the potential on the potential of the control of time. Excel is especially useful for making repetitious calculations on large data sets. More information Physics 161 FREE FALL Introduction This experiment is designed to study the motion of an object that is accelerated by the force of gravity. It also serves as an introduction to the data analysis capabilities More information This activity will show you how to draw graphs of algebraic functions in Excel. Open a new Excel workbook. This is Excel in Office 2007. You may not have used this version before but it is very much the More information EXPERIMENT 1 PHYSICS 107 ACCELERATION DUE TO GRAVITY Skills you will learn or practice: Calculate velocity and acceleration from experimental measurements of x vs t (spark positions) Find average velocities More information Archived Classes At the end of each school year, the past year s academic classes are archived, meaning they re still kept in finalsite, but are put in an inactive state and learn the differences between speed, velocity, and acceleration. You will have two days to complete the lab. There will be some More information Krystin Wright Geometer's Sketchpad Assignment Name Date We are going to investigate what happens when we draw the three angle bisectors of a triangle using Geometer's Sketchpad. First, open up Geometer More information Series and Parallel Circuits Computer 23 Components in an electrical circuit are in series when they are connected one after the other, so that the same current flows through both of them. Components are More information Creating an Excel XY (Scatter) Plot EXCEL REVIEW 21-22 1 What is an XY or Scatter Plot? An XY or scatter plot either shows the relationships among the numeric values in several data series or plots two More information Department of Physics and Geology Graphing Part 1: Background - Graphing In science it is very important to find and More information Absorbance Spectrophotometry: Analysis of FD&C Red Food Dye #40 Calibration Curve Procedure Note: there is a second document that goes with this one! 2046 - Absorbance Spectrophotometry. Make sure you More information Chapter Speed, velocity and acceleration Figure.1 What determines the maximum height that a pole-vaulter can reach? 1 In this chapter we look at moving bodies, how their speeds can be measured and how More information Freely Falling Objects Physics 1425 Lecture 3 Michael Fowler, UVa. Today's Topics In the previous lecture, we analyzed onedimensional motion, defining displacement, velocity, and acceleration and finding More information Physics Trinity Valley School Page 1 Lesson 24 Galileo, Freely Falling Bodies & Uniformly Accelerated Motion Galileo argued that a freely falling body is undergoing uniform acceleration. Its speed is increasing More information Chapter 2 One Dimensional Kinematics How would you describe the following motion? Ex: random 1-D path speeding up and slowing down In order to describe motion you need to describe the following properties. More information Vectors Objectives State the definition and give examples of vector and scalar variables. Analyze and describe position and movement in two dimensions using graphs and Cartesian coordinates. Organize and More information Tutorial for Tracker and Supporting Software By David Chandler I use a number of free, open source programs to do video analysis. 1. Avidemux, to exerpt the video clip, read the video properties, and save More information Due to Gravity Introduction In this experiment, you ll determine the acceleration due to earth s gravitational force with three different More information Vectors and Scalars Distinguish between vector and scalar quantities, and give example, F. A vector has More information In this activity you will use Sketchpad s Iterate command (on the Transform menu) to produce a spiral design. You ll also learn how to use parameters, and how to create animation action buttons for parameters. More information to produce a spiral design. You ll also learn how to use parameters, and how to create animation action buttons for parameters. More information to produce a spiral design. You ll also learn how to use parameters, and how to create animation action buttons for parameters. More information to produce a spiral design. You ll also learn how to use parameters, and how to create animation action buttons for parameters. BEFORE using the Gizmo.) More information Microsoft Access Rollup Procedure for Microsoft Access 2007. 2. More information 55 Name Date Partners LAB 6: GRAVITATIONAL AND PASSIVE FORCES And thus Nature will be very conformable to herself and very simple, performing all the great Motions of the heavenly Bodies by the attraction More information Computer Skills Microsoft Excel Creating Pie & Column Charts In this exercise, we will learn how to display data using a pie chart and a column chart, color-code the charts, and label the charts. Partners LAB 6: GRAVITATIONAL AND PASSIVE FORCES And thus More information USER MANUAL Detcon Log File Viewer DETCON, Inc. 4055 Technology Forest Blvd., The Woodlands, Texas 77381 Ph.281.367.4100 / Fax 281.298.2868 www.detcon.com January 29, 2013 Document #4482 Revision 1.00 More information Chapter 4 One Dimensional Kinematics 41 Introduction 1 4 Position, Time Interval, Displacement 41 Position 4 Time Interval 43 Displacement 43 Velocity 3 431 Average Velocity 3 431 Average Velocity More information Version PREVIEW B One D Kine REVIEW burke (1111) 1 This print-out should have 34 questions. Multiple-choice questions may continue on the next column or page find all choices before answering. Jogging More information Average rate of change 1 1 Average rate of change A fundamental philosophical truth is that everything changes. In More information Piecewise Functions Developing the Graph of a Piecewise Function Learning Goals In this lesson, you will: Develop the graph of a piecewise function from a contet with or without a table of values. Represent More information (Least Squares Investigation) o Open a new sketch. Select Preferences under the Edit menu. Select the Text Tab at the top. Uncheck both boxes under the title Show Labels Automatically o Create two points More information Pivot Tables & Pivot Charts Pivot tables... 2 Creating pivot table using the wizard...2 The pivot table toolbar...5 Analysing data in a pivot table toolbar...5 Pivot Charts Pivot Charts Pivot tables... 2 Creating pivot table using the wizard...2 The pivot table using the More information Physics: Principles and Applications, 6e Giancoli Chapter 2 Describing Motion: Kinematics in One Dimension Conceptual Questions 1) Suppose that an object travels from one point in space to another. Make More information Bio 15B Excel Tutorial As part of your laboratory write-ups and reports during this semester you will be required to collect and present data in an appropriate format. To organize and More information. Activity 5 Two Hot, Two Cold How do we measure temperatures? In almost all countries of the world, the Celsius scale (formerly called the centigrade scale) is used in everyday life and in science and More information Free Fall Acceleration (Teacher's Guide) 2012 WARD S Science v.11/12 OVERVIEW Students will measure More information Dynamics Track Mechanical Force, Impulse and Momentum An object to unbalanced forces undergoes acceleration, which changes the velocity of the object in question. This change in motion can be More information 1. In the space below, make a sketch of your roller coaster. 2. On your sketch, label different areas of acceleration. Put a next to an area of negative acceleration, More information Minds On Physics Activity FFá2 5 Representing Vector Fields Using Field Line Diagrams Purpose and Expected Outcome One way of representing vector fields is using arrows to indicate the strength and direction More information Phy203: General Physics Lab page 1 of 6 Experiment: Series and Parallel Circuits OBJECTVES MATERALS To study current flow and voltages in series and parallel circuits. To use Ohm s law to calculate equivalent More information Chapter 7 Kinematics of a particle Overview In kinematics we are concerned with describing a particle s motion without analysing what causes or changes that motion (forces). In this chapter we look at More information Name Date Time to Complete h m Partner Course/ Section / Grade Magnetic Fields and Their Effects This experiment is intended to give you some hands-on experience with the effects of, and in some cases More information Interacting Interaction Interaction Motion Name Partner Introduction Motion in a circle is a straight-forward extension of linear motion According to the textbook, all you have to do is replace displacement, velocity, More information Name Partners Date Visual Quantum Mechanics The Next Generation Energy Diagrams I Goal Changes in energy are a good way to describe an object s motion. Here you will construct energy diagrams for a toy More information SCIENCE 1206 MOTION - Unit 3 Slideshow 2 SPEED CALCULATIONS NAME: TOPICS OUTLINE SCALAR VS. VECTOR SCALAR QUANTITIES DISTANCE TYPES OF SPEED SPEED CALCULATIONS DISTANCE TYPES OF SPEED SPEED CALCULATIONS DISTANCE TYPES OF SPEED SPEED CALCULATIONS DISTANCE. Students will measure a sound wave by placing the Ward s DataHub microphone near one tuning fork A440 (f=440hz). Then More information MONITORING PERFORMANCE IN WINDOWS 7 Performance Monitor In this demo we will take a look at how we can use the Performance Monitor to capture information about our machine performance. We can access Performance More information STATIC AND KINETIC FRICTION LAB MECH 3.COMP From Physics with Computers, Vernier Software & Technology, 2000. INTRODUCTION If you try to slide a heavy box resting on the floor, you may find it difficult More information FRICTION, WORK, AND THE INCLINED PLANE Objective: To measure the coefficient of static and inetic friction between a bloc and an inclined plane and to examine the relationship between the plane s angle More information PHY 201: General Physics I Lab page 1 of 6 OBJECTIVES Experiment: Static and Kinetic Friction Use a Force Sensor to measure the force of static friction. Determine the relationship between force of static More information Prisms and Cylinders Answer Key Vocabulary: cylinder, height (of a cylinder or prism), prism, volume Prior Knowledge Questions is More information 3.5 Increasing, Decreasing, Max, and Min So far we have been describing graphs using quantitative information. That s just a fancy way to say that we ve been using numbers. Specifically, we have described More information Acceleration Introduction: Acceleration Introduction: Acceleration Introduction: Acceleration Introduction is defined as the rate of change of velocity with respect to time, thus the concepts of velocity also apply to acceleration. In the velocity-time graph, acceleration More information Math 1205 Calculus/Sec. 3.3 The Derivative as a Rates of Change I. Review A. Average Rate of Change 1. The average rate of change of y=f(x) wrt x over the interval [x 1, x 2] is!y!x () - f(x 1) = y More information Creating an Address Book Database February 9, 2011 Copyright 2011 by World Class CAD, LLC. All Rights Reserved. Purpose of the Address Book Contains professional contacts Database is computer based (digital) More information Weekly Skill: Numeracy Skills in Science Lesson Summary: This week students will continue reading for comprehension with reading passages on speed, velocity, and More information 1 Rather than teaching sample lessons on induction days or sending Secondary School teachers to visit Primaries, some Secondary Schools are now using video conferencing technology to display sample lessons More information Avery Wizard: Using the wizard with Microsoft Word This is a simple step-by-step guide showing how to use the Avery wizard in word Open up a blank document in Microsoft Word and click the Avery Tab at More information Inertia, Forces, and Acceleration: The Legacy of Sir Isaac Newton Position is a Vector Compare A A ball is 12 meters North of the Sun God to A A ball is 10 meters from here A vector has both a direction More information NORMAL DISTRIBTIONS MEASURES OF VARIATION In statistics, it is important to measure the spread of data. A simple way to measure spread is to find the range. But statisticians want to know if the data are More information Online Tools Training Lesson Plan Reading grade 5 Assessment Development, OSPI, Washington State Table of Contents Purpose Statement... 2 Disclaimer... 2 Lesson Objectives... 2 Lesson Overview... 3 Lesson Overview... Strategies Primary Can I interpret and explain data presented in line graphs? Teaching guidance Key vocabulary One of the difficulties in studying mechanics is that many common words are used with highly specific technical meanings, among them velocity, acceleration, more information Educator's Guide to Excel Graphing Overview: Students will: make More information 1. What is the average speed of an object that travels 6.00 meters north in 2.00 seconds and then travels 3.00 meters east in 1.00 second? 9.00 m/s 3.00 m/s 0.333 m/s 4.24 m/s 2. What is the distance traveled More information Newton s 3rd Law and Momentum Conservation, p./ PRELAB: NEWTON S 3 RD LAW AND MOMENTUM CONSERVATION Read over the lab and then answer the following questions about the procedures:. Write down the definition More information More informatio E. Parks Department of Physics and Astronomy 401 Nielsen Physics Building The University of Tennessee Knoxville, Tennessee Knoxville, Tennessee Knoxville, Tennessee Tennessee Knoxville, Tennessee the screen. Select All Programs and then find More information EQUATIONS and INEQUALITIES Linear Equations and Slope 1. Slope a. Calculate the slope of a line more information PERSONAL LEARNING PLAN- STUDENT GUIDE TABLE OF CONTENTS SECTION 1: GETTING STARTED WITH PERSONAL LEARNING STEP 1: REGISTERING FOR CONNECT P.2 STEP 2: LOCATING AND ACCESSING YOUR PERSONAL LEARNING ASSIGNMENT More information CONDENSED L E S S O N 10.1 Solving Quadratic Equations In this lesson you will look at quadratic functions that model projectile motion use tables and graphs to approimate solutions to quadratic equations More information Formulas, Functions and Charts 8.1 INTRODUCTION In this leson you can enter formula and functions and perform mathematical calcualtions. You will also be able to More information Apex Student Tutorial Welcome to Apex... 2 Announcements... 2 Navigation... 2 Learning Tools... 4 Vocabulary... 4 Study Sheets... 4 Transferring Study Guides to a Word Processor... 5 Reports... 6 Student More information 9 HOOKE S LAW AND OSCILLATIONS OBJECTIVE To measure the effect of amplitude, mass, and spring constant on the period of a springmass oscillator. INTRODUCTION The force which restores a spring to its equilibrium More information Page 1 Data representation and analysis in Excel Let's Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will teach you how to analyze data and make charts in Excel Let s Get Started! This course will be a started with the started will be a started Excel 2010 When you start Excel, you will see the screen below. Various parts of the display are labelled in red, with arrows, to define the terms used in the remainder of this overview. More information Scalar versus Vector Quantities Scalar Qua Quantities Magnitude (size) Direction 55 mph, North v = Dx More information AP Calculus AB 006 Scoring Guidelines The College Board: Connecting Students to college Board: Connecting Students to college Board is a not-for-profit membership association whose mission is to connect students to college Board: Connecting Students to College Experiment 8 Titration Curve for a Monoprotic Acid Objectives To learn the difference between titration curves involving a strong acid with a strong base and a weak More information

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