Adrienne Deshaies

STARS Science

Monday, July 12, 2010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Getting Yourself Ready** | | | | |
| **Materials**:  sticker labels/sticky notes  Computer and dongle  Lab materials from last fri  Graph paper  Hw worksheet | | **Your Preparation**:  make stickies  Find length of ramp  search catapult clips  Set up computer  Have practice prompts ready  Make example of blueprint  make homework/copies | | **Agenda (w/times)**: 55 mn  Do Now – 5 mn  Teaching – 15 mn  Practice – 10 mn  Intro to catapults = 20 mn  Closing = 5 mn |
| **Getting Your Students Ready** | | | | |
| \***Do Now**: On board is a word problem: a car traveled part of its journey at 45 mph, then the next part at 62 mph, and finally the rest at 43 mph - find the *average* speed of the car over the course of its whole journey, showing your steps on your white board. One person with a right answer comes up to explain how they did it, I fill in holes as needed. What does the word average mean? Everyone take 2 mns to find the average times from each of the phases of Friday’s lab. | | | | |
| **Objective**: *Today you will be able to…*  Use the rate equation to find the average speed of the cars in last week’s lab.  Begin to design your own catapult! | | | **Proving behavior**: *by…*  Plugging data from our lab into the rate equation and solving for rate.  Using what we know and have seen about catapults to begin making our own designs. | |
| **Purpose**: *We are doing this because…* we have already learned how to measure distance and time, and now we will get to the most important part of our unit – learning how to calculate velocity. Knowing how this equation works will help us the rest of the summer, especially with the catapult lab we are beginning today. | | | | |
| **Teaching** | | | | |
| Step 1: | **Say:** The rate equation is: D = R\*T. You can remember it by taking the word DIRT, and turning the I sideways into an equals sign. You can also make sure you have it correct by looking at just the units of these three variables  **See:** On board: miles = (mile/hr)\* hr. The hr’s cancel out, and you get miles=miles, which is true, so you know you’ve got the equation in the right order.  **\*Do:** Each person gets a sticker-label with a numeric expression or sign on it: (“distance=5,” “rate = 25,” time = 5,” “feet,” “feet per minute,” “minutes,” “x,” “\_” “+,” “/.” As a class, they need to work together to see how fast they can arrange themselves into an equation that makes sense, complete with units. At the end, they should have an example of the rate equation. | | | |
| Step 2: | **Say:** In order to solve for the our cars’ speeds, however, we need to rearrange the equation so that speed is by itself on one side.  **See:** VIP of isolating a variable.  **\*Do:** I need two volunteers (popsickle sticks) to come up here and rearrange our Do Now equation so that rate is by itself on one side, and the equation still makes sense. You can use the signs and symbols that we left out the first time. Give them 1 mn. (I write final equation on board) Now I need two diff volunteers to come rearrange it so that time is isolated. | | | |
| Step 3: | **Say:** Finally, let’s plug in our data from the ramp lab. For phase one, we use our average time calculation, and the distance (length of the ramp, I provide), stick them where they go in the d=rt equation (I use a made-up set of data to demonstrate), and solve for R.  **See:** I work through example on board.  **\*Do:** Take 2-3 mns to calculate the average rate of your cars in phase 1, phase 2, and phase 3. Then, get with other members of your groups to compare answers. Did you get the same thing? If not, compare process to find where you did things differently. Each group shares. | | | |
| Step 4: | **Say:** These times are average times. Can anyone tell me why? Was the speed of the car at the top of the ramp the same as at the bottom? No, that’s right, it sped up, or it *accelerated.* The speed we calculated is the average speed of the car throughout its whole trip down the ramp.  **See:** Reminder demo with car on ramp, see how it speeds up.  **\*Do:** Whole class response – with this equation, are we calculating the speed at the top? (hand motion and say, NO!). Are we calculating the speed at the bottom? (NO!) Are we calculating the average speed for the whole trip? (YES!) | | | |
| **Practice** | | | | |
| \***Structured Practice** (3-4 additional examples led by teacher with gradually quickening pace, helping students approach automaticity by manipulating time, materials, and group size) | | | | |
| Time: 2 mn  Materials:  Group Size: 2 | **Example 1**  I draw on board – this penguin runs at a speed of 33 m/s for 30 sec before being devoured by a hungry dragon. How far did he run before meeting his doom? | | | |
| Time: 2 mn  Materials: notebooks  Group Size: 2 | **Example 2:**  This Breakthrough student was about to miss her bus, which was 20ft away and was leaving in 30 seconds. How fast would she have to run to make it on time? | | | |
| Time: 2 mn  Materials: notebook  Group Size: 1 | **Example 3:** This pirate ship was sailing at 25 mph to reach land, 5 miles away. A storm was due to hit in 15 mns. Did the ship escape the storm? | | | |
| \***Guided Practice** (the proving behavior of the objective monitored by the teacher) | | | | |
| **Assignment: (from proving behavior)**  I show clip/s of catapult action. What might affect how far/fast a catapult can launch something? How might they work? What sort of force launches them?  Problem on board: if a catapult launches a cow, and the cow is in the air for 20 sec and lands 300 meters away, what was its average (horizontal) speed throughout its flight? (15 m/s) (Time permitting, explain why only horizontal component is taken into account here).  I introduce catapult project and time frame/schedule. Explain what materials we’ll have available, and introduce groups. Students begin brainstorming a catapult design using popsickle sticks, tape, rubber bands, paper cups, and small launching objects (marshmallows, grapes, golf balls, marbles…). I show what blueprints should look like. | | | **Criteria for Mastery:**  Students can individually use the rate equation to find the horizontal speed of an object launched by a catapult. Students can hypothesize about what sort of forces make a catapult work, and begin brainstorming ideas for construction. | |
| Independent Practice (Homework) | | | | |
| **Explain Homework:** worksheet on finding averages and calculating using d=rt. Also, a blueprint-draft of a catapult design. | | | | |
| **Closure** | | | | |
| **Explain Closure:** whipshare one thing you learned that was new today. | | | | |

Adrienne Deshaies

STARS Science

Tuesday, July 13, 2010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Getting Yourself Ready** | | | | |
| **Materials**:  Catapult article  Popsickle sticks (~60) or wooden dowels?  Duct tape and scotch tape  Paper/plastic cups (20)  Rubber bands (~60)  Scissors (2-3 pair)  Twig clippers (for cutting dowels?)  Graph paper  White paper | | **Your Preparation**:  Find/copy article  Get supplies  Test out design  Make/copy grading rubric | | **Agenda (w/times)**: 55 mn  Do Now = 5 mn  Objective/purpose =2mn  Gallery walk = 8 mn  Compile lists = 5 mn  Final design/proposal = 20 mn  Hw/Closing = 5mn |
| **Getting Your Students Ready** | | | | |
| \***Do Now**: Silent reading time (2-3mn) – I hand out an article about the history/physics of catapults. Whip share, each person tell me one thing new you learned from the article. Did it give you some ideas about your design? | | | | |
| **Objective**: *Today you will be able to…*  Consider components of yours and others’ designs and use them to come up with a final blueprint/proposal for a catapult construction project. | | | **Proving behavior**: *by…*  Working in partners to come up with a collaborative design and explanation for why you think it will work.  Beginning construction on final design. | |
| **Purpose**: *We are doing this because…*  We are moving in to the next step of our scientific process – experimenting. This project is your chance to take what you know about observation (observing other examples of catapults and designs), hypothesis (making predictions about what components/designs will work best), and now we’re taking it a step further and designing a project that will test our predictions. | | | | |
| **Teaching** | | | | |
| Step 1: | **Say:** Everyone please get out your blueprint that you made for homework, and hang it on the whiteboard using scotch tape. The purpose of this is not a competition or a critique of each others’ work, it is to see each others’ ideas and consider how we might add to or improve our own ideas.  **See:** We all do a gallery-walk to view each others’ designs  **\*Do:** Bring your notes with you, and write at least 3 things you observe about your classmates’ drawings that you think might work well and/or which you might want to try out in your own final design. Make sure to write the designer’s name by the idea. Once back in seats, have a few share observations. | | | |
| Step 2: | **Say:** Now get into the partner-groups I assigned you yesterday. You can retrieve your drawings from the board and bring them back to your seat. I want you to compare notes with your partner; draw from both of your designs and the notes you just made, and compile a final list of components you want your actual construction to have.  **See:** I model examples of components that might be included in list.  **\*Do:** get with partners, take 4-5 mns to create list. I walk by and check lists. | | | |
| Step 3: | **Say:** Elect one person to be the graphic designer, and one person to write up a proposal. The graphic artist’s job is to sketch out a final blueprint of the catapult you will create –the other partner can contribute opinions/ideas but it is the artist’s responsibility to draw it. You must include estimated lengths for all parts. The proposal-writer’s job is to write up a half-page explanation of why your group chose to design it the way you did, why you chose these components and not others, and to make an estimate of what kind/how many materials you will need to construct it (consult designer for amounts).  **See:** I show popsickle sticks and give measured length of one, same for cup.  **\*Do:** Take 15-20 mns to do this. Both parts should be as thorough and professional as possible, if you claim to be done in 5 mns, I will ask you to start over and be more thorough. | | | |
| **Practice** | | | | |
| \***Structured Practice** (3-4 additional examples led by teacher with gradually quickening pace, helping students approach automaticity by manipulating time, materials, and group size) | | | | |
| Time:  Materials:  Group Size: | **Example 1**  N/a | | | |
| \***Guided Practice** (the proving behavior of the objective monitored by the teacher) | | | | |
| **Assignment: (from proving behavior)**  Once your design and proposal are done, raise your hands and I will review them. If they are satisfactory, I will give you a stamp of approval and provide you with the supplies/amounts you estimated you will need. You may use the rest of class to begin construction! Make sure both partners collaborate in the construction part. If during the process you realize you need more materials, write down the number/kind you need and turn it in to me, and I will provide them (do not come up and grab them without requesting). | | | **Criteria for Mastery:**  Final products (to be completed by the end of tomorrow’s class, wed) will be graded on the following criteria (I hand out rubric):  \*effectiveness – catapult can launch an object without breaking  \*inventiveness/professionalism – final product is sturdy, finished-looking, and obvious thought was put into its design  \*group collaboration – both partners took part in the planning and construction work, input from each was considered in making the final product. | |
| Independent Practice (Homework) | | | | |
| **Explain Homework:**  Those partners who drafted the proposals – your homework is to take it home, revise it for spelling and grammar errors as well as content (make sure it includes everything it needs to), and create a final copy of it on clean white paper (I provide) using a pen or marker.  Those who drew up the blue print – your homework is to take it home and clean it up; either recopy it onto another piece of graph paper, or simply go over it in pen/marker, getting rid of eraser lines and making it clearer and cleaner. Make sure it includes estimated lengths and dimensions, and has a title with both partners’ names.  These two works will be displayed, along with your catapults, during visitors’ day – parents and families will see them, so they need to be polished and professional, something you can be proud to show off. | | | | |
| **Closure** | | | | |
| **Explain Closure:**  Exit ticket – problem using rate equation | | | | |

Adrienne Deshaies

STARS Science

Wednesday, July 14, 2010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Getting Yourself Ready** | | | | |
| **Materials**:  Computer and dongle  Graph paper  Graph sheet  Building materials  Blank data tables  Hw worksheet | | **Your Preparation**:  get computer set up with graphs to be projected  create data tables and hw/ copies | | **Agenda (w/times)**: 55 mn  Do Now = 5mn  Intro to graphing speed = 10 mn  Construction = 35 mn or less  IF LESS: begin lab prep and lab, time permitting  Closing: 5mn |
| **Getting Your Students Ready** | | | | |
| \***Do Now**: On projector is example of a t vs. d graph. Find the slope of this graph (take 2 mn, record answer in notebooks). Use up and down arrows to complete the following statement: as distance\_\_\_\_, time\_\_\_\_. If needed, review of how to find slope: rise/run. | | | | |
| **Objective**: *Today you will be able to…*  Read and create a distance vs. time graph.  Finish constructing your catapults. | | | **Proving behavior**: *by…*  Deriving speed from a d vs. t graph, using slope  Producing finished constructions that are ready to be tested. | |
| **Purpose**: *We are doing this because…* we will need this graphing skill when we are presenting the results of our labs. A graph is one of the easiest ways to explain what happened during your experiment, and we will need to be able to make them for the results of our catapult lab. | | | | |
| **Teaching** | | | | |
| Step 1: | **Say:** (I indicate a point on the Do Now graph). Take a minute to identify the distance and the time at this point on the graph. Once you’ve done that, use those numbers and the rate equation to find the speed for that point on the graph.  **See:** graph, point highlighted  **\*Do:** Compare your answer to the answer you got for the slope of the graph. What do you notice? (they should be the same) | | | |
| Step 2: | **Say:** Yes, the slope of a d vs. t graph IS the speed/rate/velocity. Watch this clip and think about our catapult lab:  **See:** Clip of catapult launching object.  **\*Do:** To the person next to you, discuss how we might use a graph like this to describe what our catapults do? (take 1 mn). Have a few share – we could use it to graph how far objects launch and how long they are in the air for. We can also use it to help find the average horizontal speed of the launched objects. | | | |
| **Practice** | | | | |
| \***Structured Practice** (3-4 additional examples led by teacher with gradually quickening pace, helping students approach automaticity by manipulating time, materials, and group size) | | | | |
| Time:  Materials:  Group Size: | **Example 1**  I bring back the catapult example problem from Monday. Using the graph sheet I provide you, make one point at (0,0). Using whatever scale you want, make another point where this launched object’s distance and time intersect on the grid (300,20). Now, use your ruler to draw a line through the point (0,0) and the point (300,20). Find the slope on this line, it should match the answer you got on Monday for what the avg speed was (look back to notes).  Another example, time permitting… | | | |
| \***Guided Practice** (the proving behavior of the objective monitored by the teacher) | | | | |
| **Assignment: (from proving behavior)**  You have the rest of class (max 35 mn) to complete the construction of your catapults. If you finish early, let me know and I’ll give you some prompts to start preparing for the lab tomorrow (come up with hypothesis, objects you want to launch, data table). If you are not done by the end of class, you can take the first 10 mns of class tomorrow to finish up, or you can elect to come in and finish during micro madness today. | | | **Criteria for Mastery:**  Remind students of grading criteria and rubric. | |
| Independent Practice (Homework) | | | | |
| **Explain Homework:**  I pass out blank data tables for lab tomorrow, along with explanation of how lab will run (each group does nine trials total, three per object – marshmallow, grape, golf ball or marble. Need to record flight time and landing distance for each trial. You need to use this information to fill in the data table in a way that makes sense to you.  Worksheet involving reading graphs to solve for speed, bonus question involves creating a graph from a story problem. | | | | |
| **Closure** | | | | |
| **Explain Closure:**  Exit ticket – confidential rating of construction partner’s participation and contribution, was the work evenly distributed? Were there problems? Were both partners’ ideas heard? | | | | |