Liz Mattarazzo
Direct and Inverse Variation 3

Direct Variation Notes

I. Content:
Notes, how exciting. Unfortunately, sometimes days like this are necessary and in this case the notes will wrap up our investigations dealing with direct variation. The notes will be done in 4 box format – definition (words), tables, graph and symbols. We will be drawing from our data we collected as well so they have real life situations to relate to the abstract concepts.

II. Learning Goal(s):

Students will know and be able to:
- See patterns by comparing and contrasting data from real life situations
- Build a function that models a relationship between two quantities
- What a direct variation relationship looks like (in words, graphs, tables, algebraically)

III. Rationale:
We will have just completed two lengthy activities delving into direct variation (Where’s Waldo = telescope lesson and It’s how far?! = miles/kilometers lesson). Therefore, it is time to discuss the concept they uncovered. In this four box format we will approach the concept from all angles, different learning styles and tie the ideas together. I want them to be able to see a direct variation relationship from a graph, word problem, table or equation. While I know taking notes will not completely teach them this, they will not automatically absorb it from this lesson; it will set them in the right direction. After these notes we will delve deeper into inverse variation and then do skills practice on both concepts. This is just tying together all their thoughts through Where’s Waldo and It’s how far?! The notes themselves will focus on data from It’s how far?! so they have a real life situation and problem to relate these concepts back to.

IV. Assessment:

Notes are a difficult thing to assess. However, the graphic organizer I give them will be mostly empty, therefore, they will be responsible for filling it in as we go along in class. This ensures they are paying attention and are responsible for their learning. In addition, I will keep track of who is contributing to the class discussion in forming the notes and give points for that. Of course, this will require me setting up the class in this manner. I will tell them at the beginning on class in order to hear from everyone, I will be keeping a list and giving participation points. Also, I do periodic notebook checks where they are graded on how complete their notebooks are (table of contents, includes all notes, everything is filled in, etc). This means that these notes will come up later down the line, they will keep reappearing. Lastly, all of our quizzes and tests are open notebook, considering the wrap up to this unit will be a test, how well they do on it may depend on how well they take notes here.
V. Personalization:

While I will give them a graphic organizer to glue into their notebooks, they will be in charge of filling it in as we go along in class. They need structure and organization which is why I have created the organizer for them. A lot of my students are on 504s or IEPs, struggling with organization, use of organizers when possible is recommended. Also, by giving them this form that they simply need to fill in and annotate as we go, ideally it will save time. I KNOW for a fact that the second I tell them to divide their pages into 4 boxes immediately I’ll hear cries of “Miss, I need a ruler!” Yes, 100% predictable. They love their lines to be straight; it also, of course, wastes class time. This way, their lines will be straight and I will save that time.

VI. Activity description and agenda:

Materials: Each student has a graph paper notebook. I will provide the 4 box note sheet for them to glue into their notebooks.

Classroom set up/grouping: The room will be set up in two horseshoes, six in the middle, the rest on the outside. This is the format we usually use for taking whole class notes and it seems to work well.

<table>
<thead>
<tr>
<th>Time</th>
<th>What Students Do</th>
<th>What Teacher Does</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 min – Entrance Slip</td>
<td><strong>Nassau (in the Bahamas) is</strong> 1227.7 miles away from Worcester. How many kilometers is it from Worcester? Madrid, Spain is 5440 kilometers away from Worcester. How many miles is it from Worcester?</td>
<td>Out of these 17 places we’ve now done conversions for (15 are in the table on your worksheet and there are two above on this slide = Nassau and Madrid ), which vacation do you think Ms. Mattarazzo should go on and why?</td>
</tr>
<tr>
<td>6-15 min – Wrap Up</td>
<td>Students will share out patterns they found in the activity we have been working on (It’s how far?!). Since they have already shared in pairs, this will be a full class discussion.</td>
<td>I will ask for one thing from each of the groups, to ensure everyone is participating. Ideally, this will encourage students to volunteer as well because they won’t to end up last. Including: ideas of constant rate, conversion factors, and properties of the graph they made.</td>
</tr>
<tr>
<td>15-18 min – TOC</td>
<td>Update Table of Contents 10/24/12 It’s how far?! Notes (As we are going along students will be annotating what I am but also whatever helps them.)</td>
<td>Write updated TOC on board (As the students are taking the notes below, I will be modeling on the ELMO by taking my own notes.)</td>
</tr>
<tr>
<td>18-27 min – Words</td>
<td>One student will read aloud what is written in the “words” box on their note sheet. Others will be following along, underlining words that stand out</td>
<td>I will ask what students have underlined; we will pick out key things. Ask students how they would...</td>
</tr>
<tr>
<td>Time Range</td>
<td>Activity Description</td>
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<tr>
<td>3-10 min</td>
<td>Students will be answering questions that Ms. M poses dealing with this section. They will be silent and listening to each other’s ideas, building off of them if possible and helping each other out when needed.</td>
<td></td>
</tr>
<tr>
<td>27-36 min – Table</td>
<td>Students will have the tables filled in (by me previously) so we will be looking for things we notice. Each of the lines will have the same km/mi and from there we will define it. On their worksheets it was called “constant rate”, so they will get that part on their own. They will be writing these terms down next to or underneath the km/mi column.</td>
<td></td>
</tr>
<tr>
<td>36-45 min – Graph</td>
<td>The graph will be constructed for the students on their note sheet. We will discuss where the y-intercept is and why. Students will know the y-intercept should be at (0,0) based on their graphs they constructed in the activity.</td>
<td></td>
</tr>
<tr>
<td>45-54 min – Symbols</td>
<td>Students will write the number relationships next to the data points (in the 4th column of their tables). Students will figure out what the general equation should be.</td>
<td></td>
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</tbody>
</table>

They worked on proportions and balance method in middle school and learned about constants and rates. I will describe the relationship between miles and kilometers in their own words. I will be calling on students with their hands raised, enforcing that behavior and having them build off of one another’s ideas if possible.

Example: As one goes up, the other goes up.

What do we notice about this table? We will observe that the km/mi is the same for each. We will define it as the constant rate (as they learned in the activity, part 3). They should get that part on their own; I will have them look back to their worksheets if no one can remember right away. Furthermore, we will define it as the constant of variation, which I will give to them as a new term.

I will ask where our y-intercept should be.

We will talk about what that means. (0,0) means 0 miles = 0 kilometers.

I will ask what the slope is. We will mark down that the slope is k. Why? Slope is always the constant difference in linear graphs, so why does this work?

We will then move to constructing a general equation. First of all, we will look at how these numbers relate. If needed: What times what equals what? What divided by what equals what? From there we will generalize this idea to an algebraic equation. y=kx. Ideally, this will be straightforward after modeling it with the numbers above. However, if they need more help, we will look at the number examples and write the
as well as on their last PS so they should be comfortable with them. They will write an example in their box.

I will also discuss the “proportion method” or balance method as a way to solve these situations. What is the only thing we can’t solve for in this proportion? When doesn’t it work?

End of class

I will show the last Where the hell is Matt video IF time and if they’ve been “good”

VII. Massachusetts Learning Standards:

N-Q.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

N-Q.2: Define appropriate quantities for the purpose of descriptive modeling.

N-Q.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

A-SSE.1: Interpret expressions that represent a quantity in terms of its context.

A-CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A-CED.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

F-IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

F-BF.1: Write a function that describes a relationship between two quantities.

VIII. Sources:

Direct Variation Notes – Shannon Hammond

IX. Reflection:

Notes are notes. The students participated accordingly, they almost seemed grateful for a break from the discovery activities. However, the way I structured the notes, they still did have to pay attention and write a lot while we were going over things. I also asked for a lot of class participation and took down names of kids who volunteered. Overall, they seemed to grasp the idea of direct variation, though they did not know it was called that obviously, very well. They are used to working with proportions and relationships that vary proportionally so it was not too much of a stretch for them here. However, they are used to being able to find a constant difference and make an equation or rule that way. They were surprised by this way of finding a rule. Other than that, they were pretty comfortable with this idea. The only new terms I was introducing were the ideas of “direct variation” and the “constant of variation”.
I do not think I would change anything, I really like the way these notes are structured actually. I think the multiple ways of representing the same data helped the students out a lot. And it is important for them to see all of those different ways. There is not only one way to solve a problem or one way to show an answer. Everyone thinks in different ways and this proves that. Math is all about variety.