Patrick Connolly has posted a message entitled IA grading help.

Message Posted on: Friday January 06, 2012 05:14:42 AM

Unfortunately for your student the rubric is a ladder. You can't reach step 5 unless you first reach step 1, then 2, then 3, then 4.

I guess my question for you is how the student got to the point where he thought it was OK to develop a model for a physical situation without defining what the variables are and the units in which they're measured. It should be one of those things that you hammer into their skulls.
The structure of a math IA, especially Type 2 should be pretty uniform.
First, an introduction to describe what the task will be about.
Second, a statement of what the variables are, what symbols will be used to represent them, and what units will be used to measure them.
Third, a graph of the data and a discussion of possible functions which might reasonably model the data.
Fourth, an analytic development of the values of the parameters in the model(s) chosen.
Fifth, a graph of the data and the model(s) generated.
Sixth, tweaking of the model(s) using regression tools to generate other values of the parameters, with a discussion of how well the various models fit the data.
Seventh, discuss limitations on the values of the variables.
Eighth, address any additional issues presented in the task.
Ninth, a conclusion summing up the task.

Two thoughts here.
(1) You *could* take a liberal view of a loose definition and award the higher marks. If this student is in the moderation sample, you'd have to explain very clearly why you were so generous and hope the moderators agree and don't moderate down other students. This gives this student a higher initial mark, but risks the marks of other students who followed your instructions better.
(2) You *could* take a harsh view and award low marks. This could push the student into your moderation sample as a low score, and if the moderators disagree with your explanation lower scores might be moderated up. This gives this student a lower initial mark, but it could be raised by moderation with the only "risk" to other students being that some lower marks may be artificially raised.

My instinct is to go with (2) and let the chips fall where they may.

Patrick Connolly has posted a message entitled Type II Task (Poulation Trends In China).

Message Posted on: Saturday January 21, 2012 01:03:45 PM

(1) PARAMETERS, in this context, are constants in the general form of the model chosen to fit the data. Hence, they are *defined* when a given model is selected, which can only occur after the start of the analysis of the data. I would say that parameters generally are not "defined", but rather have their numerical values "determined". Exceptions might be the parameters in a sinusoid or the K in the logistic growth model, since the way you determine the value is by first knowing what the parameter does to the graph and then using the graph to determine the value.
VARIABLES must be defined at the start of the task.

(2) There are two main issues here.

As Lenin points out, it is considered unacceptable to use a regression tool before determining the parameter values analytically, except in some cases where the task specifically says to "use technology" such as the determining the logistic growth model in this task. You point out that it might be difficult for a Math SL student to select a model simply by looking at the plot of the data. Given that the tasks (with notable exception of the most recent set of tasks such as Gold Medal Heights and Fish Production) are generally set so that a model is fairly obvious, I think you have overstated the difficulty of this part. Students are expected to know the general shape of the standard functions - polynomial, exponential, power, logarithmic, sinusoidal - and should be able to make reasoned choices. That being said, there is nothing to stop students from first using the regression tools as a "go/no-go" filter for various function types. This should just be done on a "don't ask, don't tell" basis.

When selecting a function to use as a model the first criterion must be to fit the data that is actually given, but a second criterion is that the function should give reasonable values when used to interpolate between, and

extrapolate beyond, the given data domain and range, at least up to point. For example, TI and Casio calculators give different parameter values for the logistic growth model for the data in this task. Both fit the given data about equally well, the difference is a large disagreement in the final equilibrium population. I told my students that they would get different values depending on what tool they used to use multiple regression tools and to compare the results, select one, and explain why they chose the one they did. As another example from this task, many of my students are trying quadratic and cubic functions initially, but the rejecting the cubic even though it is a slightly better fit of the data because of the big downturn in population that the cubic projects in the near-future. While this could be handled by placing a limitation on the time variable, it happens so quickly that the model becomes essentially useless for any sort of extrapolation into the future, and I stress to my students that one of the primary purposes of modelling is to allow extrapolation into the past and future.
On an interesting sidebar, my two best students came up with very different results for the quadratic model based on their choices of data points to use in developing the parameter values analytically. One had a concave-up parabola, as did all of the other students, but the other had a concave-down parabola with its vertex in the not-too-distant future. Both used the location of the vertex as a limitation on the time variable.

(3) Revision of a chosen model to better fit the data can occur in two basic ways. (a) The student can select a different subset of data points to analytically compute the values of the parameters and see if the results fit better. As an extreme example, I have had some over-achieving students select three different sets of three points to determine the three parameters in a quadratic, compare the results of each, and then decide to average the values to come up with their final model. This was overkill, but worked very well, and they were trying to "Wow!" me to earn F2.
(b) The more usual approach is simply to have the regression tool compute values of the parameters and then compare the analytic results to the computer results. While the computer usually "wins", I've had a few situations where the analytic model is better because of some outlying data which hand analysis ignores.

(4) The way I interpret the "incorporate the IMF data" part of the task is that the student should only look at how well the final two or three models from the original data fit these particular (IMF) data points when deciding on which model to ultimately choose. This involves zooming in the graph on the new data set to see how well the models fit this particular data. *After* deciding which model best fits the IMF data, the student should then use the regression tool with ALL of the data points to recompute the values of the parameters to get a final model.

(5) As long as the student gives a coherent and reasonable explanation for the choice there is no "correct" model and the student's choice should be accepted.