

F-BF Comic Con

Alignment to Content Standards

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

Jimmy and Timmy are trying to save money to go to the International Comic Con Convention in San Diego. In order to make money both are working year round to save money. Jimmy works for Dominos and makes minimum wage, \$9.32 an hour at his job. Timmy on the other hand, has been working at AT&T for three years, so he makes \$11.50 at his job. Since they are working hard, Jimmy's parents said they would help him save up for Comic Con by giving him \$15 a week and Timmy's parents said they would give him \$8.

- a) If both Jimmy and Timmy work the same number of hours, after a week, who will have the most amount of money? (Hint: Will it always be the same person?)
- b) Will there ever be a time that Jimmy and Timmy make the same amount of money? If so, find the number of hours that would make the above question true. If not, why do you think Jimmy and Timmy will never make the same amount of money?
- c) What do you think would happen to the relationship of the amount of money made between Jimmy and Timmy if Timmy were to get promoted to Manager and his hourly wage were to increase to \$15? Explain your answer in a few sentences.
- d) What do you think would happen to the relationship of the amount of money made between Jimmy and Timmy if Jimmy's parents decided to no longer help him with saving up for Comic Con? Explain your answer in a few sentences.

Commentary:

It is important for students to be able to realize functions and relationships in life. By being able to take information and create linear functions, students are building a function. By being able to explain the differences between the two students' income, students are showing their knowledge of being able to describe the relationship between two quantities: Jimmy and Timmy's money for Comic Con.

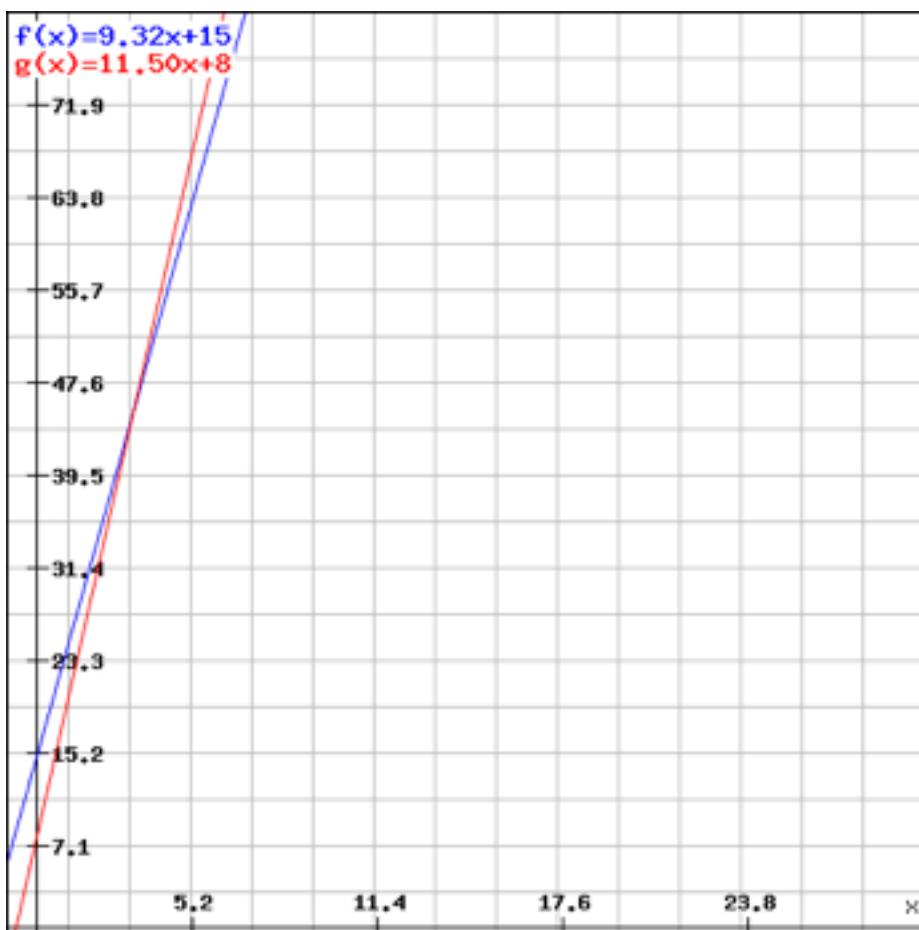
In part a, students are finding the linear functions from the problem, then they are using their functions to show who makes the most money if both students work the same amount. By being able to do this, students are showing their knowledge of intersection and rate of change.

In part b, students are showing their knowledge of being able to state and show there is a point of intersection for the data and be able to state what their point of intersection means in terms of the students and their weekly income.

In part c and d students are able to make changes to the functions and see the changes that would happen to their functions if the changes were to be made. By doing this students are showing their knowledge of further understanding the relationship between the weekly money incomes for Jimmy and Timmy.

Example Solution:

a) The total amount total money that Jimmy made in a week was the sum of the amount of money he made per week in his job, plus the amount of money his parents gave to him. In total, every week Jimmy, $f(x)$, made: $f(x) = 9.32x + 15$. Where x stands for the amount of hours that Jimmy worked The amount of money that Timmy made was also based on the amount of hours he worked per week and the amount of money that his parents gave him. So, in total in a week Timmy, $g(x)$, made: $g(x) = 11.50x + 8$. Again, where x equals the amount of money that Timmy worked. The graph below shows both students' incomes during a week.



The graph shows that if the students work less than approximately 3.2 hours, that Jimmy will make the most money, but if the students work more than 3.2 hours, that Timmy will make the most money from that point forward.

b) Yes, there is a point where Jimmy and Timmy's amount of money made in a week will be the same. This is called the point of intersection that we saw above in part a. In order to solve for the point of intersection without looking at the graph, or mathematically, the y-coordinate of the intersect has to be found. In order for Jimmy and Timmy to have the same amount of money, the totals for both boys has to be the same. This means that since the y-coordinate of the functions are the same, that the equations can be set equal to one another and then you can solve for the remaining variable x, which stands for number of hours worked:

$$\begin{array}{r}
 9.32x + 15 = 11.50x + 8 \\
 \underline{-8 \qquad \qquad -8} \\
 9.32x + 7 = 11.50x \\
 \underline{-9.32x \qquad -9.32x} \\
 7 = 2.18x \\
 \underline{2.18 \quad 2.18} \\
 3.21 = x
 \end{array}$$

c) Looking at the graph, you can see if that if Timmy's hourly rate were to increase, his slope would be bigger, therefore, his slope would be steeper. Since his slope increased, the point of increase would also move. The point of intersection would specifically move more to the left because Timmy would make money faster and probably only make the same amount of money as Jimmy at the beginning of the week.

d) Looking at the graph, if Jimmy's parents were to decide to stop helping him save up for Comic Con for one reason or another, he would never catch up to the amount of money that Timmy makes because he makes such a small amount of money per hour than Timmy, and if he is not getting that constant \$15 per week, then he would begin the week with \$0 dollar for Comic Con. Since he has no dollars and since Timmy has a \$8 from his parents to start with, Jimmy and Timmy would never have the same amount of money.