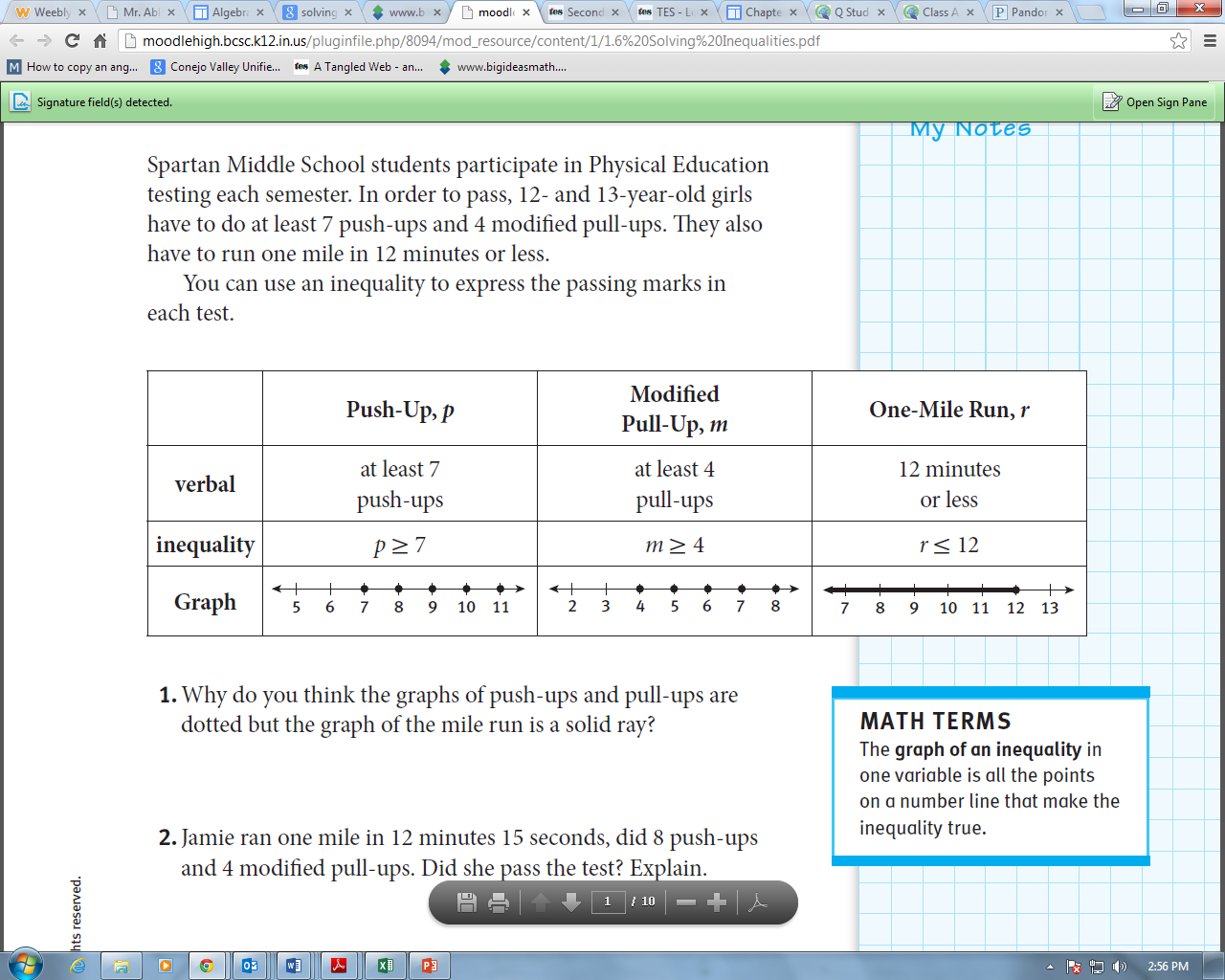
**Solving Inequalities: Lesson 6.1-6.3**

Newbury Park High School students participate in Physical Education testing each semester. In order to pass, all the students must do at least 7 push-ups and 4 modified pull-ups. They also have to run one mile in 12 minutes or less.

You can use an inequality to express the passing marks in each test.

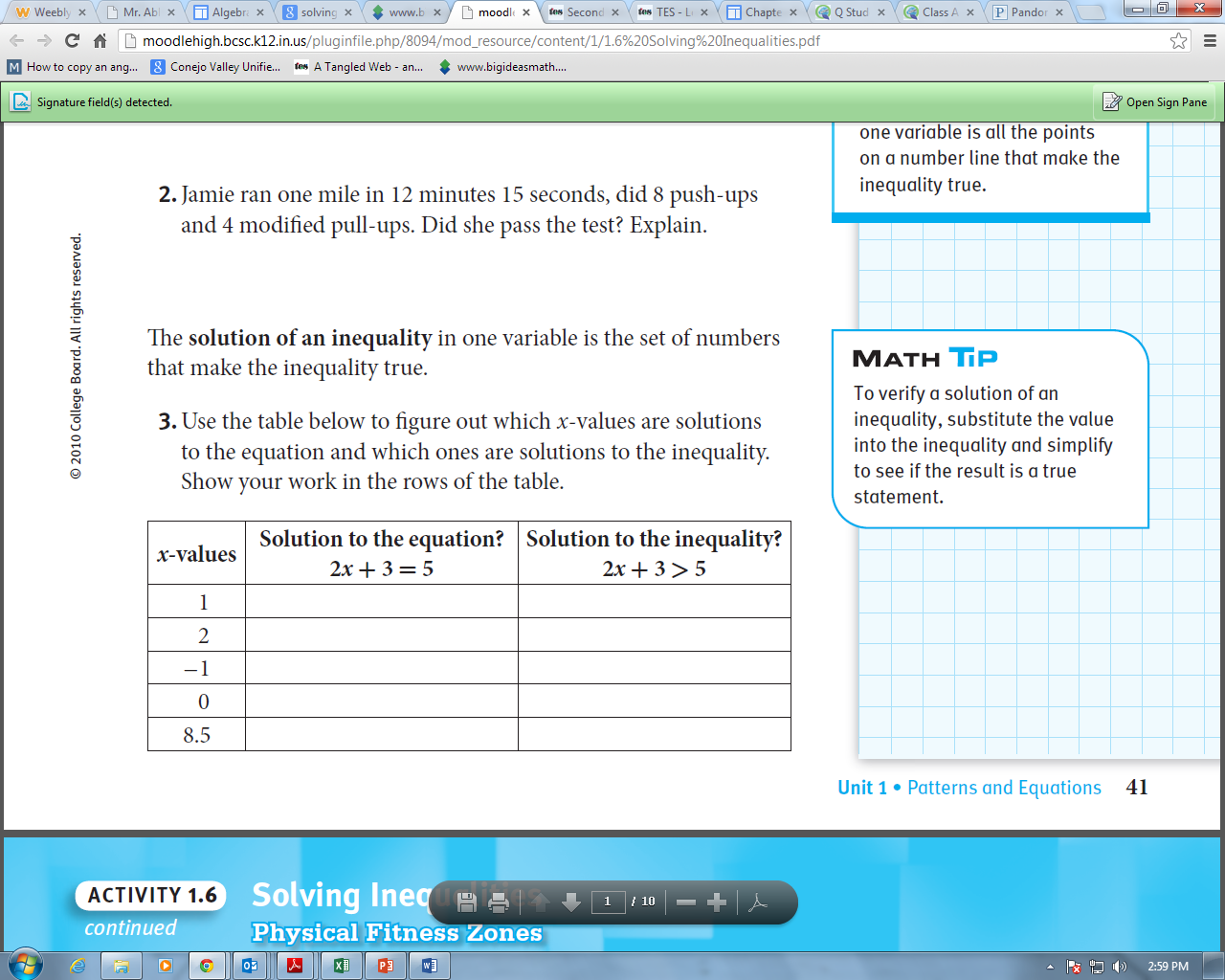


1. Why do you think the graphs of push-ups and pull-ups are dotted but the graph of the mile run is a solid ray?
2. Jamie ran one mile in 12 minutes 15 seconds, did 8 push-ups, and 4 modified pull-ups. Did she pass the test? Explain.

The **graph of an inequality** in one variable is all the points on a number line that make the inequality true.

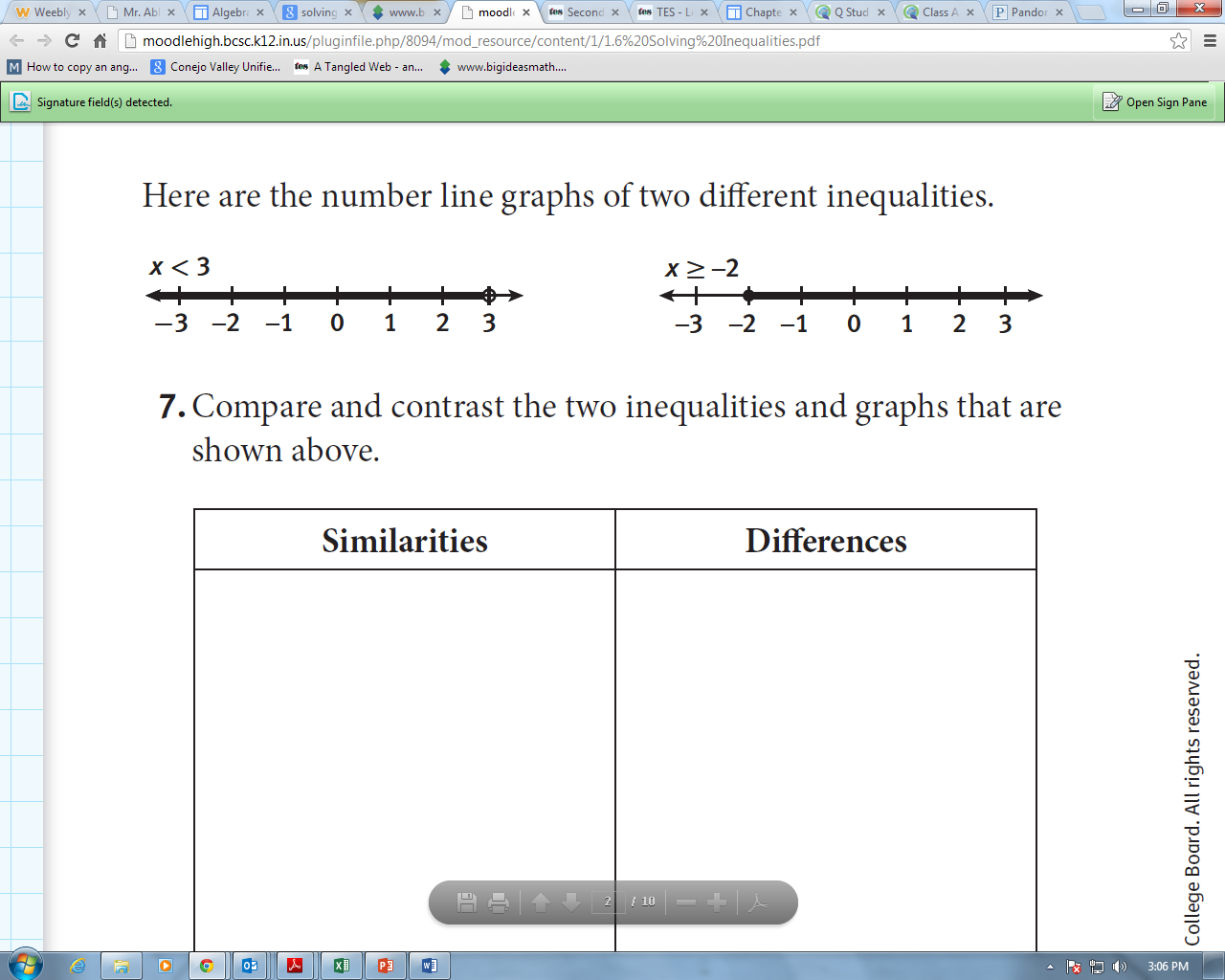
The **solution of an inequality** in one variable is the set of numbers that make the inequality true.

1. Use the table below to figure out which x-values are solutions to the equation and which ones are solutions to the inequality. Show your work in the rows on the table.

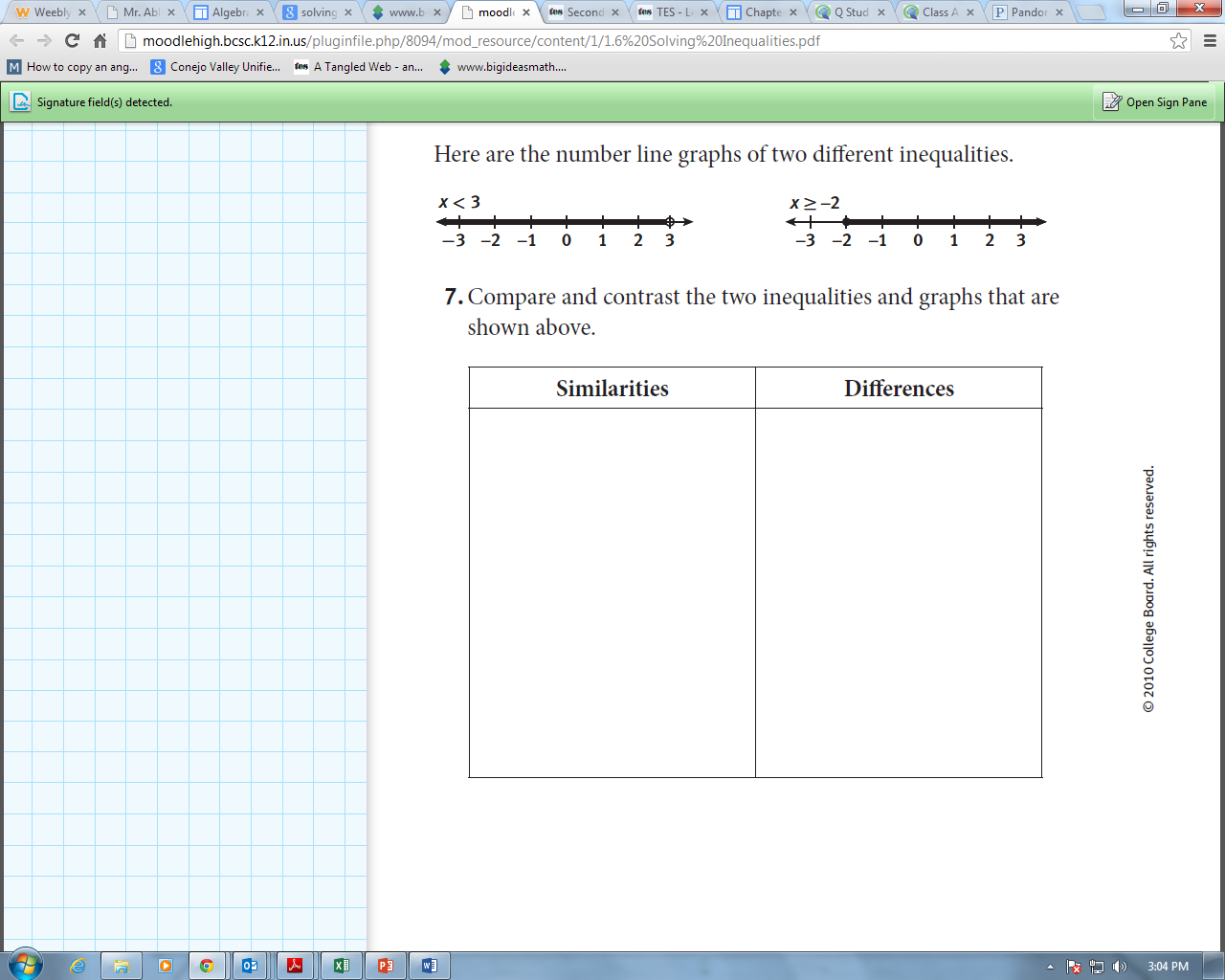


**Math Tip:** To verify a solution of an inequality, substitute the value into the inequality and simplify to see if the result is a true statement.

1. How many solutions are there to the equation 2x + 3 = 5? Explain.
2. Are 2 and 8.5 the only solutions to the inequality 2x + 3 > 5? Explain.
3. Would 1 be a solution to the inequality 2x + 3 > 5? Explain.

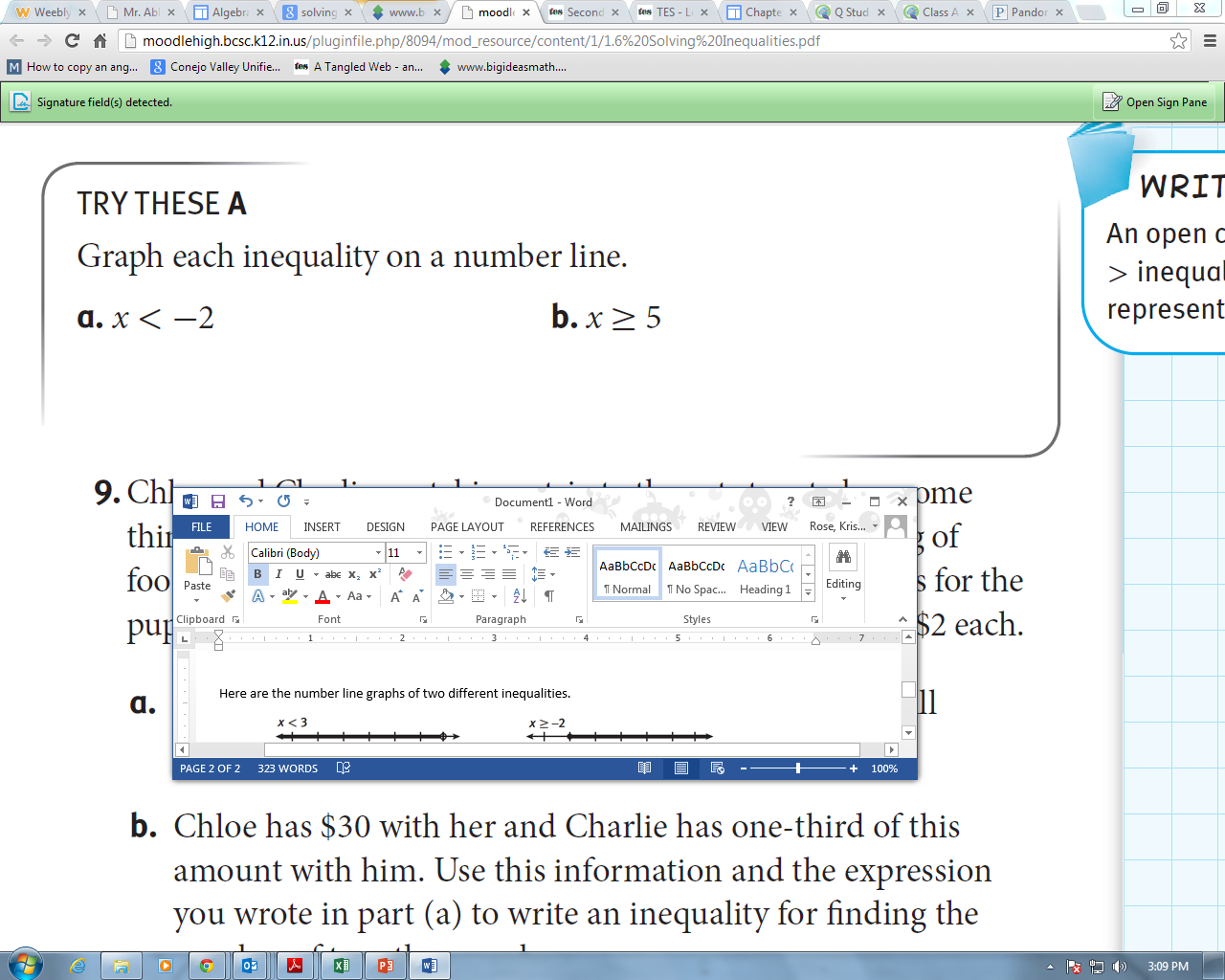
Here are the number line graphs of two different inequalities.

1. Compare and contrast the two inequalities and graphs that are shown above.



1. Think about why the graphs are different.
   1. Why is one of the graphs showing a solid ray going to the left and the other graph is showing a solid ray going to the right?
   2. Why does one graph have an open circle and the other graph has a filled-in circle?

**Try These:** Graph the following inequalities.



1. Chloe and Charlie are taking a trip to the pet store to buy some things for their new puppy. They know what they need a bag of food that costs $7, and they also want to buy some new toys for the puppy. They find a bargain barrel containing toys that cost $2 each.
   1. Write an expression for the amount of money they will spend if the number of toys they buy is *t.*
   2. Chloe has $30 with her and Charlie has one-third of this amount with him. Use this information and the expression you wrote in part (a) to write an inequality for finding the maximum number of toys they can buy.

There are different methods for solving the inequality you wrote in the previous question. Chloe suggested that they guess and check to find the number of new toys that they could buy.

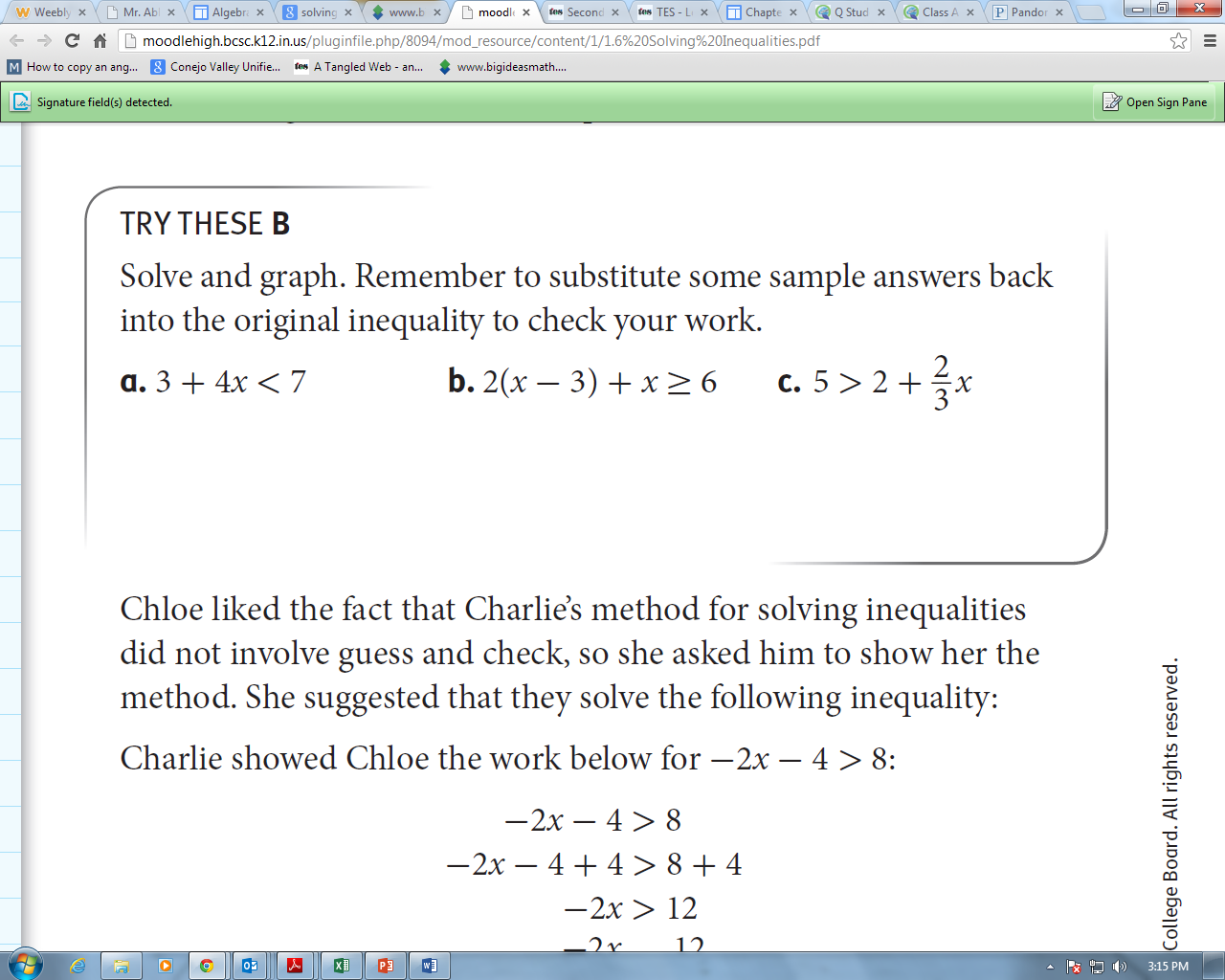
1. Use Chloe’s suggestion to find the number of new puppy toys that Chloe and Charlie can buy with their combined money.

Charlie remembered that they could use algebra to solve inequalities. He imagined that the inequality symbol was an equal sign. He then used equation-solving steps to solve the inequality.

1. Use Charlie’s method to solve the inequality you wrote in Item 9b.
2. Did you get the same answer using Charlie’s method as you did using Chloe’s method? Explain.

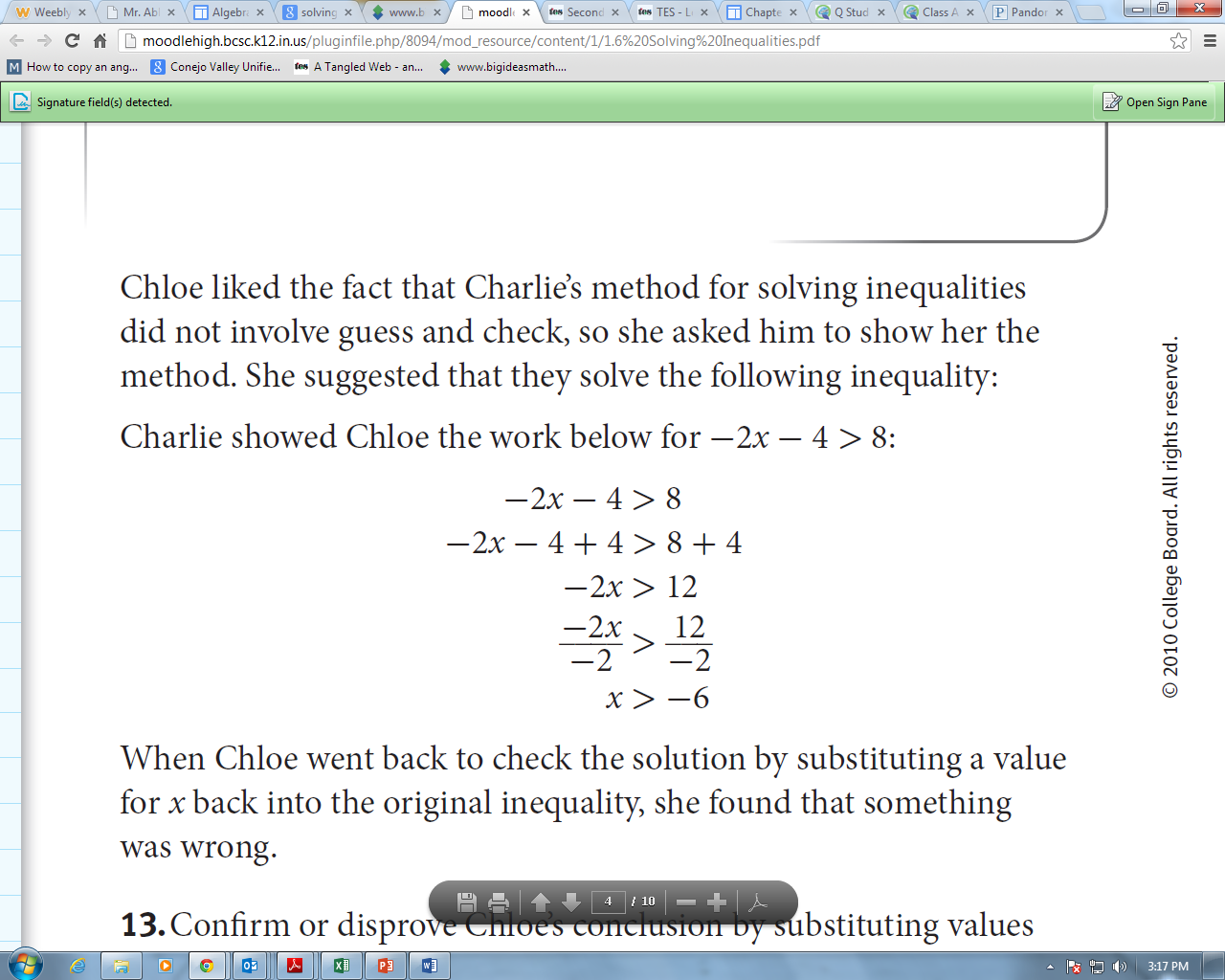
TRY THESE **B:**

Solve and graph. Remember to substitute some sample answers back into the original inequality to check your work.



Chloe liked the fact that Charlie’s method for solving inequalities did not involve guess and check, so she asked him to show her the new method. She suggested that they solve the following inequality:

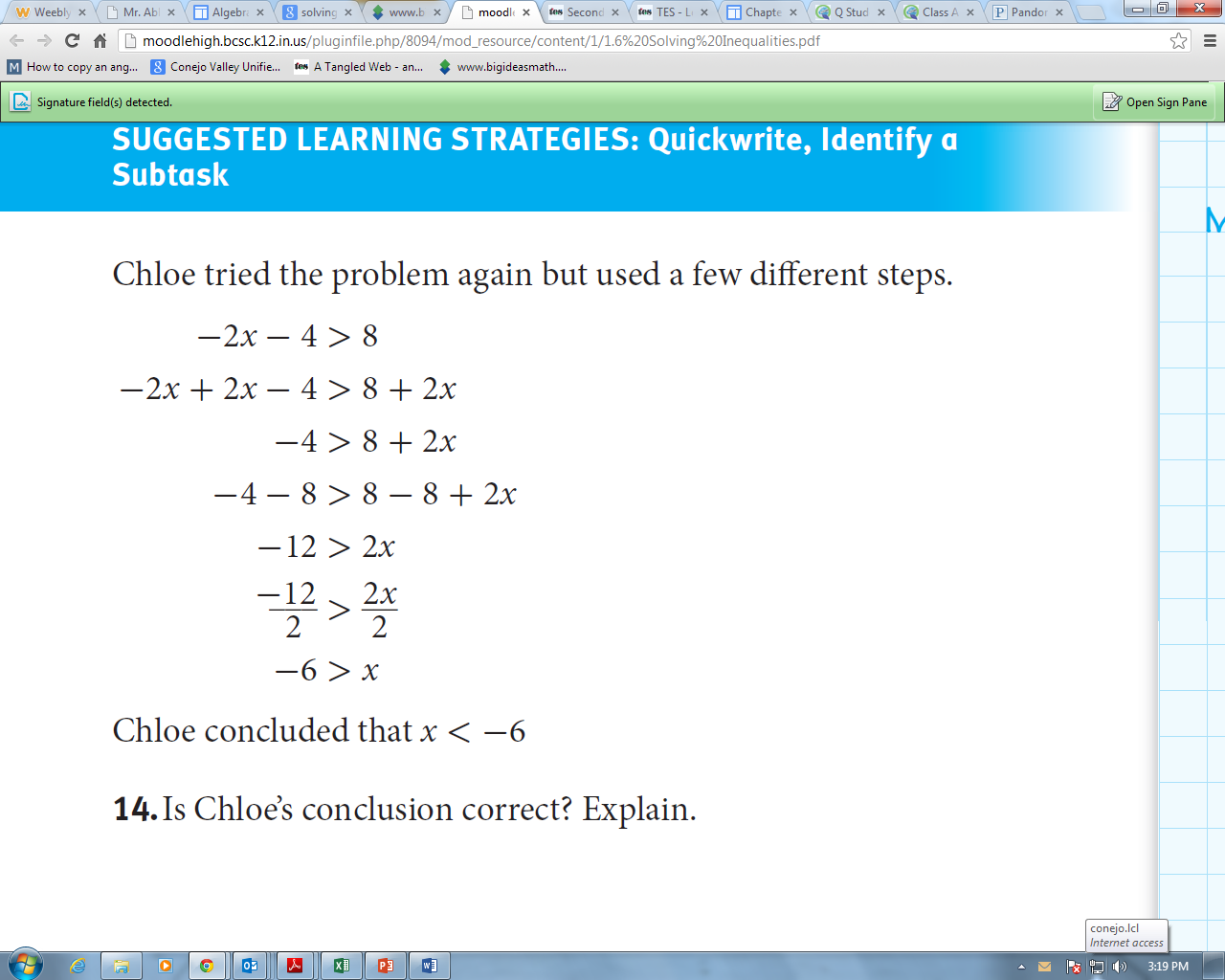
Charlie showed Chloe the work below for –2x – 4 > 8:



When Chloe went back to check the colution by substituting a value for *x* back into the original inequality, she found that something was wrong.

1. Confirm or disprove Chloe’s conclusion by substituting values for *x* into the original inequality.

Chloe tried the problem again but used a few different steps.

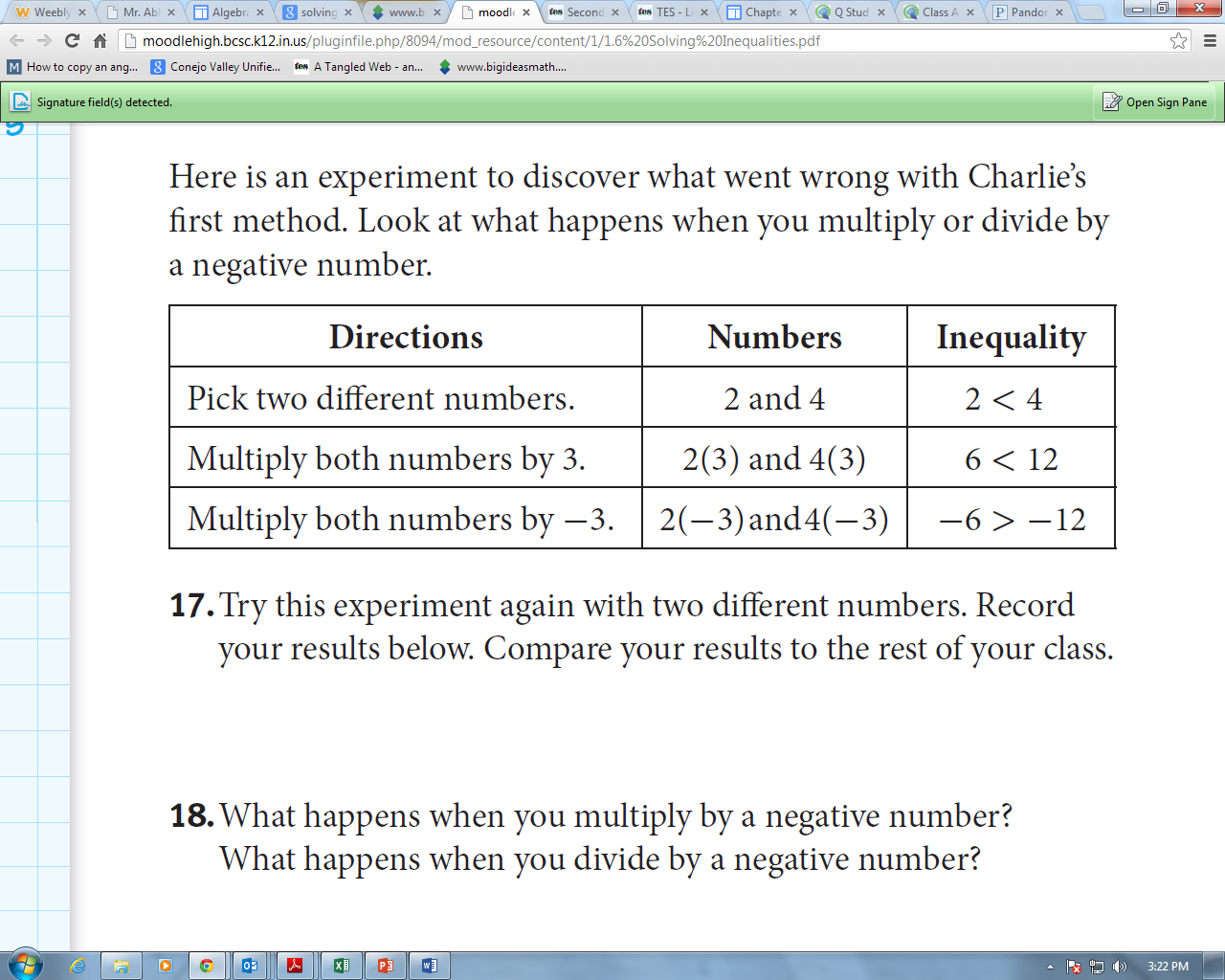


1. Is Chloe’s new conclusion correct? Explain.
2. Explain what Chloe did to solve the inequality.

Charlie looked back at his work. He said that he could easily fix his work by simply switching the inequality sign.

1. What do you think about Charlie’s plan? Explain.

Although both of these methods worked, Charlie and Chloe wanted to know *why* they were working.

Here is an experiment to discover what went wrong with Charlie’s first method. Look at what happens when you multiply or divide by a negative number. 

1. Try this experiment with two different numbers. Record your results below. Compare you results to the rest of the class.
2. What happens when you multiply by a negative number? What happens when you divide by a negative number?
3. How does this affect how you solve an inequality?

