

MTH 150 Chapter 2

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1 Reflection

Since last project, I promised to myself that I'd be better with time, and be sure to be at class whenever there was the opportunity. I think this definitely helped, I wasn't scrambling at the end to try to get everything done. A big difference I noticed was how much easier I found this chapter in comparison to the first chapter. I imagine by giving myself proper time to work, I found the work easier as I wasn't panicking to get the work in. While I still did have some issues and had to check the answer key a few times, I felt I did much better with this chapter than the previous. Overall, I am much happier with the work I did in this chapter. I plan to keep up this plan with with my work going forward, its definitely helped.

2 Section 2.1: Linear Functions

2.1 Problem 1.

A town's population has been growing linearly. In 2003, the population was 45,000, and the population has been growing by 1700 people each year. Write an equation, $P(t)$, for the population t years after 2003.

Answers:

$$P(t) = 45,000 + 1700t$$

Comments

This was a rather simple problem to solve, when you read into it, the equation its wants to be made is a $y=mx+b$ equation. Which once I understood that, I quickly put the problem together without an issue.

Just to be safe, I checked my answer using the solution manual of the text, which showed that my answer was correct.

2.2 Problem 3.

Sonya is currently 10 miles from home, and is walking further away at 2 miles per hour. Write an equation for her distance from home t hours from now.

Answers:

$$P(t) = 10 + 2t$$

Comments

Similar to the last problem, I found this rather simple. Just interpreting what type of equation the problem wanted, which I already assumed was $y=mx+b$ and then just plugging in the data.

Again to be safe I checked my answer using the book's answer key, which showed my answer was correct.

2.3 Problem 7.

Determine if each function is increasing or decreasing

$$f(x) = 4x + 3$$

Answers:

Increasing

Comments

At first I didn't understand what the problem meant by increasing or decreasing. Though once I realized that the problem was referring to the slope of the equation, I quickly figured out the answer.

To be sure that this assumption that increasing or decreasing was correct, I reread through the lesson then checked my answer using the book's answer key. Both of which helped confirm my assumption and answer.

2.4 Problem 9.

Determine if each function is increasing or decreasing

Answers:

Decreasing

Comments

Using my realization from the previous problem, I was able to quickly determine that the answer was decreasing by identifying that the slope was negative. My experience with the previous problem made doing this one much easier.

I checked my answer in the solution manual to be safe. Despite how confident I am with a solution to a problem, its always a good idea to check your work.

2.5 Problem 17.

Find the slope of the line that passes through the two given points

(2,4) and (4,10)

Answers:

$$\frac{10-4}{4-2}$$

$$\frac{6}{2}$$

3

Comments

This problem wasn't all too much trouble for me. For all I really had to do was find the slope, which since I was given two points, all I had to do was put them into the slope equation and I quickly found the answer.

As always, I checked my answer in the answer key to be sure, which showed I got the right answer and did the problem correctly.

2.6 Problem 25.

Sonya is walking home from a friend's house. After 2 minutes she is 1.4 miles from home. Twelve minutes after leaving, she is 0.9 miles from home. What is her rate?

Answers:

0.05 miles per minute

Comments

This problem took a little bit more time to complete in comparison to the others. First I calculated the difference between the times and the distances. I then put divided these values by each other, as the question asked Sonya's rate. I put distance above time and reached the my answer, which I confirmed by checking the answer key after completing the problem.

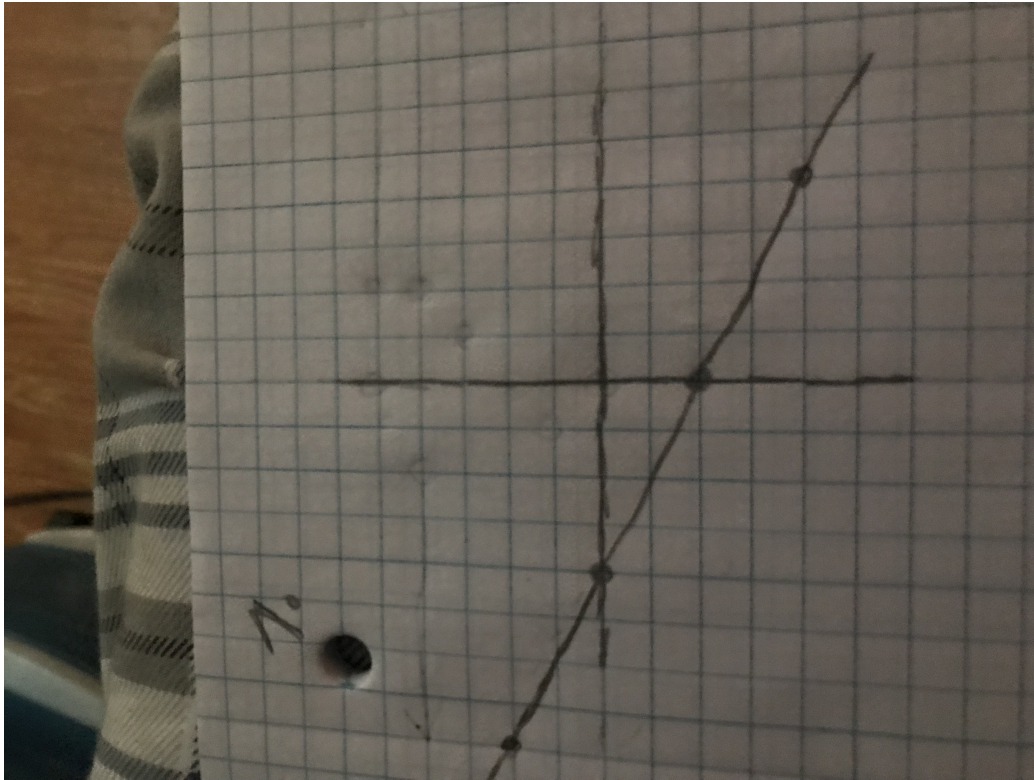
3 Section 2.2: Graphs of Linear Functions

3.1 Problem 7.

Sketch a line with the given features

An x-intercept of $(-4,0)$ and y-intercept of $(0,-2)$

Answers:



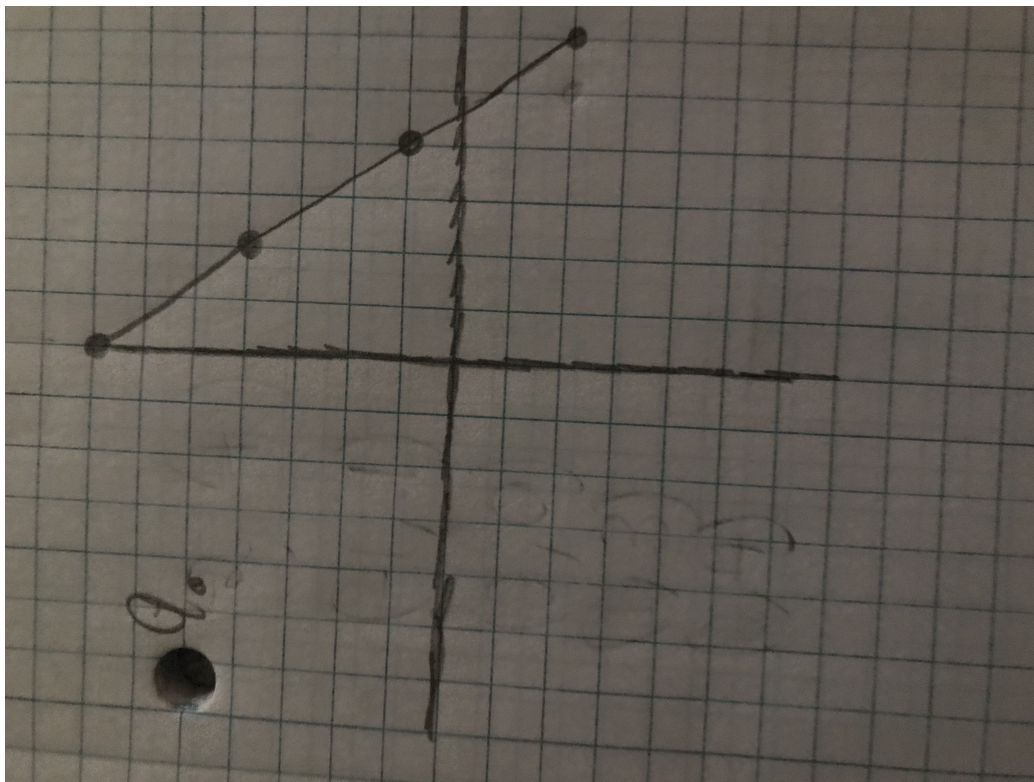
Comments

This was a rather simple problem for me. All I needed to do was to make a line, which had those two points as intercepts, which was simple enough. After I was done with my graph, I checked the answer key in the book to see if my graph was correct, which it seemed it was.

3.2 Problem 9.

Sketch a line with the given features

Answers:



Comments

Similar to last problem, I didn't have much issue with this one. A vertical intercept and a slope, just put that together into a graph and I ended up this graph.

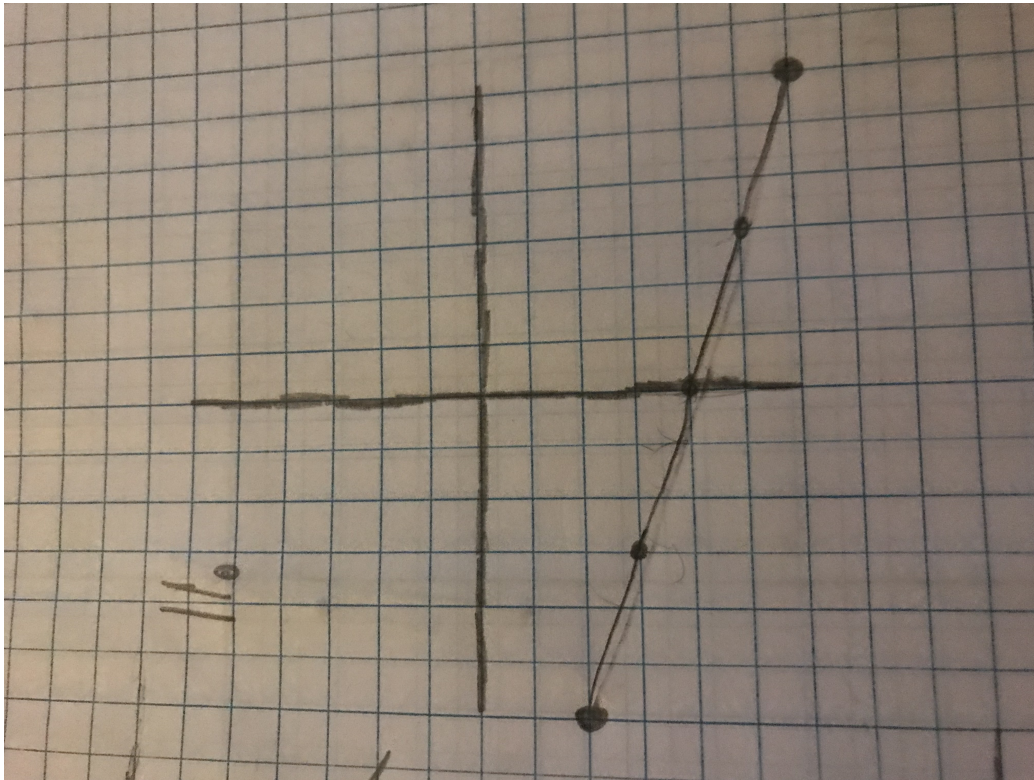
I compared this graph to the one in the answer key, which showed that I got the correct answer.

3.3 Problem 11.

Sketch a line with the given features

Passing through the points $(-6,-2)$ and $(6,-6)$

Answers:



Comments

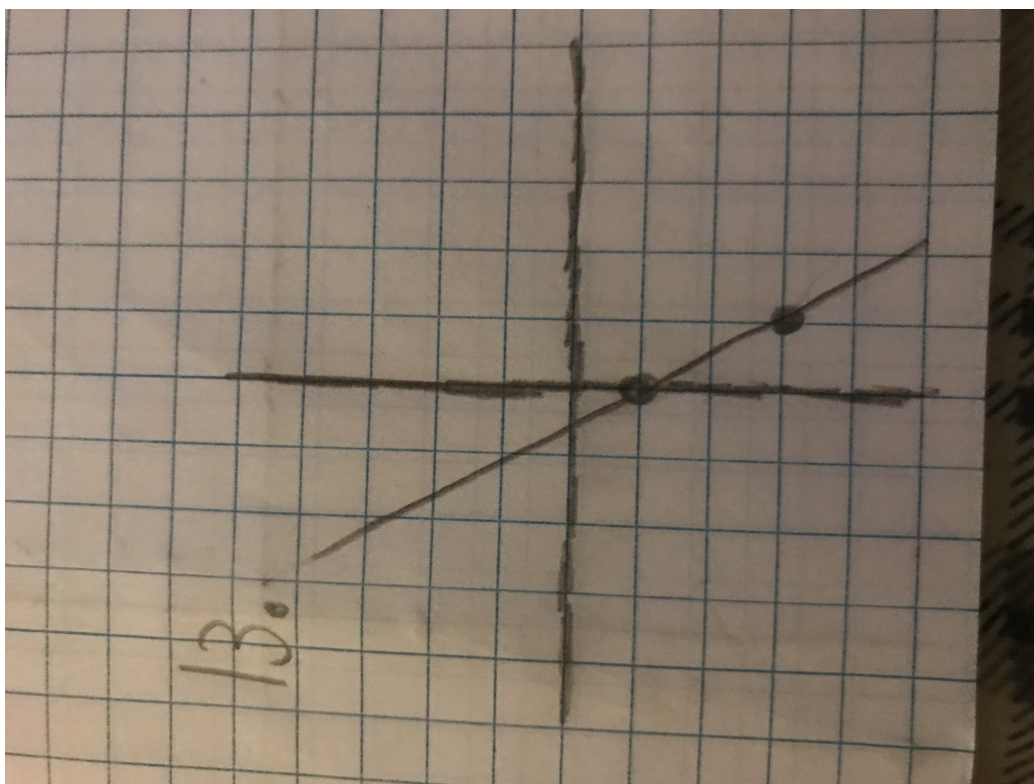
For the most part, I didn't have any issues with this problem. Though when I created my graph and compared to the answer key, I found that my line was slightly off, making it seem as if the slope was something else completely. Therefore I redrew the line, making sure to keep it to the slope. After this, my graph, while smaller than the one in the answer key, it did seem correct.

3.4 Problem 13.

Sketch the graph of each equation

$$f(x) = -2x - 1$$

Answers:



Comments

Unlike the last problem, I didn't have any issues with this problem. Just used the equation like a $y=mx+b$ equation and graphed the line.

Like usual, I checked my answer via the answer key, finding that my graph seemingly was correct.

3.5 Problem 23.

If $g(x)$ is the transformation of $f(x) = x$ after a vertical compression by $3/4$, a shift left by 2, and a shift down by 4

- a. Write an equation for $g(x)$
- b. What is the slope of the line?

Find the vertical slope of the line.

Answers:

- a.
 $3/4(x+2)-4$
- b.
 $3/4$
- c.
 $(0,-5/2)$

Comments

This problem was much more complex than the previous ones, and thus it took me a bit of time to get it done. This was one of the problems that I was a bit stuck at, but we reviewed the question in class, and that helped me figure out how to do the problem.

I checked the answer key and my class notes to see if I messed up my work anywhere, which I seemingly didn't.

3.6 Problem 29.

Find the horizontal and vertical intercepts of each equation
 $f(x) = -x + 2$

Answers:

$$0 = -x + 2$$

$$x = -2$$

$$y = 0 + 2$$

$$y = 2$$

vertical intercept = 2

horizontal intercept = -2

Comments

This problem was pretty easy for me once I realized I was just looking for the y and x of the problem. I just input zeroes in and that gave me the intercepts.

Of course I checked my answer in the solution manual, which showed that I got the correct answer.

3.7 Problem 35.

Given below are descriptions of two lines. Find the slopes of Line 1 and Line 2. Is each pair of lines parallel, perpendicular or neither?

Line 1: Passes through (0,6) and (3,-24)

Line 2: Passes through (-1,19) and (8,-71)

Answers:

Line 1 Slope: $-30/3=-10$

Line 2 Slope: $-90/9=-10$

The lines are parallel as they have the same slope.

Comments

This problem wasn't all too difficult as it was just a matter of finding the slopes then realizing that they were the same. While I had some minor miscalculations at first that slowed my process, I quickly corrected it and found the right answer.

To confirm this, I checked the answer key and compared it to my own work, which proved my answer correct.

3.8 Problem 41.

Write an equation for a line parallel to $f(x) = -5x - 3$ and passing through the point $(2, -12)$

Answers:

$$\begin{aligned}y &= -5x + b \\ -12 &= -5(2) + b \\ -12 &= -10 + b \\ -2 &= b \\ y &= -5x - 2\end{aligned}$$

Comments

This problem wasn't all too much of an issue for me. As once I realized that the slope would be the same, because the lines are parallel, I was able to input zero in and quickly solve the problem. I checked my answer with the solution manual, which showed that my answer was correct.

4 Section 2.3: Modeling with Linear Functions

4.1 Problem 1.

In 2004, a school population was 1001. By 2008 the population had grown to 1697. Assume the population is changing linearly

Answers:

- a.
696
- b.
4 years
- c.
174 per year
- d.
305
- e.
 $P=174t+305$
- f.
2219

Comments

Despite the multi-step of the nature of this problem, I found it not all that challenging. Most of the problem was finding the difference between values, then using those differences to help with other parts of the problem.

To make sure my math was correct, I checked the answer key, it showed the same answers as my own.

4.2 Problem 3.

A phone company has a monthly cellular plan where a customer pays a flat monthly fee and then a certain amount of money per minute used on the phone. If a customer uses 410 minutes, the monthly cost will be 71.50 dollars. If the customer uses 720 minutes, the monthly cost will be 118 dollars.

Answers:

a.

$$f(x)=0.15x+10$$

$$118=0.15(720)+b$$

$$118=108+b$$

$$b=10$$

310 minute difference

46.50 dollar difference

put into ordered pairs, then find slope, result: 0.15

b.

0.15 is the slope and 10 is the vertical intercept

c.

113.05 dollars

Comments

This problem was a bit daunting at first, with its several multi-step parts. It took me some time to figure out what I needed to do, and I needed to glance at the answer key to get a hint about what my first step should be. Once I saw the answer key talk about ordered pairs, I realized what I needed to do.

4.3 Problem 13.

Find the area of a triangle bounded by the y axis, the line $f(x) = 9 - \frac{6}{7}x$, and the line perpendicular to $f(x)$ that passes through the origin.

Answers:

$$f(x) = 9 - \frac{6}{7}x$$

$$f(x) = 9 + \frac{7}{6}x$$

$$9 + \frac{7}{6}x = 9 - \frac{6}{7}x$$

$$x = 4.44$$

$$\frac{1}{2}(9)(4.44) = 19.98$$

Comments

At first when looking at this problem, I didn't know where to start. Then I remembered that the slope of a perpendicular is the opposite reciprocal of the original slope. This gave me the starting point I needed and helped me complete the problem.

After completing the problem I chose to check the answer key, which showed I was correct.

4.4 Problem 15.

Find the area of a parallelogram bounded by the y axis, the line $x = 3$, the line $f(x) = 1 + 2x$, and the line parallel to $f(x)$ passing through $(2, 7)$

Answers:

6

Comments

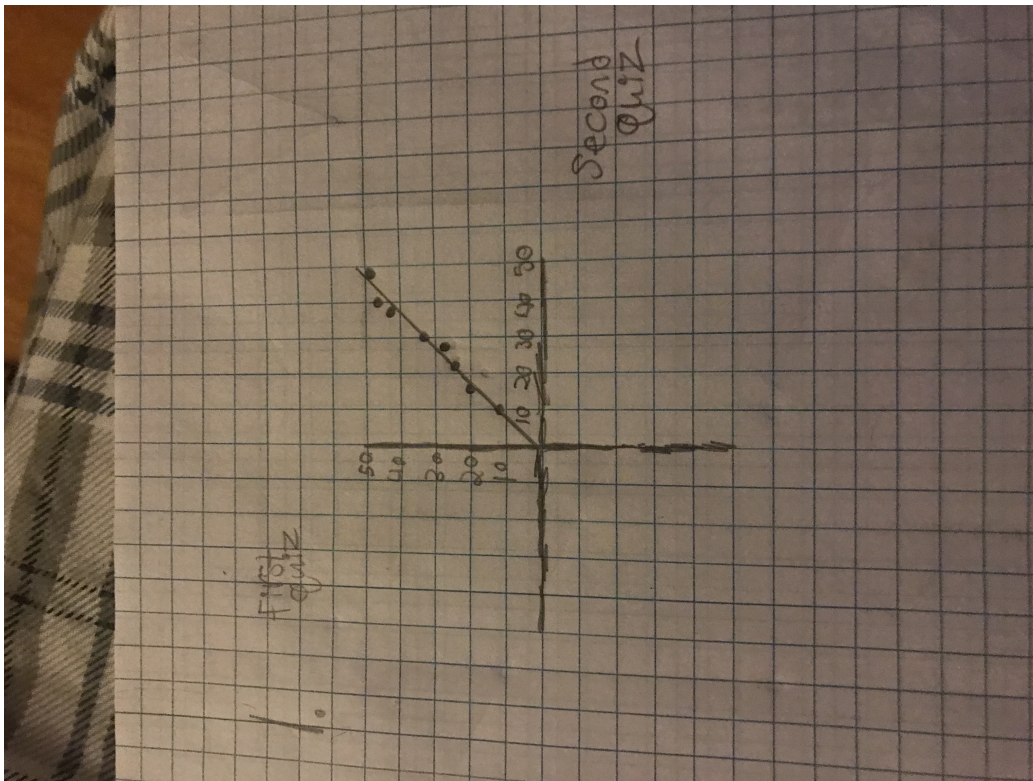
Unfortunately, this problem really stumped me. I was stuck of this problem, until I eventually looked up the answer in the answer key. I was entirely lost on this problem, but after looking at the answer key, I think I have a better grasp of it now.

5 Section 2.4: Fitting Linear Models to Data

5.1 Problem 1.

The following is data for the first and second quiz scores for 8 students in a class. Plot the points, then sketch a line that fits the data.

Answers:



Comments

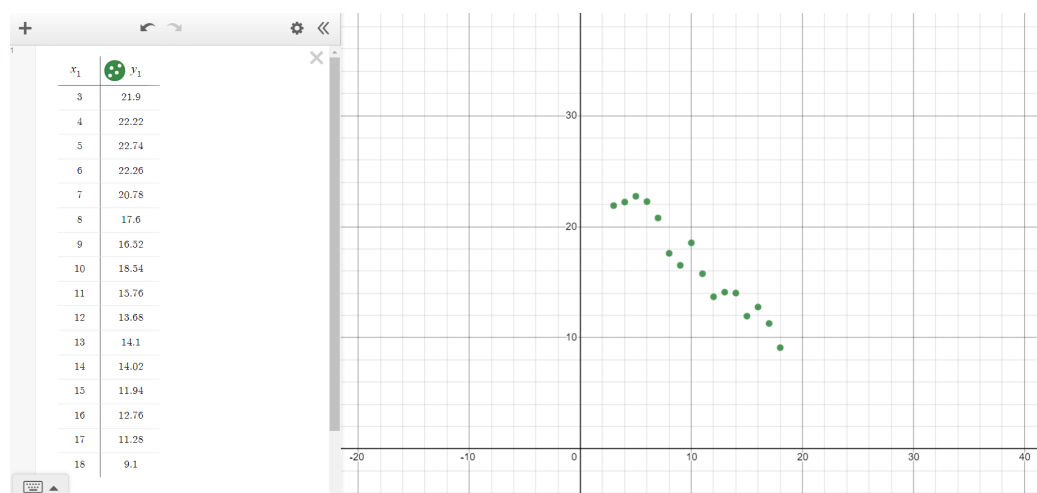
This problem wasn't much of an issue for me. Just plot the points on the graph, then sketch a line to fit the data best I can.

Again I checked to make sure my graph was accurate by looking at the answer key in the book. From what I saw it looks like my graph was correct, though my graph is different in scale in comparison to the one in the book.

5.2 Problem 5.

Based on each set of data given, calculate the regression line using your calculator or other technology tool, and determine the correlation coefficient.

Answers:



$$f(x) = -0.901x + 26.04$$

$$R = -0.967988$$

Comments

This problem was a little difficult for me, and eventually I needed to look at the answer key for help. While I ended up creating the graph with the points, I was lost on the second part of the problem.

5.3 Problem 7.

A regression was run to determine if there is a relationship between hours of TV watched per day (x) and number of situps a person can do (y). The results of the regression are given below. Use this to predict the number of situps a person who watches 11 hours of TV can do.

Answers:

$$y = -1.341(11) + 32.234$$

$$y = 17.483$$

17.5 sit ups

Comments

Thankfully, unlike the last few problems, this one wasn't all too bad. Most of this problem was just using the $y = ax + b$ equation and inputting the values. Despite how easy I found this problem, I still checked my answer using the answer key. Which showed that my answer was correct.

5.4 Problem 13.

The US census tracks the percentage of persons 25 years or older who are college graduates. That data for several years is given below. Determine if the trend appears linear. If so and the trend continues, in what year will the percentage exceed 35 percent?

Answers:

The trend seems linear, and the percentage will exceed 35 percent in 2020.

Comments

Unfortunately, I also got stuck on this problem. While I graphed the data no problem and realized that the data was linear, I didn't know how to answer the second part of the question. So I ended up looking up the answer in the answer key.

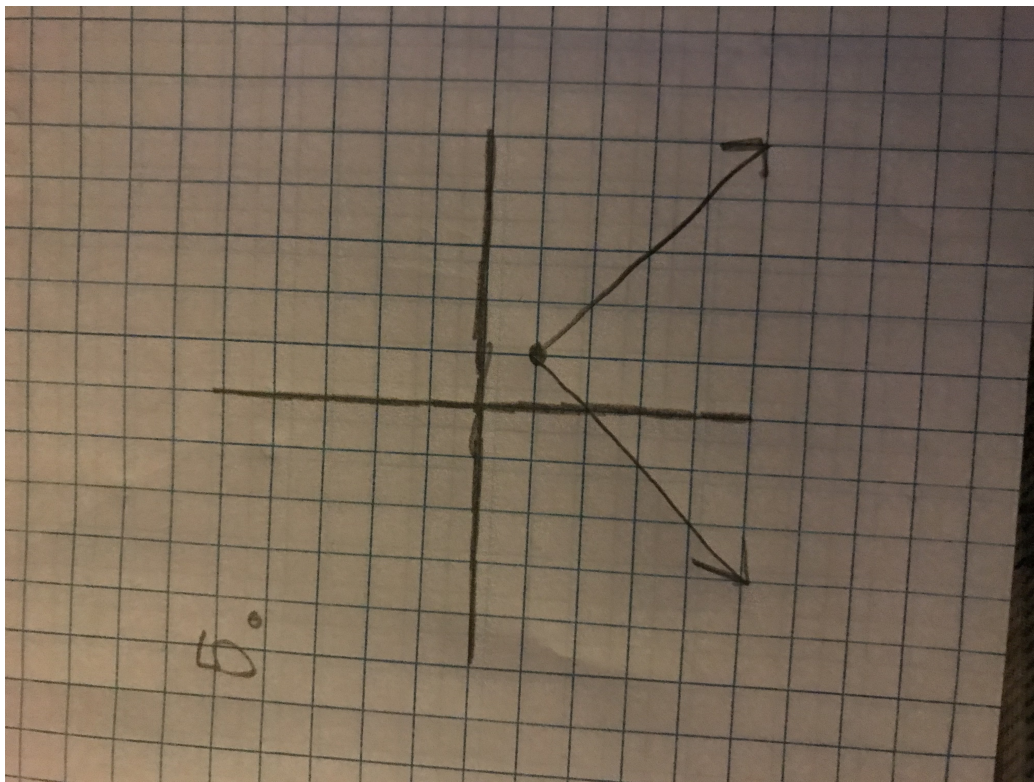
6 Section 2.5: Absolute Value Functions

6.1 Problem 5.

Sketch the graph for each function

$$f(x) = -|x - 1| - 1$$

Answers:



Comments

At first, I realized I had forgotten how to graph absolute value functions, but after reading through the lesson again and remembering, I realized how easy this problem was and quickly graphed out the solution.

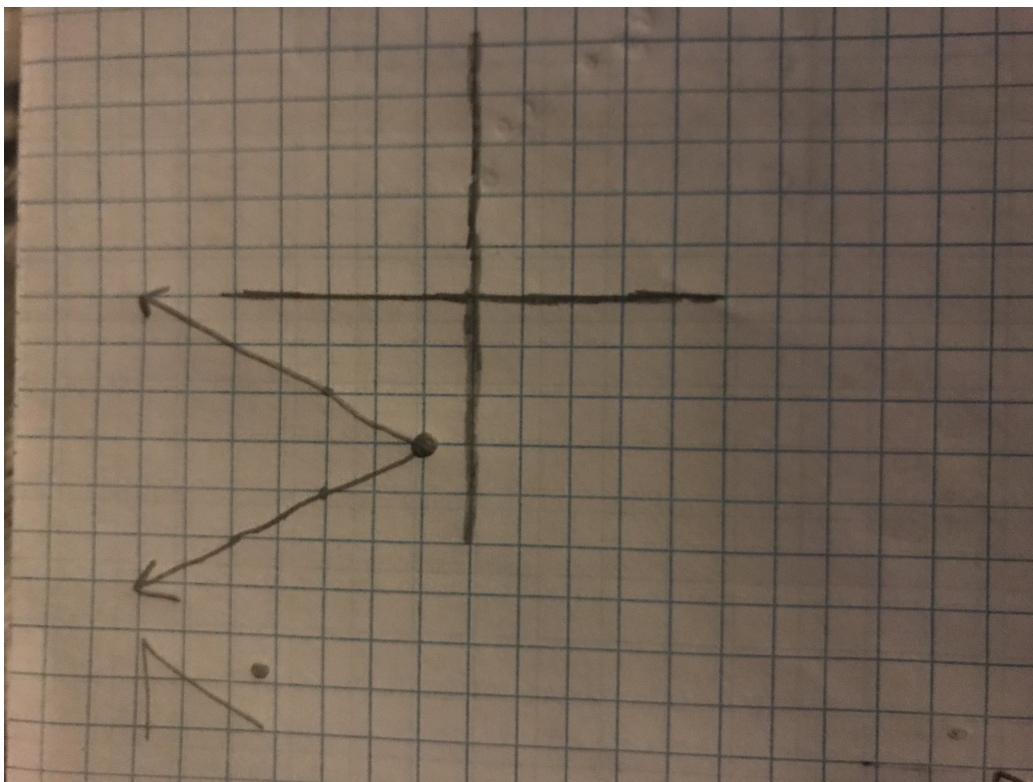
Just to be sure, I looked up the answer in the answer key. I was confident in my answer, but I needed to make sure I properly understood the material. Thankfully, I understood and my answer was correct.

6.2 Problem 7.

Sketch the graph for each function

$$f(x) = 2|x + 3| + 1$$

Answers:



Comments

After I put together how to graph absolute value functions, these problems became pretty easy for me. So I had no issues with this problem.

Of course, with it being better safe than sorry, I checked my answer using the answer key. Which showed that my answer seemed to be correct.

6.3 Problem 11.

Solve each equation

$$f(x) = |5x - 2| = 11$$

Answers:

$$5x - 2 = 11$$

$$5x = 13$$

$$x = \frac{13}{5}$$

$$5x - 2 = -11$$

$$5x = -9$$

$$x = \frac{-9}{5}$$

Comments

Unlike graphing absolute value functions, I remembered how to solve absolute value equations. This problem was relatively simple for me, then again, this equation didn't have much to it, beyond being an absolute value equation.

I checked my work using the book's answer key. Which, agreed with my answer.

6.4 Problem 13.

Solve each equation

$$f(x) = 2|4 - x| = 7$$

Answers:

$$4 - x = 7/2$$

$$-x = -1/2$$

$$x = \frac{1}{2}$$

$$4 - x = -7/2$$

$$-x = -15/2$$

$$x = \frac{15}{2}$$

Comments

At first I was a little confused about what to do regarding numbers outside the absolute value, but then realized I could just divide them. After that, the rest of the problem was easy for me.

Of course, as it had become habit by this point, I checked my answers using the answer key. Which agreed with my answers.

6.5 Problem 17.

Find the horizontal and vertical intercepts of each function

$$f(x) = 2|x + 1| - 10$$

Answers:

$$2|x + 1| - 10 = 0$$

$$2|x + 1| = 10$$

$$|x + 1| = 5$$

$$x + 1 = 5$$

$$x = 4$$

$$x + 1 = -5$$

$$x = -6$$

$$\text{horizontal} = (4, 0)$$

$$\text{horizontal} = (6, 0)$$

$$2|0 + 1| - 10$$

$$2(1) - 10 = -8$$

$$\text{vertical} = (0, -8)$$

Comments

Despite the difference this problem has to the previous problems, this problem didn't give me all too much trouble. At one point I had forgotten that absolute value equations cross the x axis twice, and thus meaning there were two horizontal intercepts. Once I remembered that, the rest of the problem wasn't an issue to complete.

Just to make sure that I did everything correctly, I checked my answer with the answer key. Good thing I did too, as when I looked, I saw that I wrote vertical when I meant to write horizontal when giving my answers. More of a typo than anything, but looking over my work did help me catch the error.

6.6 Problem 19.

Find the horizontal and vertical intercepts of each function

$$f(x) = 2|x + 1| - 10$$

Answers:

$$-3|x - 2| - 1 = 0$$

$$|x - 2| = -1/3$$

$$x - 2 = -1/3$$

$$-3|0 - 2| - 1$$

$$-3(2) - 1$$

$$-6 - 1$$

$$-7$$

vertical intercept=(0, -7)

Comments

While for most of this problem, I was fine, it wasn't until I checked my answers that I realized I did something wrong. I did this problem much in the same way I did the last one, but forgot that absolute value cannot equal a negative and thus that this problem had no horizontal intercepts. Though thankfully I caught this mistake when checking my answers and quickly corrected it. Beyond that, my vertical intercept answer agreed with the answer key.

6.7 Problem 21.

Solve each inequality

$$f(x) = |x + 5| < 6$$

Answers:

$$|x + 5| < 6$$

$$|x + 5| = 6$$

$$x + 5 = 6$$

$$x = 1$$

$$x + 5 = -6$$

$$x = -11$$

$$-11 < x < 1$$

A graph was used to help solve this problem

Comments

At first, I was somewhat confused about how I was supposed to solve this, but after reviewing the lesson, I figured it out. I chose to use a graph to help me with this problem, as I felt I was getting comfortable with graphing absolute value equations.

I checked my answer using the answer key of the book. Which agreed with my answer.

6.8 Problem 23.

Solve each inequality

$$f(x) = |x - 2|3$$

Answers:

$$|x - 2| = 3$$

$$x - 2 = 3$$

$$x = 5$$

$$x - 2 = -3$$

$$x = -1$$

$$-1x5$$

A graph was used to help solve this problem

Comments

From my experience with the last problem, I already knew what I was supposed to do. I did the problem without a hitch, and used a graph to help me solve it, for the same reason I said before.

I checked my answer using the answer key of the book. Which agreed with my answer.