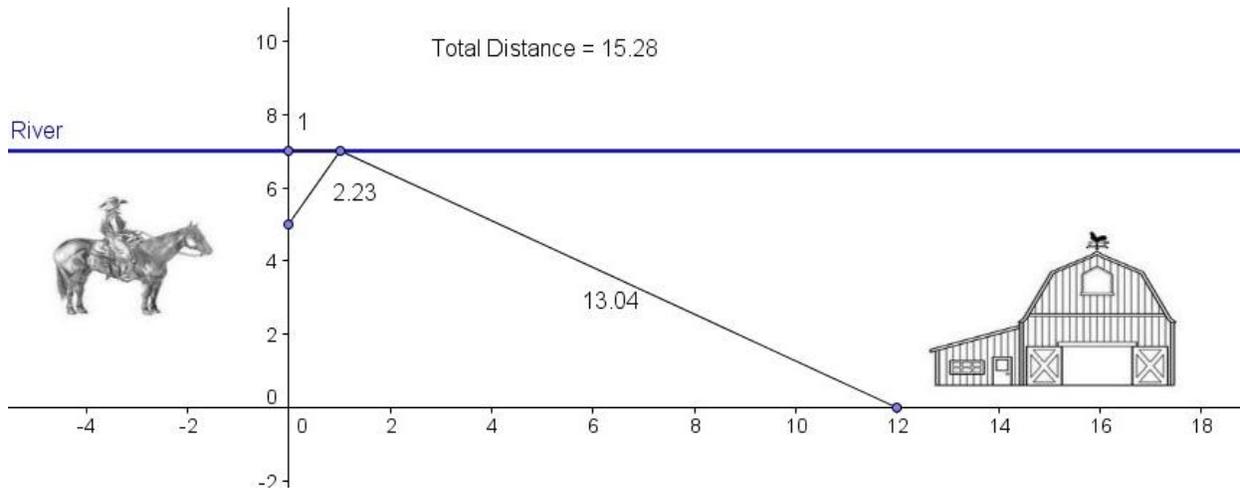


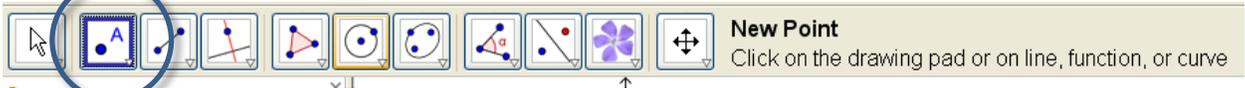
Geogebra Technology Assignment

We seek a solution to a problem faced by a rancher. He is 2 miles south of the river and is 5 miles north and 12 miles west of his ranch. He desires to take his thirsty horse to the river for a drink and then ride

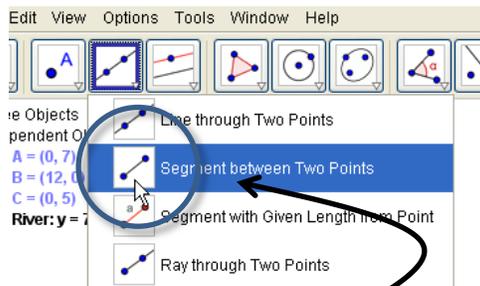
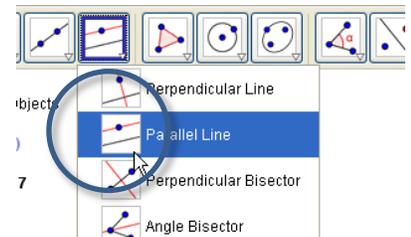


cross country to his ranch. He needs to minimize the distance (and thus the time) traveled. We will create a Geogebra worksheet to help him figure out the best route.

1. Open Geogebra (you may download your own version of this or use Geogebra in the labs).



2. Use the Point Tool to place a point on (0, 7), it will automatically be labeled A
3. Place a point on (12, 0), it will automatically be labeled B
4. Place a point on (0, 5), it will automatically be labeled C
5. Use the Parallel line tool, to create a line through (0, 7) and parallel to the x-axis.
6. Right click on the resulting line and choose Rename – rename it **River**
7. Choose the Point tool again and place a point on the River line, it will automatically be named D.



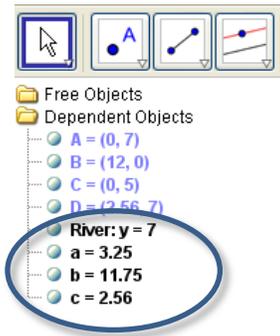
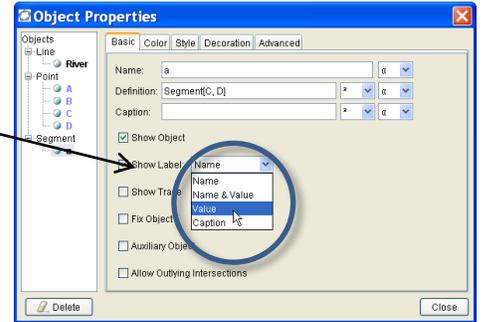
8. Use the Line Segment tool to connect the point C (0,5) with D (on the river).
9. Place another line segment connecting point D with point B (12,0).
10. Place a third line segment connecting point A (0,7) with point D (on the river).

Geogebra Technology Assignment

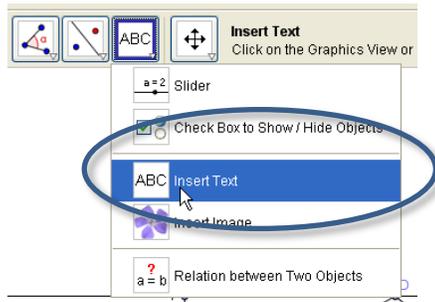
11. Right click on each line segment and use the pulldown menu to the right to specify the object properties.



12. Set the Show Label option to **Value**. Do this for all three line segments.
 13. Notice that these line segment lengths are labeled (with lower case letters), **a**, **b**, and **c**



14. Your picture should now look something like what you see above (without the horse and the barn).
 15. Now choose the Text Tool

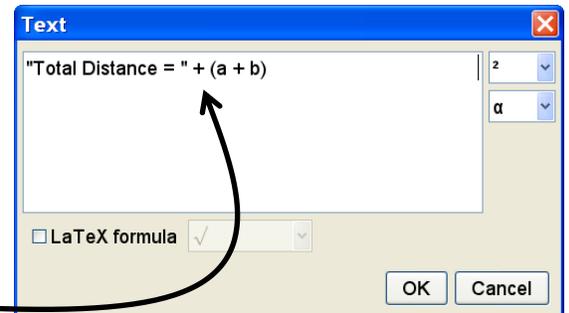


16. Now we will use the **a** and **b** values. Click somewhere above the "River" line and a dialog box appears. Enter in the text exactly as you see here ... **with the quotes and parentheses**

"Total Distance = +(a + b)

When you click OK, you should see the label

Total Distance = XX.XX with the current value of the sum of the two line segments (much like what you see above on the previous page).

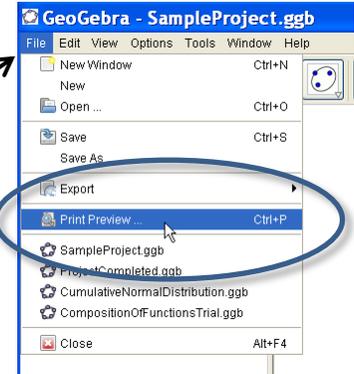


Geogebra Technology Assignment

17. As you slide point D back and forth along the river line, you will see the total distance change. Answer questions on the cover sheet using the different values you find.

18. Print out your Geogebra sheet. Use the pulldown menu from the File option and choose PrintPreview.

19. Give the print out a title and include your name.



20. You will receive elegance points for:

- a. Placing pictures of the cowboy and ranch on the page (they are on blackboard with this document)
- b. Placing a point on the page which shows the distance as a function of the location of point D. It will trace out the graph of the distance function. Turn on the trace and include the trace in the printout. It's x value will be the same as the length of **c** and it's y value should be **a + b**.

Geogebra Technology Assignment

Name _____ CPO _____

Attach this sheet to the front of your print out as a cover sheet. You do not need to submit the above pages.

Answer the following questions by using the Geogebra page you have created.

_____ 1. What is the total distance when point D is placed on (0,7) ... that is when the cowboy rides straight to the river?

_____ 2. At what point on the river (the length of segment AD) should the cowboy ride to get a total distance of 16 miles?

_____ 3. At what point on the river (the length of segment AD) should the cowboy ride to get the minimal total distance?

_____ 4. Given the cowboy rides to the point $(x, 7)$ on the river. Write a formula in terms of x , which gives the distance he travels from his starting point to the river.

_____ 5. Given the cowboy has ridden to the point $(x, 7)$ and now will ride to the ranch, point $(12, 0)$. Write a formula in terms of x , which gives the distance he travels from the river to the ranch.

6. Write the sum of the previous two formulas which will give the total distance as a function of x .

$D(x) =$

7. Write the derivative of your function $D(x)$

$D'(x) =$

_____ 8. Determine the value of x for which $D'(x) = 0$. This should be the point $(x, 7)$ on the river to which the cowboy should ride to minimize the total distance.

_____ 9. What is that total distance?

10. Print out your Geogebra page and attach this page as the cover to it.

Geogebra Technology Assignment

Geogebra Technology Assignment Evaluation

Requirements Possible	Points off
1. Points A, B, C, and D correctly placed	_____ 12
2. Horizontal line $y = 7$, named River	_____ 5
3. Line segments, a, b, c with lengths showing	_____ 9
4. Text with Total Distance = _____ showing	_____ 10
5. Name and Title on printout	_____ 6
6. Total dist when D (0,7) = 13.89	_____ 3
7. Distance = 16 when $x = 7.3$	_____ 3
8. Minimal distance at $x = 2.67$	_____ 3
9. Dist from start to river = $\sqrt{x^2+4}$	_____ 3
10. Dist from river to ranch = $\sqrt{(12-x)^2+49} = \sqrt{x^2-24x+193}$	_____ 3
11. Total distance = $\sqrt{(12-x)^2+49} + \sqrt{x^2+4}$	_____ 3
12. $\frac{dy}{dx} = \frac{x-12}{\sqrt{x^2-24x+193}} + \frac{x}{\sqrt{x^2+4}}$	_____ 3
13. $D'(x) = 0$ at $x = 2.6667$	_____ 3
14. Total shortest distance = 15	_____ 3
15. Other	_____

Elegance points	
_____ Horse and barn pictures showing	
_____ Graph of total distance traced, showing	
=====	
_____ Total elegance + 100 - points off _____ = _____	

Name _____

CPO _____