

Geometry Activity: Segment and Shape Construction

Casio Classpad 300 vs. TI-89

C.C. Edwards

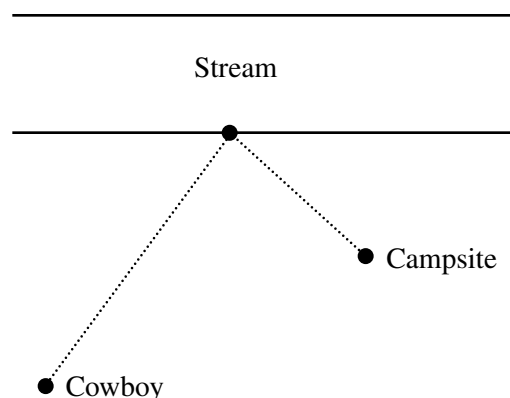
CALCULATORS: Casio: *ClassPad 300* • Texas Instruments: *TI-89, TI-89 Titanium*

Using the Casio ClassPad 300

The Cowboy and His Horse

A cowboy and his horse have just returned to the vicinity of their campsite which is near a stream having a rather straight shape. The cowboy wants to take his horse to the stream for a drink of water before going to the campsite.

What path should he take in order to minimize the total distance from his present location to the stream and then from the stream to the campsite?



Here's how you solve this problem using the Casio ClassPad 300.

Start a geometry session:

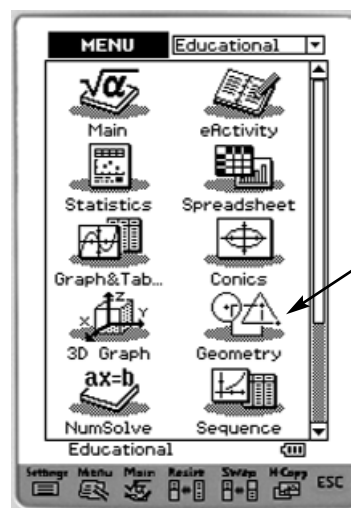
- Use the stylus to tap **MENU** on the Icon Panel.
- Tap **GEOMETRY** to start a geometry session.

Start a new file:

- Tap **File** on the Menu bar.

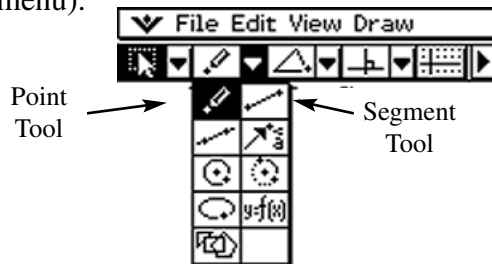


- Tap **New** in the drop down menu.
- Tap **OK** to clear the screen and start a new file.

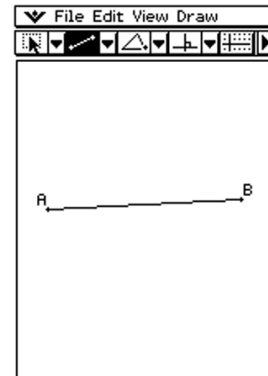


Construct and the stream:

- Tap the Segment tool in the Draw menu (second drop down menu).

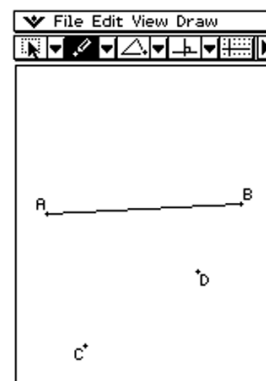


- Tap a point at the left center of the screen and then tap a point at the right center of the screen. A segment representing the stream appears on the screen.



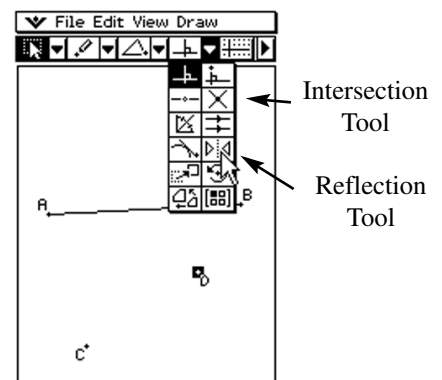
Construct a point C representing the location of the cowboy and a point D representing the location of the campsite:

- Tap the **Point** tool in the Draw menu.
- Tap a point at the lower left of the screen.
- Tap another point on the same side of the stream.



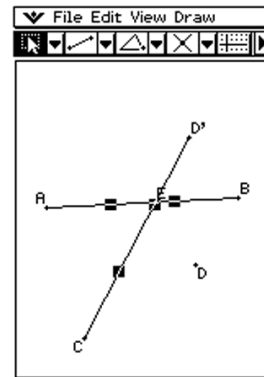
Reflect the point D in segment AB :

- Tap the **Selection** tool on the label of the first drop down menu.
- Tap point D to select it.
- Tap the **Reflection** tool in the Construct menu, as illustrated in the figure at the right.
- The directions at the bottom of the screen instruct you to “**Select Axis.**” Tap segment AB . The reflection D' of point D appears on the screen.



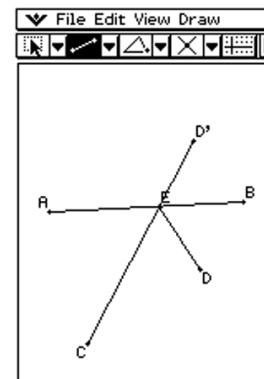
Construct segment CD' and then construct the intersection of CD' and AB :

- Tap a **blank area** of the screen to deselect point D .
- Tap the **Segment** tool y in the Draw drop down menu.
- Tap point C and then tap point D' . A segment joining these points appears on the screen.
- Tap the **Selection** tool of the first drop down menu.
- Tap segment CD' and then tap segment AB .
- Tap the **Intersection** tool in the Construct menu (fourth drop down menu). The point E of intersection appears on the screen.



Construct the path of minimal length:

- Tap a **blank area** of the screen to deselect the two segments.
- Tap the **Segment** tool of the Draw drop down menu.
- Tap point E and then tap point D .



Since D' is the reflection of D in segment AB , segments $D'E$ and DE are of equal length. So the path $CE + ED$ has the same length as path $CE + ED'$. But path $CE + ED'$ is the straight line CD' . Since the shortest distance between two points is a straight line, the path $CE + ED$ is the shortest path the cowboy can take.

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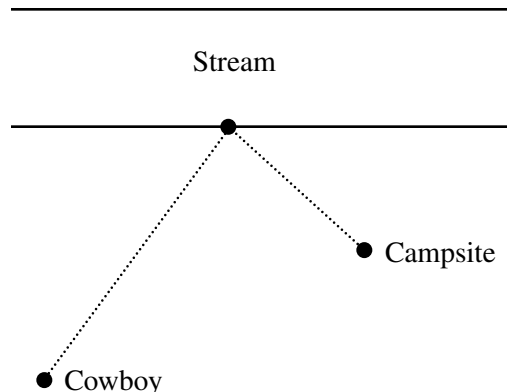
CALCULATORS: Casio: *ClassPad 300* • Texas Instruments: *TI-89, TI-89 Titanium*

Using Geometer's Sketchpad on a TI-89 Titanium

The Cowboy and His Horse

A cowboy and his horse have just returned to the vicinity of their campsite which is near a stream having a rather straight shape. The cowboy wants to take his horse to the stream for a drink of water before going to the campsite.

What path should he take in order to minimize the total distance from his present location to the stream and then from the stream to the campsite?



Here's how you solve this problem using Geometer's Sketchpad on a TI-89 Titanium.

Install the Sketchpad application on your calculator:

Sketchpad isn't preloaded on the TI-89, so you'll have to download it from Texas Instruments' website and install it on your calculator. The Sketchpad application is free and the cable connection the TI-89 to your PC came with your calculator. The cable linking a TI-89 to your PC needs to be purchased separately.

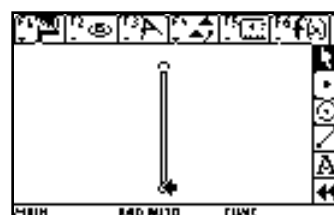
Start Sketchpad and, if necessary, clear the screen:

- Press **APPS**.
- Repeatedly press the **Arrow** keys to highlight the Sketchpad application, as illustrated in the figure at the right.
- Press **ENTER** to start Sketchpad.
- Press **F1** **▲** **▲** **▲** **▶** to view the options in the Sketch menu.
- Press **ENTER** to tell the calculator that you want to start a new file.
- If you are asked if you want to save any previously existing sketch, press **ESC** to clear the screen.



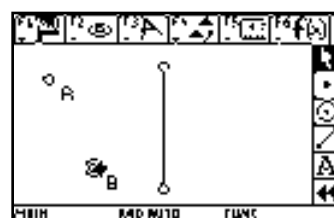
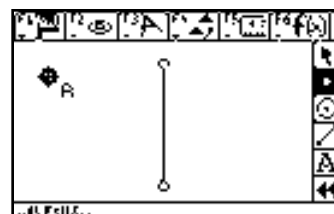
Construct and the stream:

- Press **2nd F3** ▼ ▼ ▼ to display the line options.
- Press **ENTER** to select the Segment tool.
- Use the **Arrow** keys to move the cursor to the top middle of the screen.
- Press **ENTER** to anchor the first point of the segment representing the stream.
- Use the **Arrow** keys to move the cursor to the bottom middle of the screen and press **ENTER** to anchor the end of the segment.
- Press **ESC** to tell the calculator that you are finished drawing segments.
A segment representing the stream appears on the screen.



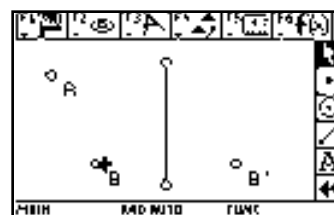
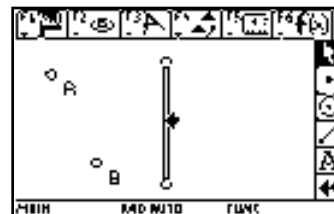
Construct a point *A* representing the location of the cowboy and a point *B* representing the location of the campsite:

- Press **2nd F3** ▼ **ENTER** to select the Point tool.
- Use the **Arrow** keys to move the cursor to the upper left of the screen and press **ENTER** to create a point representing the location of the cowboy.
- Press **F2 3** to label that point.
- Use the **Arrow** keys to move the cursor to the lower left of the screen and a bit closer to the line segment. Then press **ENTER** to create a point representing the location of the campsite.
- Press **F2 3** to label that point.
- Press **ESC** to tell the calculator that you are finished constructing points.



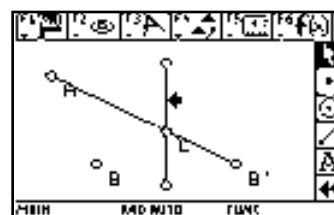
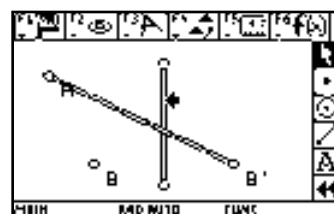
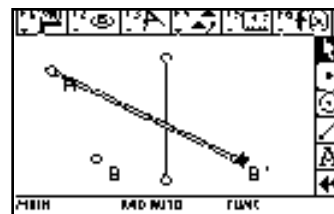
Reflect the point B in the segment:

- Press **ESC** to deselect point B .
- Use the **Arrow** keys to move the cursor to the segment and then press **ENTER** to select it.
- Press **F4 2** to mark the segment as a mirror.
- Use the **Arrow** keys to move the cursor to point B and then press **ENTER** to select it.
- Press **F4 ▲ ENTER** to reflect point B in the segment.
- Press **F2 3** to have the calculator label this point B' .
- Press **ESC** to deselect point B' .



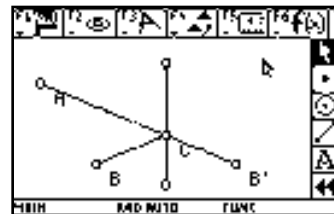
Construct segment AB' and then construct the intersection of AB' and the stream:

- Press **2nd F3 ▼ ▼ ▼ ENTER** to activate the Segment tool.
- Use the **Arrow** keys to move the cursor to point A and then press **ENTER** to select it.
- Use the **Arrow** keys to move the cursor to point B' and then press **ENTER** to create the segment joining these two points.
- Press **ESC** to deactivate the Segment tool. The segment AB' remains selected, as illustrated in the figure on the right.
- Use the **Arrow** keys to move the cursor to the segment representing the stream and then press **ENTER** to select it.
- Press **F3 3** to construct the point of intersection of the two selected segments. Then press **F2 3** to label this point C .
- Press **ESC** to deselect point C .



Construct the path of minimal length:

- Press **2nd F3** ▼ ▼ ▼ **ENTER** to activate the Segment tool.
- Use the **Arrow** keys to move the cursor to point B and then press **ENTER** to select it.
- Use the **Arrow** keys to move the cursor to point C and then press **ENTER** to create the segment joining points B and C.
- Press **ESC** two times; once to deactivate the segment tool and a second time to deselect segment BC.
- Use the **Arrow** keys to move the cursor away from your view of the figure.



Since B' is the reflection of B in the segment representing the stream, segments $B'C$ and BC are of equal length. So the path $AC + CB$ has the same length as path $AC + CB'$. But path $AC + CB'$ is the straight line AB' . Since the shortest distance between two points is a straight line, the path $AC + CB'$ is the shortest path the cowboy can take.

The Casio Advantage...

- Geometry software is preloaded on the Classpad 300
No extra steps needed.
- Pen touch for easy manipulation
- Large screen makes it easy to see
- The ClassPad 300, unlike Sketchpad on a TI-89 or Voyage 200, has the ability to move and anchor a point on a line.