

Dome Floor Dilemma

Sector Construction

- 1. Circle Construction
 - a) Use the **Compass** tool to construct a circle.



b) Use the **Segment** tool or the **Construct** menu to construct a radius of the circle. Connect the radius from the center to the "control" point on the circle. To use the Construct menu, first select the center and the point on the circle, then use Construct with the Circle By Center+Point option.



Ctrl+M

Ctrl+I

Ctrl+L



- 2. Rotate Radius
 - a) To rotate the radius and its endpoint that lies on the circle, first mark the point of rotation by double clicking on the center of the circle. You will see a quick flash of concentric circles as the "marking" takes place, then highlight the radius and the endpoint that lies on the circle. Use the **Transform** menu and choose the **Rotation** option.



b) A box will pop up that allows the desired degrees of rotation to be entered. For this construction, enter 60° , then click on **Rotate**.

Rotate 🔀	
Rotate By: Fixed Angle C Marked Angle	
60 degrees	
About Center A	
Help Cancel Rotate	



3. Construct Intercepted Arc

To construct the intercepted arc of the sector, select the endpoints of the radii in a counter clockwise direction. Then select the circle and use the **Construct** menu to construct **Arc on Circle**.





4. Construct Arc Sector

While the newly constructed arc is still highlighted, create the arc sector interior by using the **Construct** menu with the options, **Arc Interior** then **Arc Sector**.

Construct	Transform	Measure	Graph	Window	Help
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Circle By Circle By Arc On C Arc Thro	/ Center+Poir / Center+Rac Circle ough 3 Points	nt dius	/		
Arc Inter	rior	1	•	Arc Sector Arc Segme	Ctrl+P ent

- 5. Measure Area and Length
 - a) To measure the area of the sector, highlight the sector by clicking in it, then use **Measure** from the menu bar with the **Area** option. A highlighted labeled box will appear. Be sure to un-highlight the box by clicking in any white space on the sketch.



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b) Change the label of the Area to read **Arc Sector Area** by first selecting the Text tool, then double clicking on the Area label and typing in the new label in the pop-up window.

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	Properties of Arc Sector Area	
•	Object Label Value	Arc Sector Area = 8.67 cm ²
Text Tool	Arc Sector Area	
	Use Label In Custom Tools	
	Help Cancel OK	

c) To measure the length of the radius, first highlight any radii, then use the Measure menu with the Length option. Again a labeled highlighted box will appear.



6. Create a Table

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To create a table to explore the relationship between the length of the radius and the area of the sector, highlight their measures respectively. Then use **Graph** from the menu bar with the **Tabulate** option. A labeled highlighted table will pop up on the sketch.

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	Graph Window Help				
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	Grid Form		m 🗚 = 3.	05 cm	
	Show Grid		m AB	Arc Sector Area	1 \
	Snap Points		3.05 cm	4.88 cm ²	
	Plot As (x, y)				· /
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	New Function	Ctrl+F			À
	Plot New Function	Ctrl+G		\	
	Derivative				
	Tabulate 🗲			\sim	
	Add Table Data				
	Remove Table Data				

7. Plot Point

a) To plot the point represented in the table, again highlight the measure values in the respective order: length of radius then area of sector. Use **Graph** from the menu bar with the **Plot as (x,y)** option.



b) The coordinate grid appears with the highlighted point on the grid.





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c) To turn on the trace option, highlight the plotted point and use **Display** from the menu bar with the **Trace Plotted Point** option. This will allow any new points added to the table to be plotted automatically.

Display	Construct	Transform	Measure
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Show Hide T	Motion Cont oolbox	roller	



The Arc Segment Construction

1. Construct Arc Segment

To construct the arc segment, first select the arc by double clicking on the arc. Then use **Construct** from the menu bar with the **Arc Interior**, then **Arc Segment** options.



2. Change the color of the segment by using Display with the Color option.





3. Measure Arc Segment Area

a) To measure the area of the arc segment, highlight it by clicking in the interior of the arc sector, then use **Measure** from the menu bar with the **Area** option. With the measurement still highlighted, you may move it to a new location on the sketch for easier viewing. Remember to click in any blank space to deselect the measurement.







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	Properties of Arc Segment Area	
τ,	Object Label Value	
•	Label	Arc Segment Area = 0.84 cm ²
Text Tool	Arc Segment Area	
	Use Label In Custom Tools	
	Help Cancel OK	



4. Create Table

To create a table to explore the relationship between the length of the radius and the arc segment area, highlight their measures respectively. Then use Graph from the menu bar with the Tabulate option. A labeled highlighted table will pop up on the sketch.

Graph Window Help	
Define Coordinate Syste	m
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Show Grid	
Snap Points	
Plot As (x, y)	
New Parameter	Shift+Ctrl+P
New Function	Ctrl+F
Plot New Function	Ctrl+G
Derivative	
Tabulate 🗲	
Add Table Data	
Remove Table Data	





5. Plot and Trace Point

a) To plot the point represented in the table, highlight the measure values in the respective order: length of radius, then area of the arc segment. Use **Graph** from the menu bar with the **Plot as** (**x**, **y**) option.







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b) To turn on the trace option, highlight the plotted point and use Display from the menu bar with the Trace Plotted Point option. This will allow any new points added to the table to be plotted automatically.

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1. Construct Triangle Interior

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To construct the triangle interior, first select the vertices of the triangle, then use **Construct** from the menu bar with the **Construct Triangle Interior** option. The color will change to the last color selected, so use **Display** from the menu bar with the **Color** option to make the triangle a different color than the arc segment.

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Locus			



2. Measure Triangle Area

To measure the area of the triangle, click the triangle interior (may require double clicking to keep from selecting the entire sector) and use **Measure** from the menu bar with the **Area** option. With the measurement still highlighted, you may move it to a new location for easier viewing.







3. Create Table

To create the table to explore the relationship between the length of the radius and the area of the triangle, highlight both measures respectfully. Use **Graph** from the menu bar with the **Tabulate** option.

Graph Window Help	
Define Coordinate Syste	em
Mark Coordinate System	1
Grid Form	-
Show Grid	
Snap Points	
Plot As (x, y)	
New Parameter	Shift+Ctrl+P
New Function	Ctrl+F
Plot New Function	Ctrl+G
Derivative	
Tabulate 🗲	
Add Table Data	
Remove Table Data	





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a) To plot the point in the table, highlight the measures again: length of the radius and area of the triangle. Use **Graph** from the menu bar with the **Plot as** (**x**, **y**) option.

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Graph Window Help	
Define Coordinate Syste Mark Coordinate System Grid Form	m
Show Grid Snap Points	
Plot As (x, y)	_
New Parameter	Shift+Ctrl+F
New Function Plot New Function	Ctrl+F Ctrl+G
Derivative	





b) To trace the plotted point, highlight the plotted point and use **Display** from the menu bar with the **Trace Plotted Point** option. This will allow any new points added to the table to be plotted automatically.

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Function Rule Verification—Geometer's Sketchpad.

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- Arc Sector Area = 4.88 cm² Arc Segment Area = 0.84 cm² m AB = 3.05 cm m 🗚 Arc Segment Area 3.05 cm 0.84 cm² m AB Arc Sector Area 3.41 cm 1.05 cm² 3.05 cm 4.88 cm² 5.19 cm 2.44 cm² 3.41 cm 6.08 cm² **₿**:31 cm 3.61 cm² 5.19 cm 14.08 cm² 6.76 cm 4.14 cm² 6.31 cm 20.87 cm² 5 -6 8.08 cm 5.92 cm² 6.76 cm 23.95 cm² 8.98 cm 7.30 cm² 8.08 cm 34.21 cm² 9.77 cm 8.65 cm² 8.98 cm 42.21 cm² 3.05 cm 0.84 cm² 9.77 cm 49.97 cm² Þ 3.05 cm 4.88 cm² Area ∆B'AB = 4.04 cm² Area ∆B'AB m AB 3.05 cm 4.04 cm² 3.41 cm 5.03 cm² 5.19 cm 11.65 cm² 6.31 cm 17.26 cm² 6.76 cm 19.80 cm² 8.08 cm 28.29 cm² 8.98 cm 34.90 cm² 9.77 cm 41.33 cm² 3.05 cm 4.04 cm²
- 1. Using the existing sketch from the Dome Floor Dilemma Exploration, use **Graph** with the **Plot New Function** option.

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Graph	Window	Help	
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Grid	Form		
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Snap	o Points		
Plot	Points		
New	Paramete	r	Shift+Ctrl+P
New	Function.		Ctrl+F
Plot	New Fund	tion	Ctrl+G
Deri	vative		
Tabi	ulate		
Add	Table Dat	a	
Rem	ove Table	Data	



A **New Function** box will pop up, allowing the function rule to be entered. Then click on the **OK** button.



The function will then graph on the coordinate grid. If it is right, it will graph directly on top of its corresponding points, thus verifying the rule. Repeat this process for all function rules.



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Function Rule Verification—TI-Interactive.

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1. With your sketch in Geometer's Sketchpad still open, open TI-Interactive by pressing on the TI-Interactive icon.

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2. Click on the List Icon to get the Data Editor screen.

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3. Select one of the tables from your sketch in **Geometer's Sketchpad** by clicking on it. Use **Edit** from the menu bar with the **Copy** option.





4. Return to the **Data Editor** and click on the **Paste** icon or use **Edit** from the menu bar with the **Paste** option.

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5. Notice that the table headings also transfer. Delete the non-numerical data; and if you like, enter the point of origin in its place.

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7	3	4.71							
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6. Highlight the data you want to graph and click the Scatter Plot icon.

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The **Functions** window and the **Graph** window will pop up with **L1** and **L2** listed in the **Stat Plots** windows and the points plotted on the **Graph**.



7. To enter the function for verification, click on the f(x) tab.

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f(x) Stat Plots
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Independent Variable:
Deselect All Copy All Close Help



8. To enter the function, press the Symbol Pallet icon 🗐. This lets the Symbol Palette pop up. Enter the function and check the box to graph the function.







Function Rule Verification—Spreadsheet

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1. Copy the table from **Geometer's Sketchpad** by first selecting it, then use **Edit** from the menu bar with the **Copy** option.

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2. Open a blank Spreadsheet and paste into the spreadsheet by using the **Edit** from the menu bar with the **Paste** option.

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3. Highlight the data you want to graph, then click on the **Chart Wizard** icon. The Chart Wizard box will pop up on the screen. Select **XY** (**Scatter**).

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7	3	4.71									
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4. Click **Finish** to view the graph.







5. Select the graph, then use the Chart menu with the Add Trendline option.

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6. Since the scatterplot appears to be quadratic, select **Polynomial** order 2.

Add Trendline	×
Type Options Trend/Regression type Order:	
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7. Click the **Options** tab.

Add Trendline		×
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8. Check Display Equation on Chart, then click OK.







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spreadsheet is equivalent to $A_{sec} = \frac{\pi r^2}{6}$.

Press ON.

Enter both functions into Y=.

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Press the GRAPH key. If the functions are equivalent, they will graph on top of each other and the graphing window will show what appears to be only one graph.



For further verification, press 2nd GRAPH to examine the table values.

X	Y1 -	Y2
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