

Modelação Geométrica e Generativa



20241110



Matilde Fernandes Silva

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- Aula 02- Introdução ao Rhinos
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- Aula 05- Layouts
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- Aula 07- Continuação abóbadas
- Aula 08- Conclusão abóbadas e Grasshopper
- Aula 09- Spirula e abóbadas no Grasshopper
- Aula 10- Continuação do Grasshopper
- Aula 11- Planorbis e Nautilus
- Aula 12- Conclusão dos moluscos e fazê-los com o grasshopper
- Aula 13- Terreno em Grasshopper
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Apresentação do site do professor:

Página Nuno Alão – FAUL

Nuno Alão, arquitecto
Professor Auxiliar Convidado
Faculdade de Arquitectura - ULisboa
E-mail FA - ULisboa
Fenix FAUL
Geometria Descritiva e Conceptual
Sistemas de Representação Digital
Modelação e Visualização Tridimensional em Arquitectura

Nuno Alão

Faculdade de Arquitectura
da
Universidade de Lisboa

GEOMETRIA CONCEPTUAL I e II

SISTEMAS de DIGITALIZAÇÃO

MODELAÇÃO TRIDIMENSIONAL



Softwares que vão ser utilizados

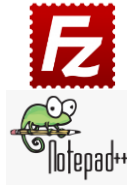
Rhinos 8



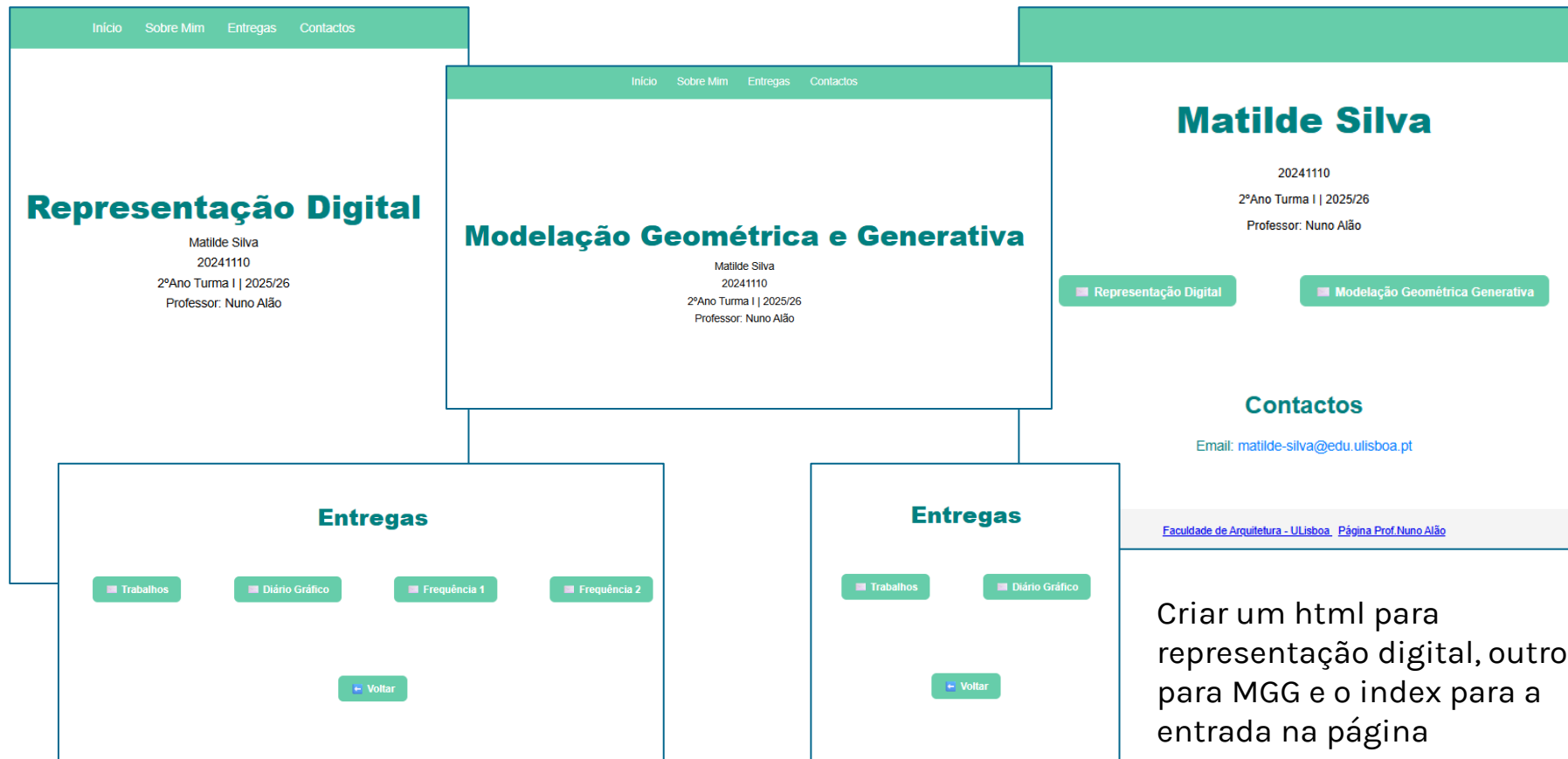
Glasshopper

Softwares usados para realizar a página web

- Filezilla
- Notepad++



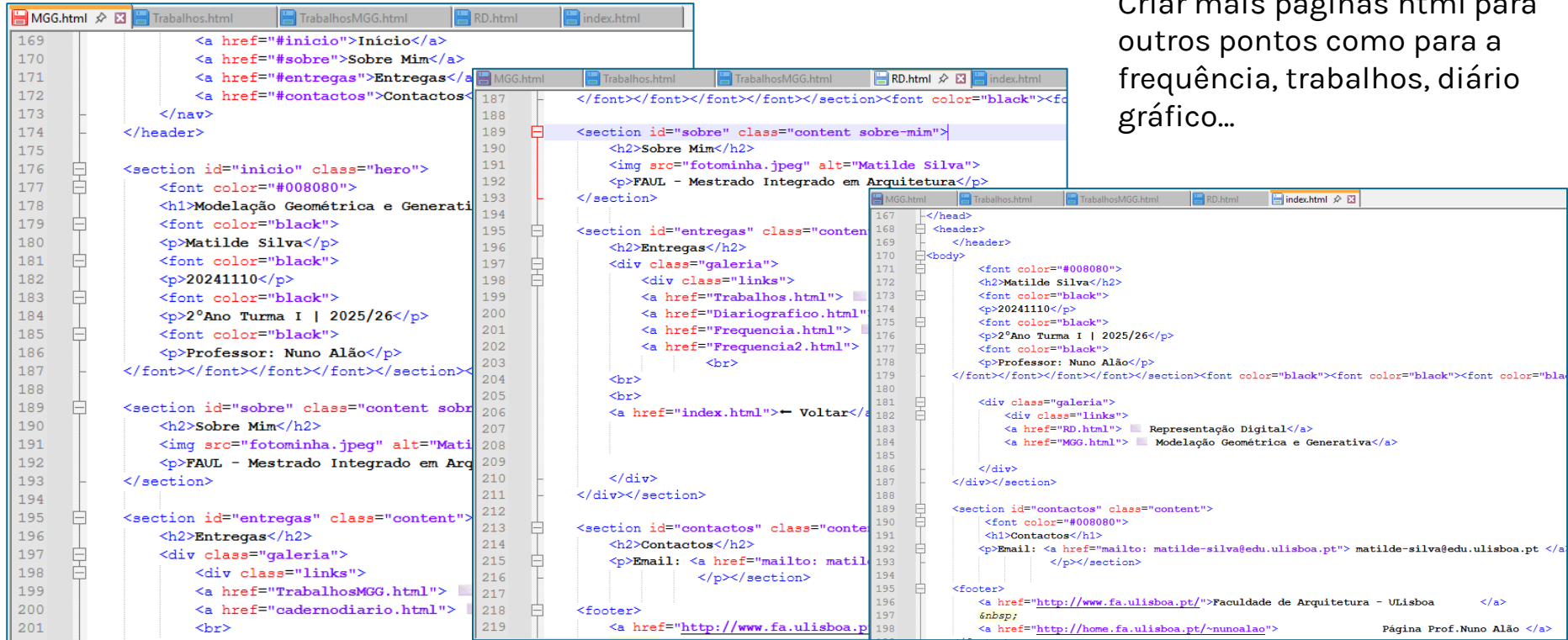
Aula 01- Apresentação da disciplina



Criar um html para representação digital, outro para MGG e o index para a entrada na página

Aula 01- Linguagem HTML, melhorar a página web

Notepad++

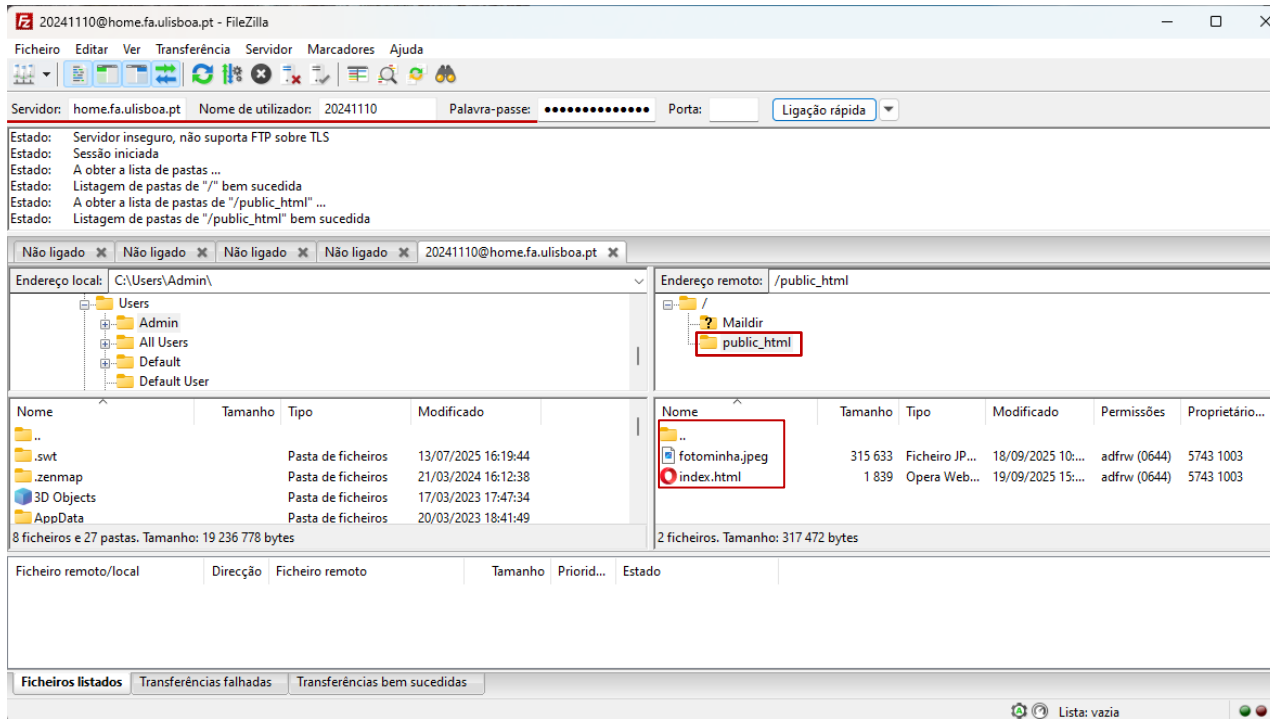


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169 <a href="#inicio">Inicio</a>
170 <a href="#sobre">Sobre Mim</a>
171 <a href="#entregas">Entregas</a>
172 <a href="#contactos">Contactos</a>
173 </nav>
174 </header>
175
176 <section id="inicio" class="hero">
177 <font color="#008080">
178 <h1>Modelação Geométrica e Generati
179 <font color="black">
180 <p>Matilde Silva</p>
181 <font color="black">
182 <p>20241110</p>
183 <font color="black">
184 <p>2ºAno Turma I | 2025/26</p>
185 <font color="black">
186 <p>Professor: Nuno Alão</p>
187 </font></font></font></font></section>
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190 <h2>Sobre Mim</h2>
191 
192 <p>FAUL - Mestrado Integrado em Arquitetura</p>
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208
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214 <footer>
215 <a href="http://www.fa.ulisboa.pt/">Faculdade de Arquitetura - ULisboa
216 &nbsp;
217 <a href="http://home.fa.ulisboa.pt/~nunoalao">Página Prof.Nuno Alão</a>
```

Criar mais páginas html para outros pontos como para a frequência, trabalhos, diário gráfico...

Aula 01- Linguagem HTML, da página web

Filezilla



Para Transferir os ficheiros do computador para o servidor da faculdade e assim aparecer na página web

Servidor: ftp.fa.ulisboa.pt, username: 20241110, criar pasta public_html e colocar os ficheiros pretendidos nessa pasta.

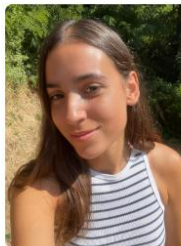
Para colocar os ficheiros necessários para a página, criamos uma pasta, public_html

Aula 01 – Colocação da página web no servidor da faculdade

Matilde Silva

20241110
2ºAno Turma I | 2025/26
Professor: Nuno Alão

Sobre Mim



FAUL - Mestrado Integrado em Arquitetura

Sobre Mim



Entregas

📁 Trabalhos

📅 Diário Gráfico

📊 Frequência 1

Contactos

Email: matilde-silva@edu.ulisboa.pt

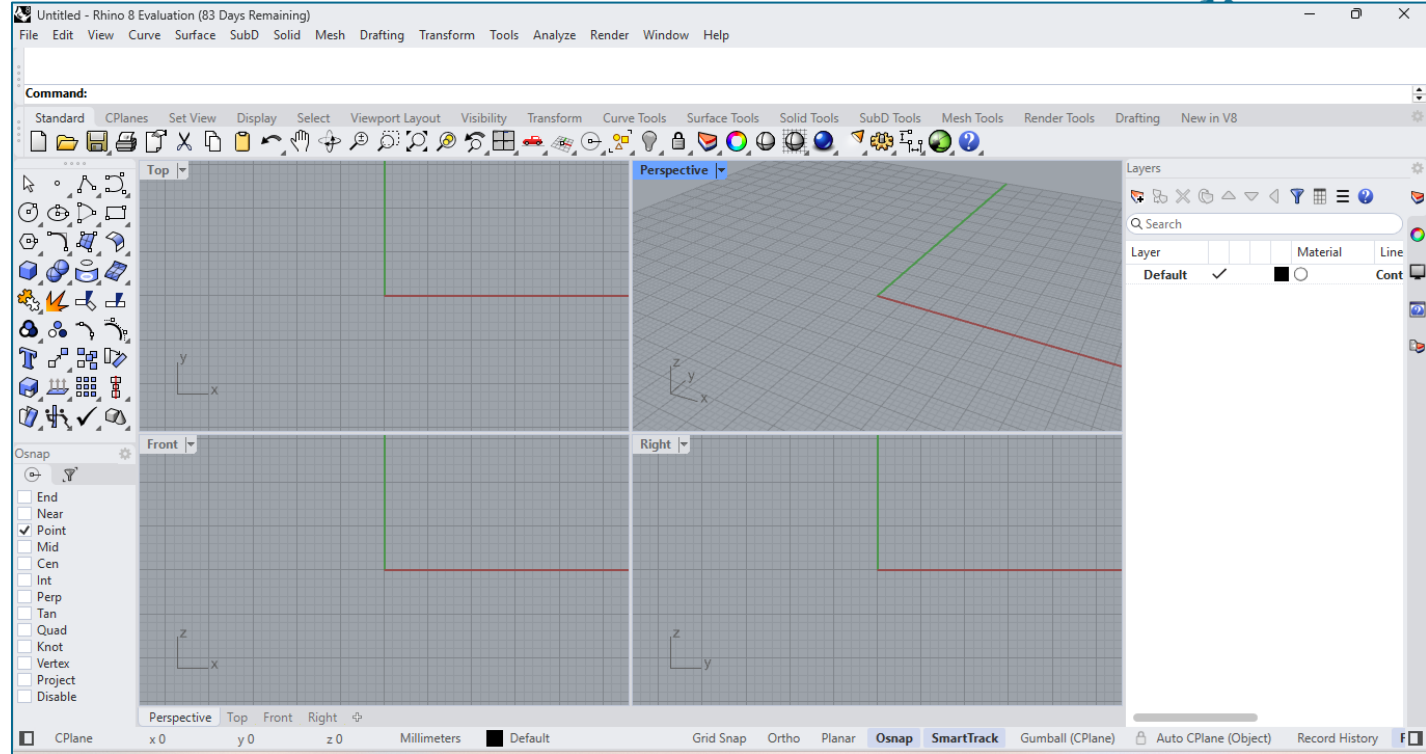
[Faculdade de Arquitetura - U.Lisboa](#) [Página Prof Nuno Alão](#)

Página web

Janela de visualização
do rhinos com 4 vistas,
semelhante ao 3dmax.

Para aumentar uma
vista clicar 2x.

Cada quadradinho é 1
unidade, 1 centímetro.

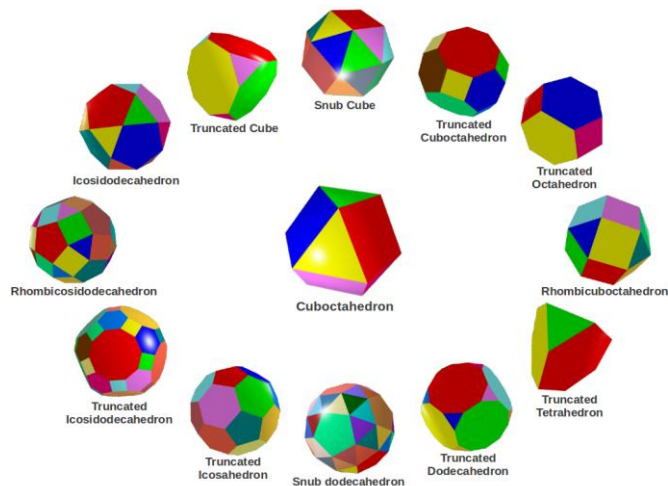


Aula 02 – Introdução ao rhinos



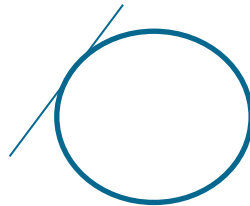
Sólidos Arquimedianos

Poliedros semiregulares cujas faces são polígonos regulares de mais de um tipo, e todos os seus vértices são congruentes.

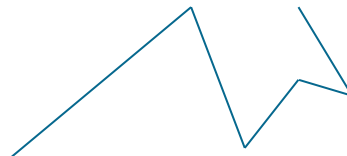


Tipos de linhas:

- Linha curva com tangente



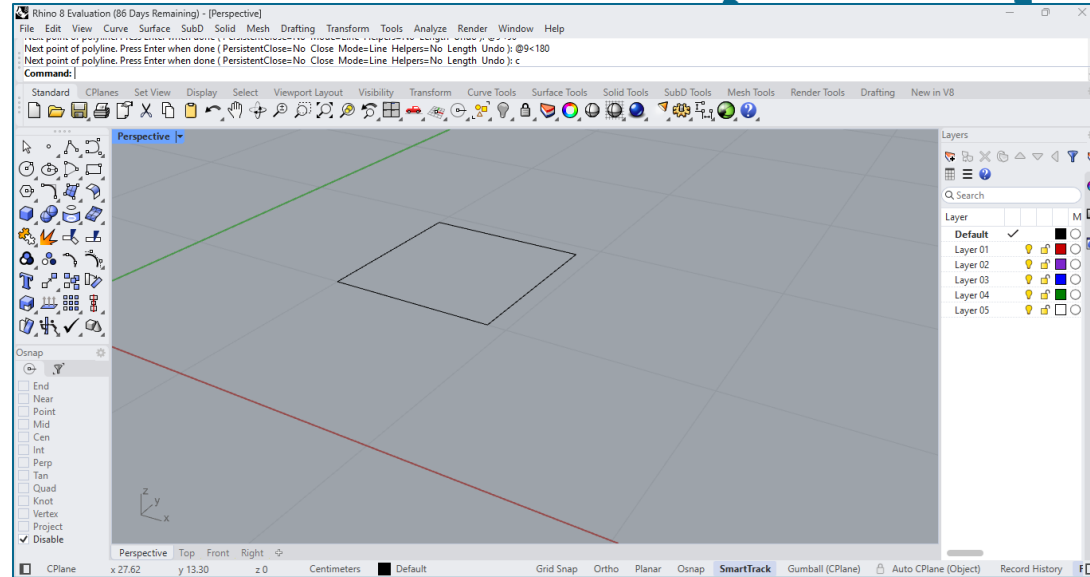
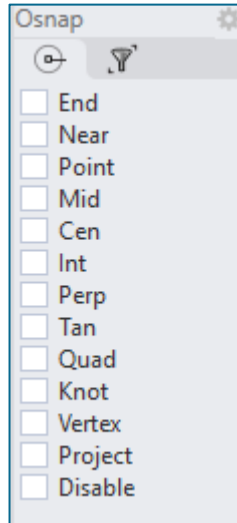
- Linha curva sem tangente



- Linha reta



OSNAP deve estar ligado para escolher o ponto em específico pretendido.



Quadrado de 9cm

Polyline 10,10 @9<0 @9<90 @9<180 c

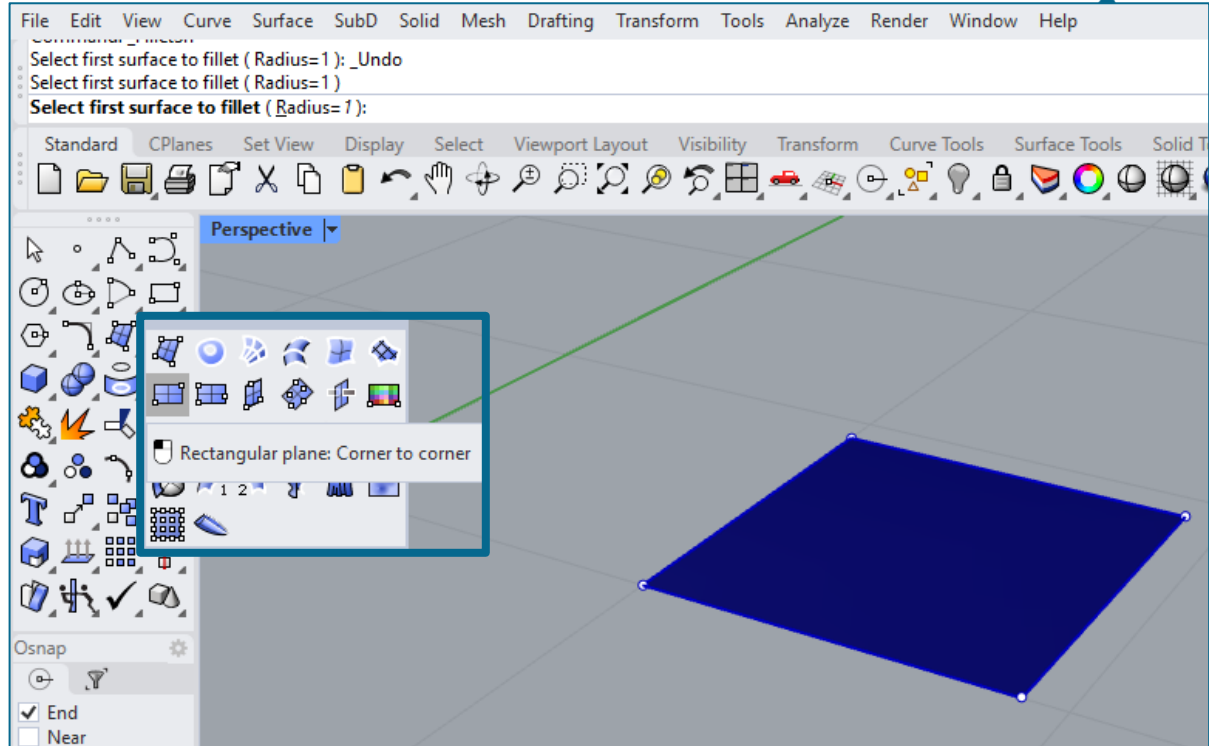
Aula 02 – Cubo truncado



Para preencher o quadrado

Layers					
Q Search					
Layer		Material	Linetype	Print Width	Section Style
Default	✓		Continuous	◆ Default	None
Cubo	🔒		Continuous	◆ Default	None
Aux	🔒		Continuous	◇ Default	None
Notas	🔒		Continuous	◆ Default	None
Cubo Trunc	🔒		Continuous	◆ Default	None
Vértices	🔒		Continuous	◆ Default	None
Texto	🔒		Continuous	◆ Default	None

Janela dos Layers

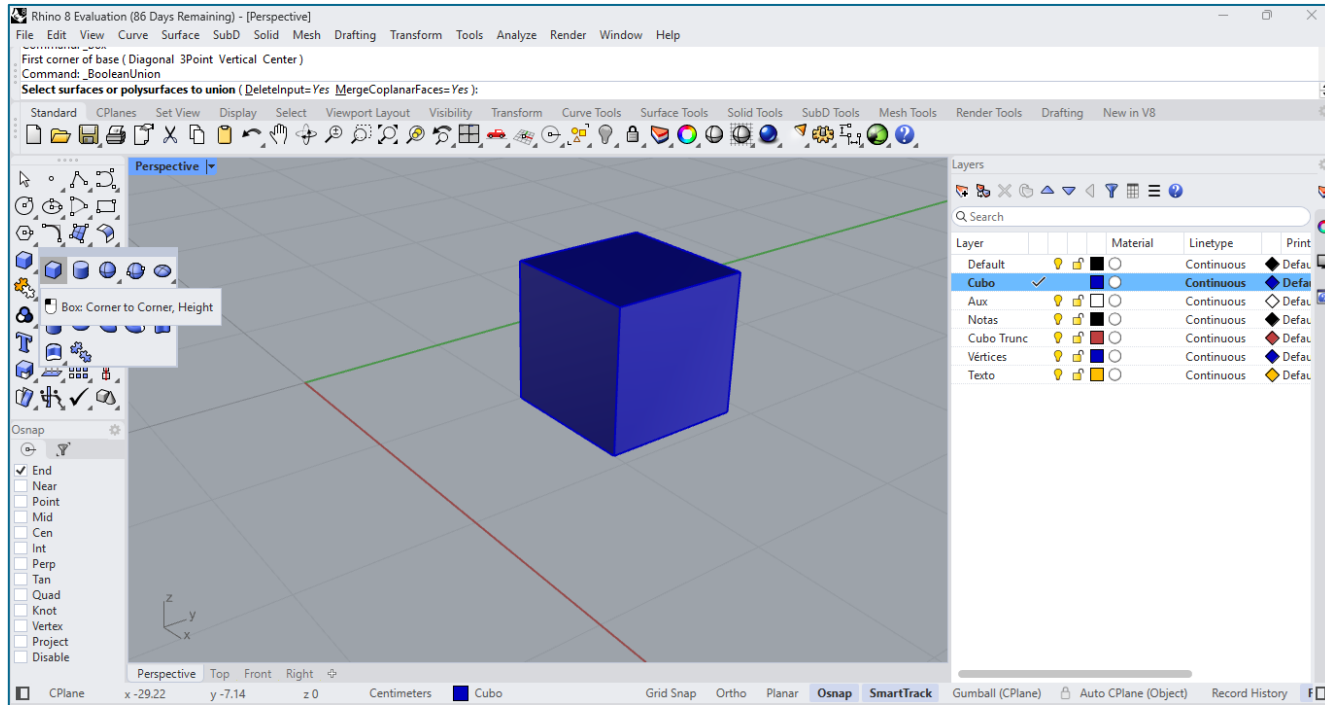


Aula 02 – Cubo truncado



Fazer um cubo pelo comando “Box”:

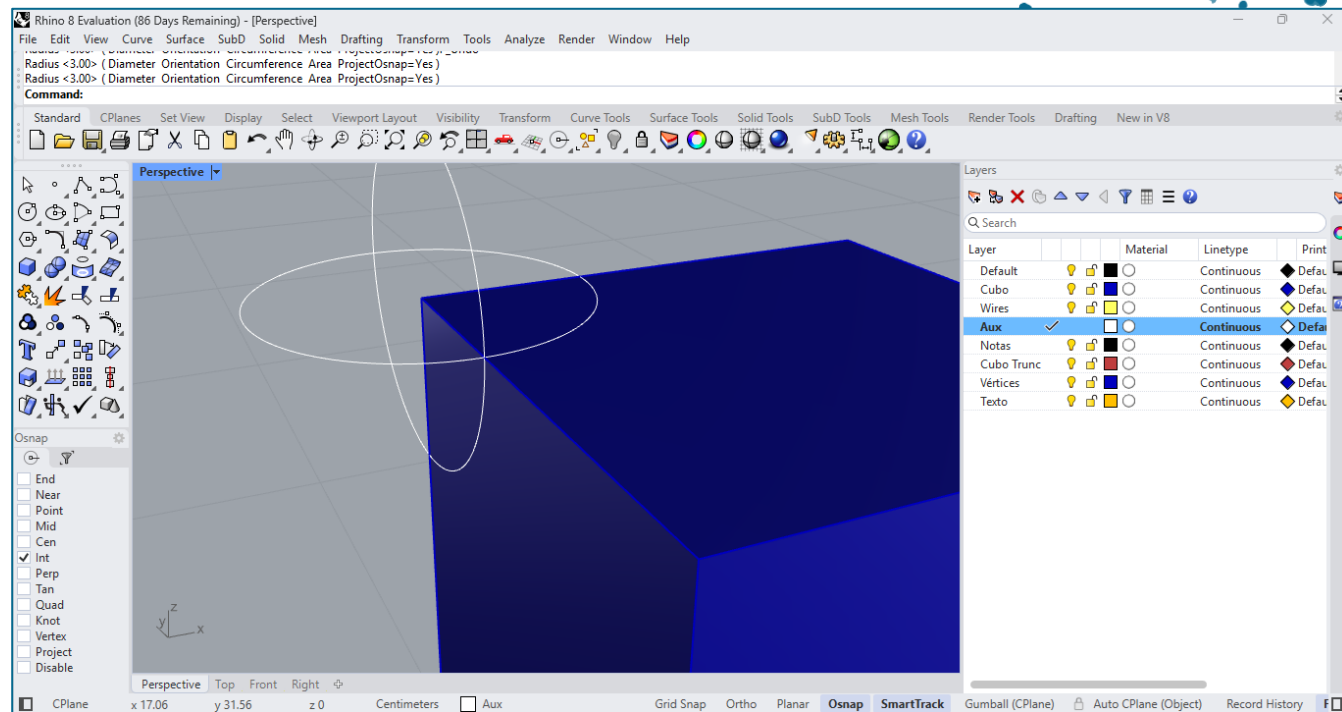
1º ponto:10,10 medida dos lados do quadrado:@9,9 altura:9



Aula 02 – Cubo truncado

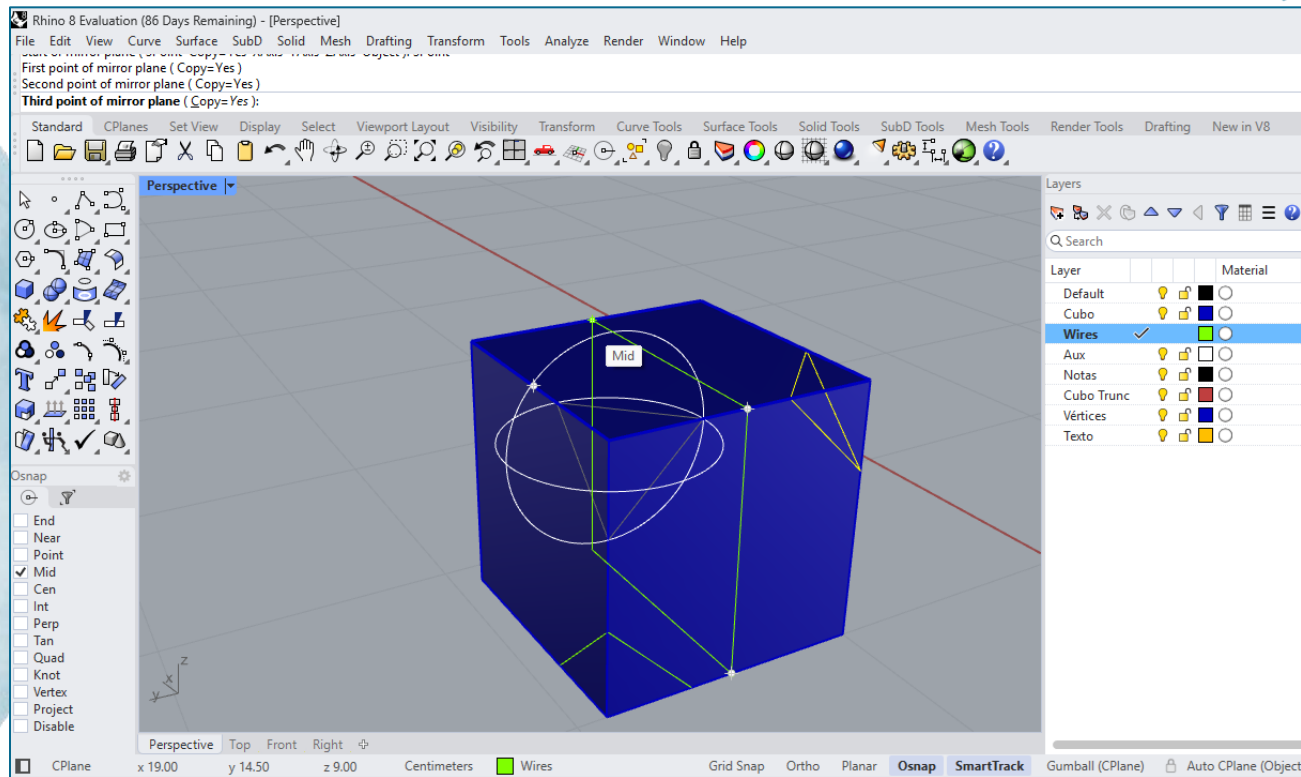


Para marcar a medida da aresta que vamos cortar, faz-se com linhas auxiliares duas circunferências de raio igual e unem-se os pontos de interseção com o cubo.



Aula 02 – Cubo truncado

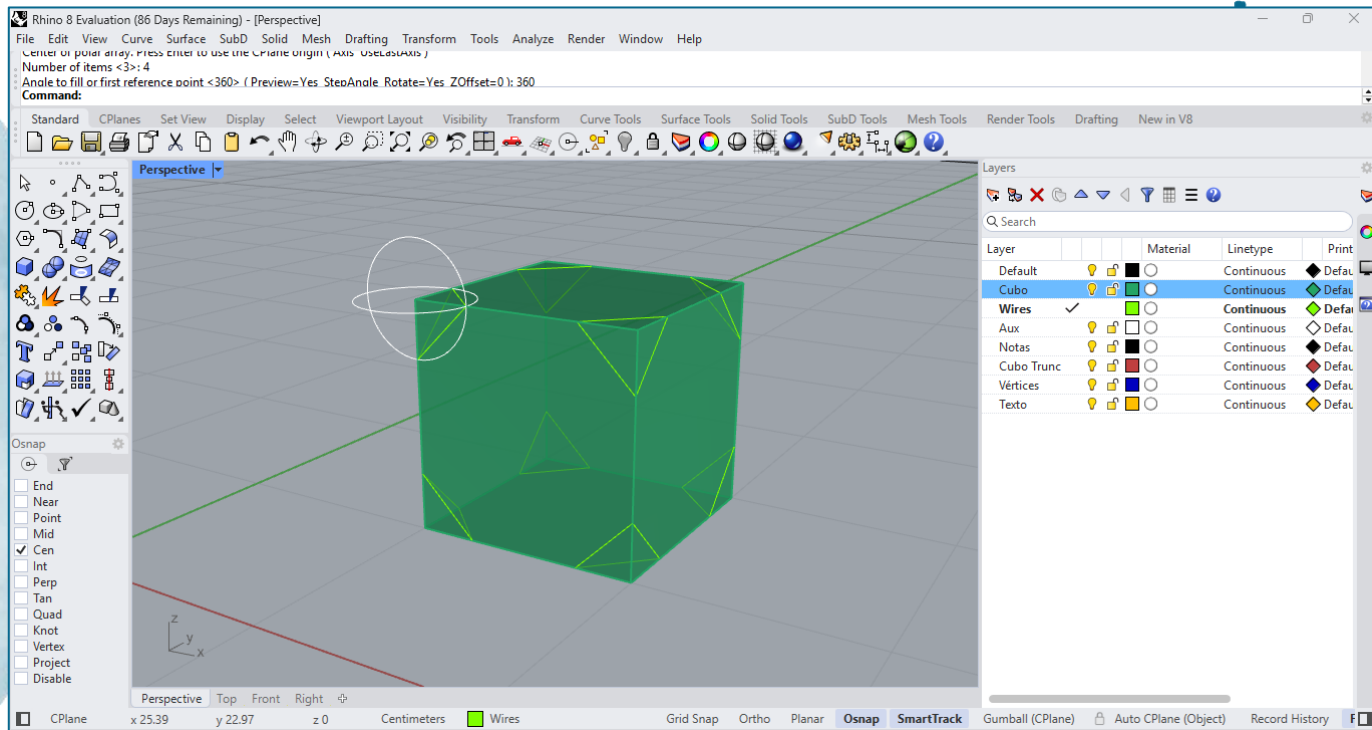




Para copiar para outros cantos, realizar um **mirror- 3 points**

Aula 02 – Cubo truncado



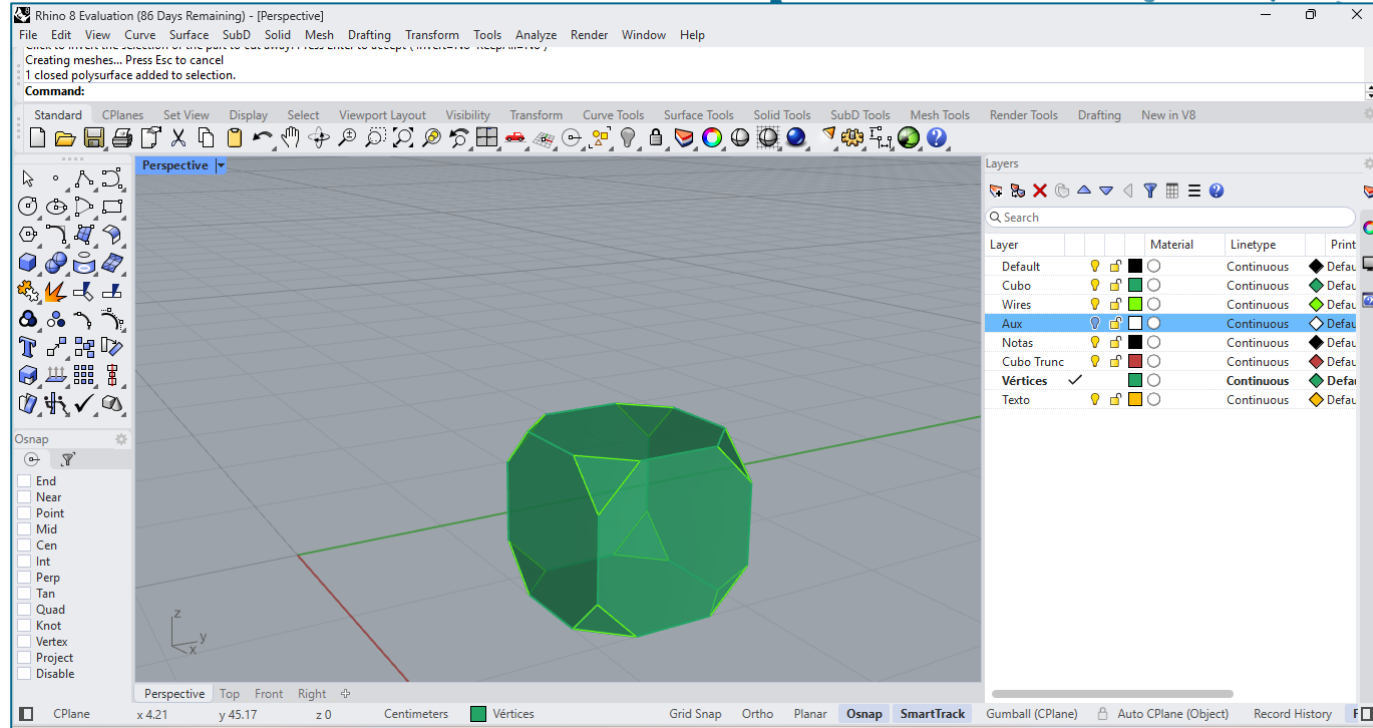


Array polar para
marcar os restantes

Aula 02 – Cubo truncado

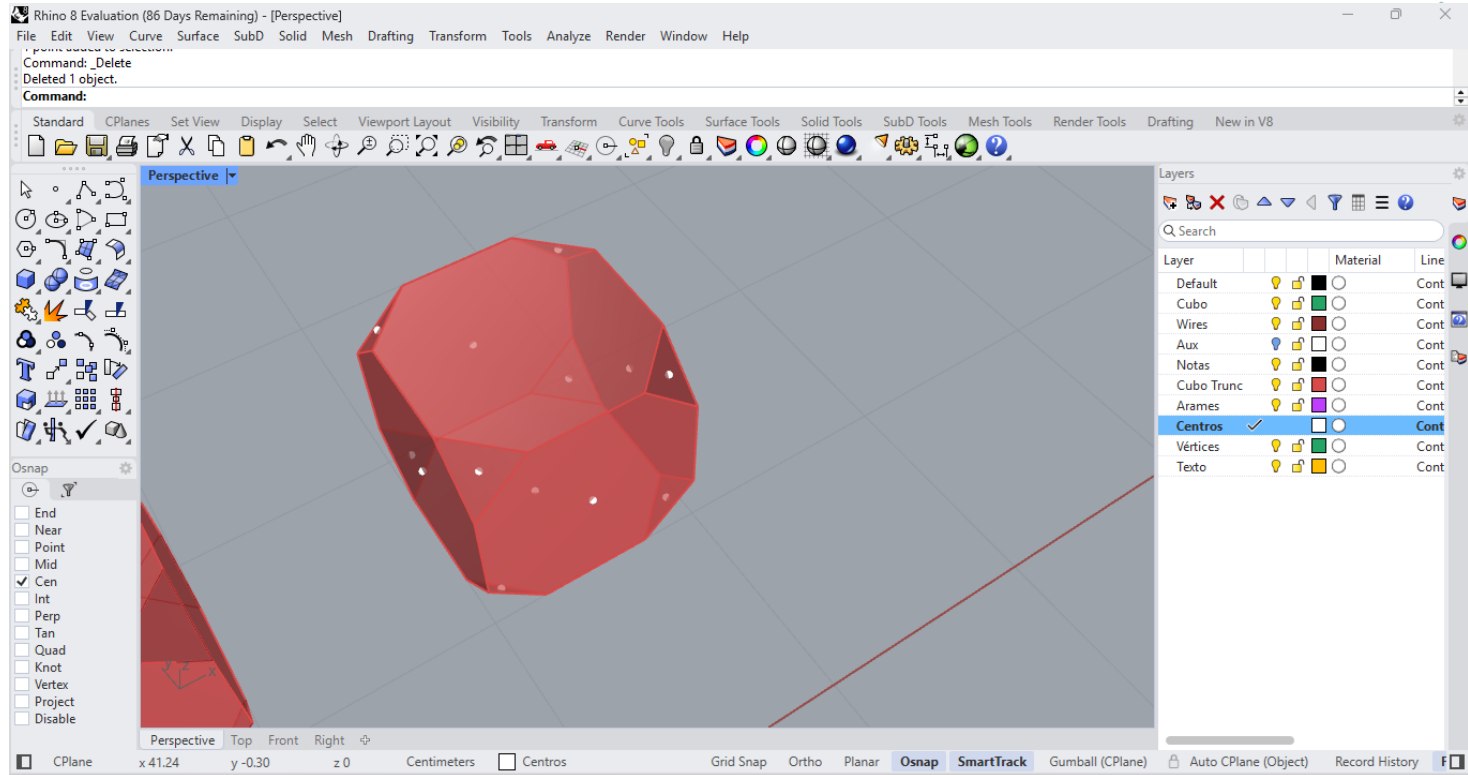


WIRE CUT, corta as arestas ficando assim um cubo truncado.



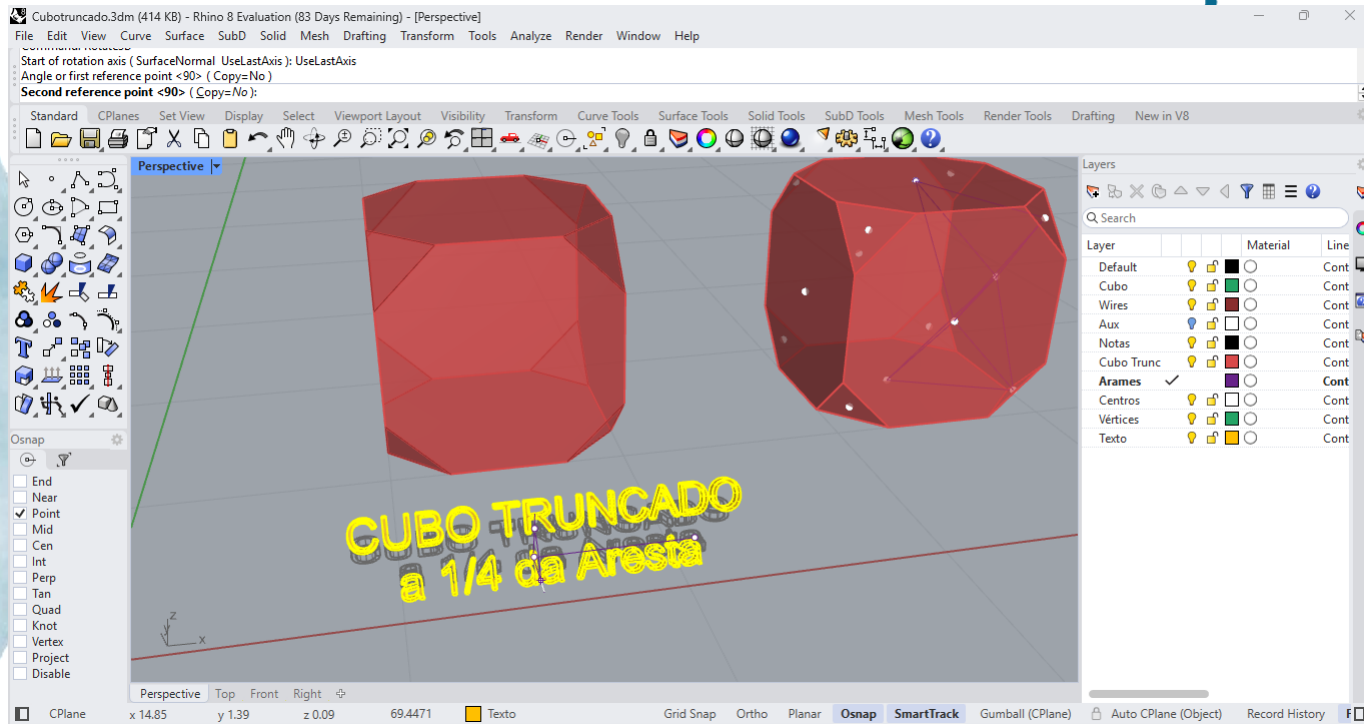
Aula 02 – Cubo truncado





Aula 02 – Cubo truncado

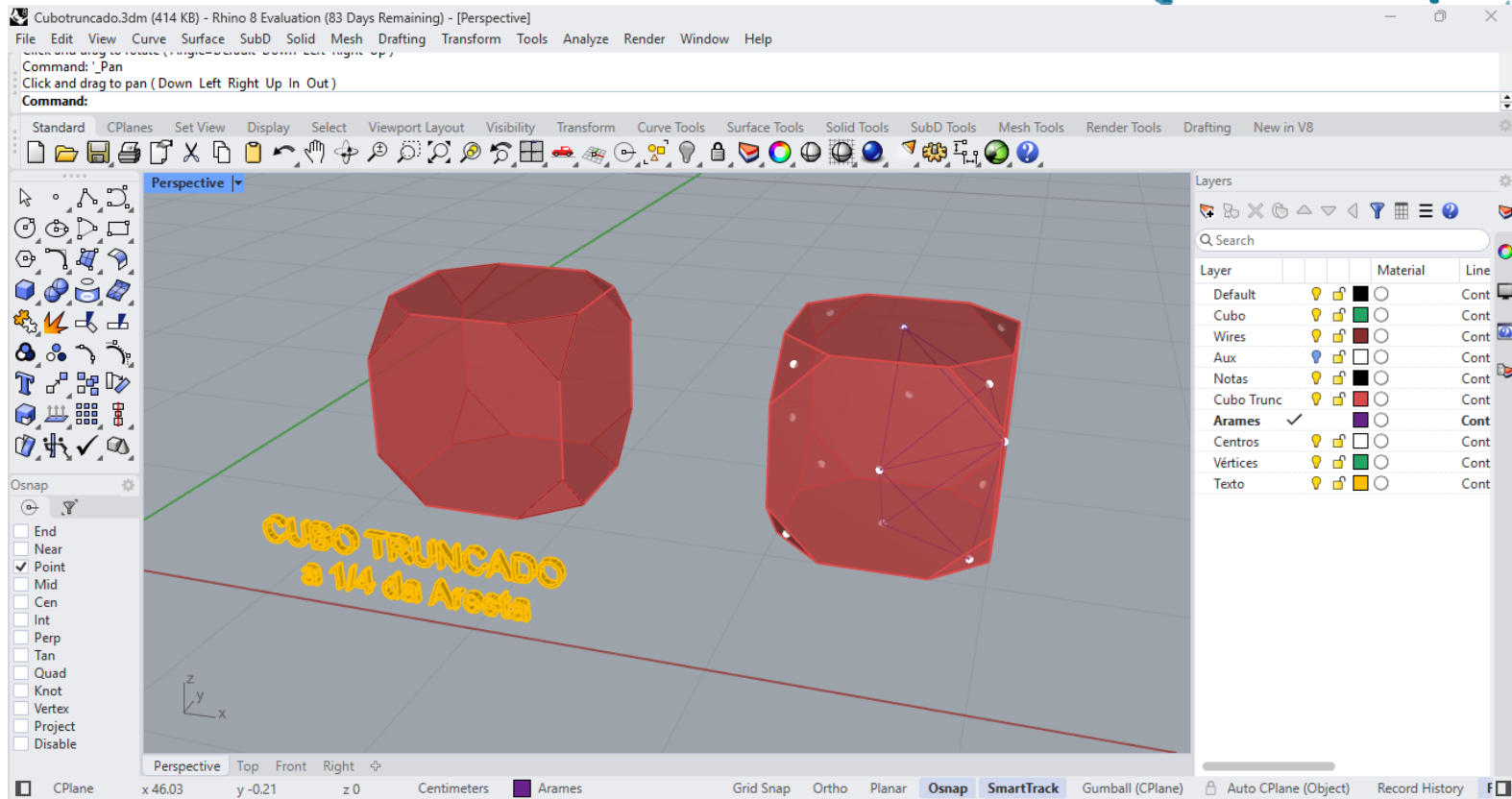




Rotate3d

Aula 02 – Cubo truncado

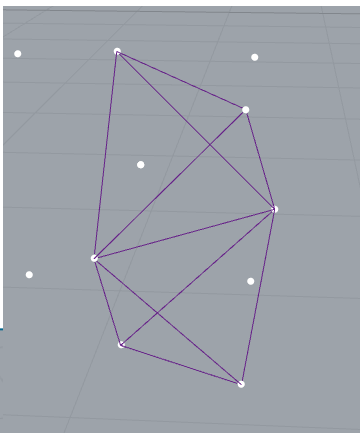




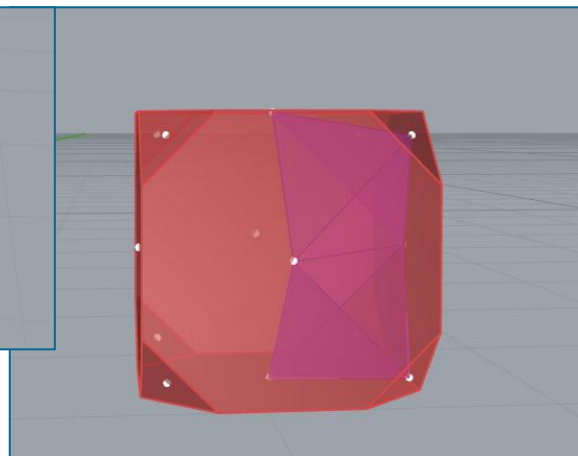
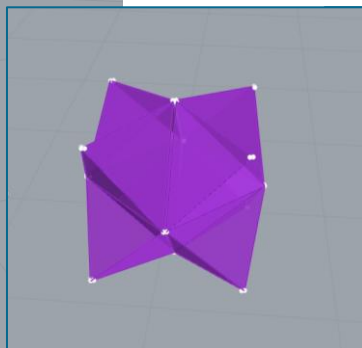
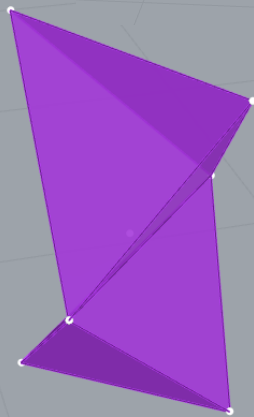
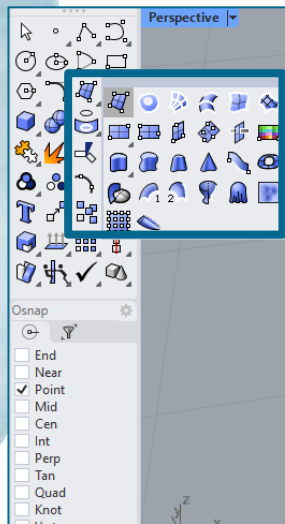
Aula 02 – Cubo truncado



A união dos pontos centrais
de cada face são os vértices
do dual do cubo truncado

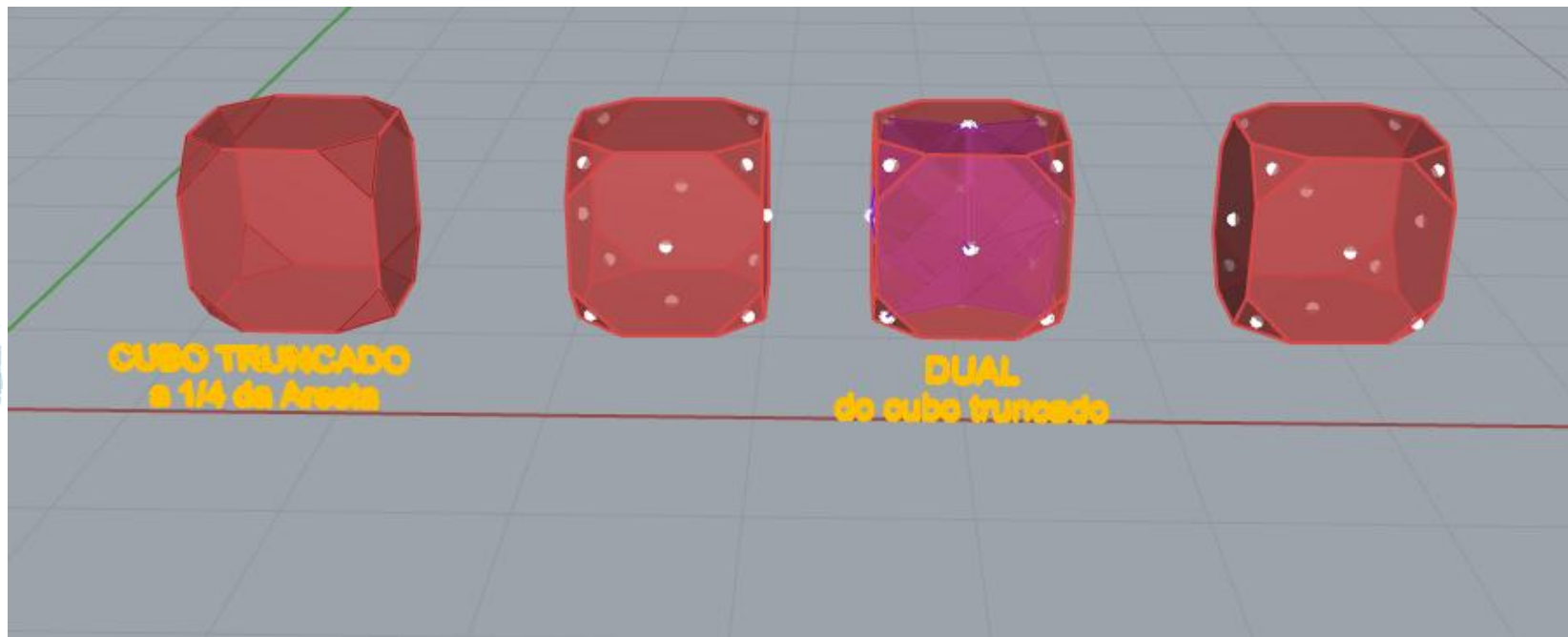


Array polar – selecionar
o objeto – selecionar o
eixo – 4 – 360 – enter



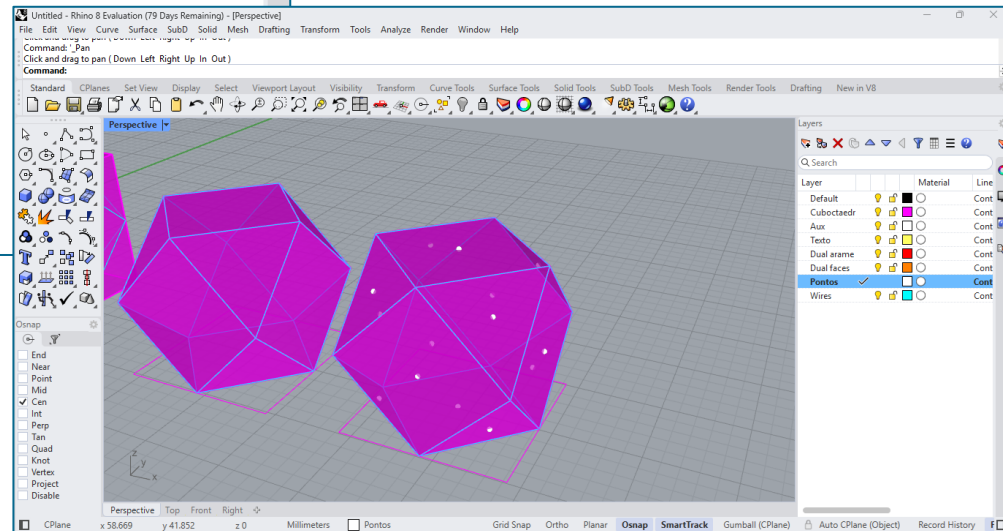
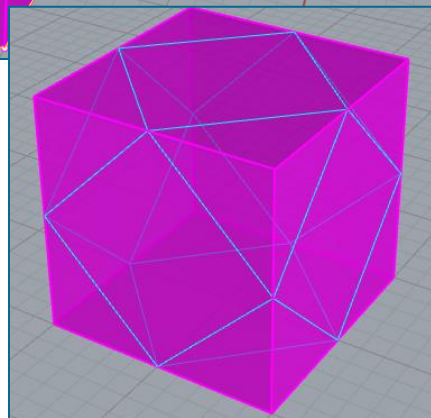
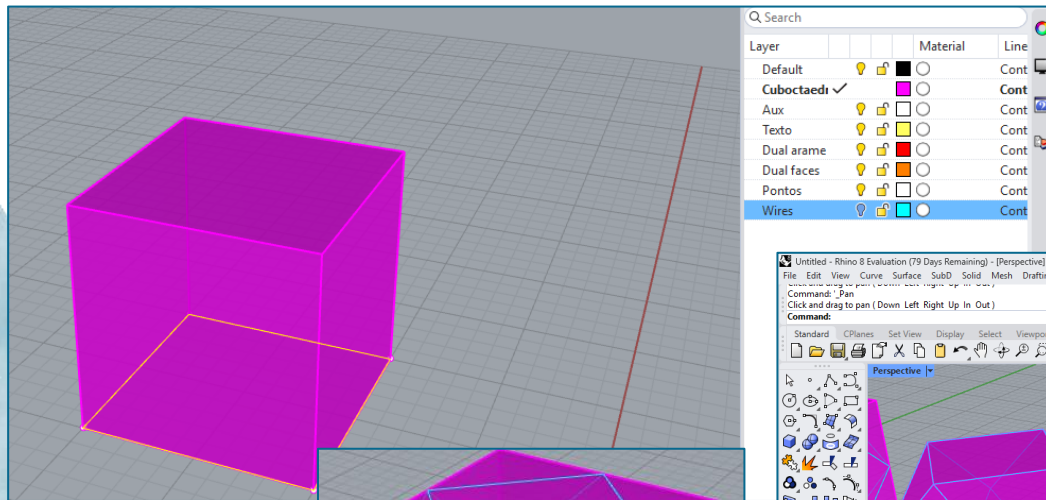
Aula 03 – Cubo truncado continuação





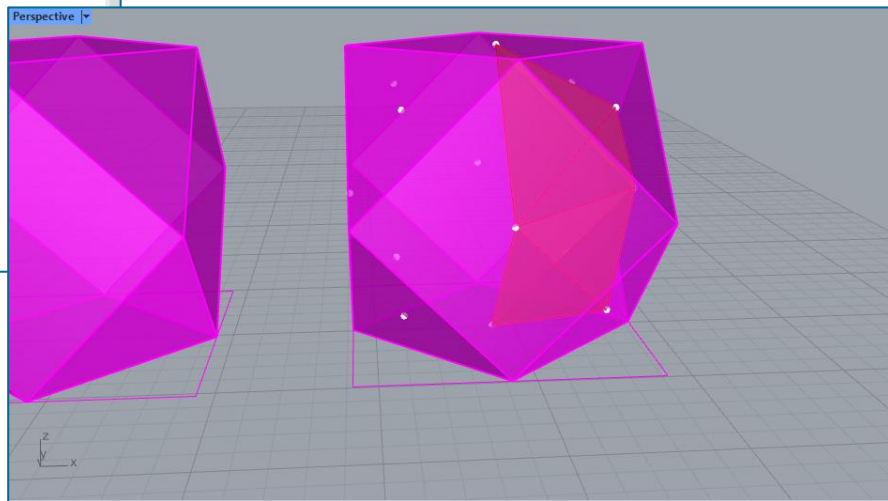
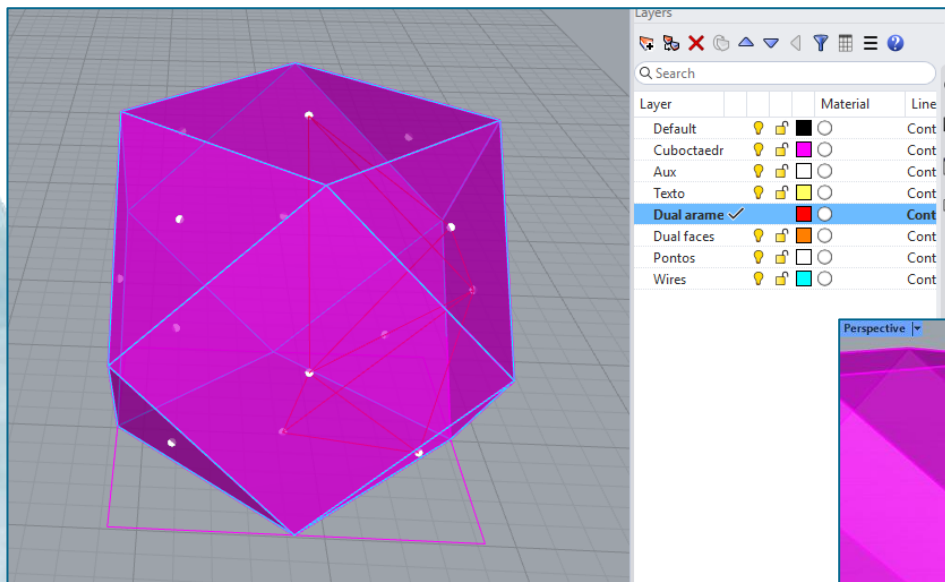
Aula 03 – Cubo truncado continuação





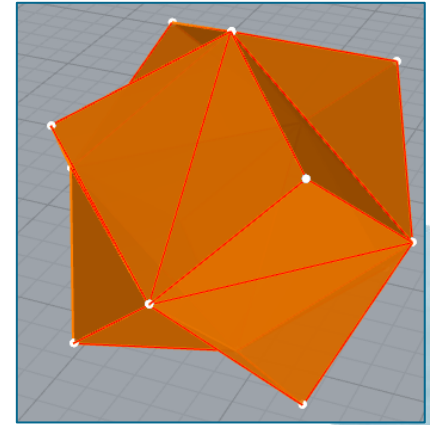
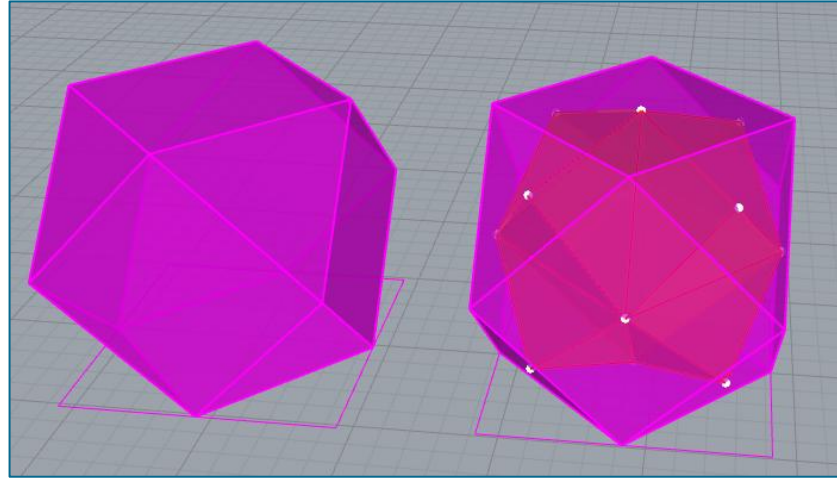
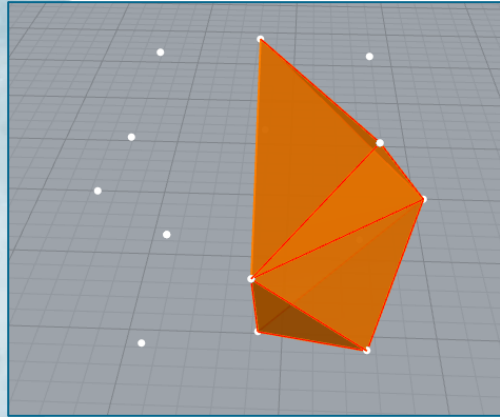
Aula 03 – Cuboctaedro





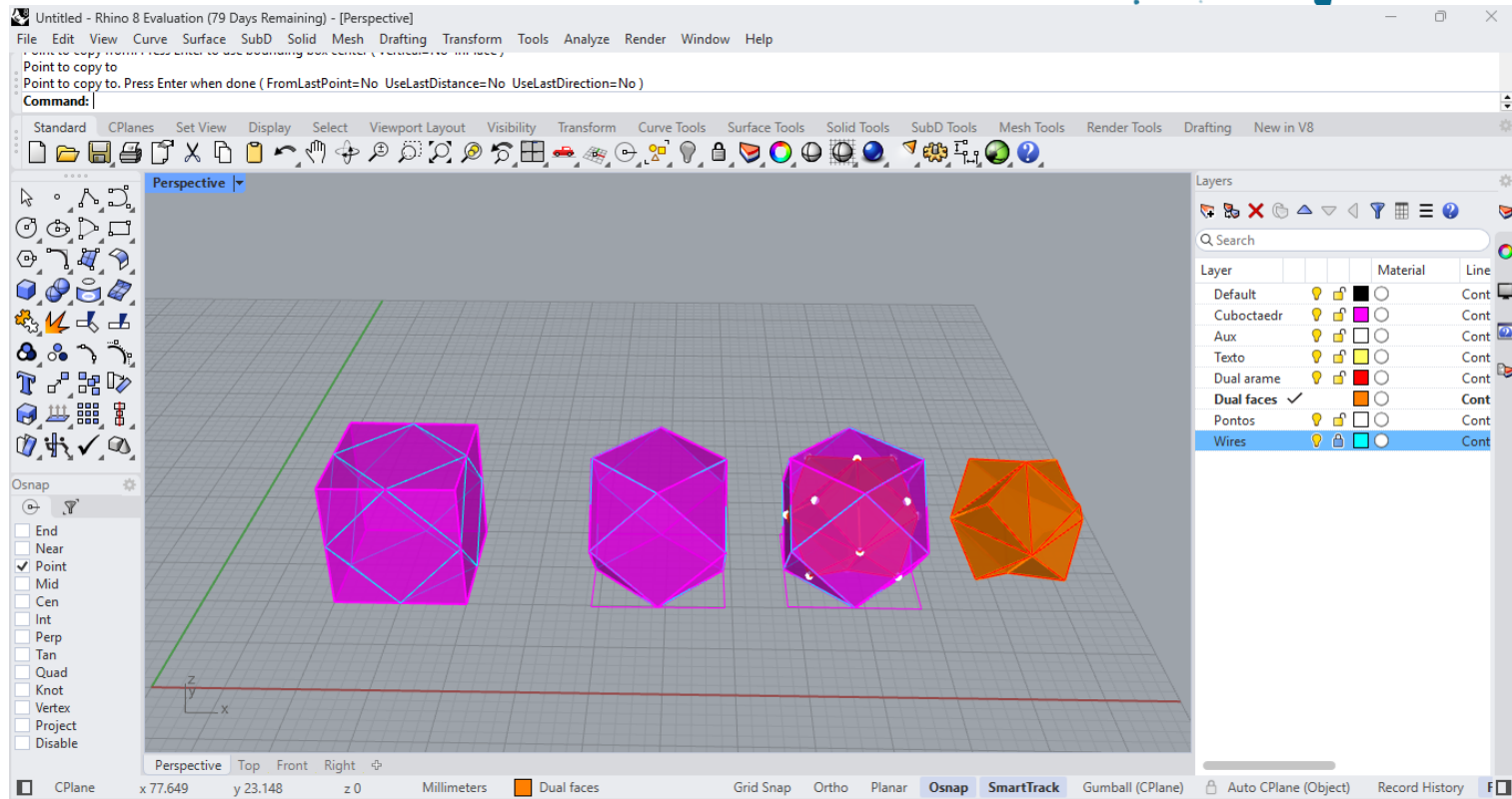
Aula 03 – Cuboctaedro





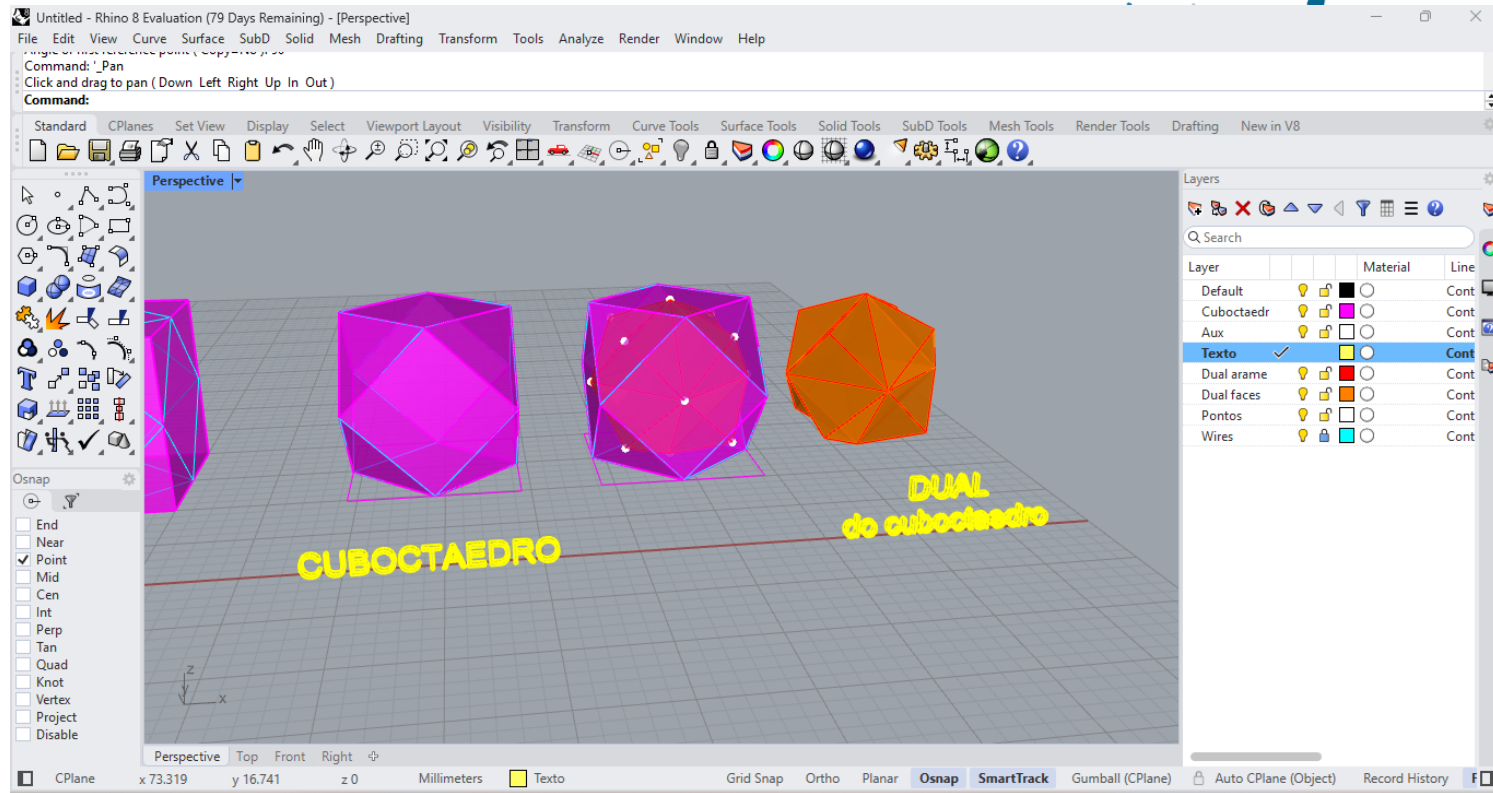
Aula 03 – Cuboctaedro e dual





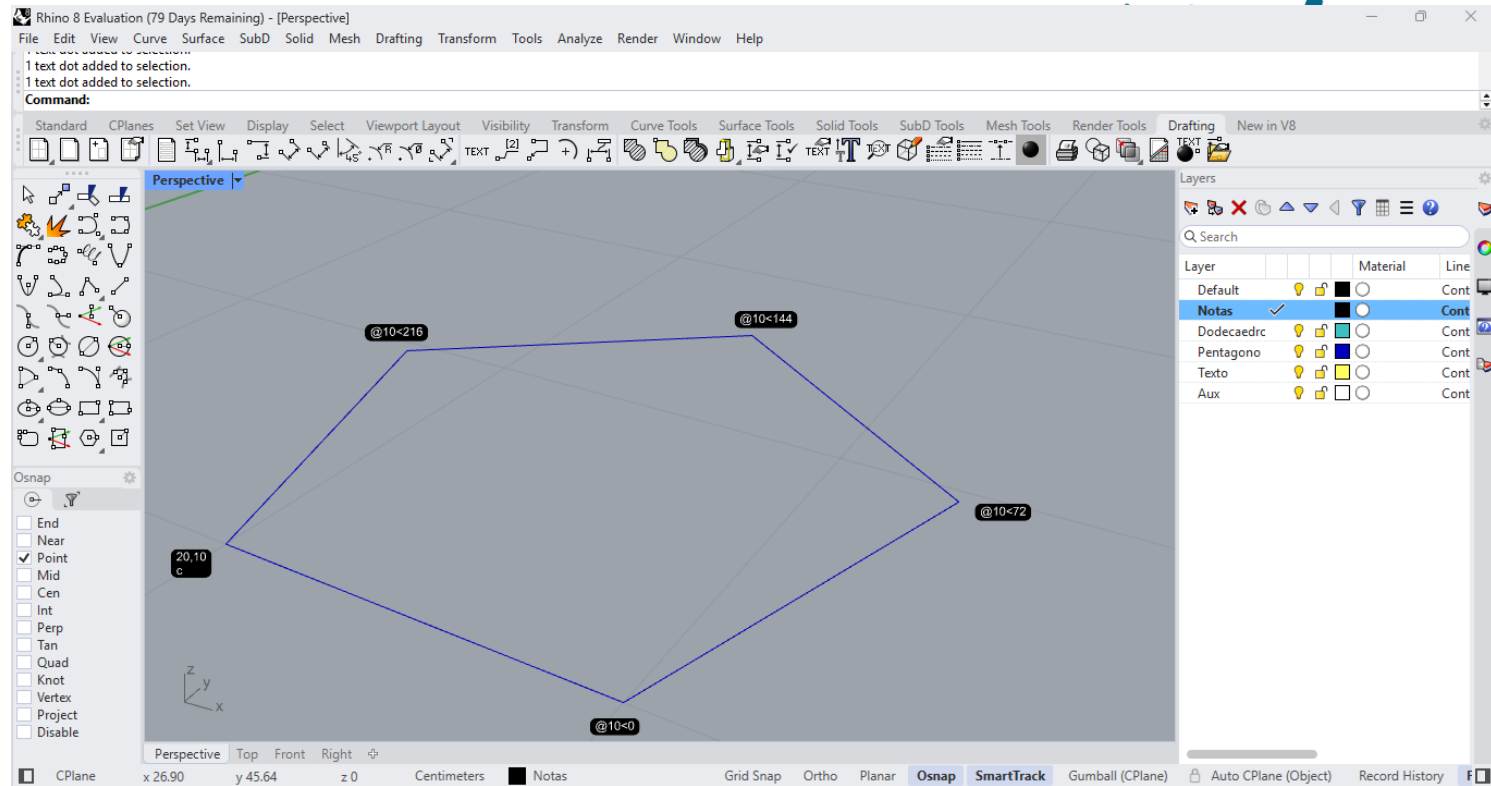
Aula 03 – Cuboctaedro





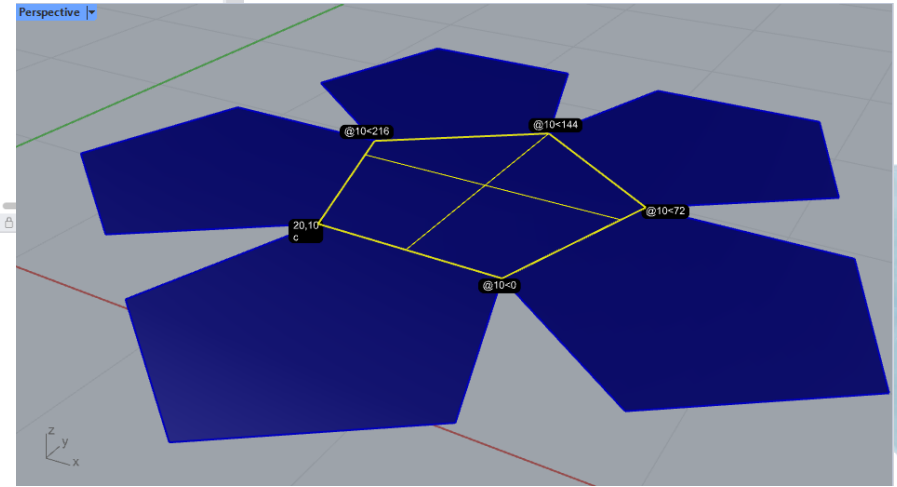
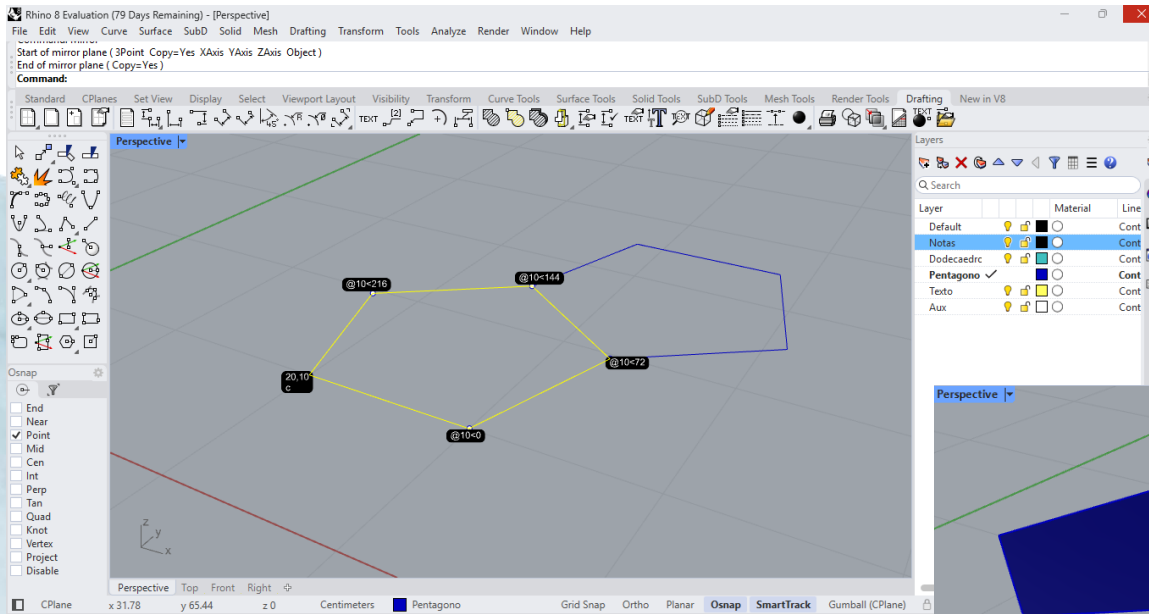
Aula 03 – Cuboctaedro





Aula 03 – Dodecaedro



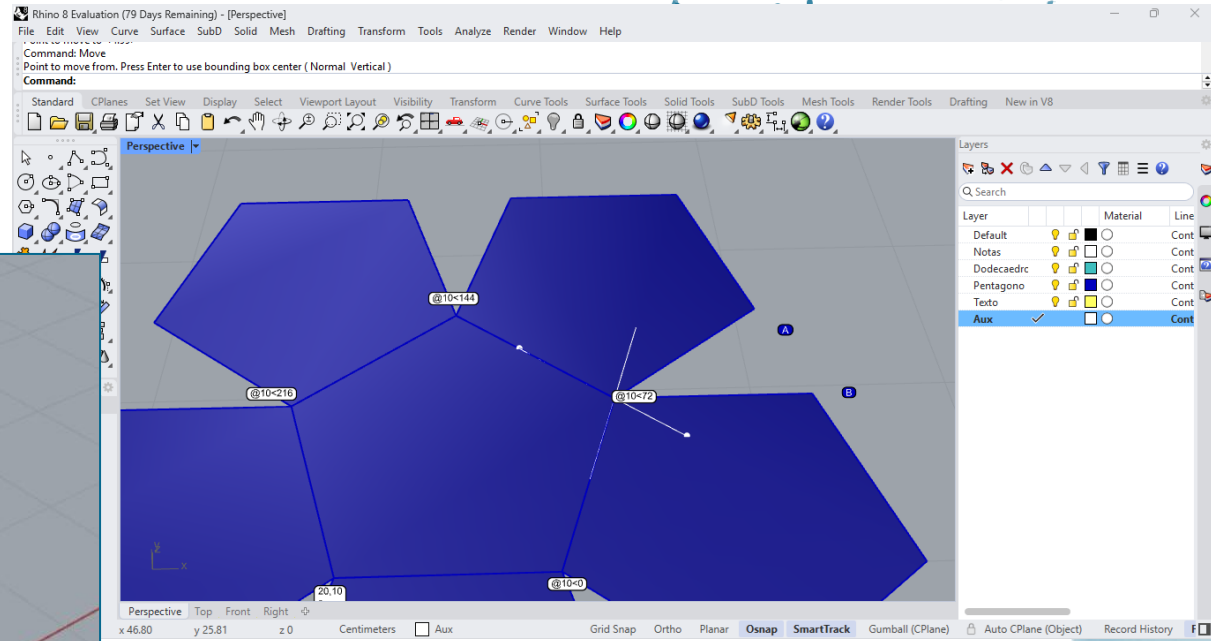
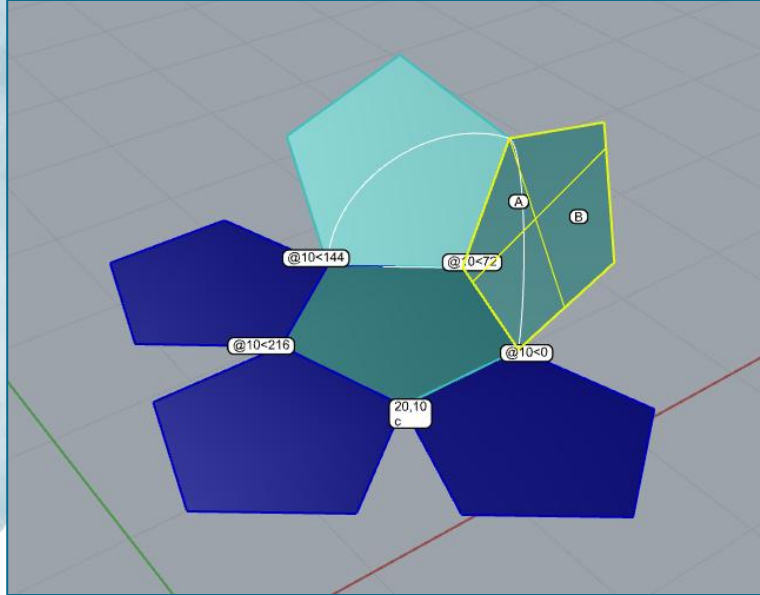


Drafting – dot: para adicionar notas



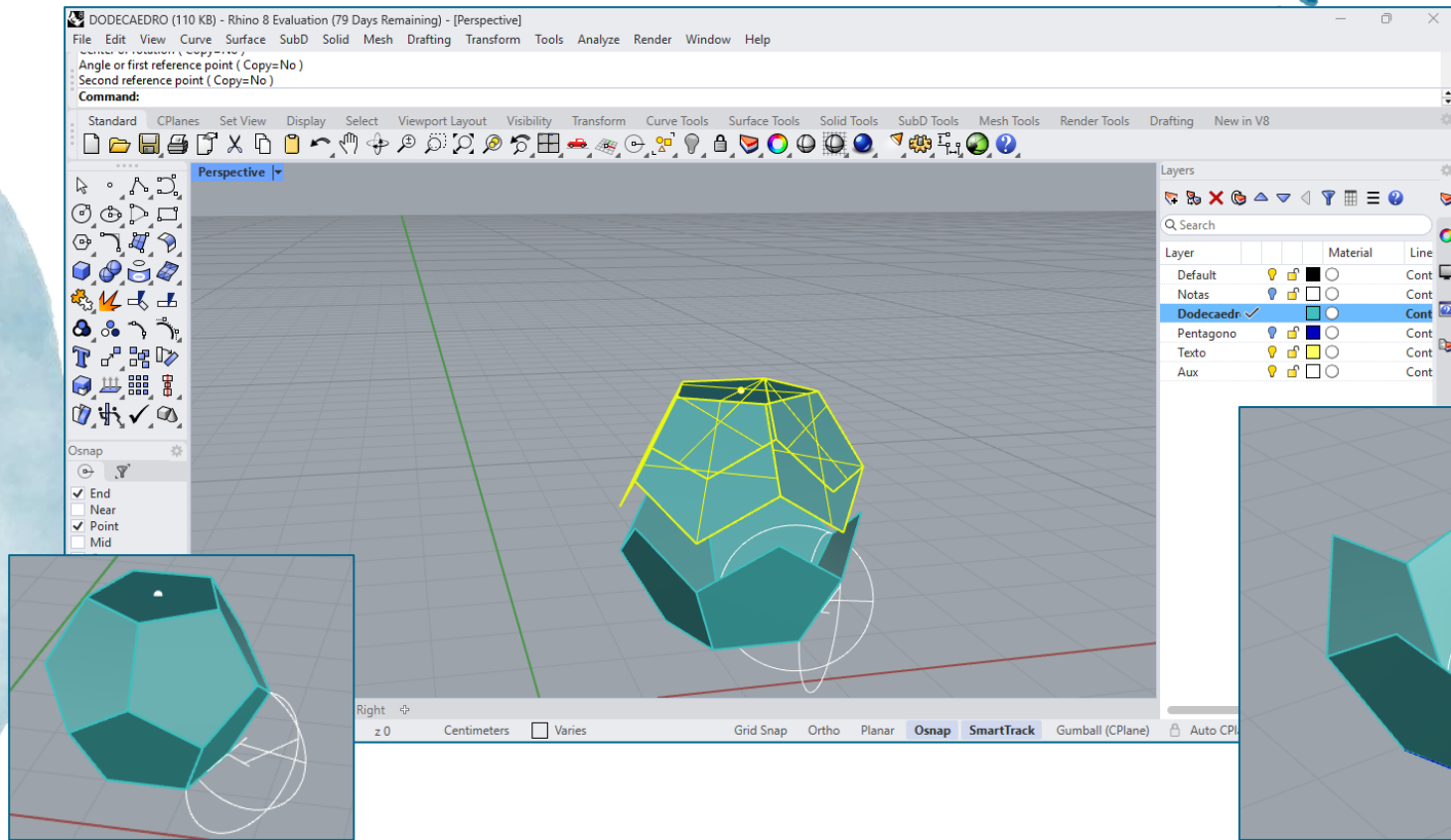
Aula 03 – Dodecaedro





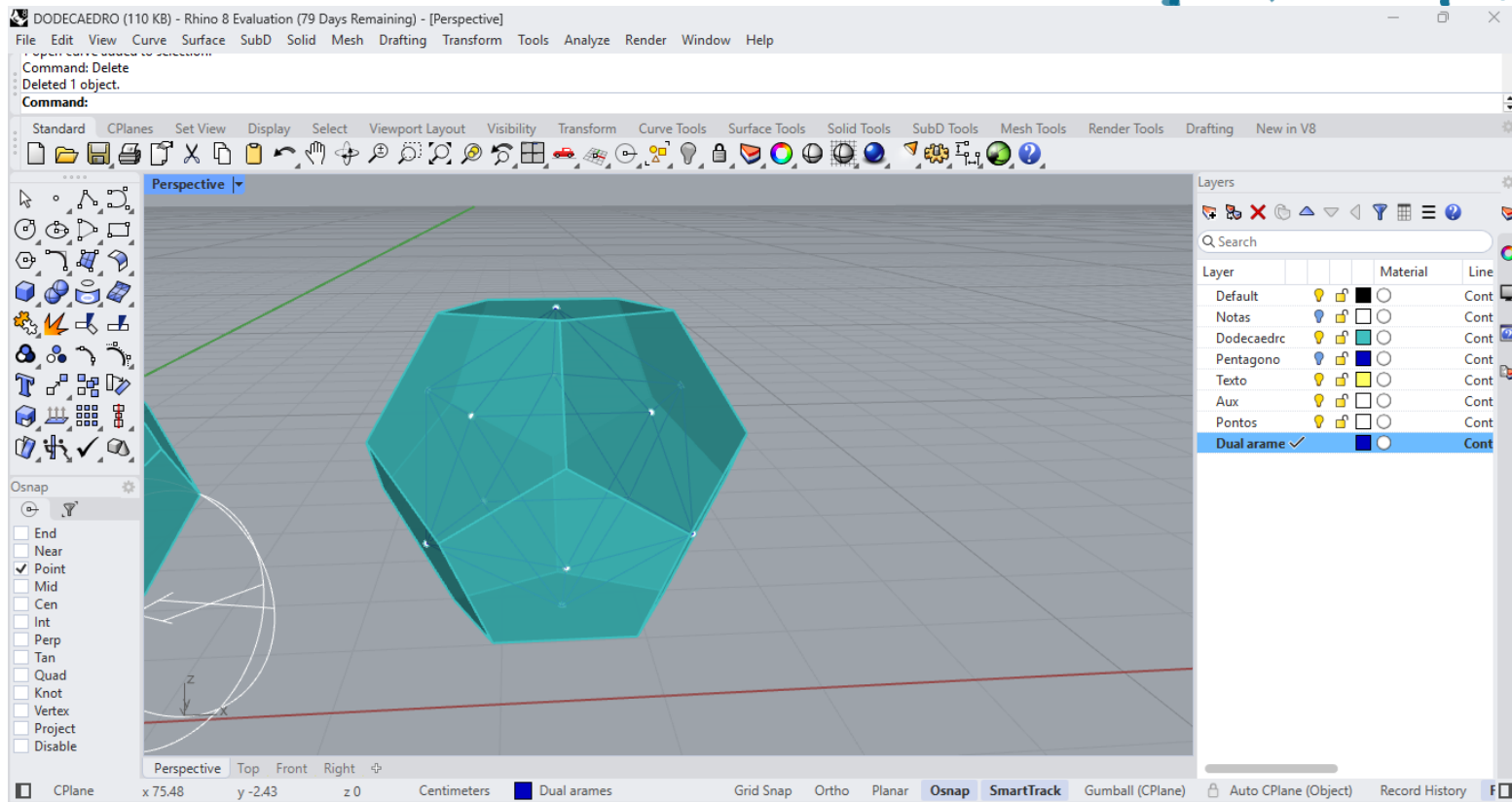
Aula 03 – Dodecaedro





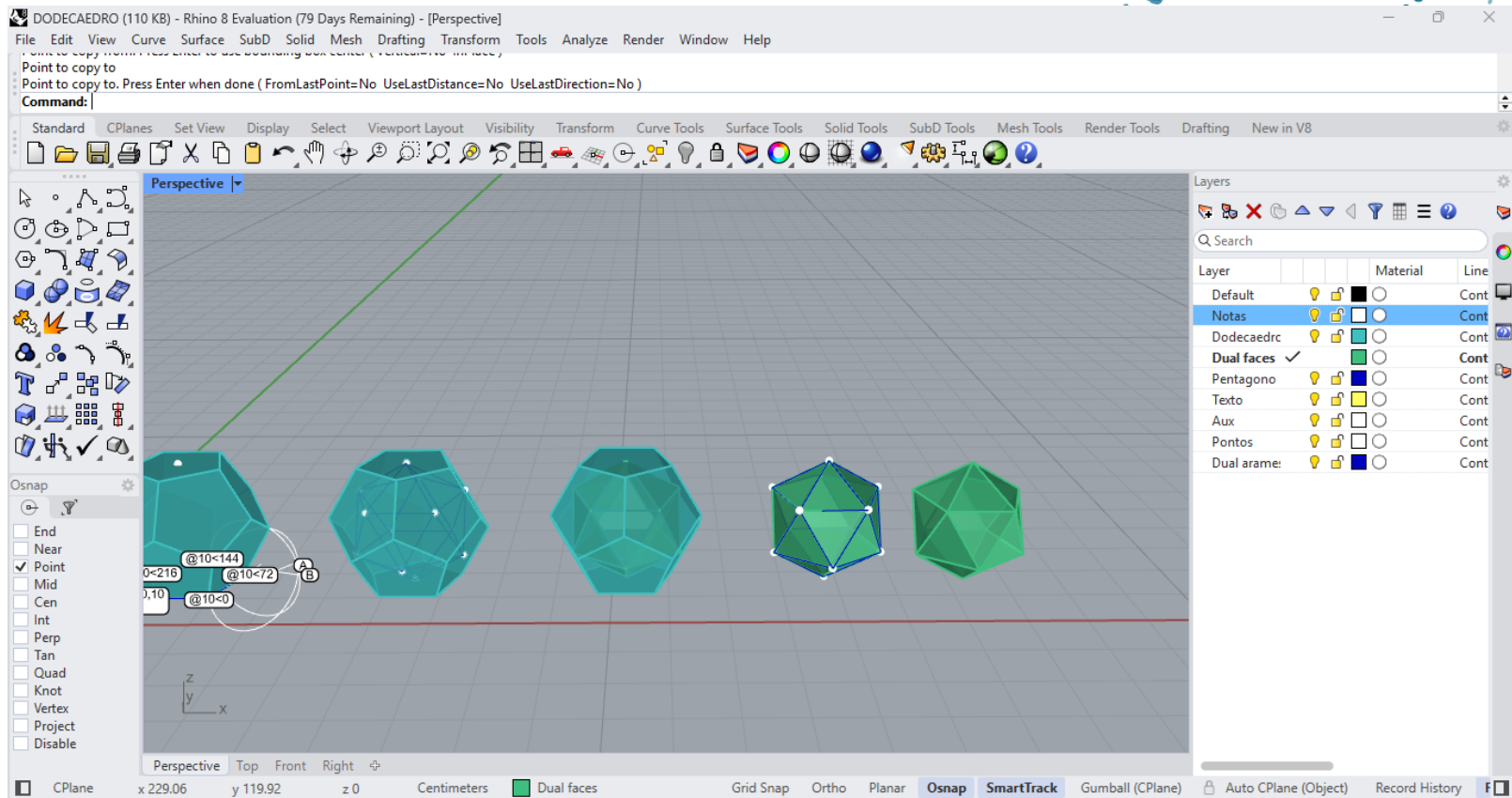
Aula 03 – Dodecaedro





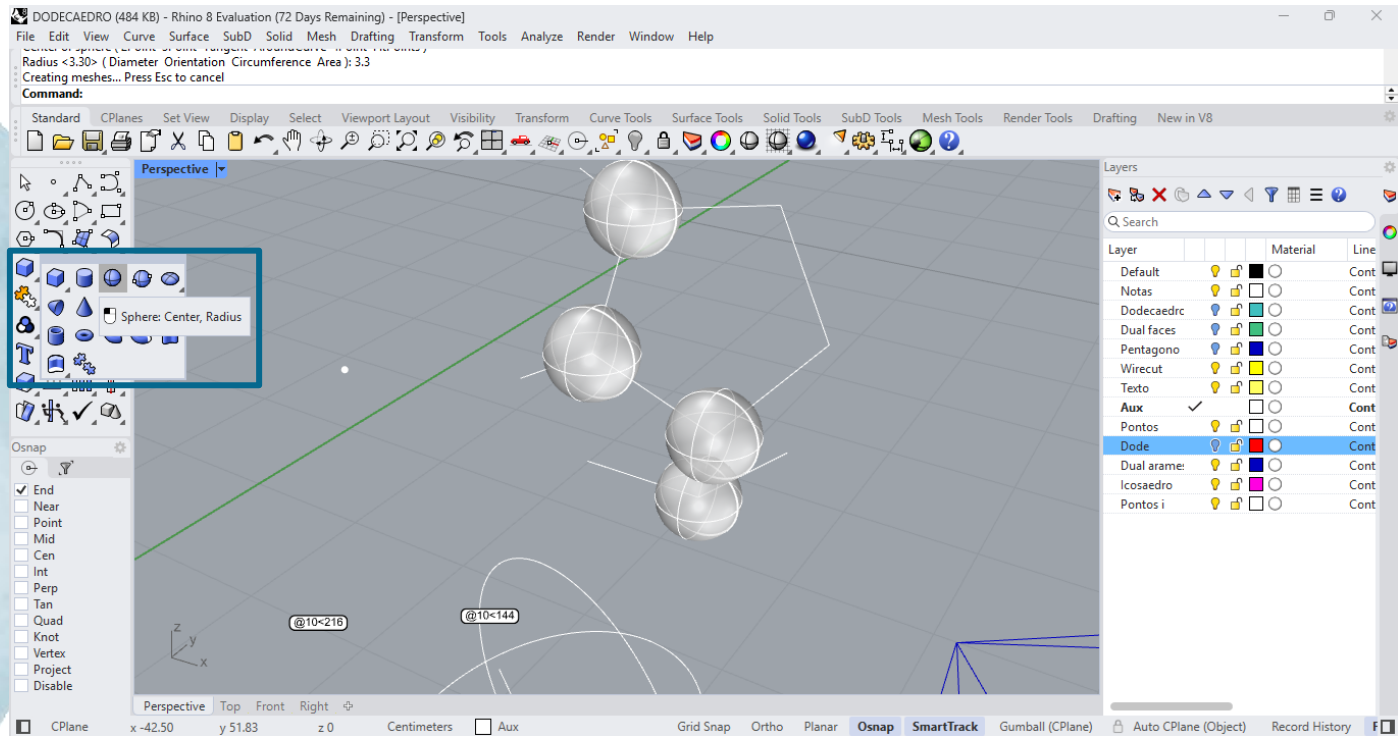
Aula 03 – Dodecaedro





Aula 03 – Dodecaedro

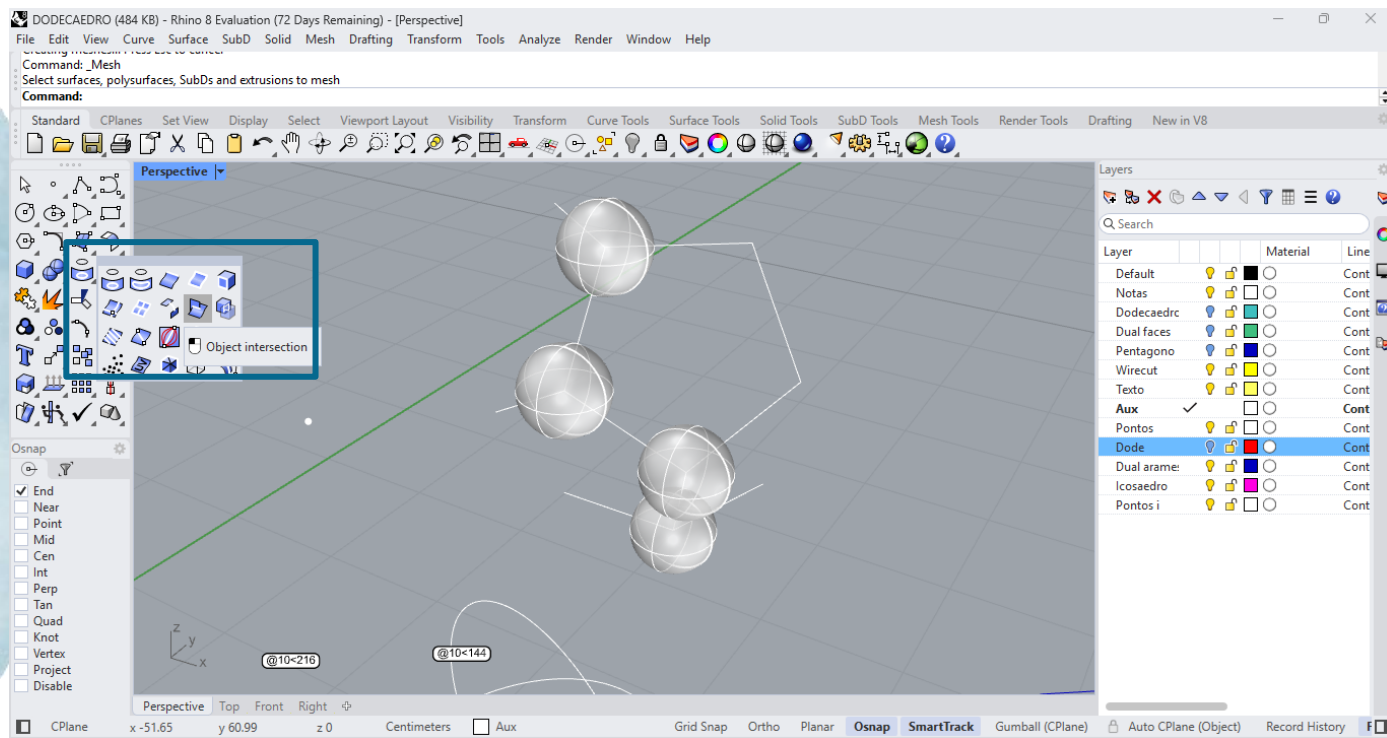




Esfera

Aula 04 – Dodecaedro truncado

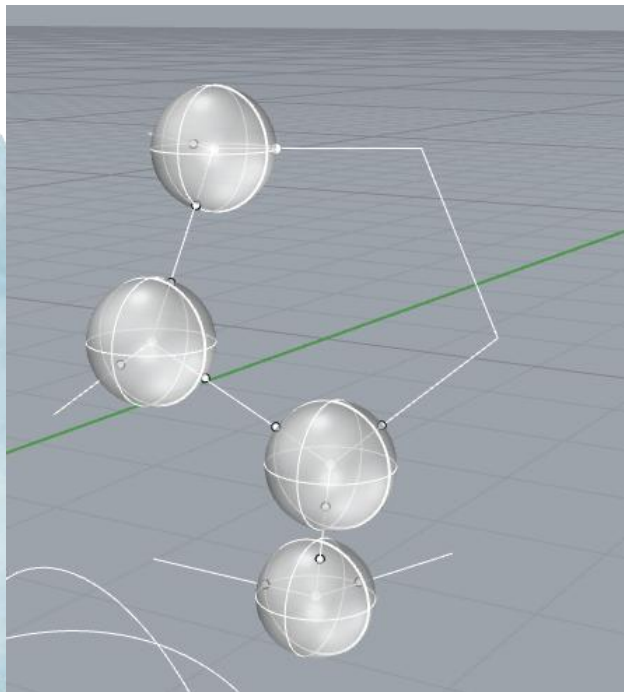




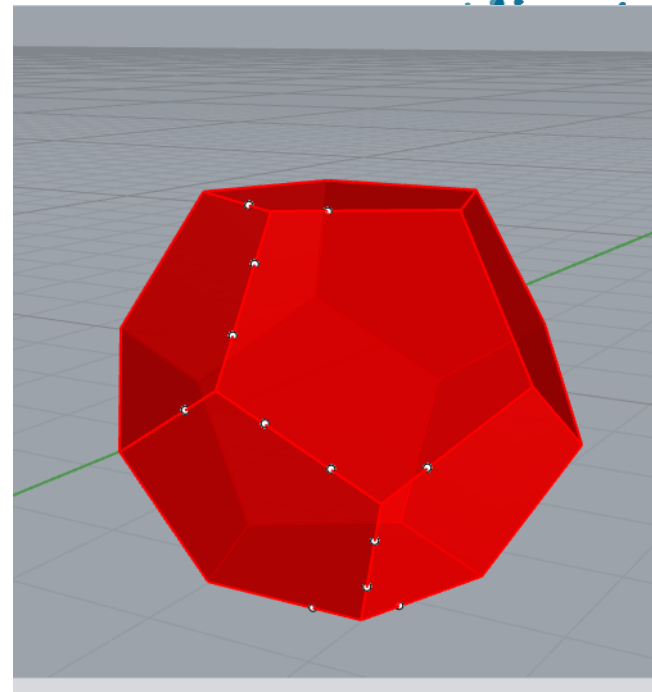
Object Intersection

Aula 04 – Dodecaedro truncado



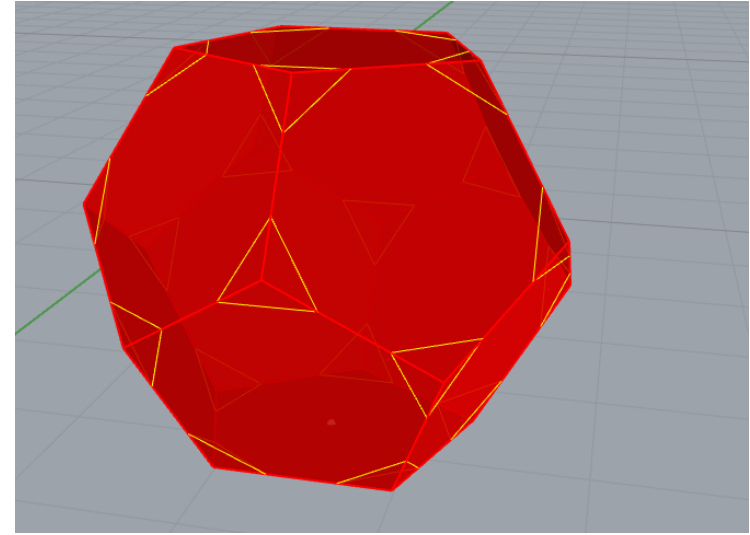
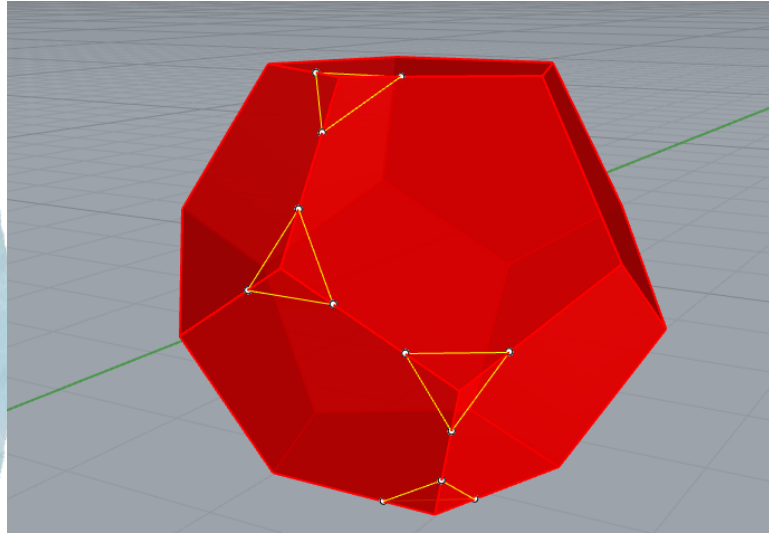


Marca os pontos de
interseção entre,
neste caso, as
esferas e as linhas.
Pontos necessários
para os wires



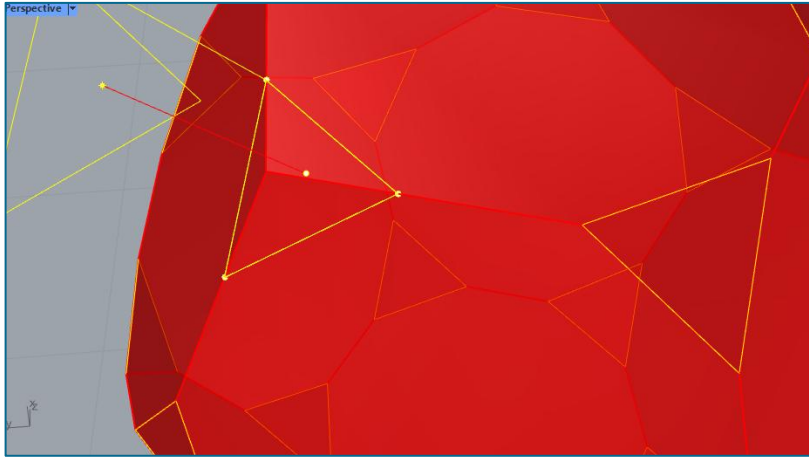
Aula 04 – Dodecaedro truncado



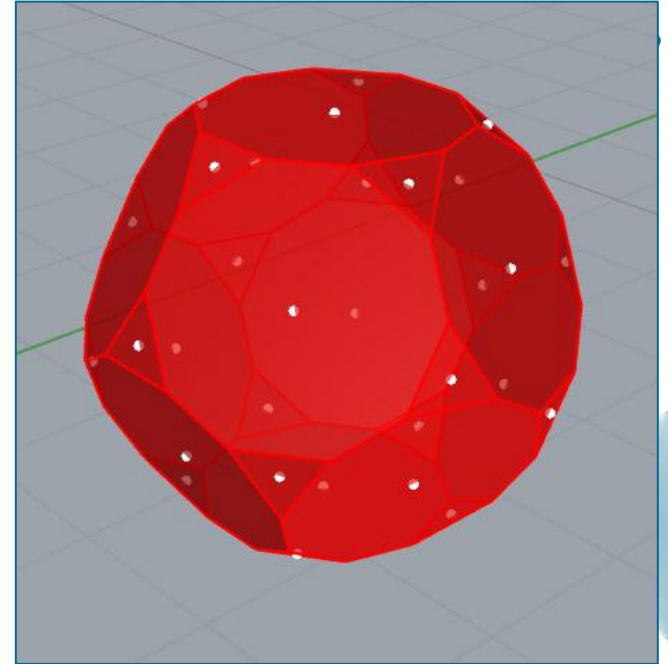


Aula 04 – Dodecaedro truncado



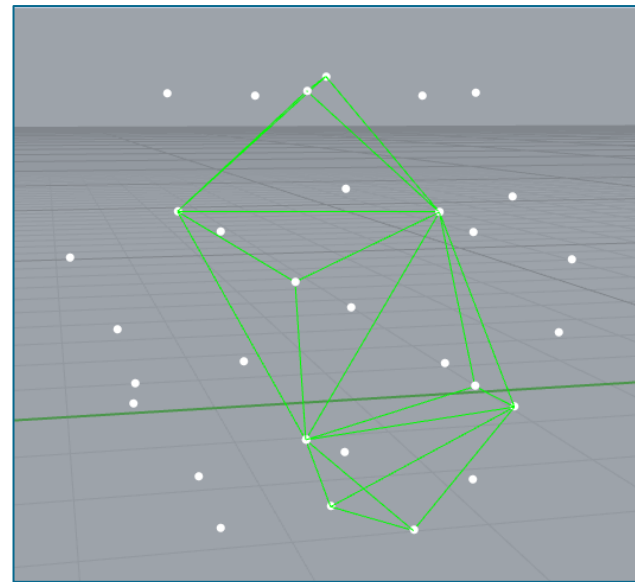
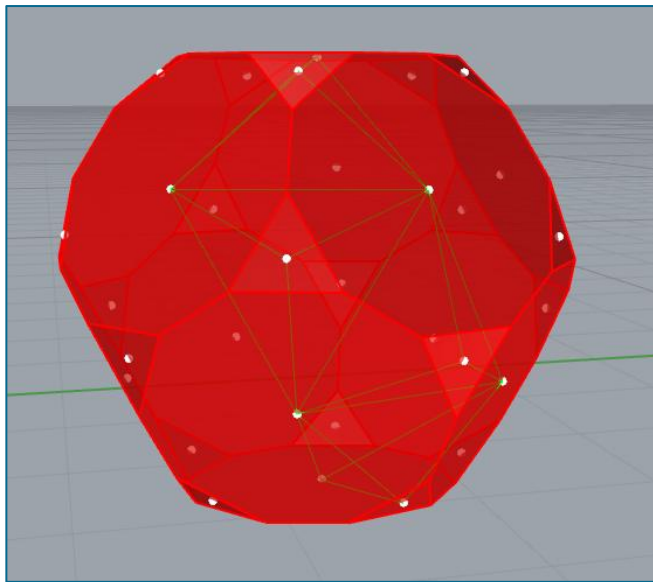


No wirecut, escolher invert yes se não estiver a
resultar bem o corte das arestas



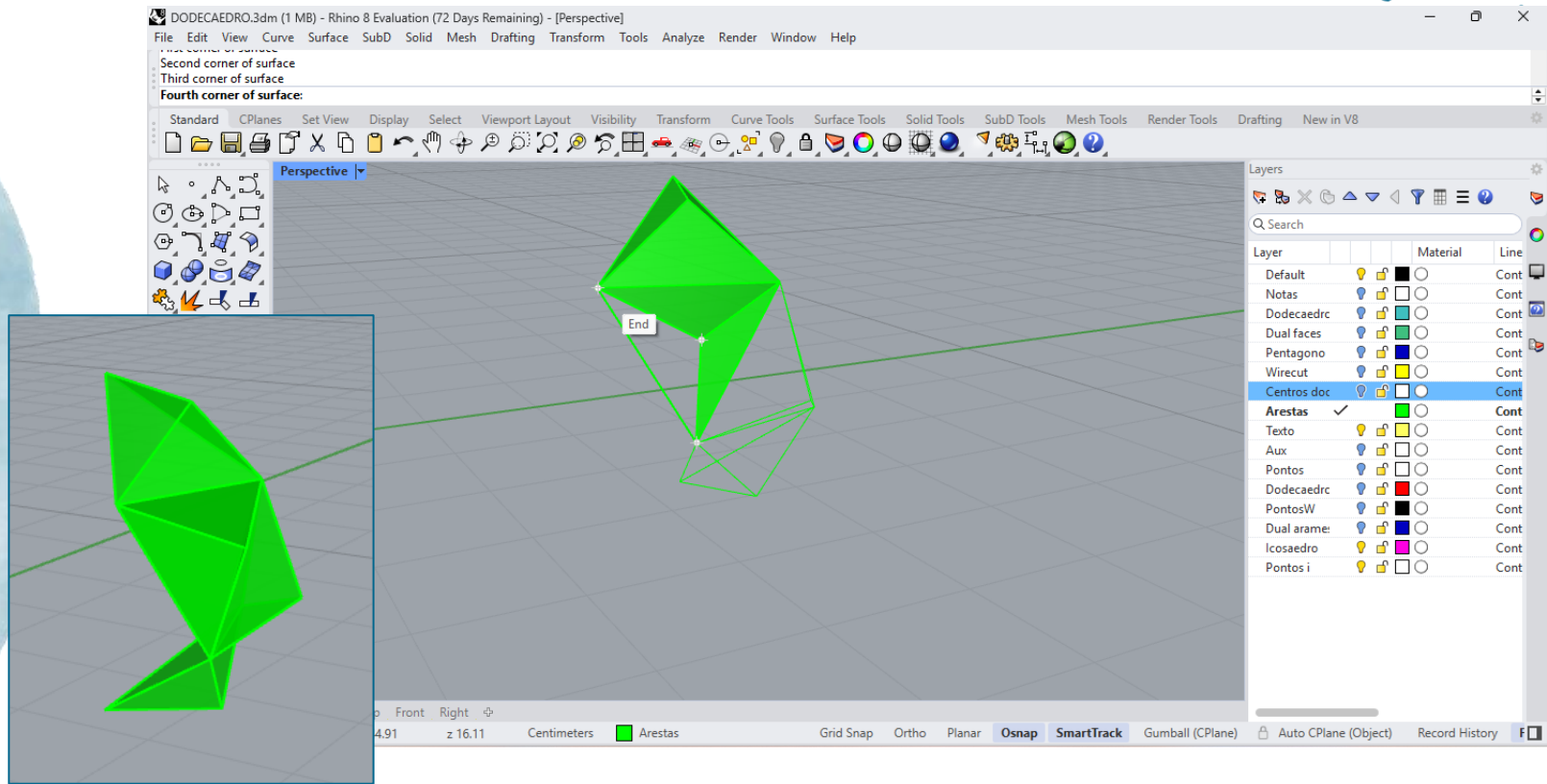
Aula 04 – Dodecaedro truncado





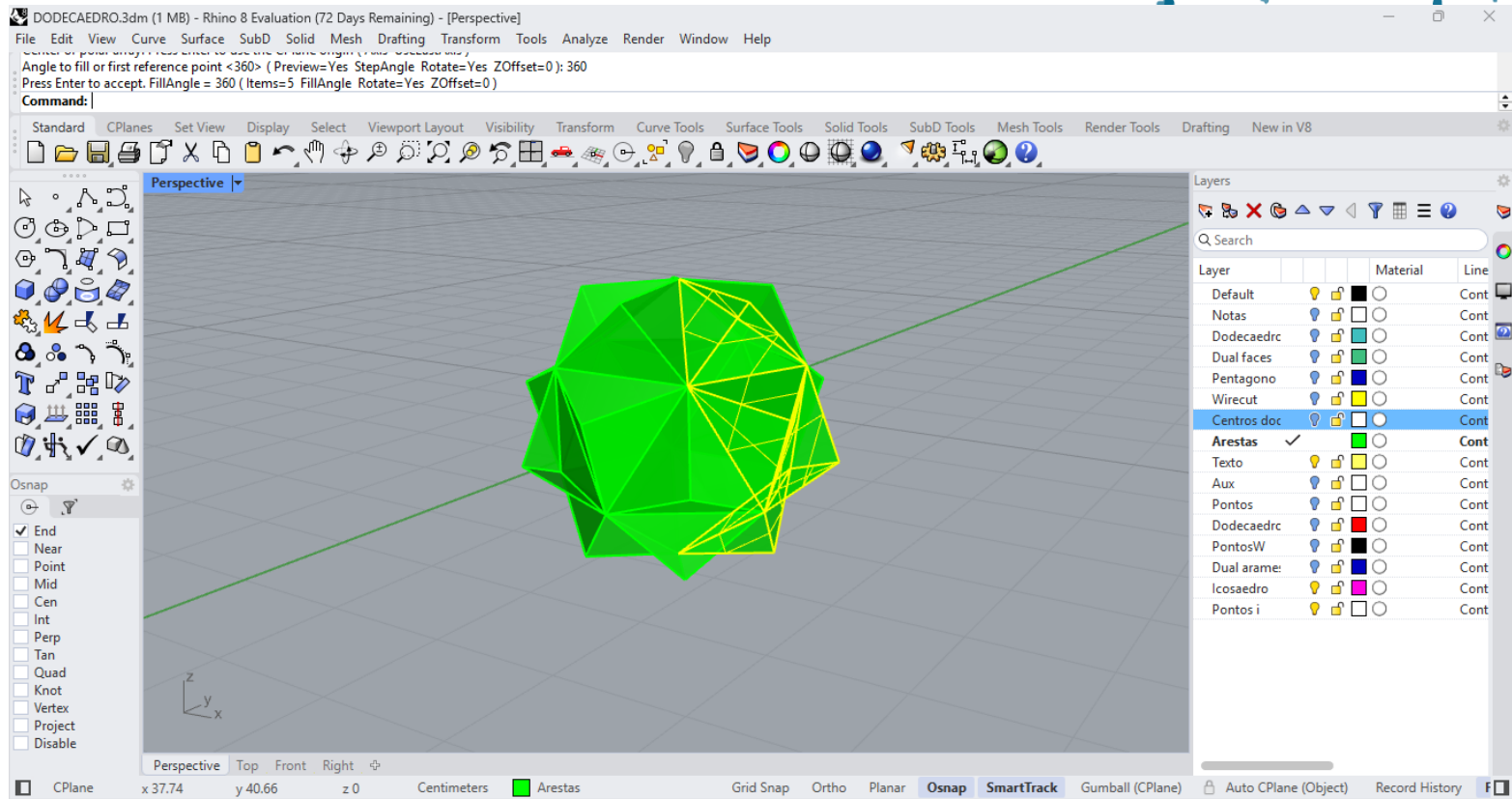
Aula 04 – DUAL do Dodecaedro truncado





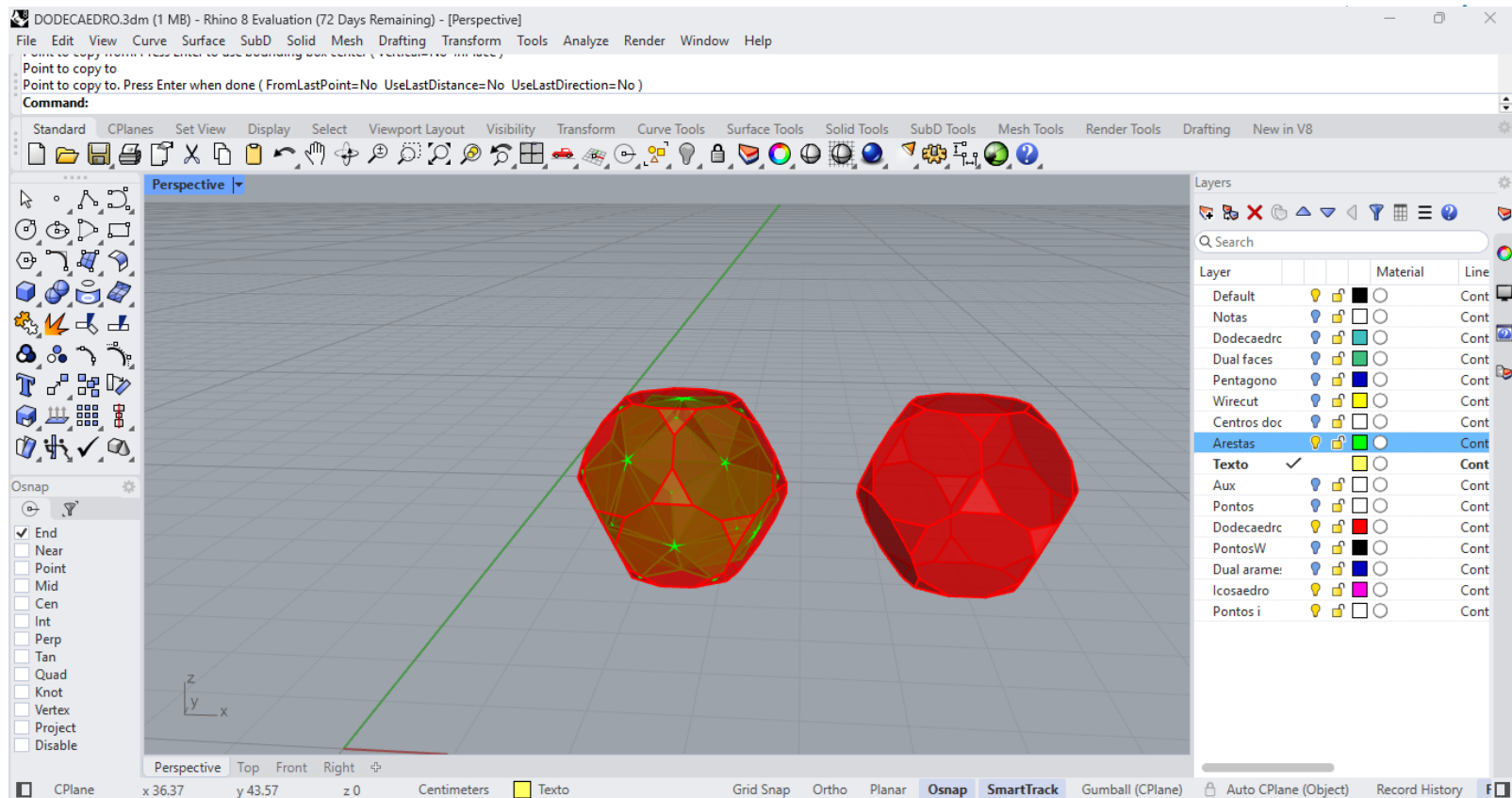
Aula 04 – DUAL do Dodecaedro truncado





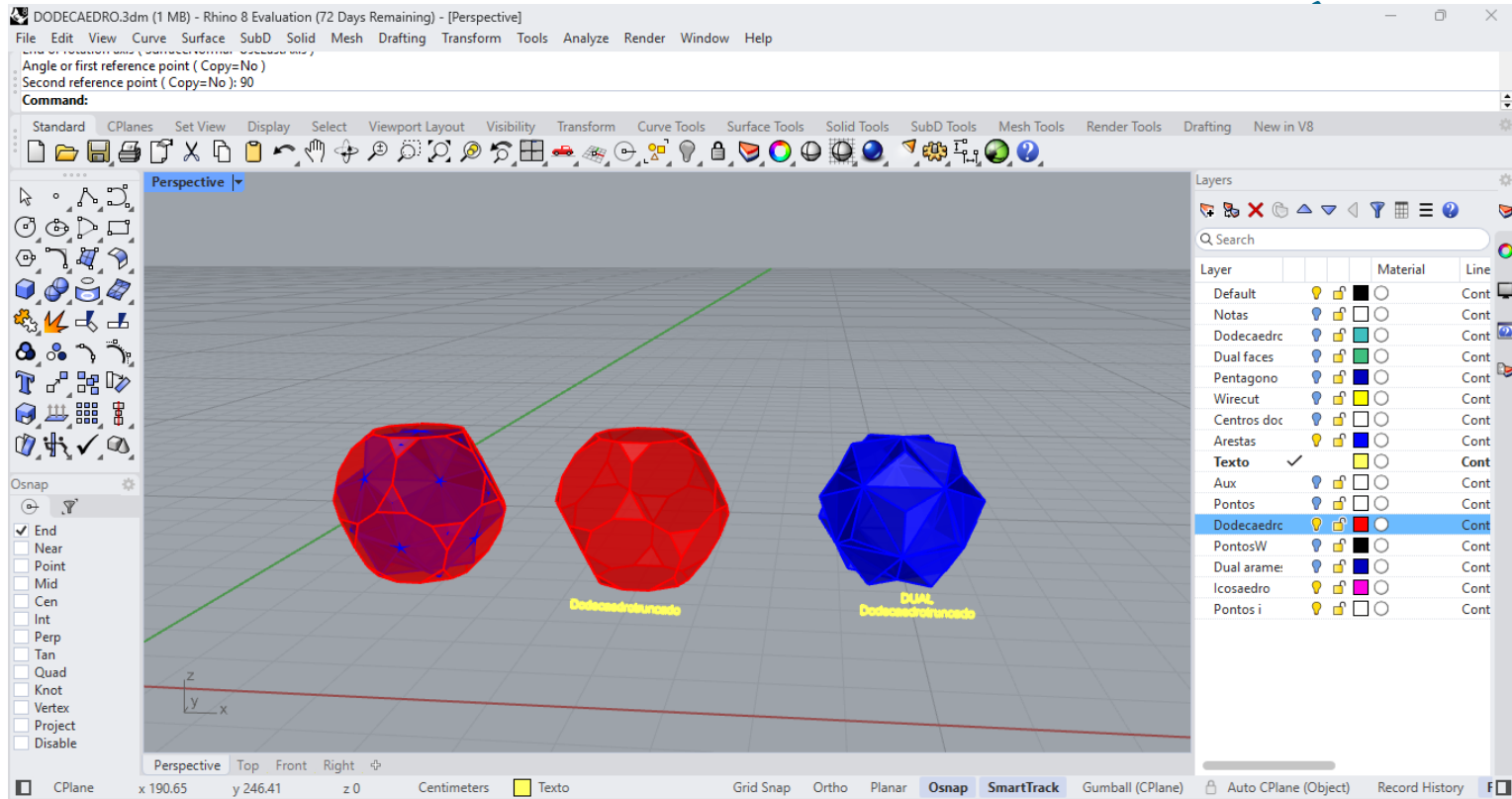
Aula 04 – DUAL do Dodecaedro truncado





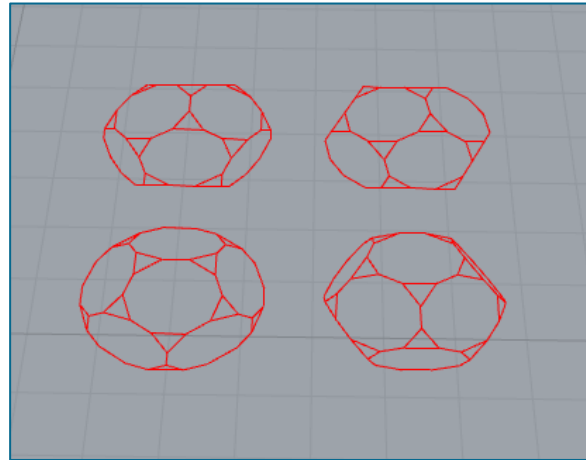
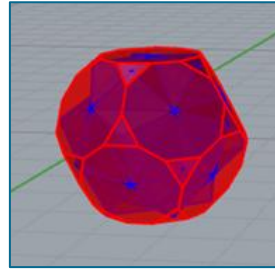
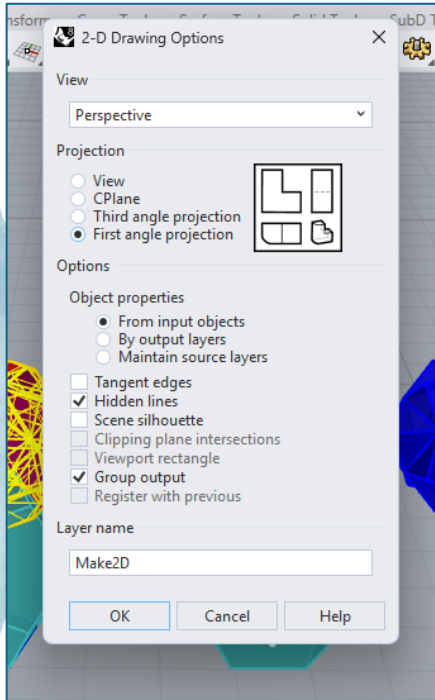
Aula 04 – Dodecaedro truncado e dual





Aula 04 – Dodecaedro truncado e dual

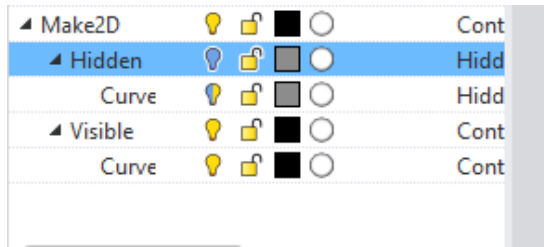




Make2D: para representar o modelo 3D em desenhos técnicos 2D, como planta e alçados

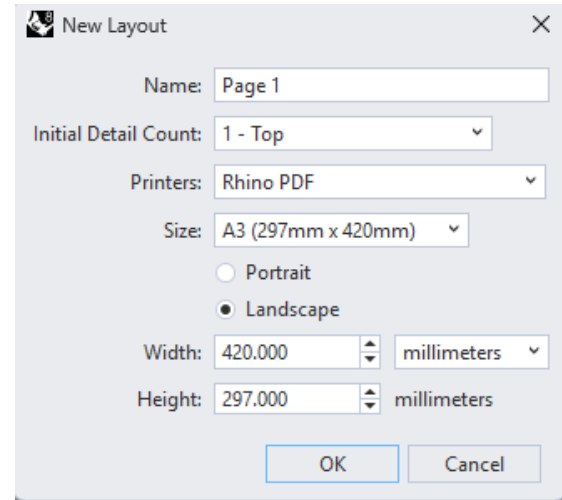
Aula 05 – Layouts





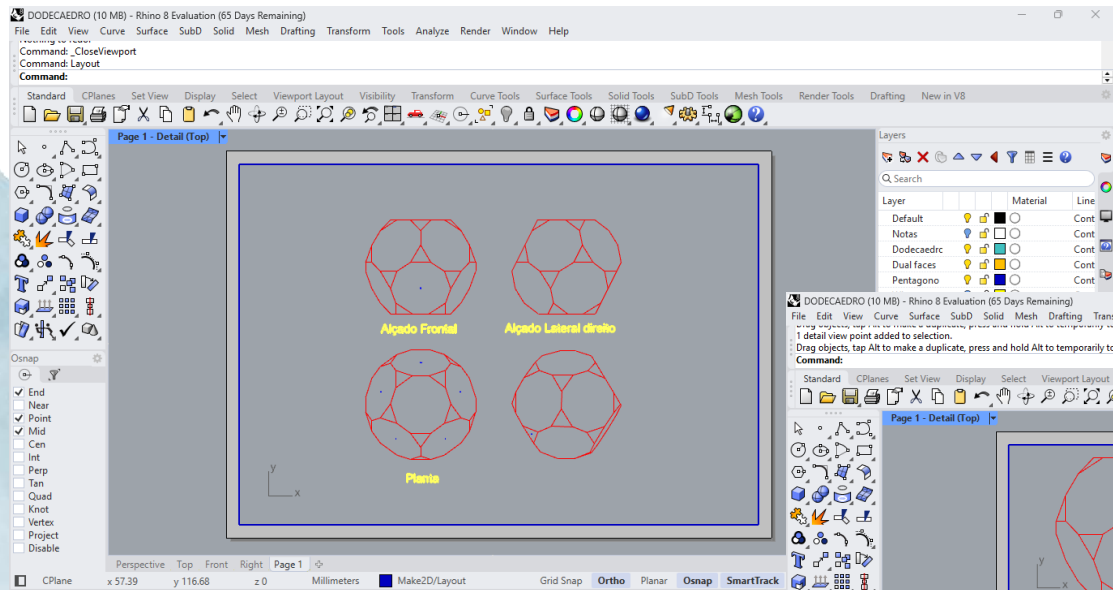
Aparece uma layer Make2D com as partes visíveis e invisíveis do objeto

Para fazermos um layout basta escrever o comando layout ou ir á barra de baixo e clicar no + onde estão o nome das janelas de visualização. No new layout podemos configurar.

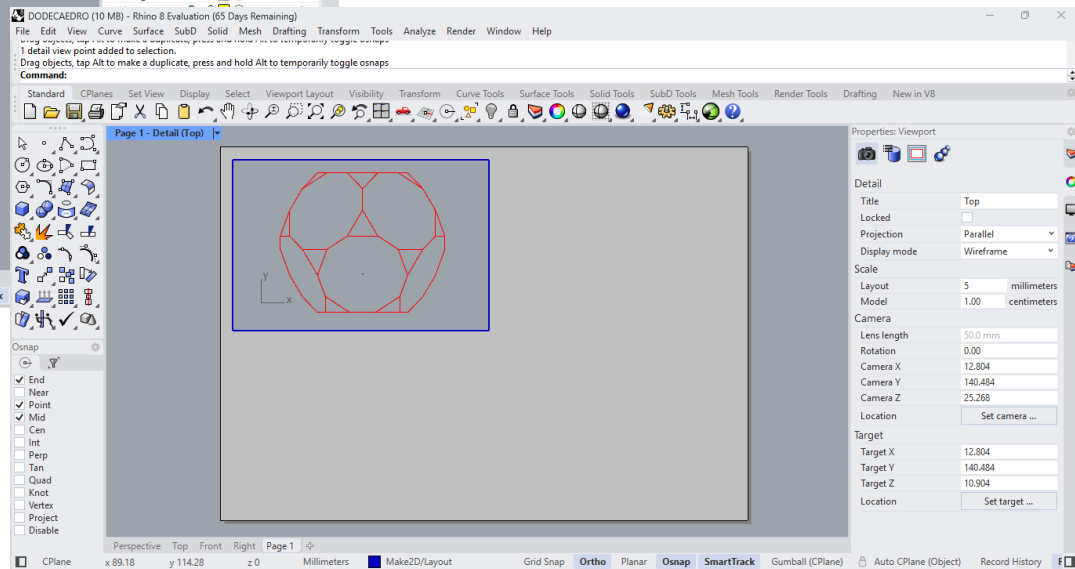


Aula 05 – Layouts



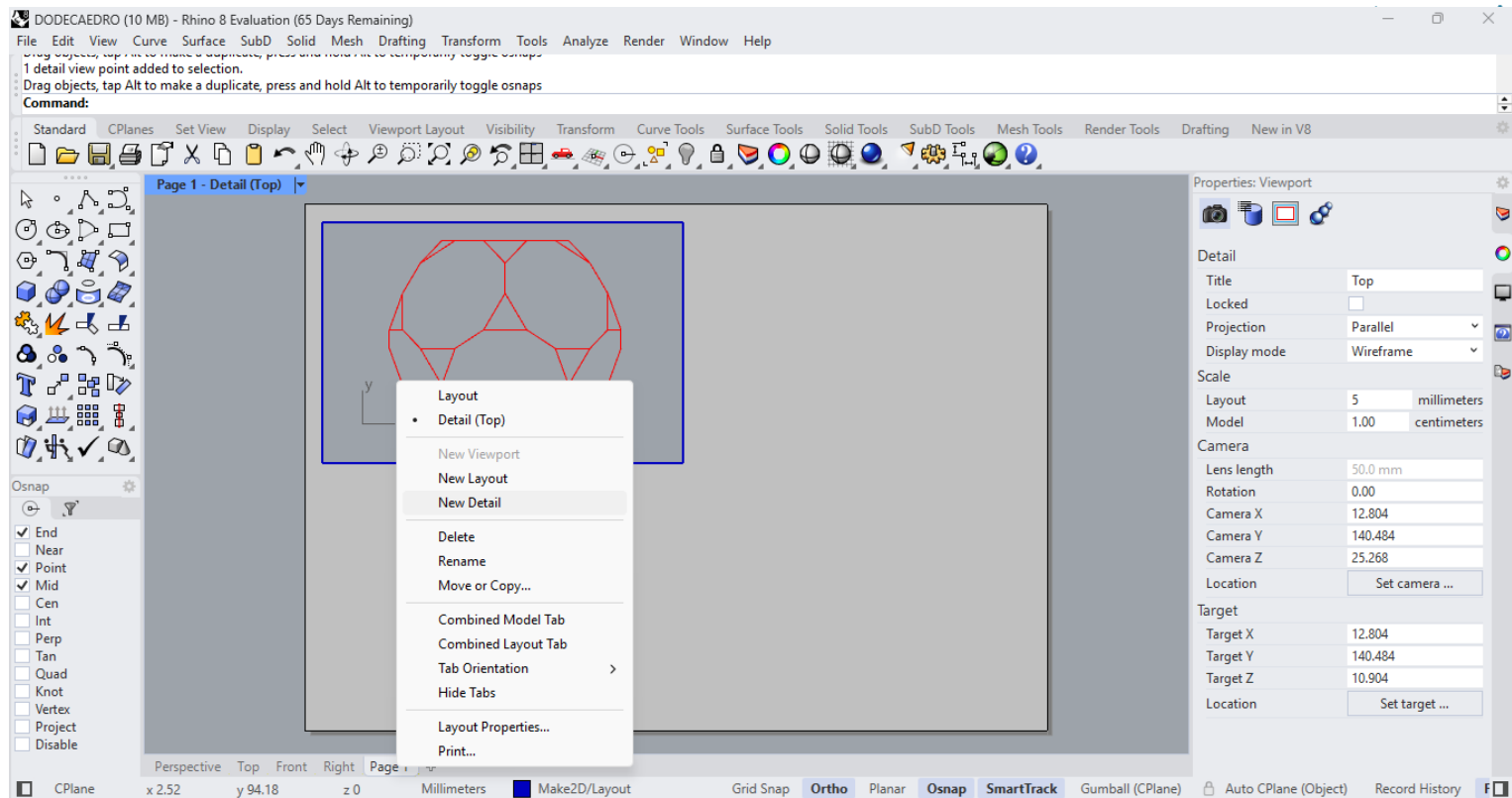


Detail: para acrescentar outra janela de layout.



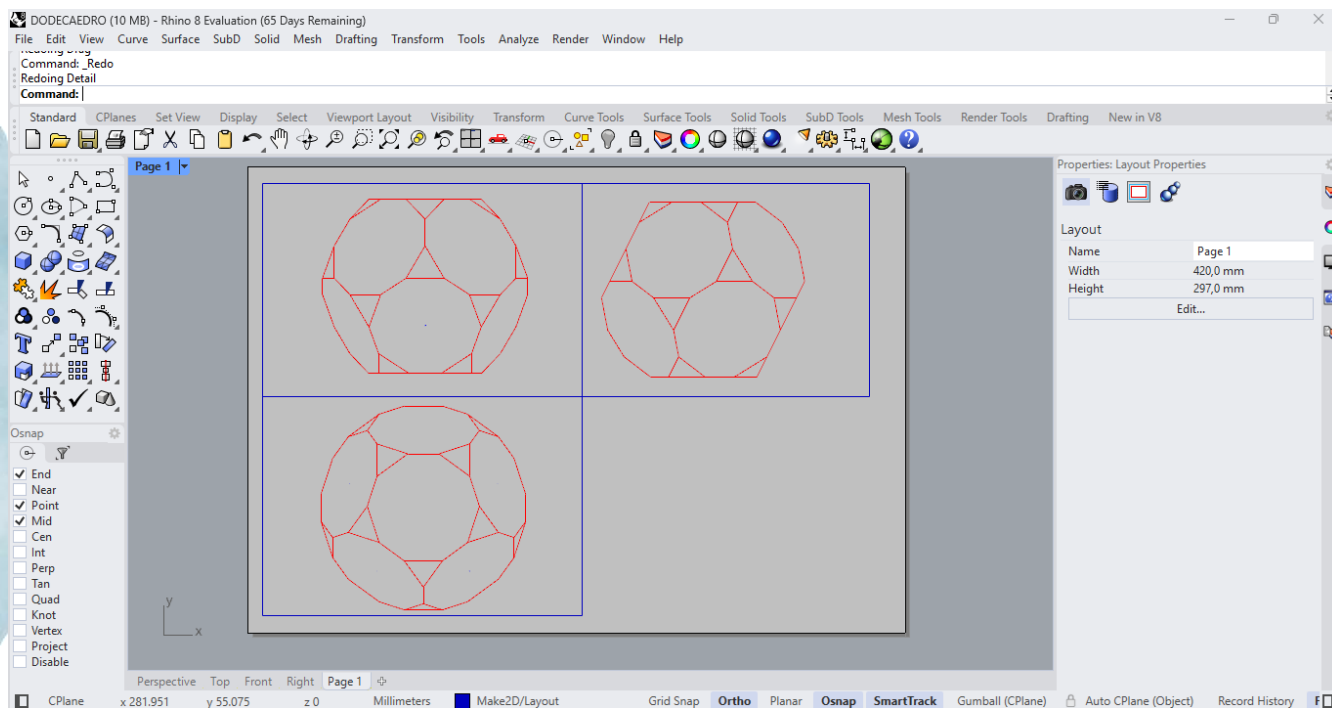
Aula 05 – Layouts





Aula 05 – Layouts

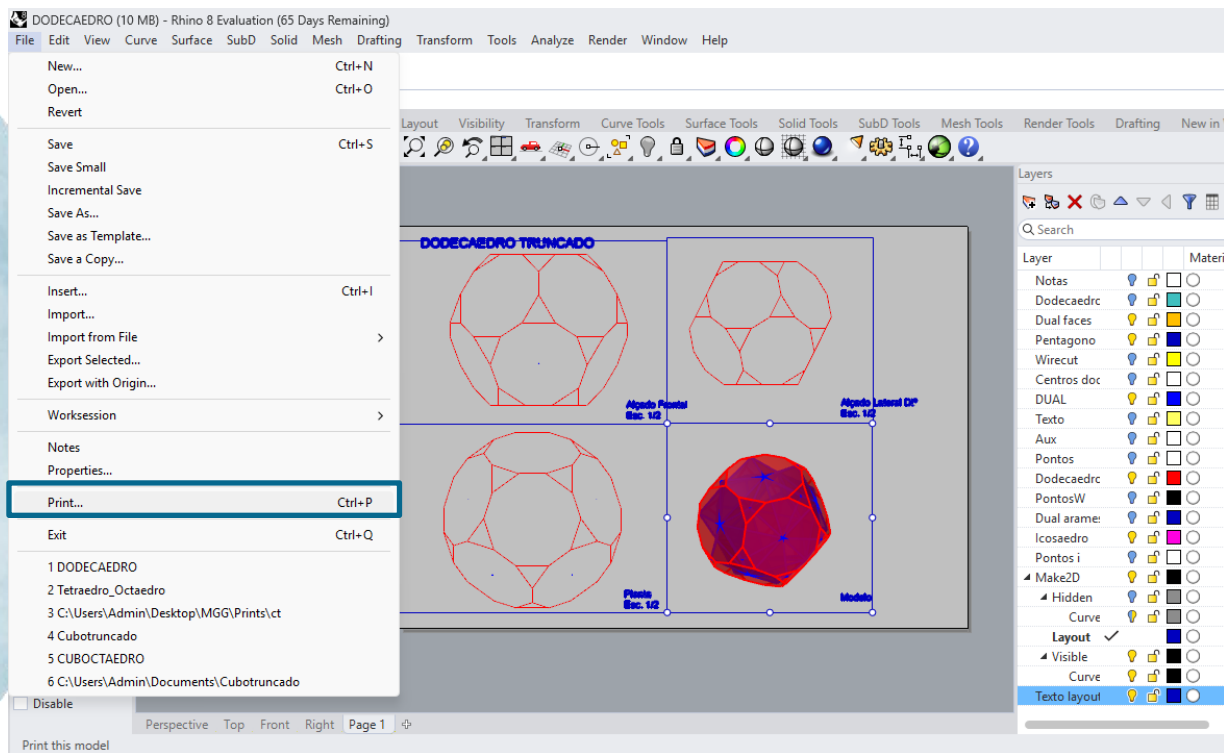




Para movimentar e mexer nas propriedades de cada janela, clicar 2x nela

Aula 05 – Layouts

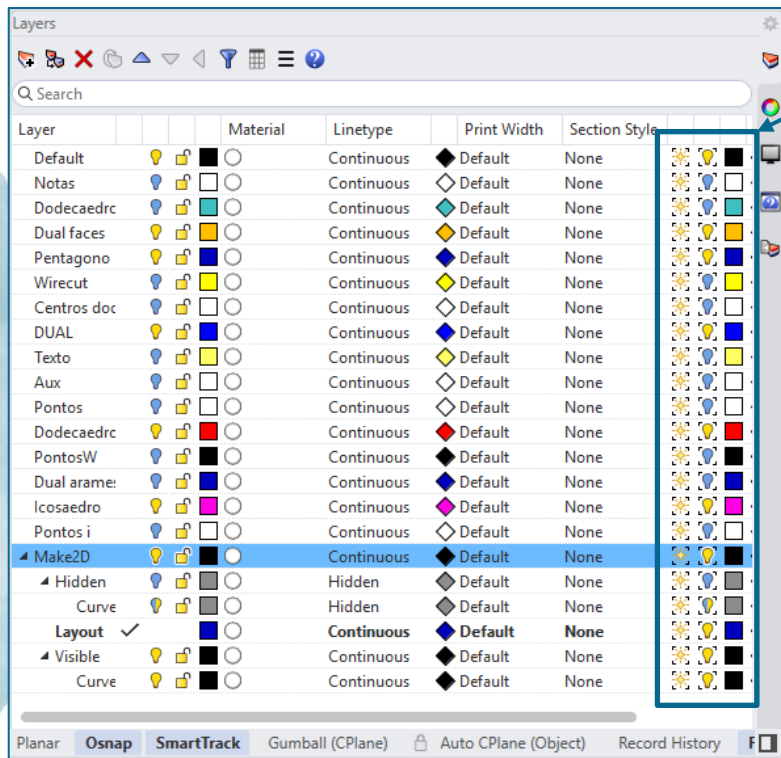




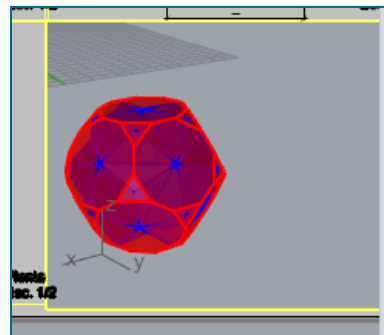
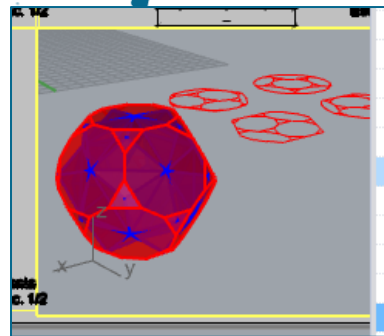
Print: para guardar e imprimir

Aula 05 – Layouts





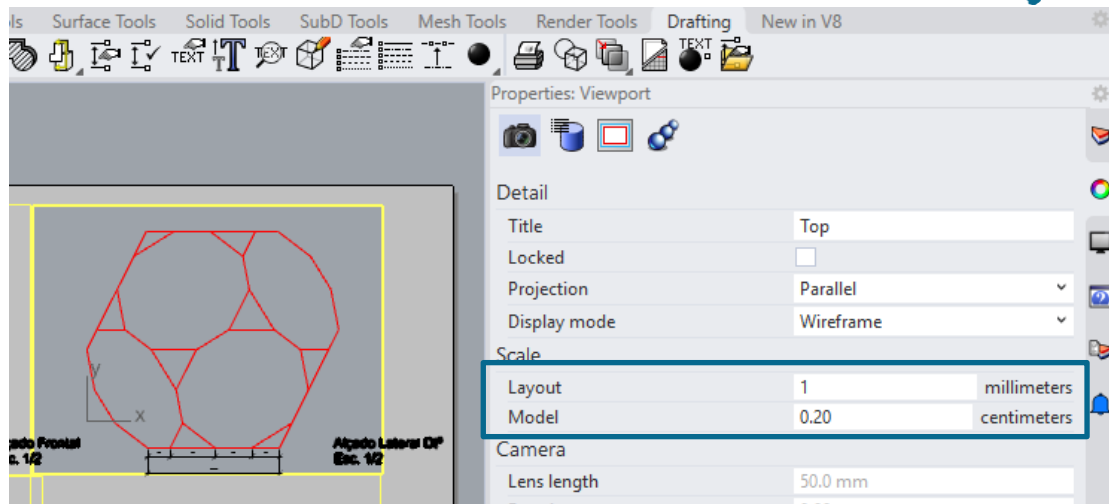
Para “esconder” elementos que não pretendemos ter visíveis, vamos aos layers e na coluna do detail on, congelamos com a lâmpada. Também temos ao lado a print color, escolhendo a que cor vai ficar no layout.



Aula 05 – Layouts



A fim de escalar a figura, ir
a **properties**. Para estar na
escala real, por exemplo,
tenho de ter 1cm no model
e 10 milímetros no layout.

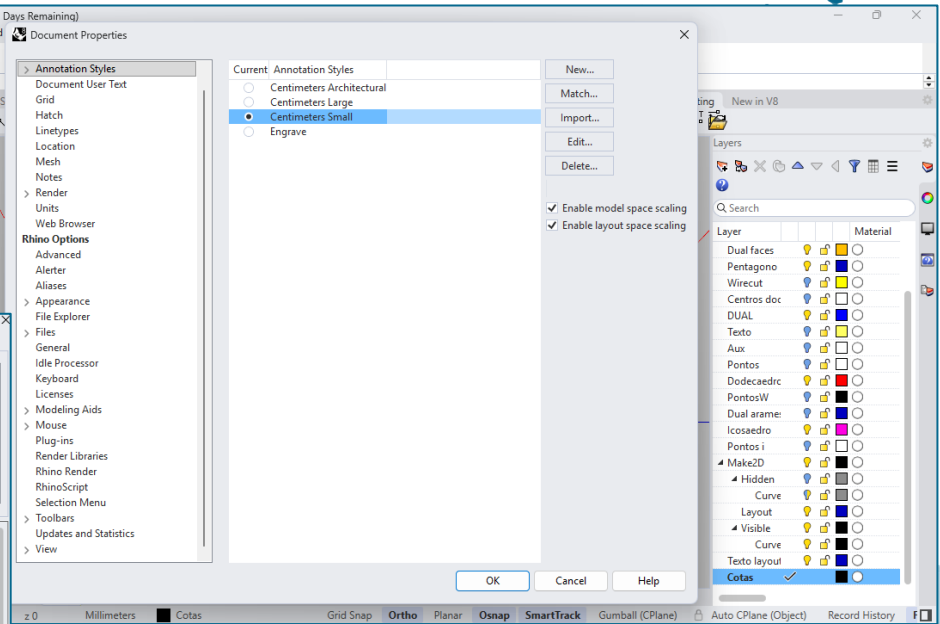
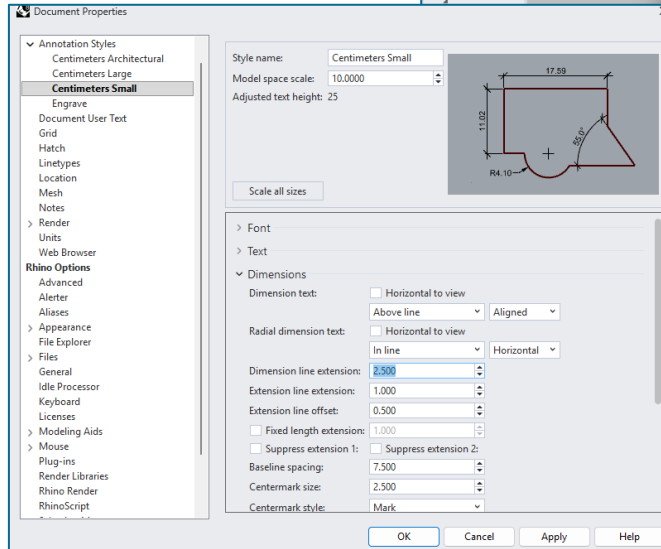


Aula 05 – Layouts



No Document properties, editamos
como queremos as anotações.

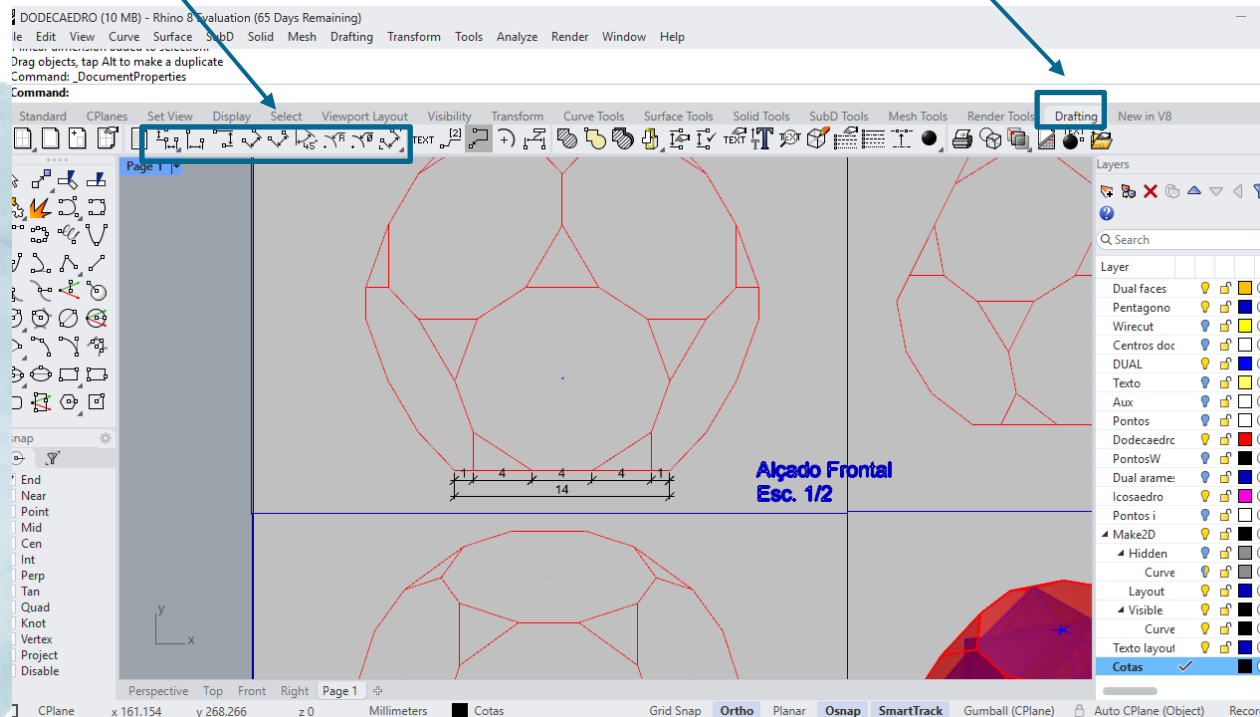
Annotation Styles- Centimeters Small- Edit



O texto, as dimensões, as
unidades, ...

Aula 05 – Layouts



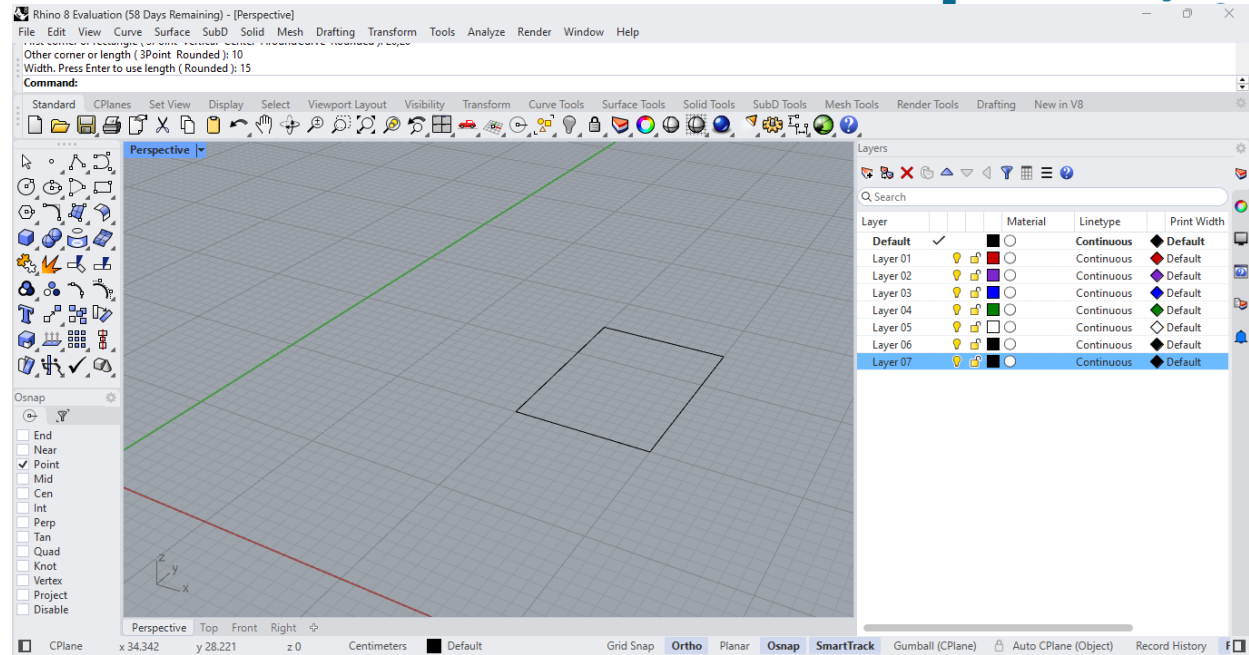


No **Drafting- Dimension**,
para dimensionar a
figura. Temos para
dimensionar um angulo,
um raio, uma linha
horizontal, vertical,
diagonal, ...

Aula 05 – Layouts



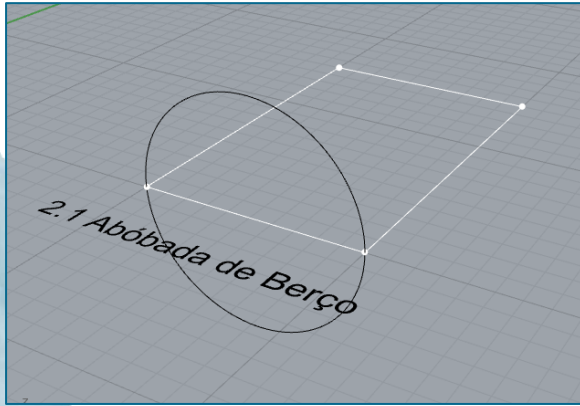
Rectangle: escolher o primeiro ponto, o tamanho de um lado e depois do outro.



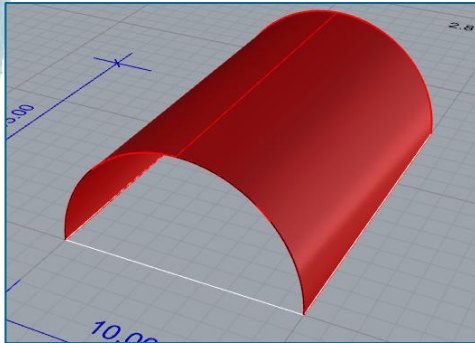
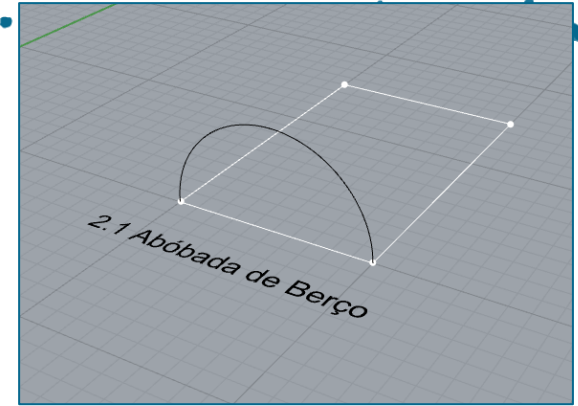
Aula 06 – Abóbadas e Lunetas



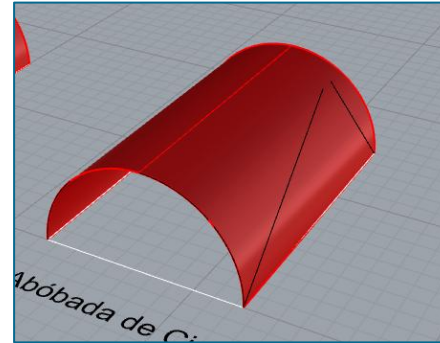
Abóbada de Berço



Trim: Cortar partes



ExtrudeCrv

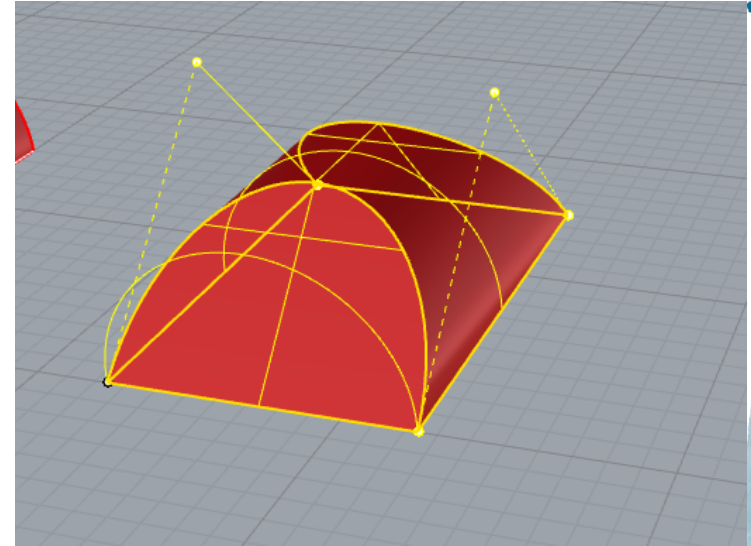
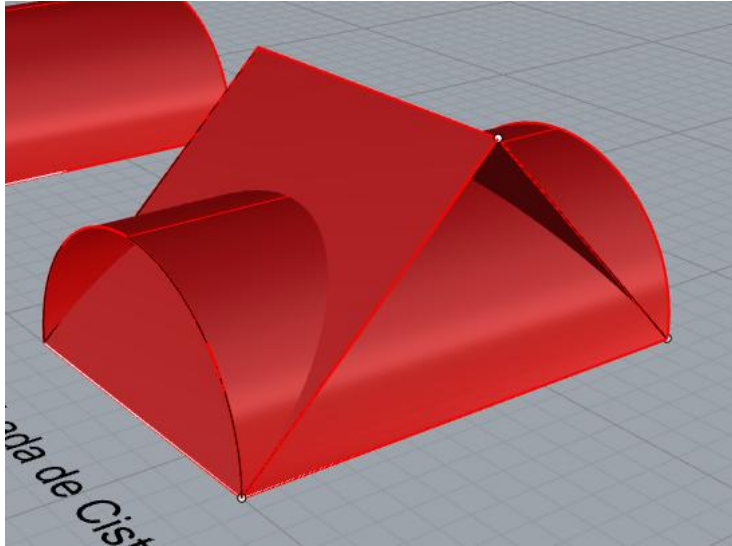


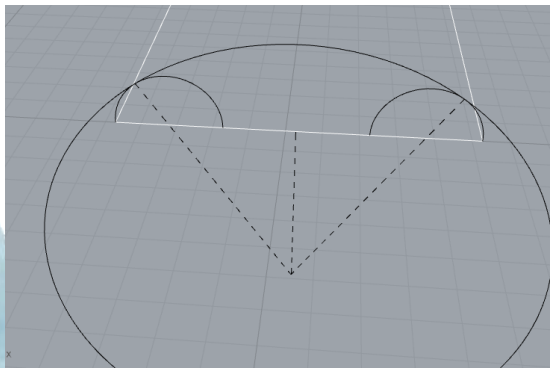
Fillet

Aula 06 – Abóbadas e Lunetas



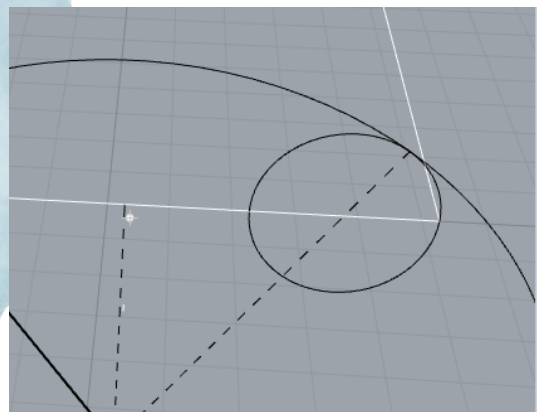
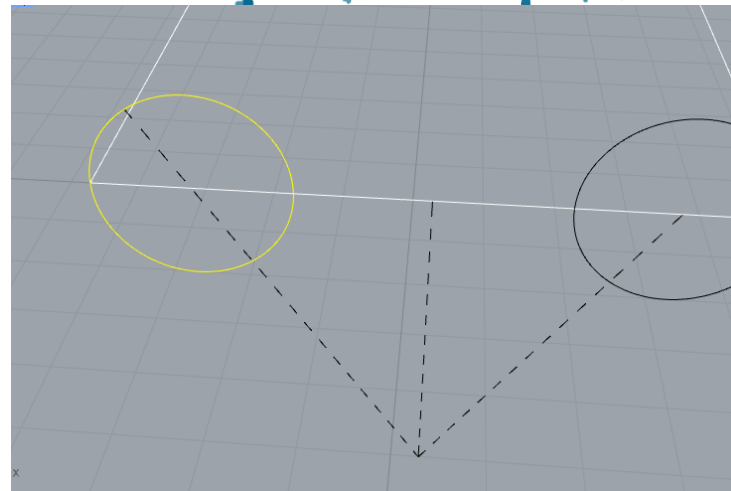
Abóbada de cisterna





Abóbada abatida

Extend: para
prolongar a linha.

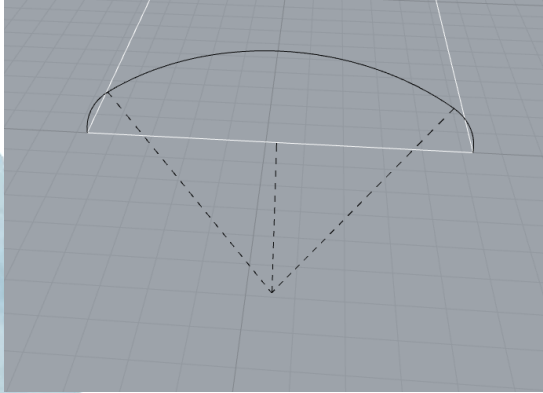


Layer	Material	Linetype	Print Width
Default		Continuous	◆ Default
Aux1		Continuous	◇ Default
Aux2		Hidden	◆ Default
Arcos		Continuous	◆ Default
Abóbadas		Continuous	◆ Default
Cotas		Continuous	◆ Default
Notas		Continuous	◆ Default
Texto		Continuous	◆ Default

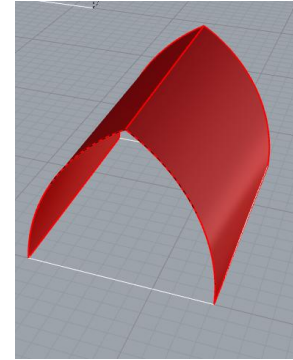
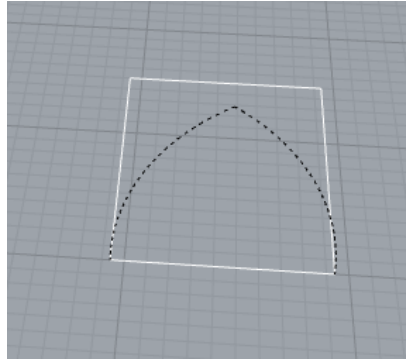
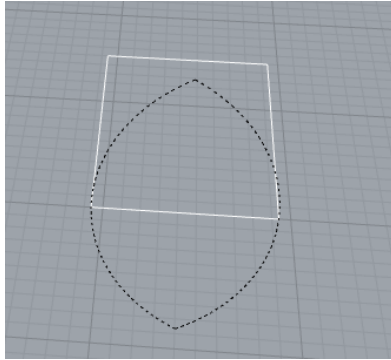
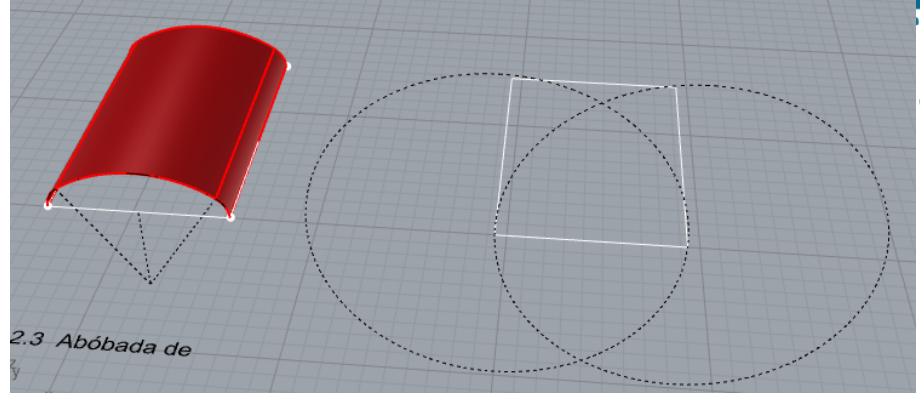
Para colocar a linha a
tracejado ir ao tipo de linha
e mudar para hidden

Aula 06 – Abóbadas e Lunetas





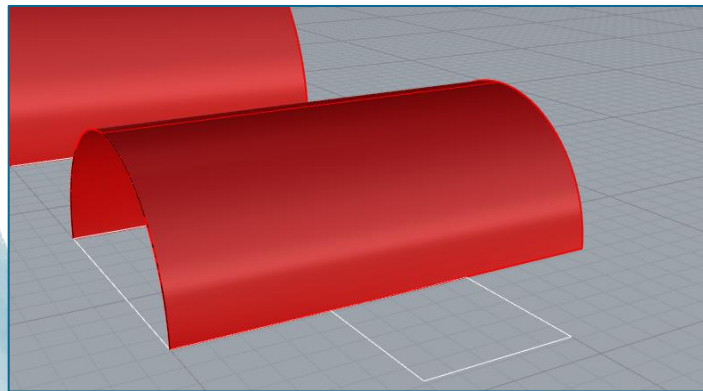
**Abóbada
abatida**



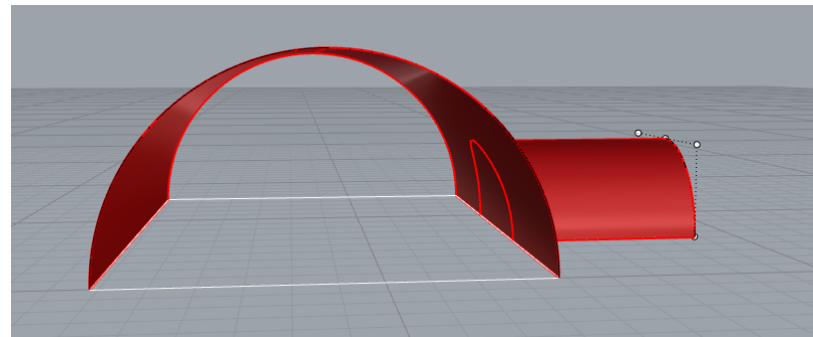
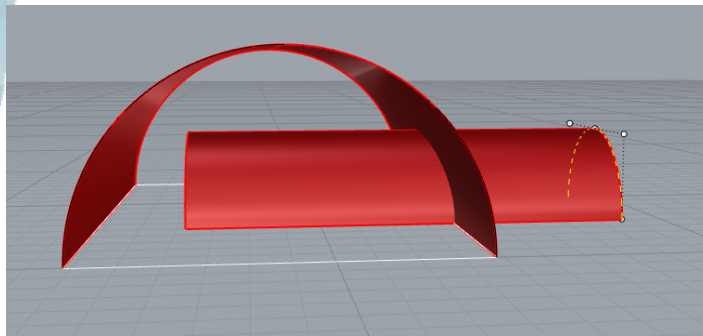
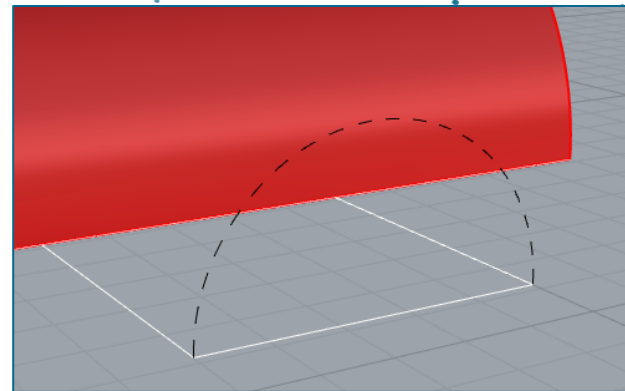
**Abóbada
ogival**

Aula 06 – Abóbadas e Lunetas



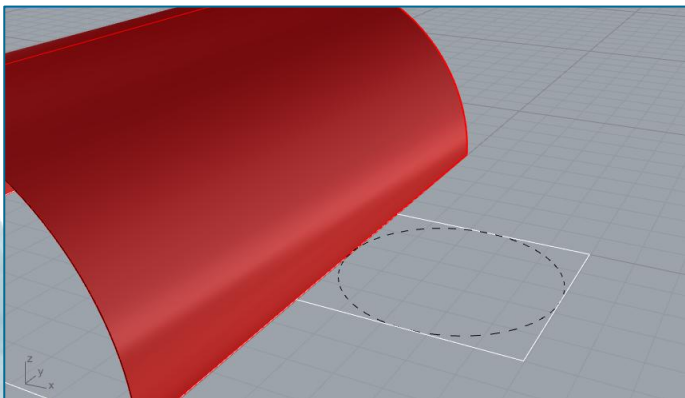


Luneta
cilíndrica

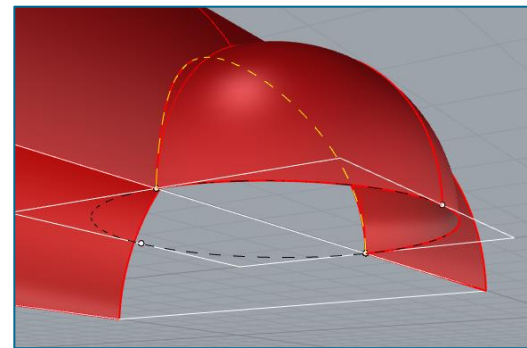
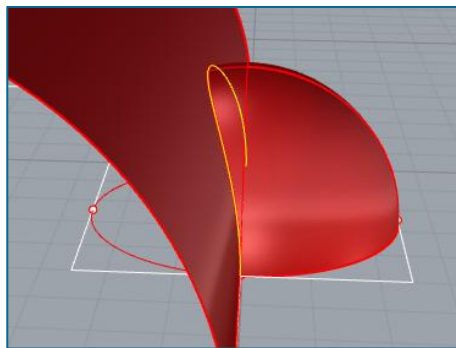
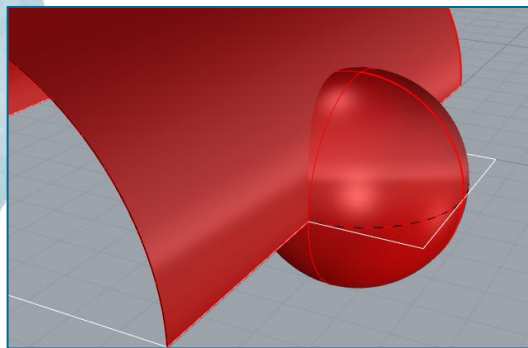
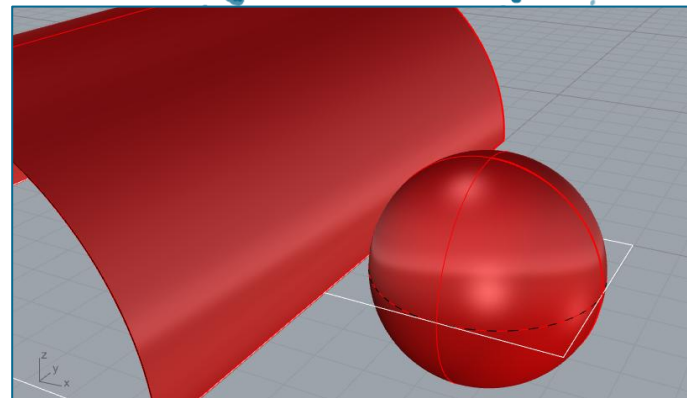


Aula 06 – Abóbadas e Lunetas



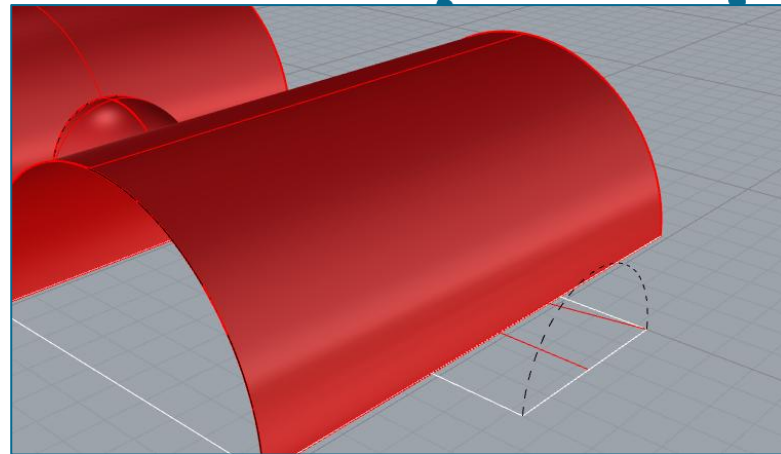
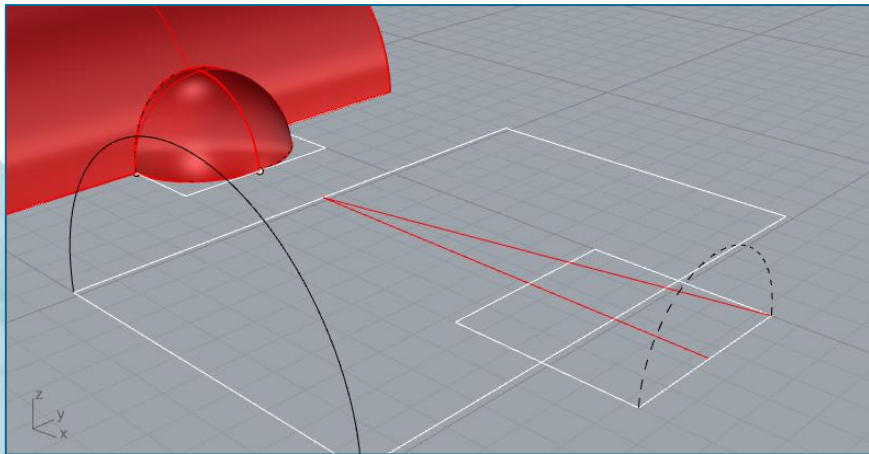


Luneta
esférica



Aula 06 – Abóbadas e Lunetas

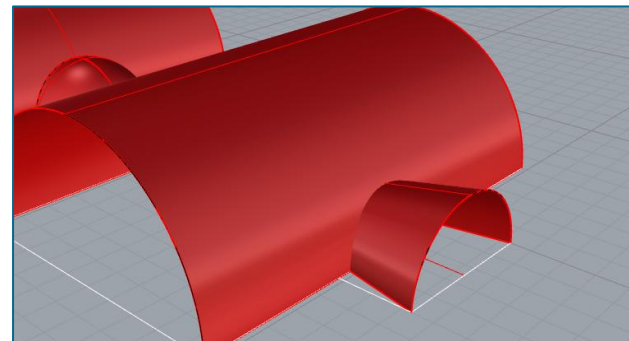




Fazer a geratriz do cone

RailRevolve: forma superfícies complexas que não são perfeitamente circulares a partir de um caminho (rail).

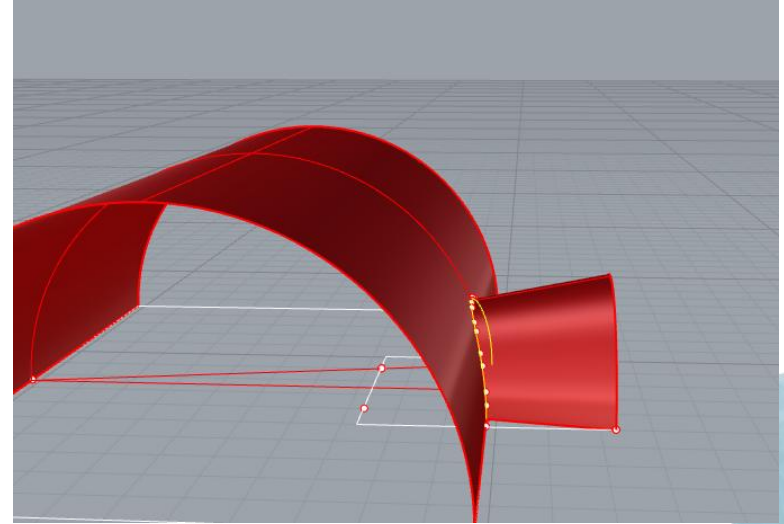
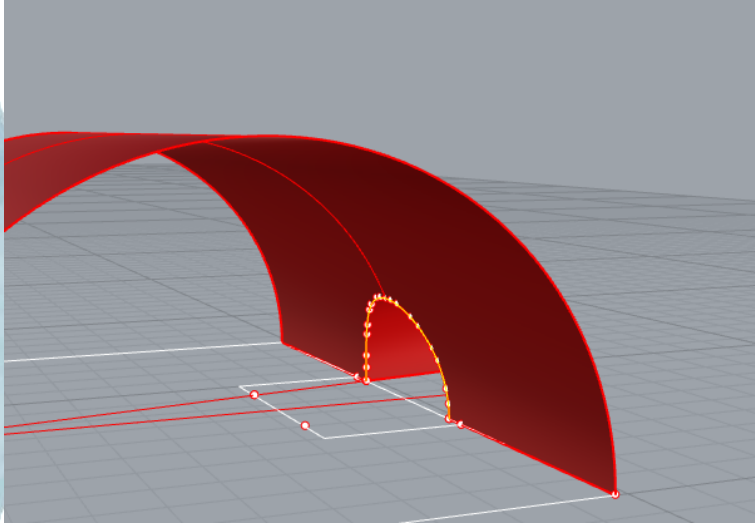
Geratriz- arco- enter



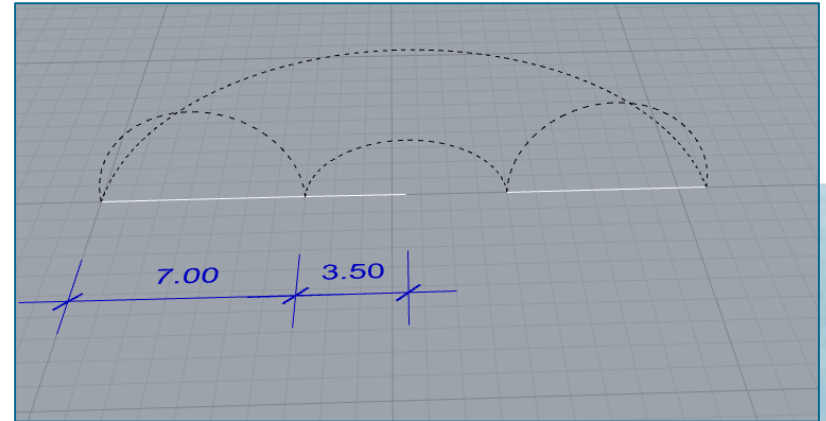
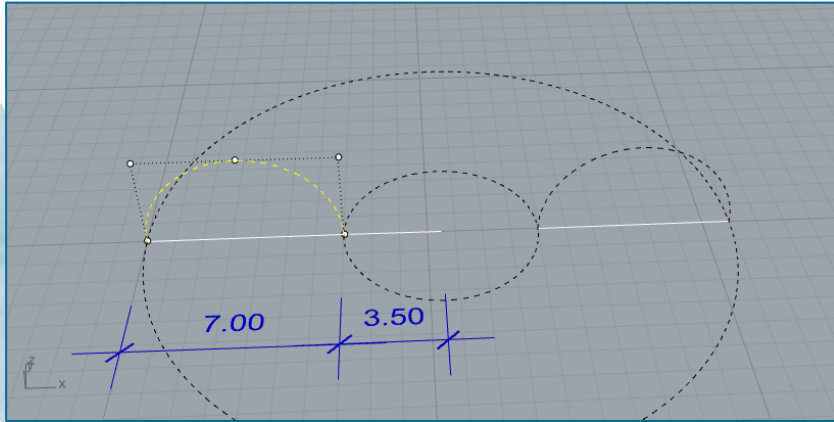
Aula 06 – Abóbadas e Lunetas



Luneta cónica

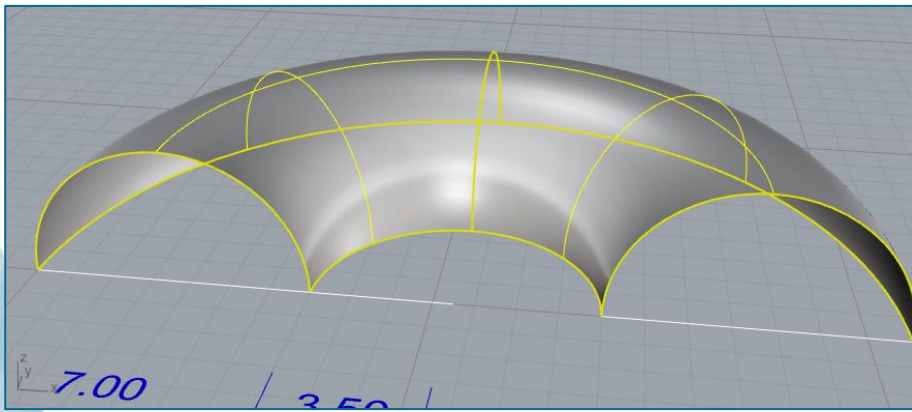


Abóbada Toral



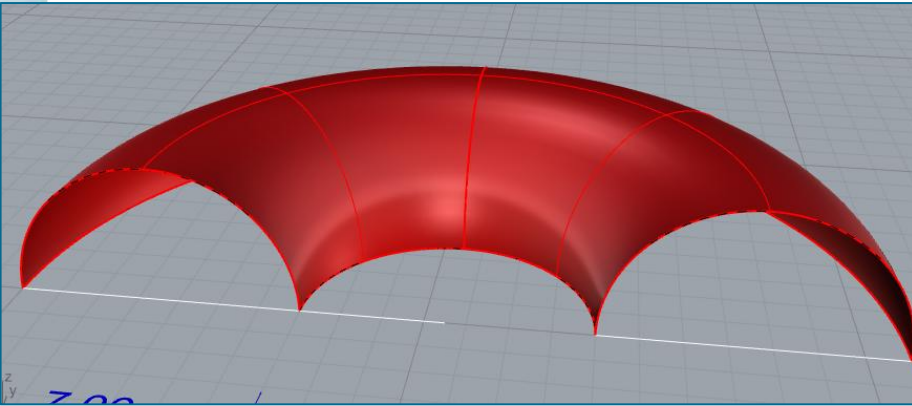
Aula 06 – Abóbadas e Lunetas



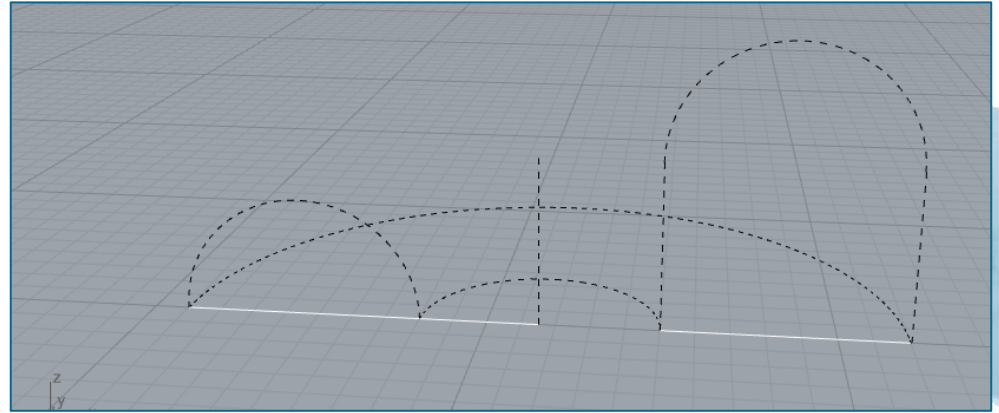
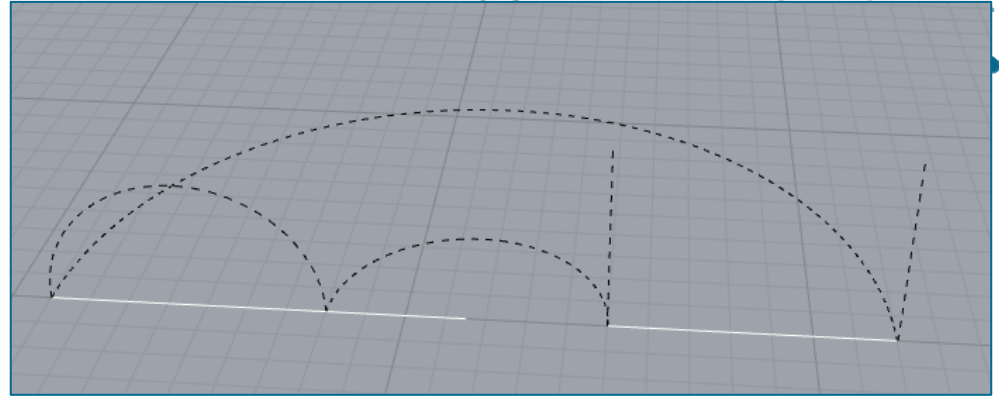


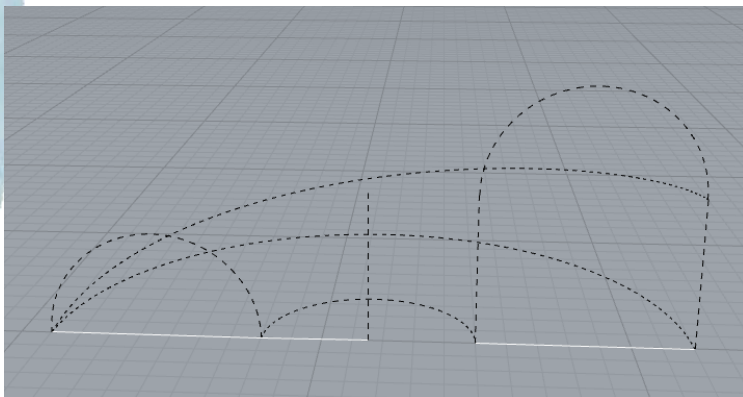
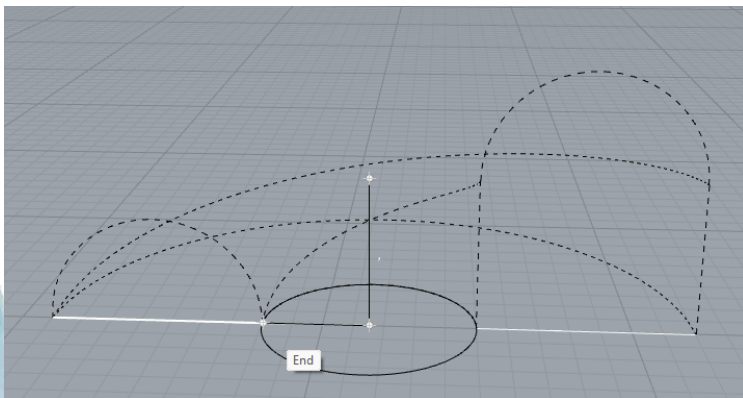
Abóbada Toral

Sweep2: cria uma superfície mais complexa usando duas curvas (os caminhos) e uma curva de secção (perfis).



Abóbada Helicoidal





Abóbada Helicoidal

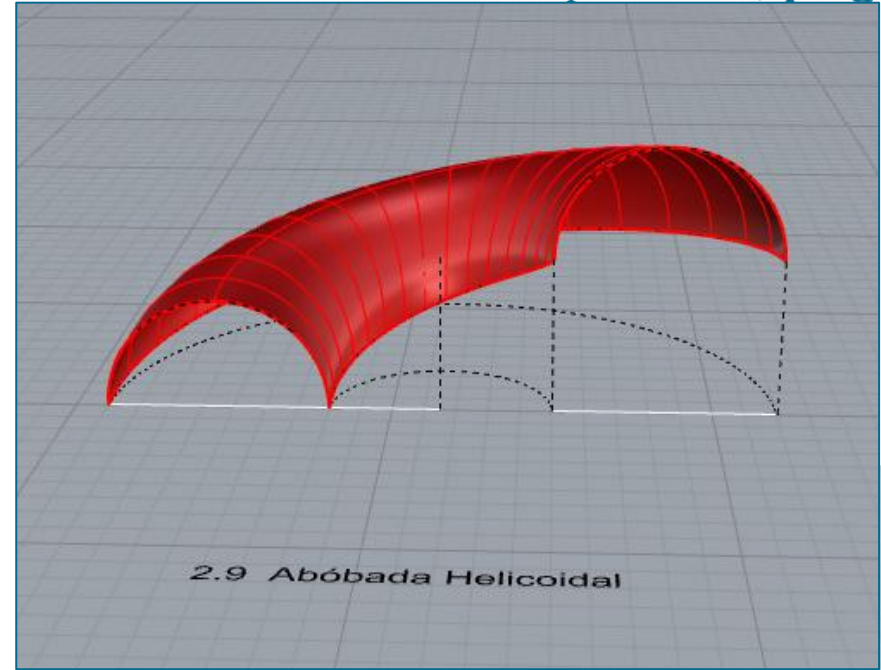
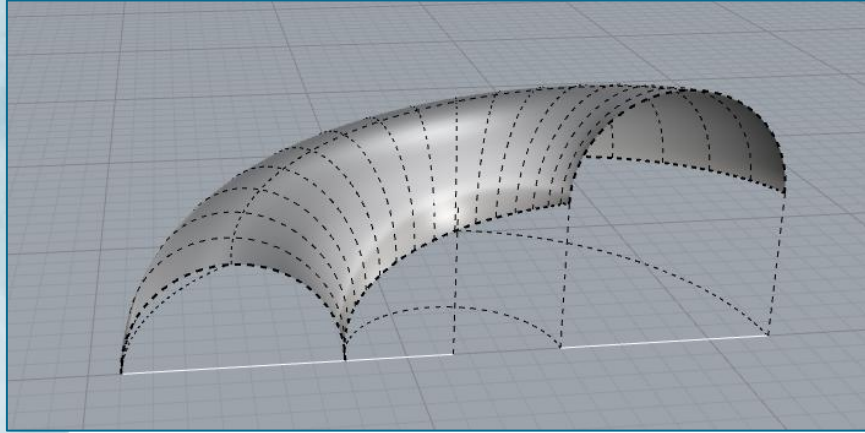
Hélix: para fazer a curva

Escolher o eixo- o raio- no de voltas

Turns 0,5

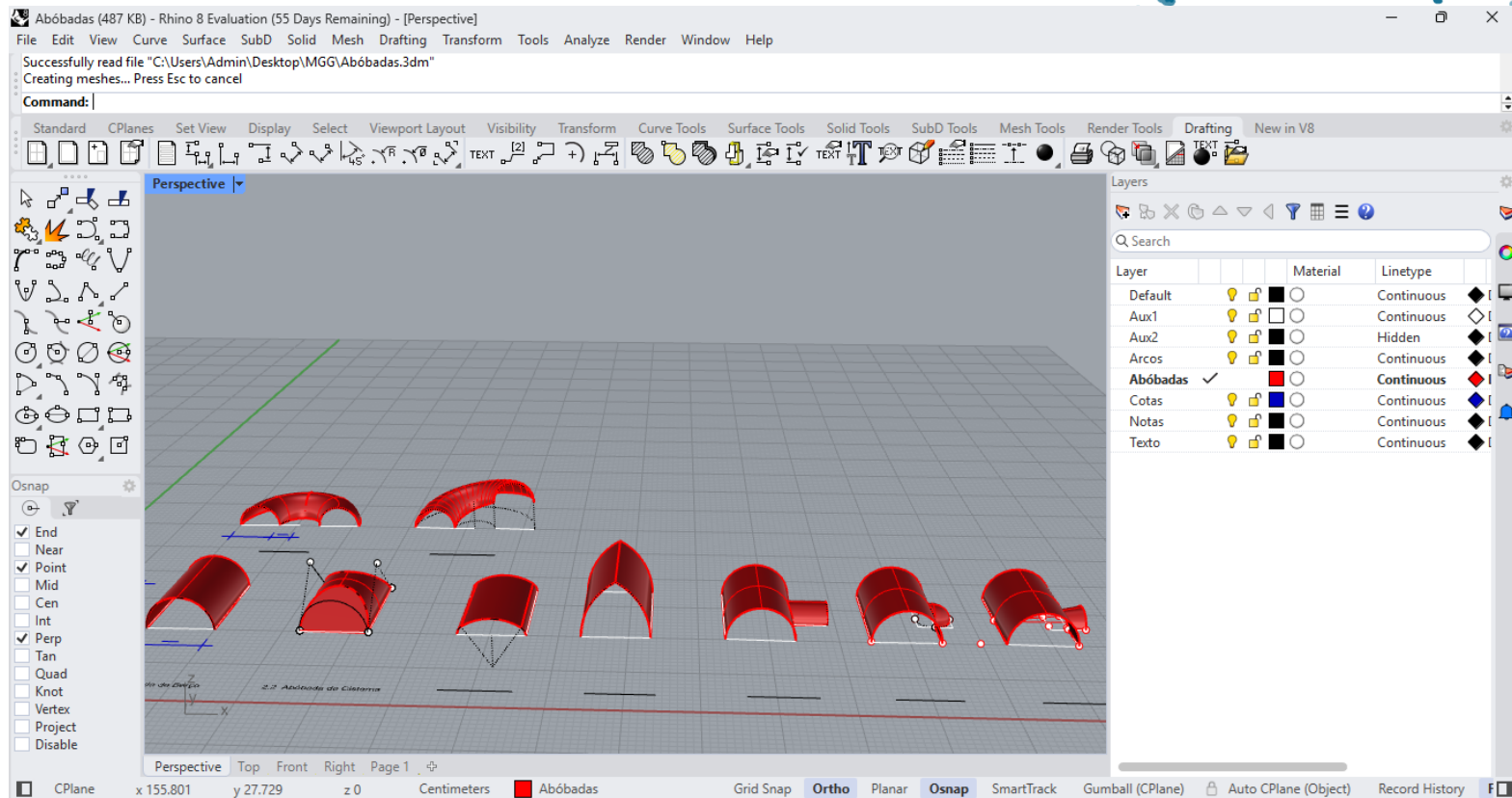
Se estiver ao contrário, fazer **Reverse twist**.





Aula 06 – Abóbadas e Lunetas

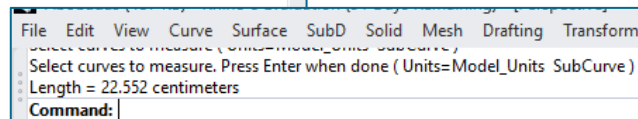
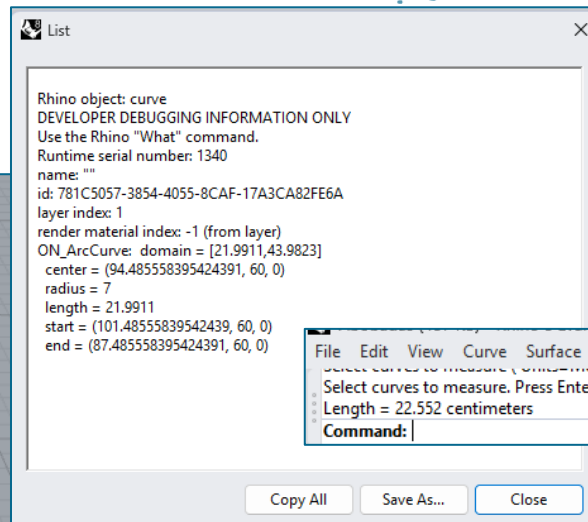
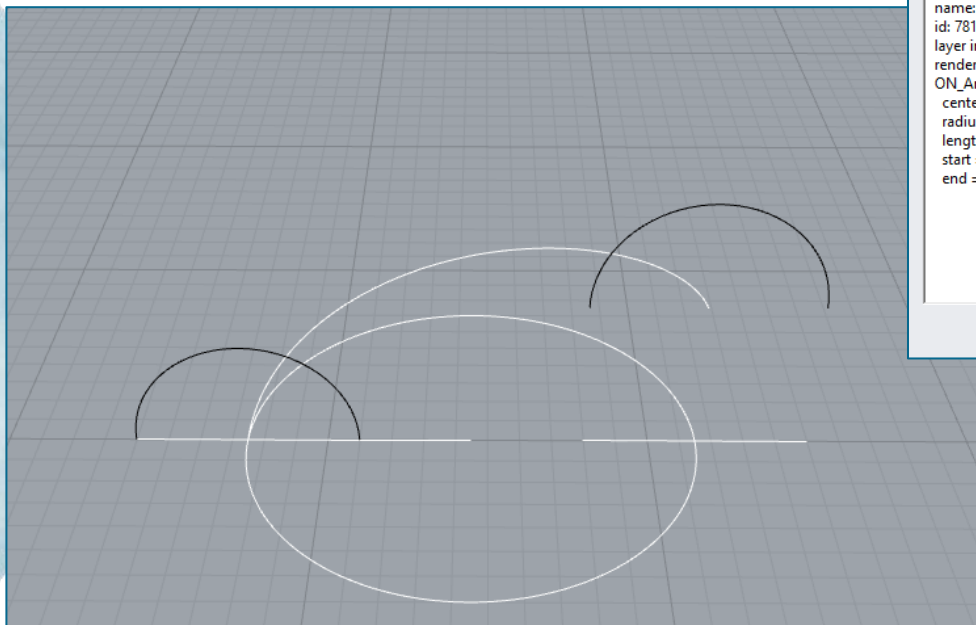




Aula 06 – Abóbadas e Lunetas



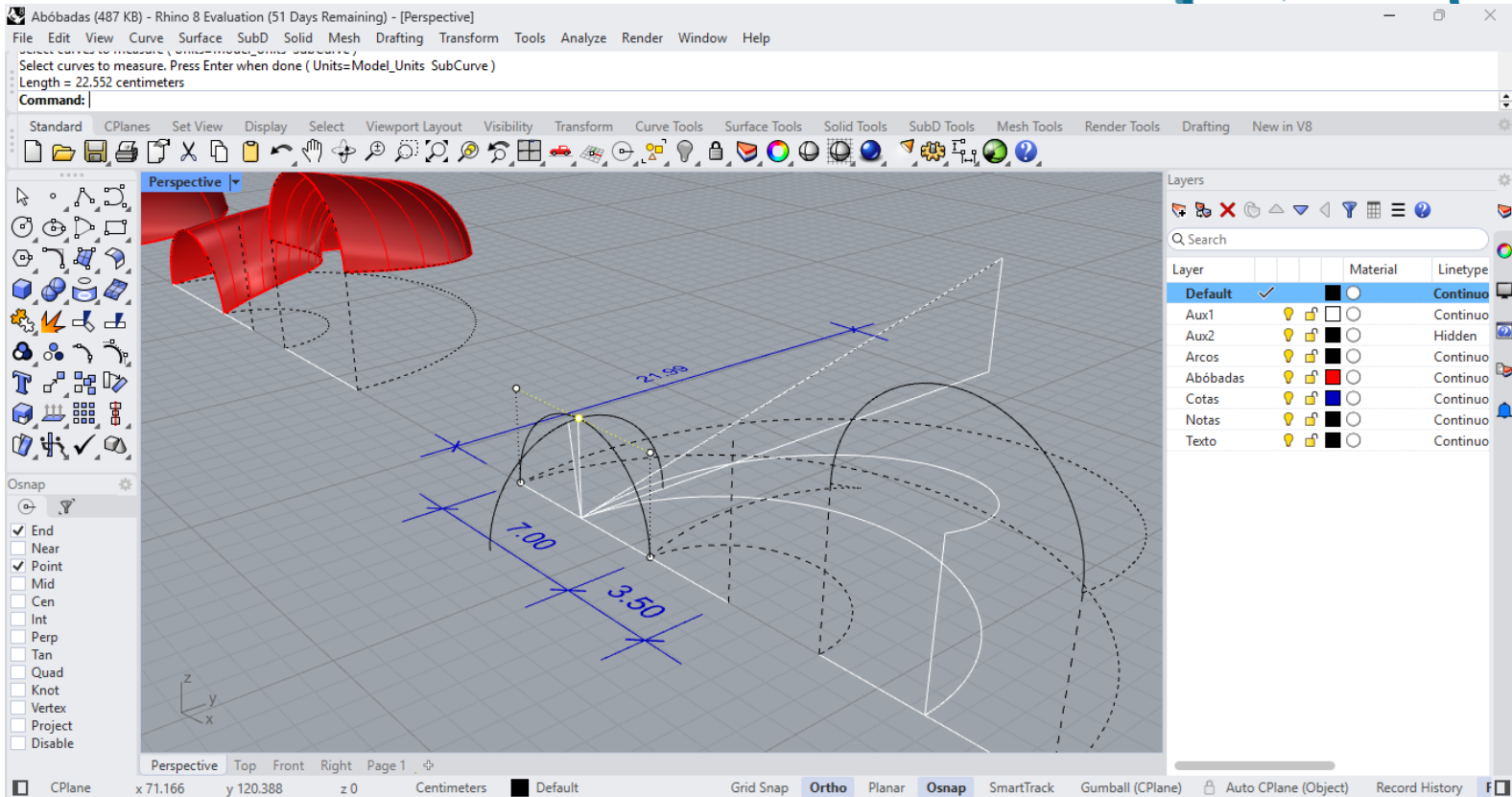
Abóbada Saint Gilles



Para saber o comprimento da helicoidal ou de qualquer linha, colocar o comando **list** ou **length**.

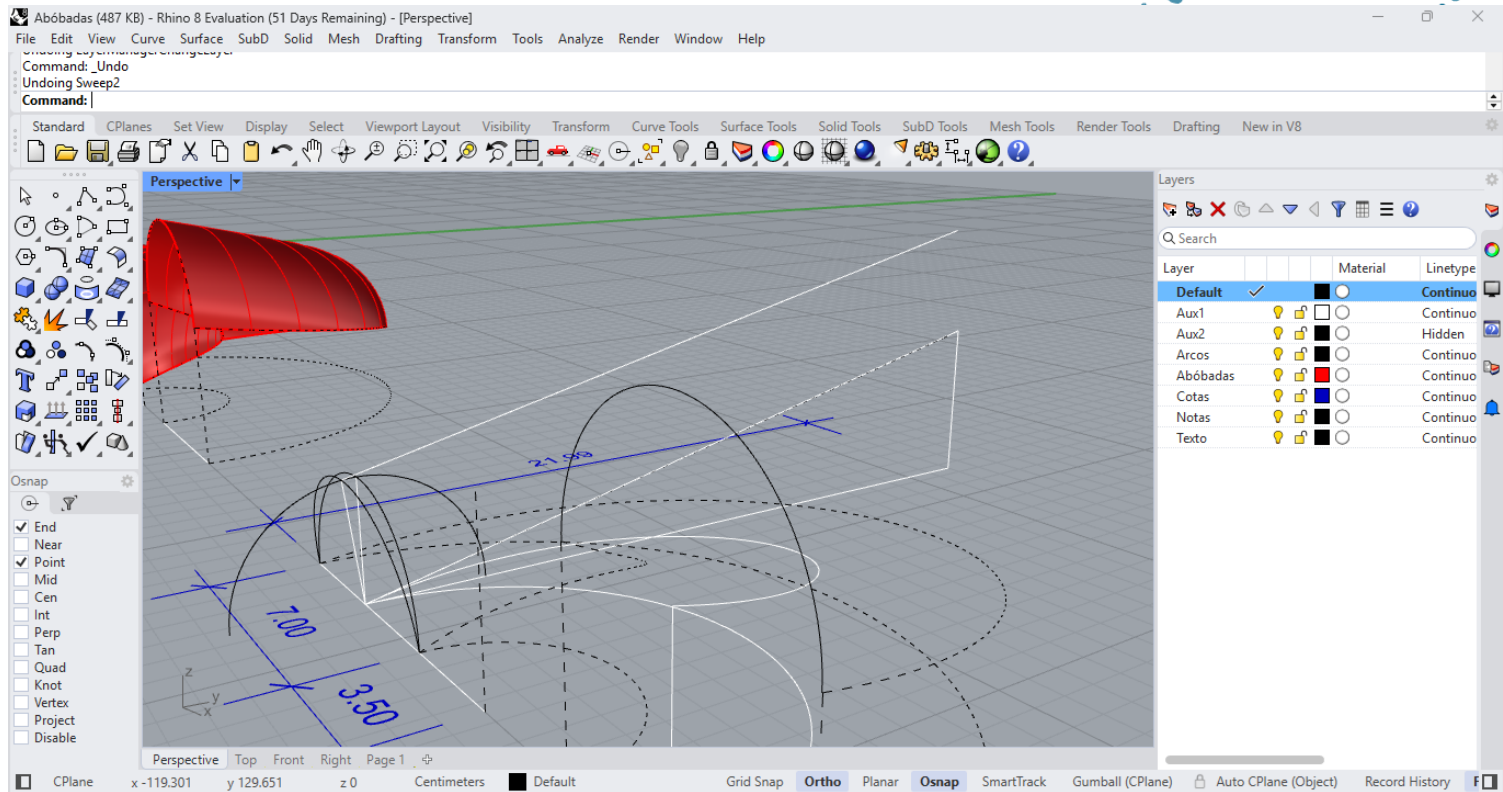
Aula 07 – Continuação Abóbadas





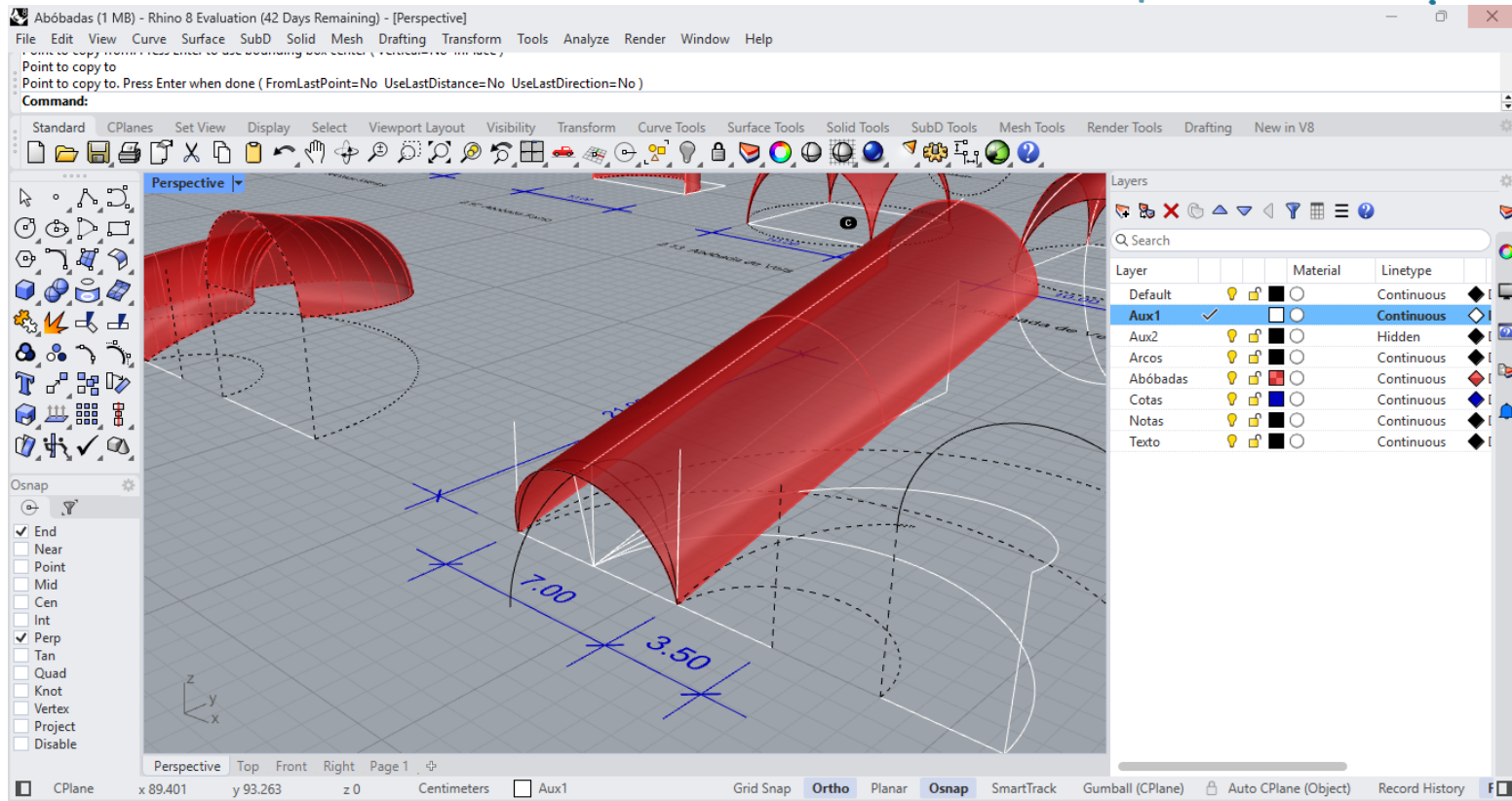
Aula 07 – Continuação Abóbadas





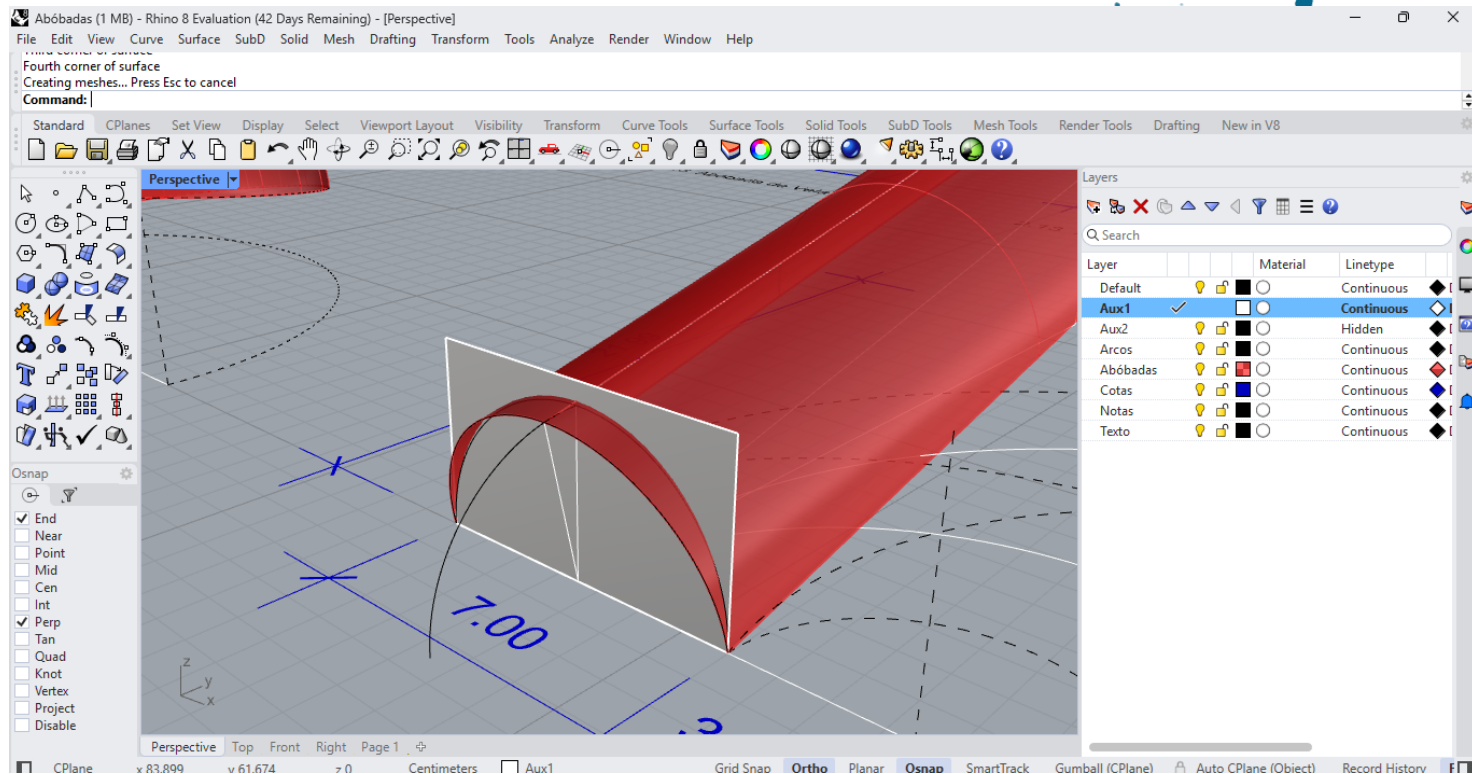
Aula 07 – Continuação Abóbadas





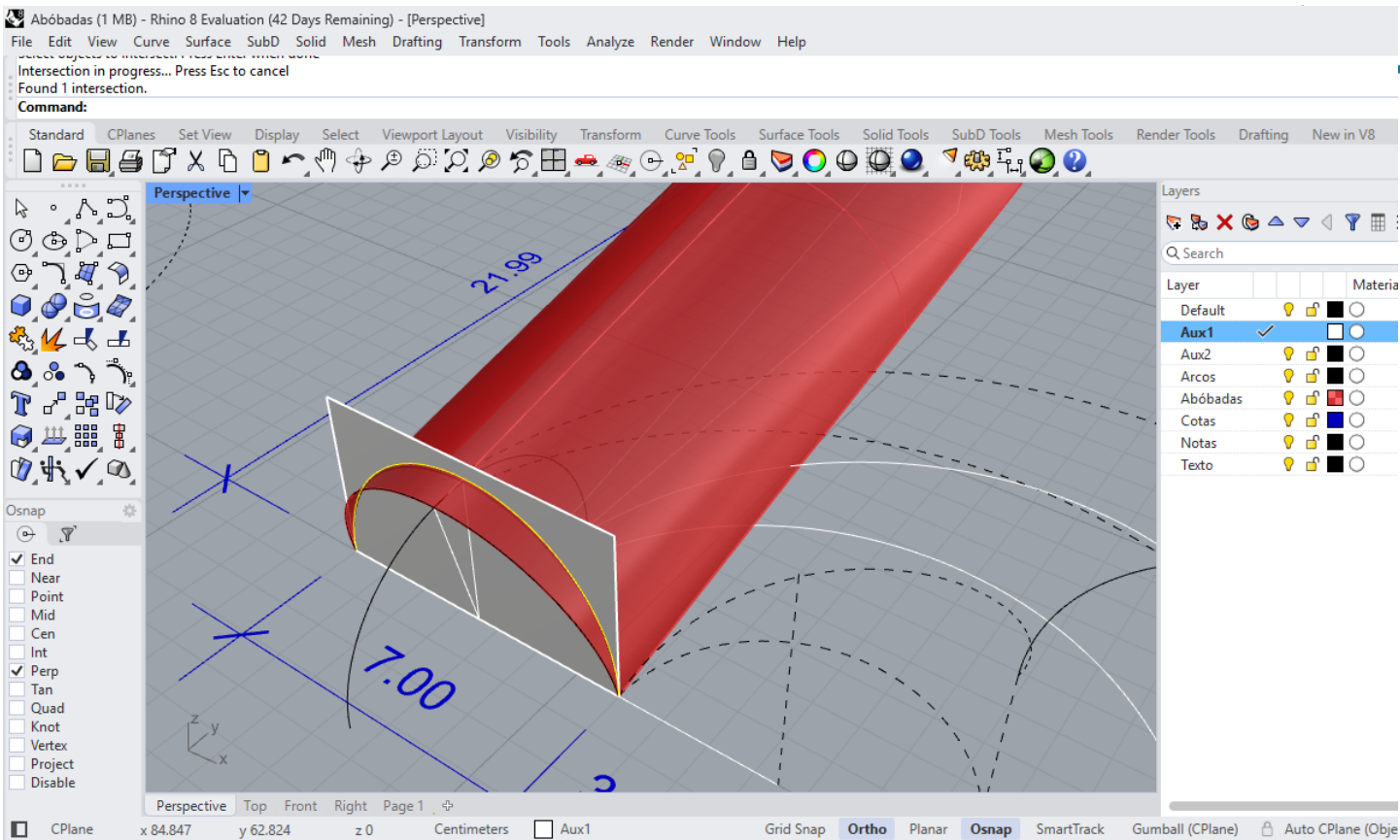
Aula 07 – Continuação Abóbadas





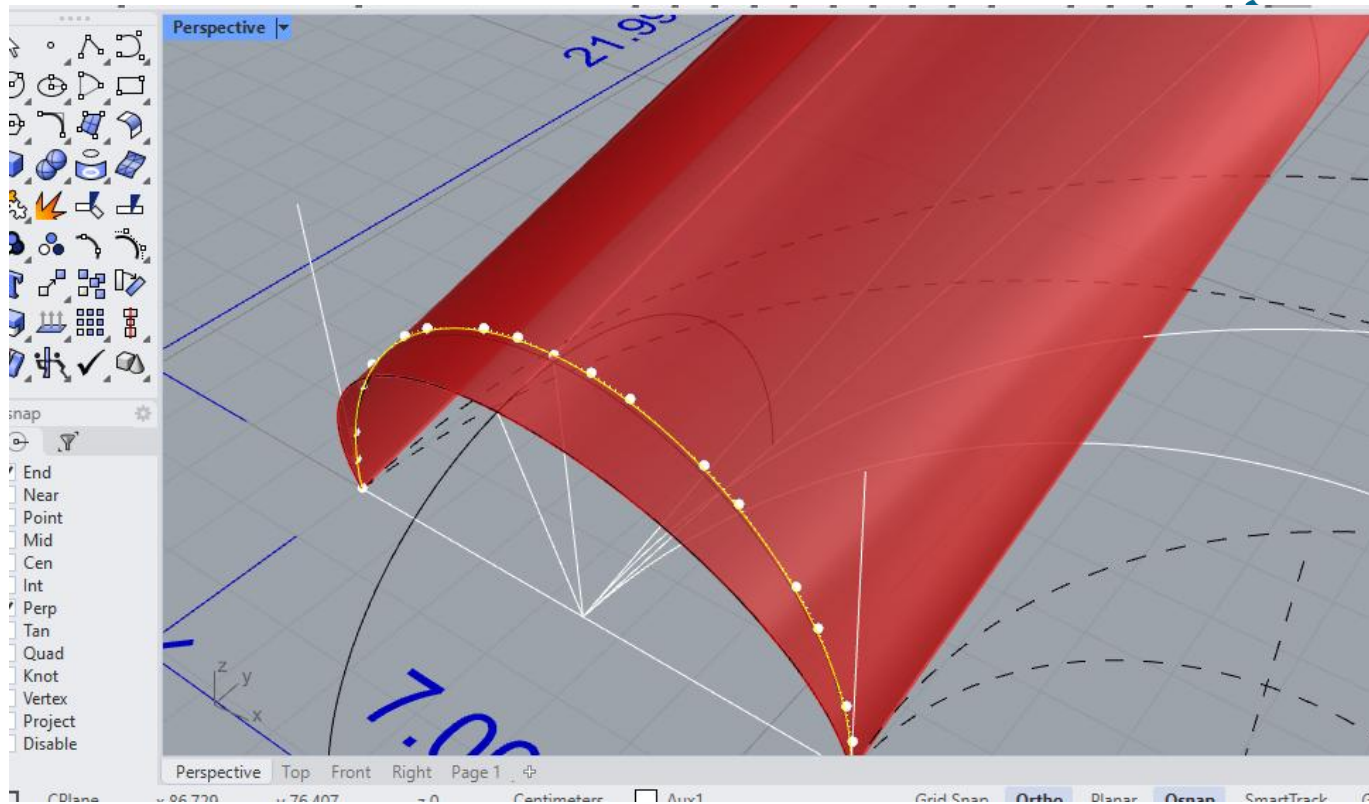
Aula 07 – Continuação Abóbadas





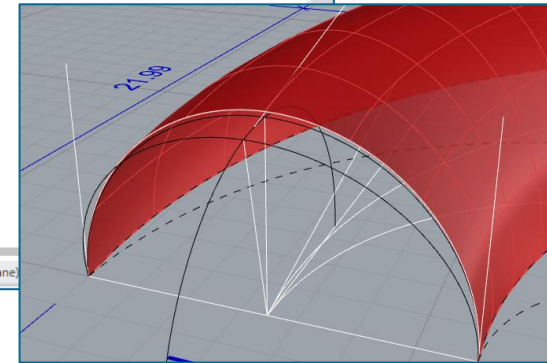
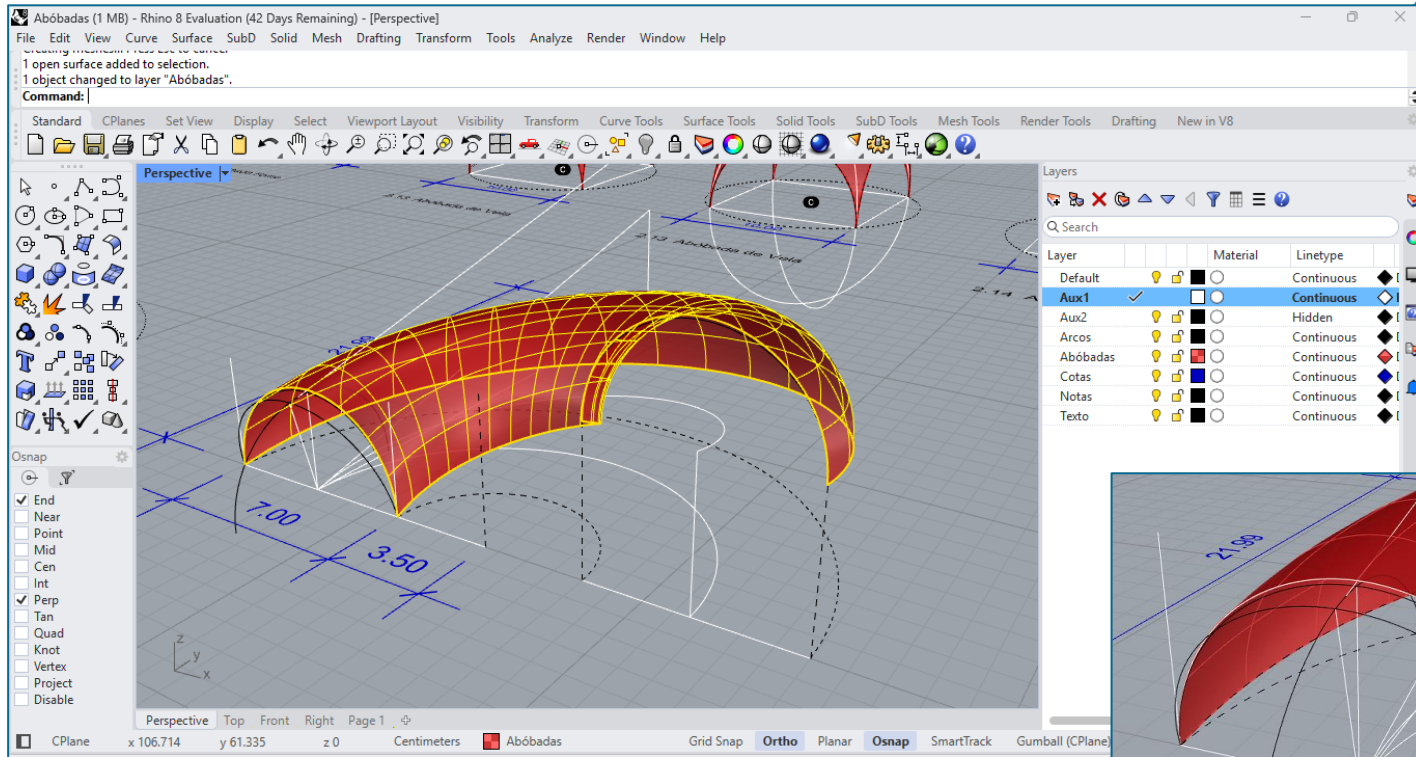
Aula 07 – Continuação Abóbadas





Aula 07 – Continuação Abóbadas



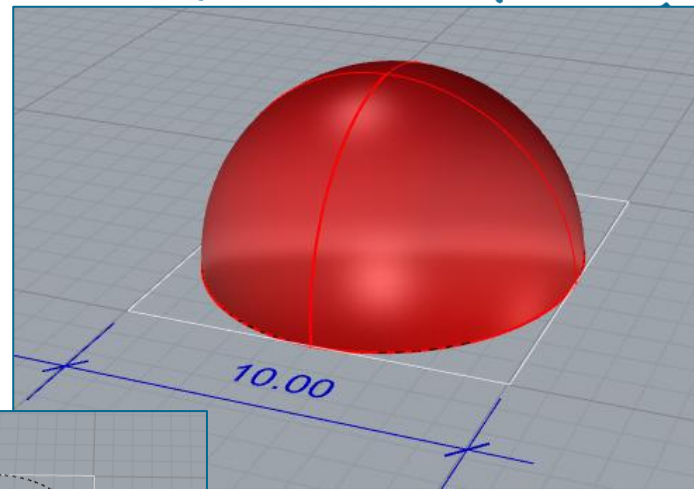
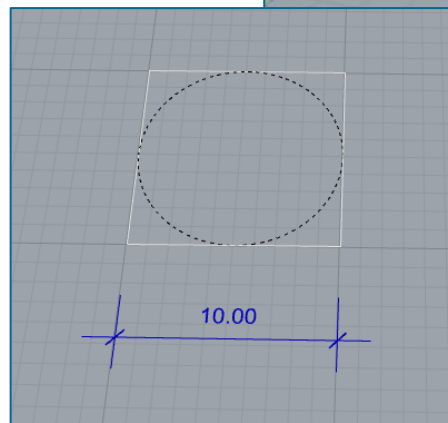
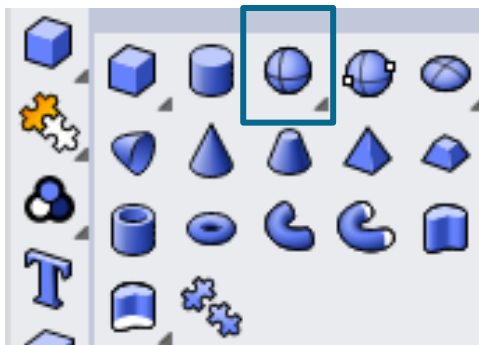


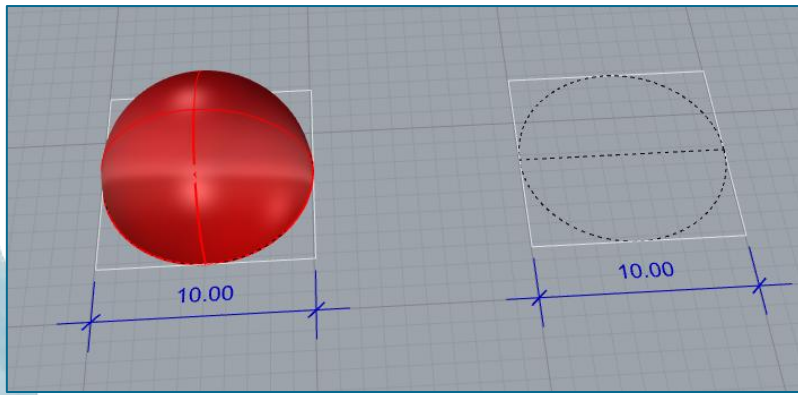
Aula 07 – Continuação Abóbadas



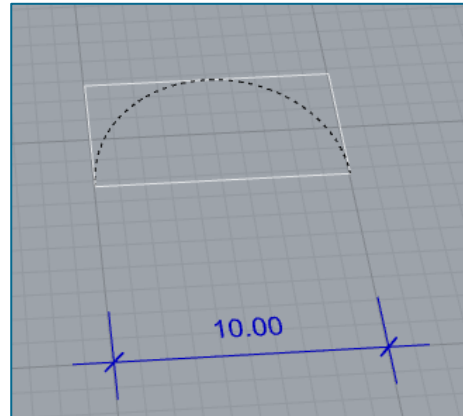
Abóbada Esférica

Em primeiro fazer num quadrado um circunferência circunscrito e de seguida, o **sphere** (esfera). Tirar a parte de baixo com trim.



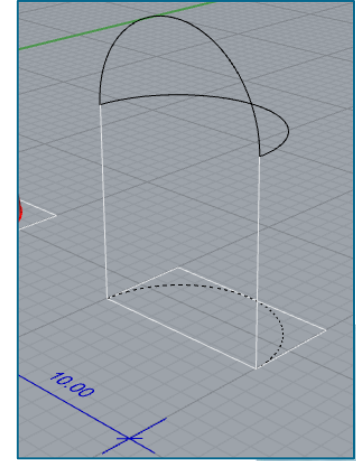


Fazer copy da abobada anterior e eliminar o que não vai ser necessário.



Abóbada Forno

Utilizar metade do quadrado e do círculo. Duas lines iguais em cada canto e uma cópia da semicircunferência para os pontos de cima da line criada. Fazer outra semicircunferência, desta vez vertical.

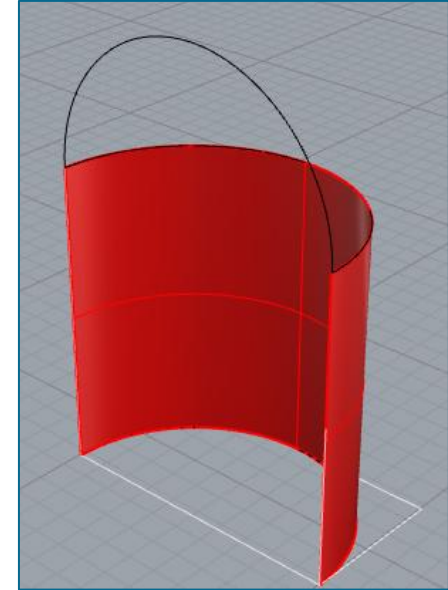
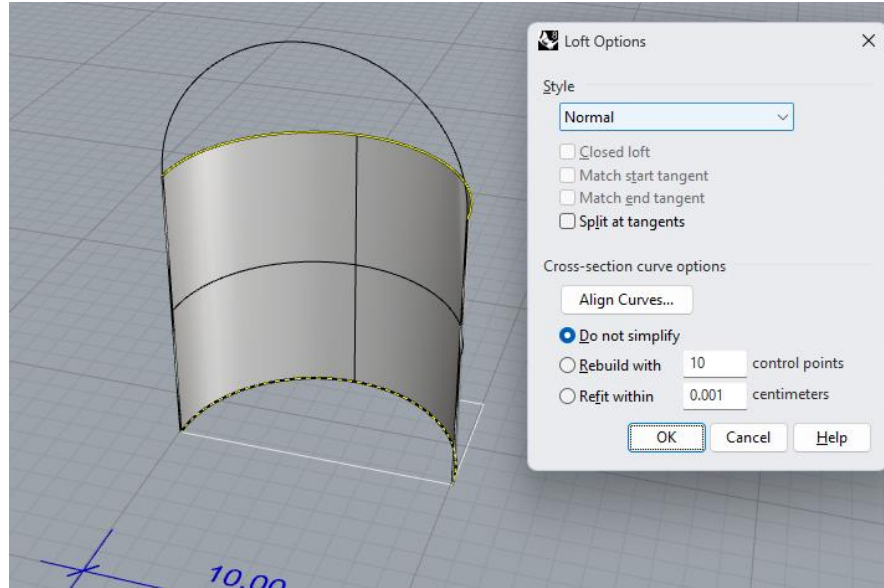


Aula 07 – Continuação Abóbadas



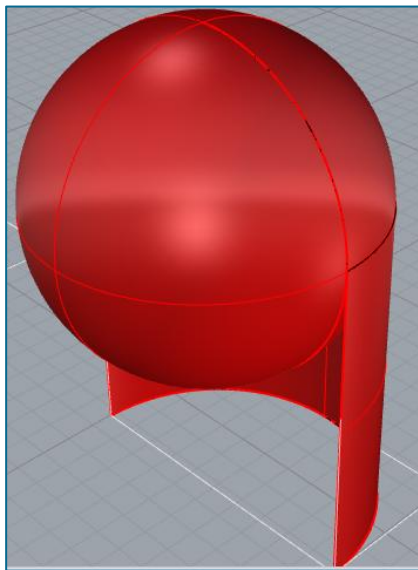
Abóbada Forno

Loft- Criar uma superfície através de duas ou mais curvas.



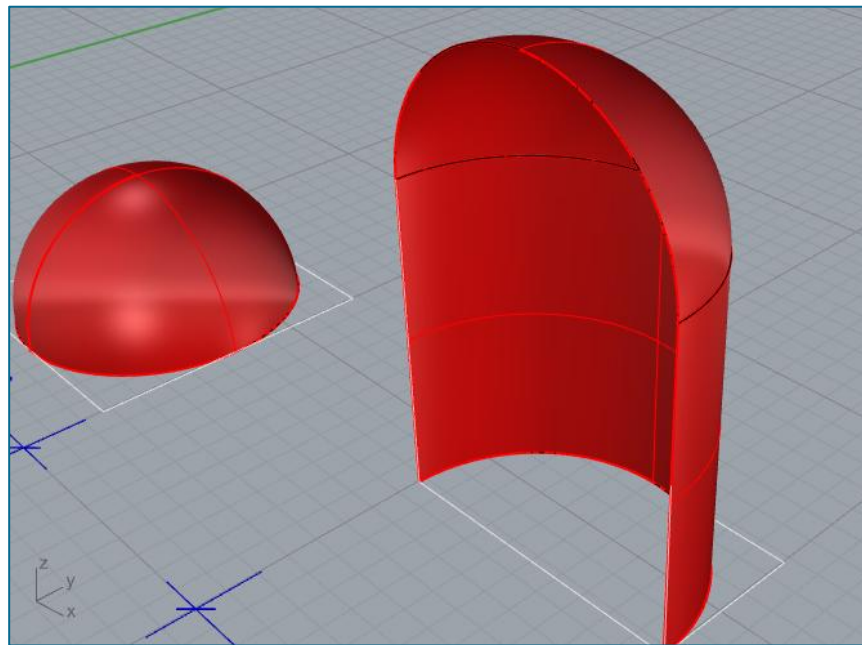
Aula 07 – Continuação Abóbadas





Abóbada Forno

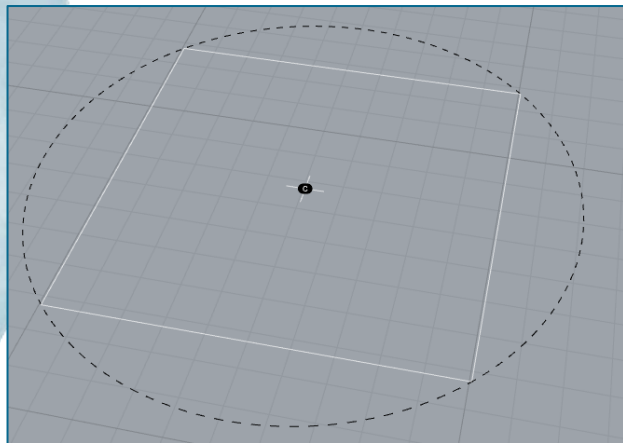
Para a parte superior, fazer uma esfera e retirar as partes a mais.



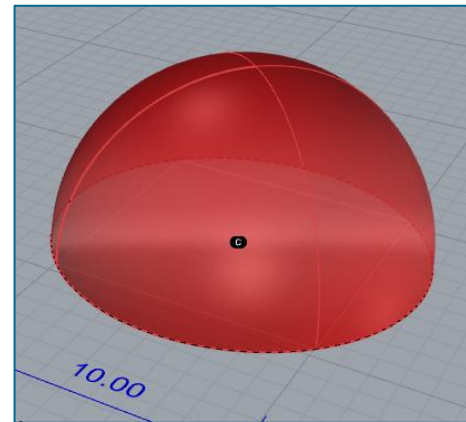
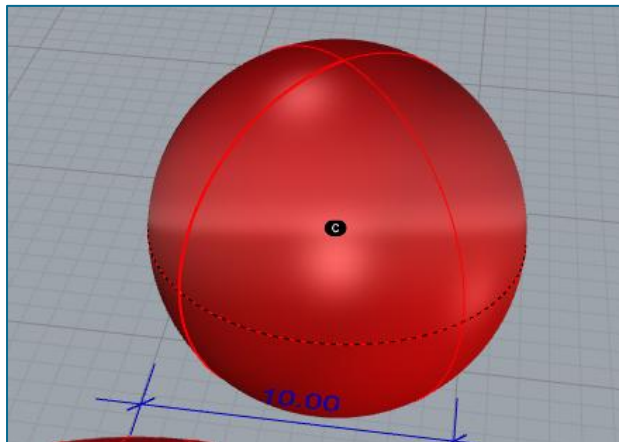
Aula 07 – Continuação Abóbadas



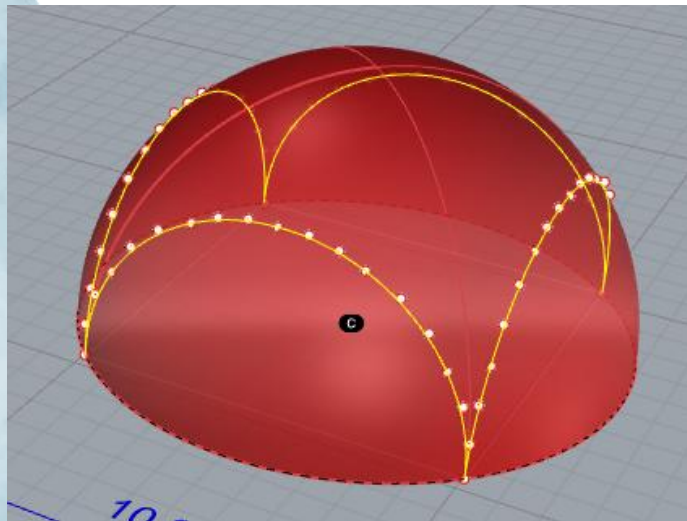
Fazer a mesma coisa que fizemos na abobada esférica, contudo com a circunferência fora do quadrado.



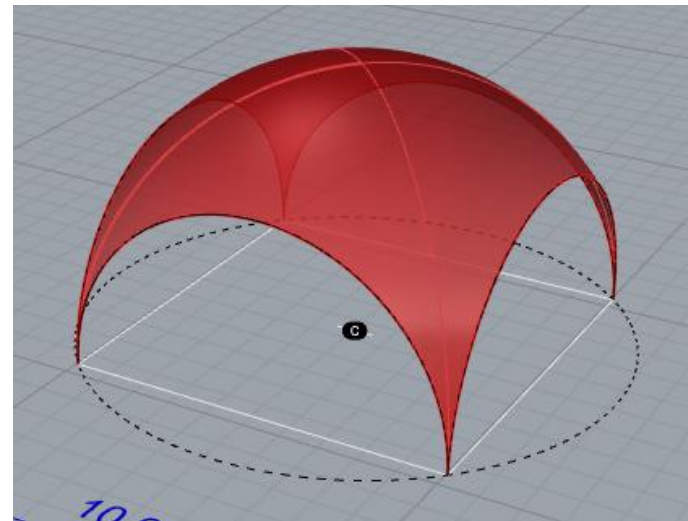
Abóbada de Vela



Abóbada de Vela



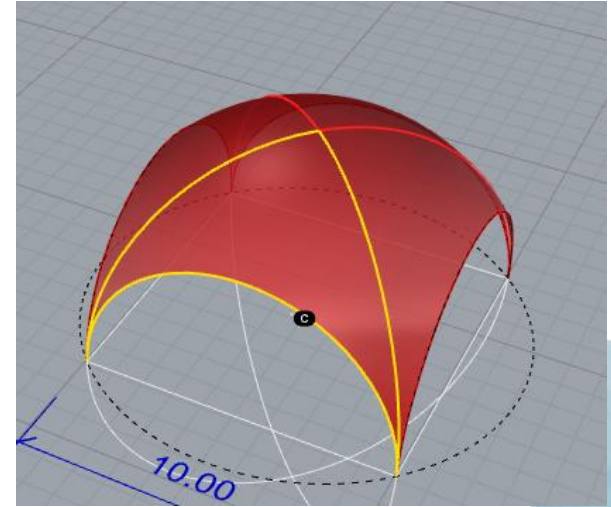
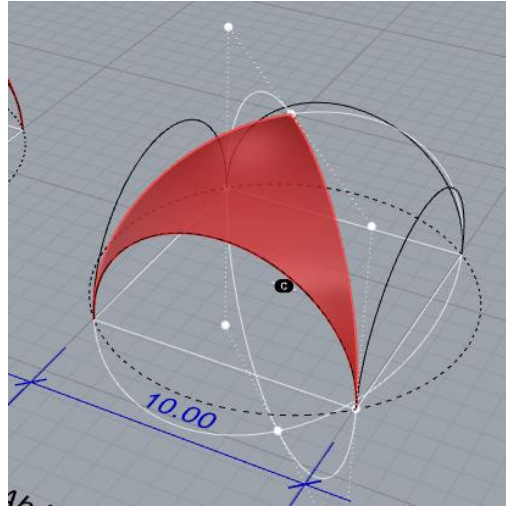
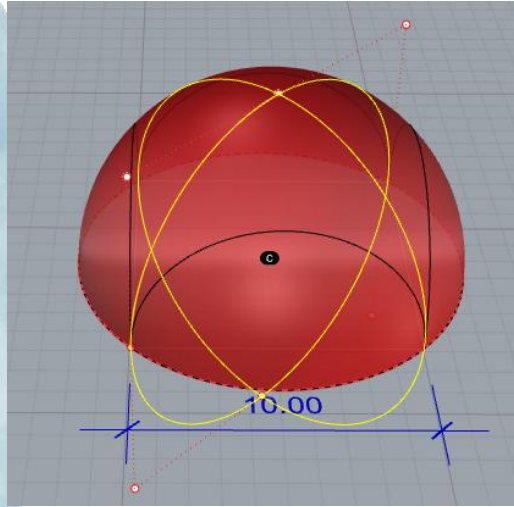
Intersect object
para marcar as
linhas que
interseccionam o
quadrado e a
esfera. De seguida
o Trim.



Aula 07 – Continuação Abóbadas



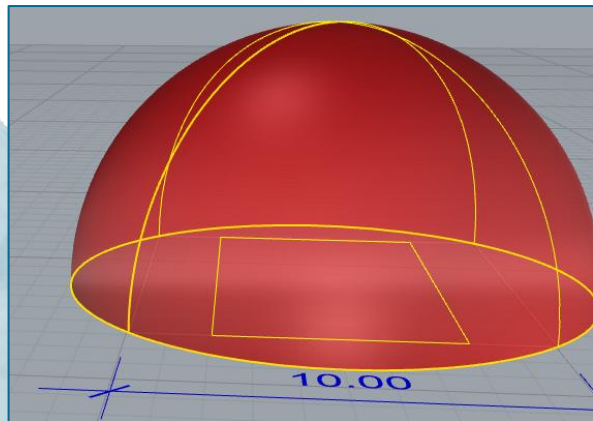
Abóbada de Vela



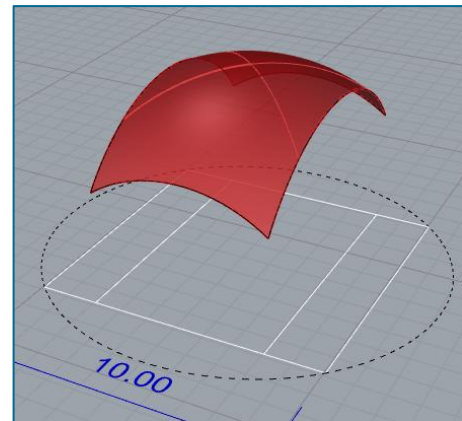
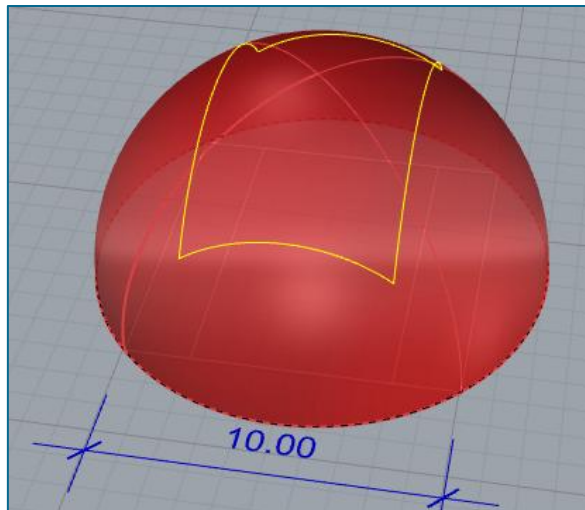
Aula 07 – Continuação Abóbadas



Abóbada de Alongada



Igual á abobada de vela, mas
fazer um retângulo dentro da
circunferência e do quadrado.

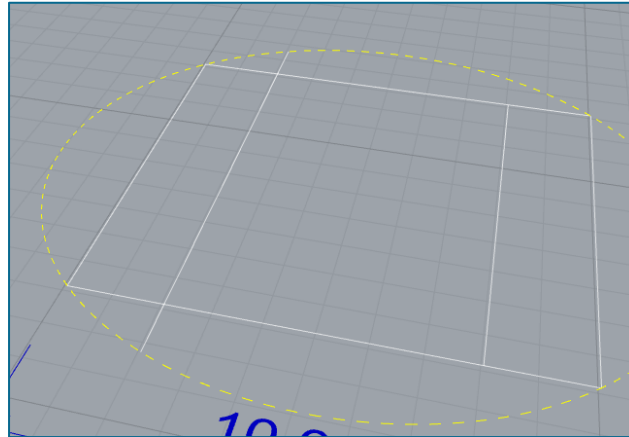
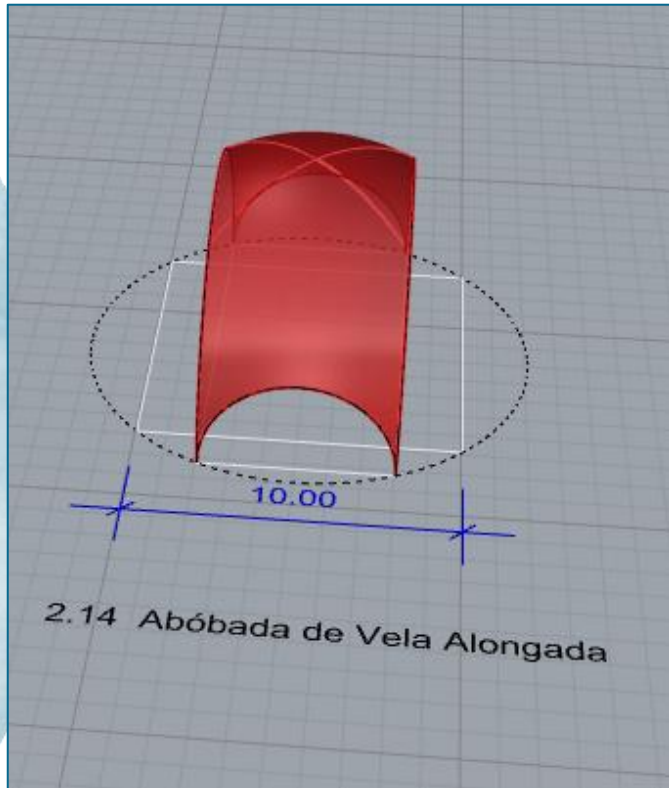


Aula 07 – Continuação Abóbadas

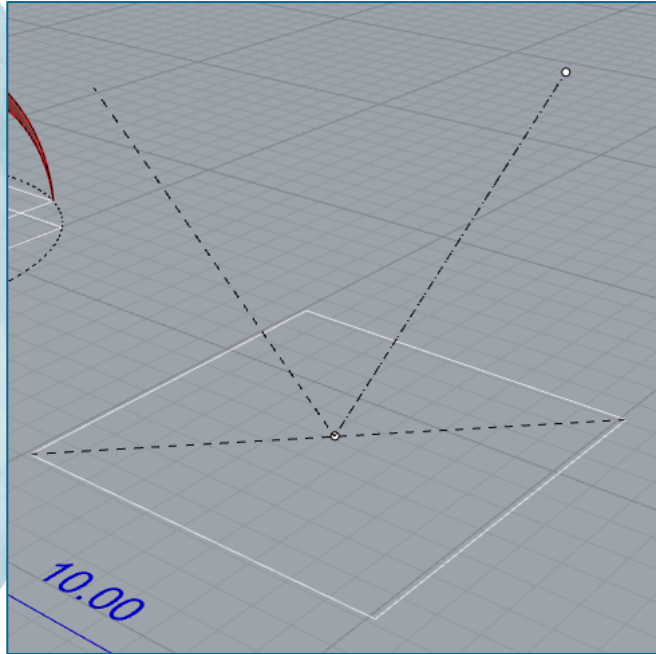


Abóbada de Vela Alongada

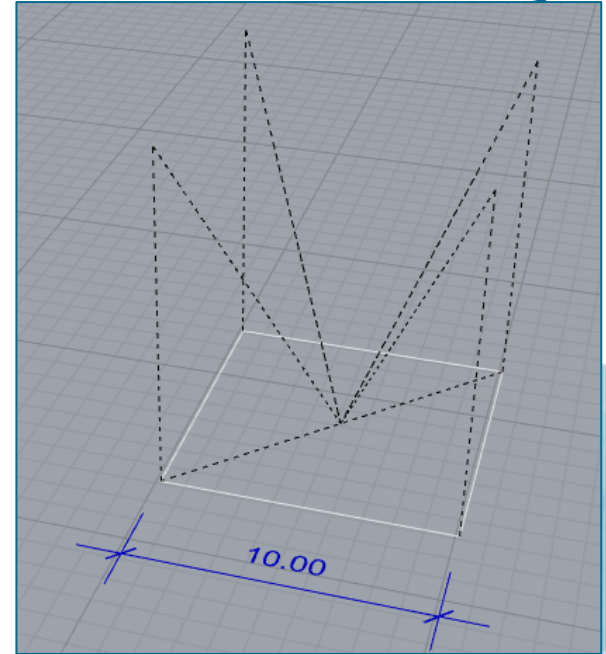
Igual á abobada de vela também, no entanto com um retângulo circunscrito na circunferência.



Abóbada Catalã

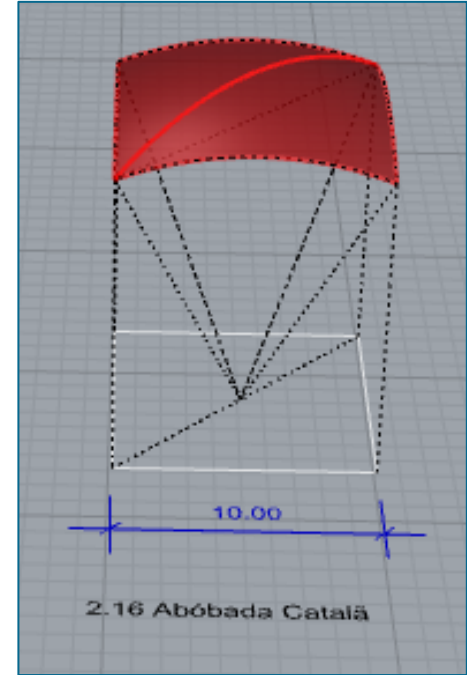
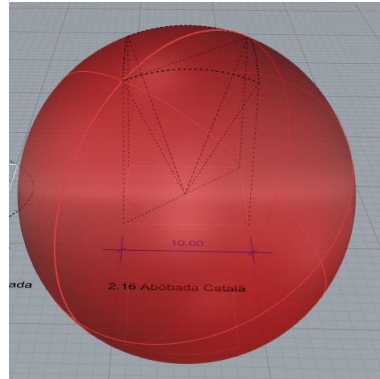
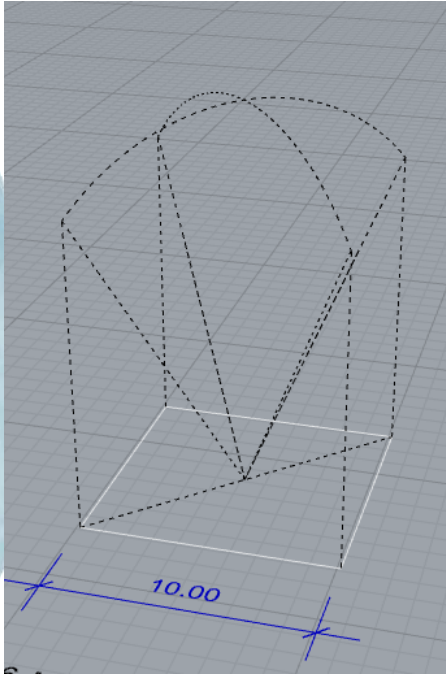


Num quadrado, fazer a diagonal e no centro uma line @10<45<60, de seguida o mirror dessa line.

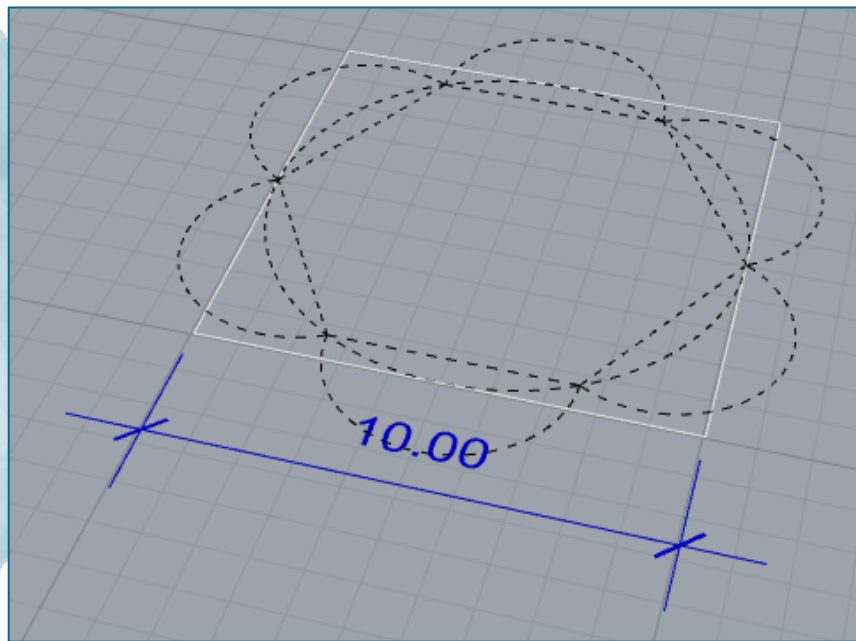


Abóbada Catalã

Fazer uma esfera e trim do desnecessário.



Abóbada Alveolada



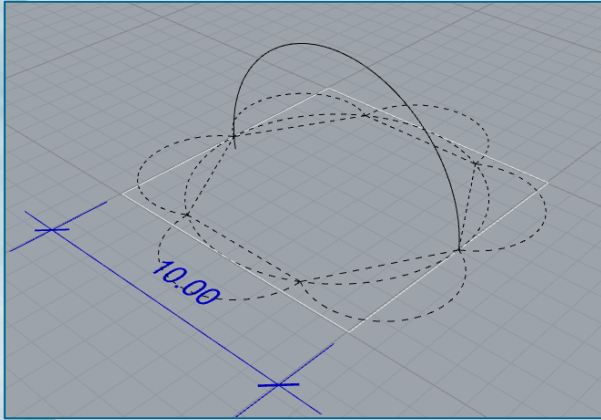
Iniciar com o quadrado e o círculo.

Polygon- para fazer um polígono, neste caso um hexágono inscrito na circunferência.

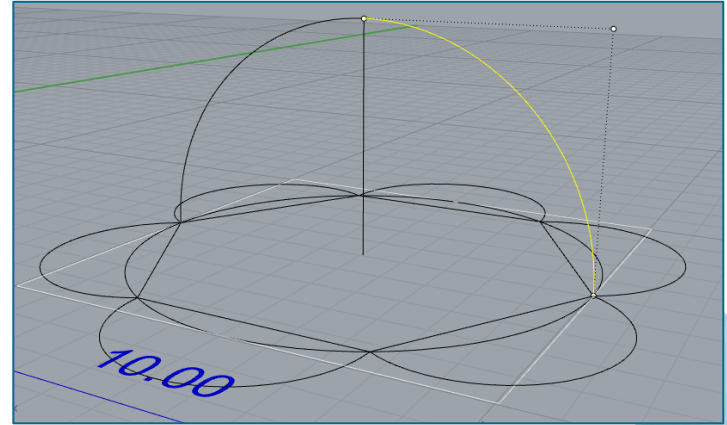
Array polar fazemos uma semicircunferência em todos os lados do hexágono.



Abóbada Alveolada



Fazer uma
semicircunferência
vertical, **split** para
separar as duas
metades dela





Abóbada Alveolada

Railrevolve

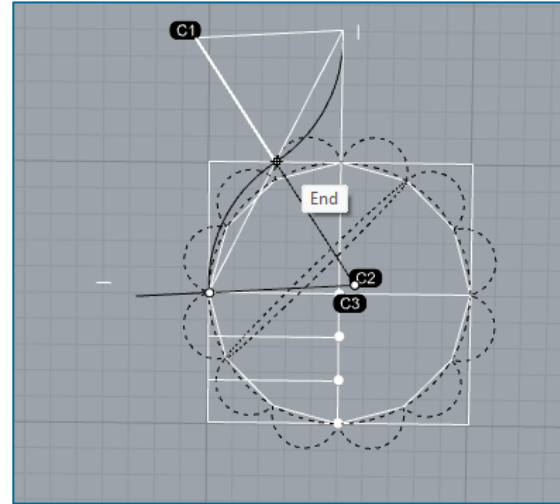
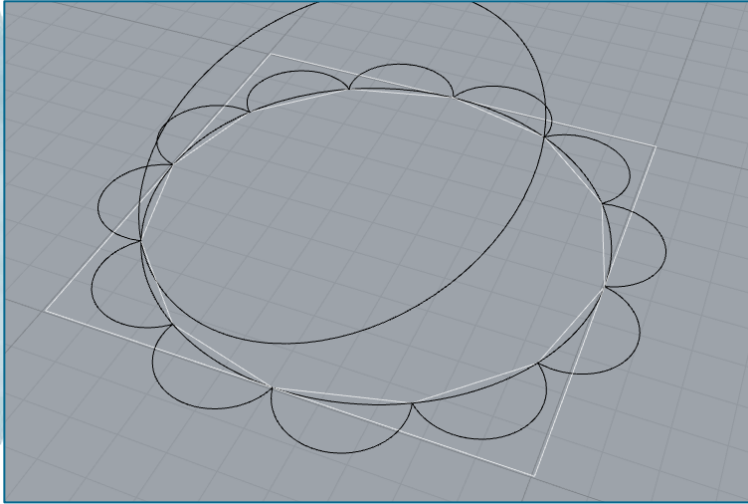
2.16 Abóbada Alveolada

Aula 07 – Continuação Abóbadas



Abóbada Alveolada de bolbo

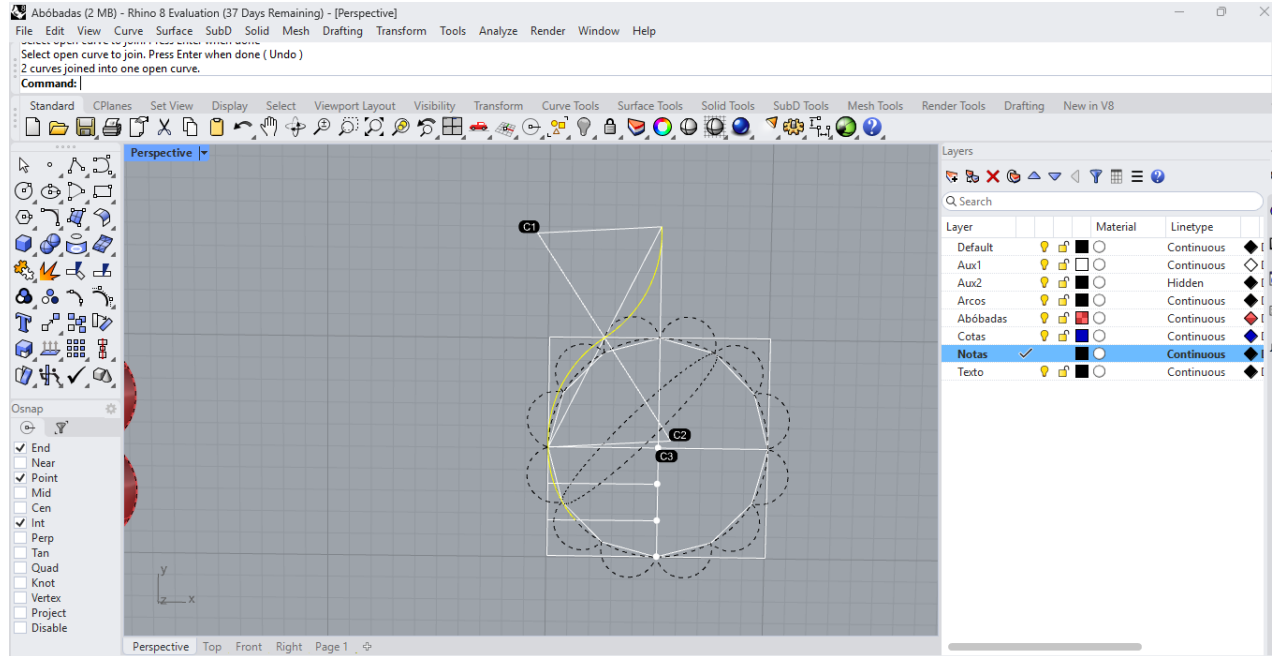
Faz-se a mesma base que a abóbada alveolada, mas em vez de ser um hexágono, é um dodecágono. A seguir, preparar a curva para o rairevolve.



Aula 08 – Conclusão Abóbadas



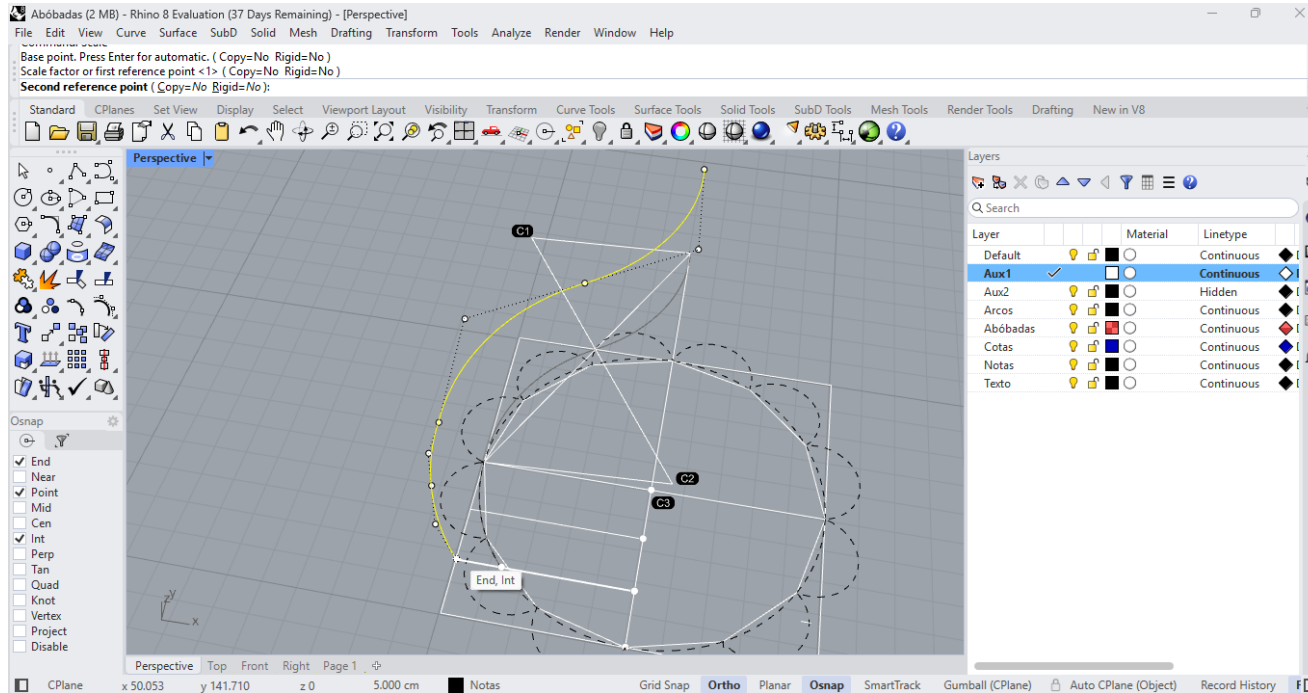
Abóbada Alveolada de bolbo



Aula 08 – Conclusão Abóbadas



Abóbada Alveolada de bolbo

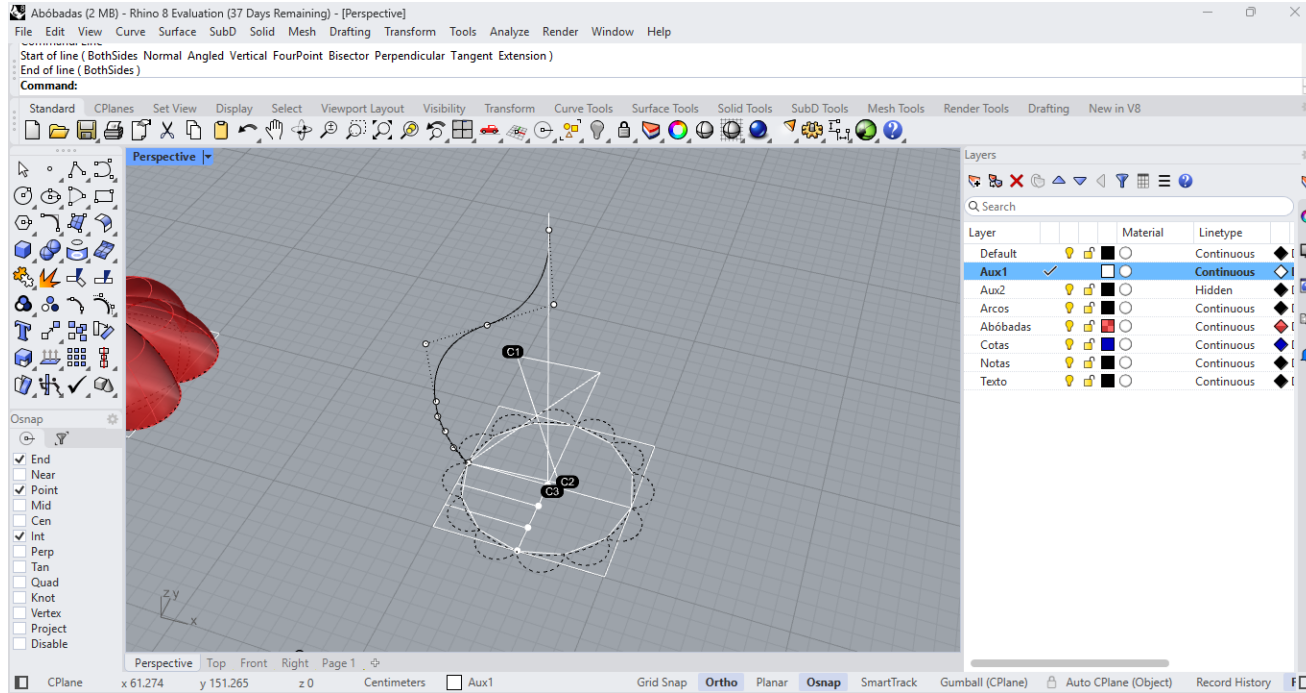


Scale: para
escalar um
elemento

Aula 08 – Conclusão Abóbadas



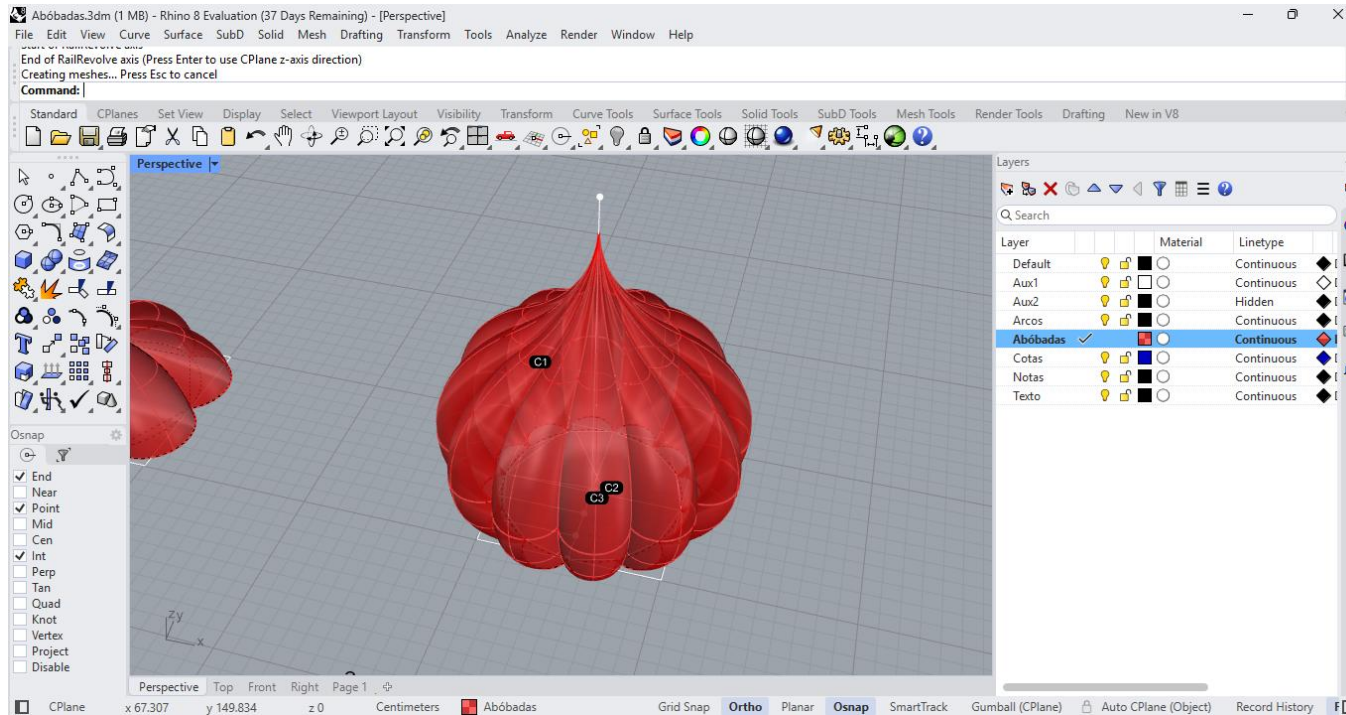
Abóbada Alveolada de bolbo



Aula 08 – Conclusão Abóbadas



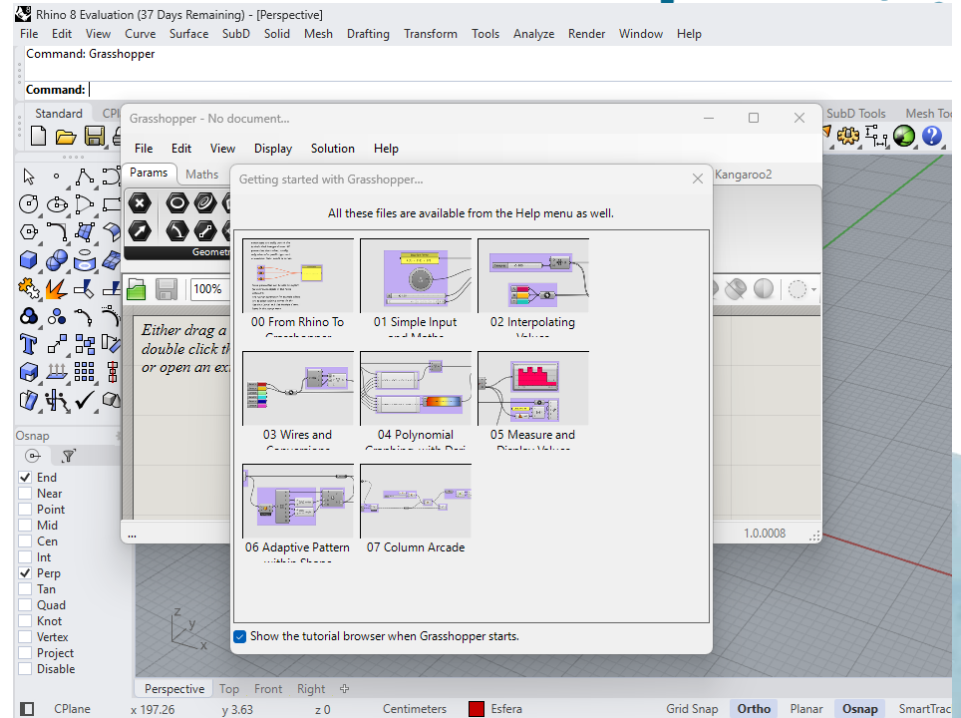
Abóbada Alveolada de bolbo



Aula 08 – Conclusão Abóbadas

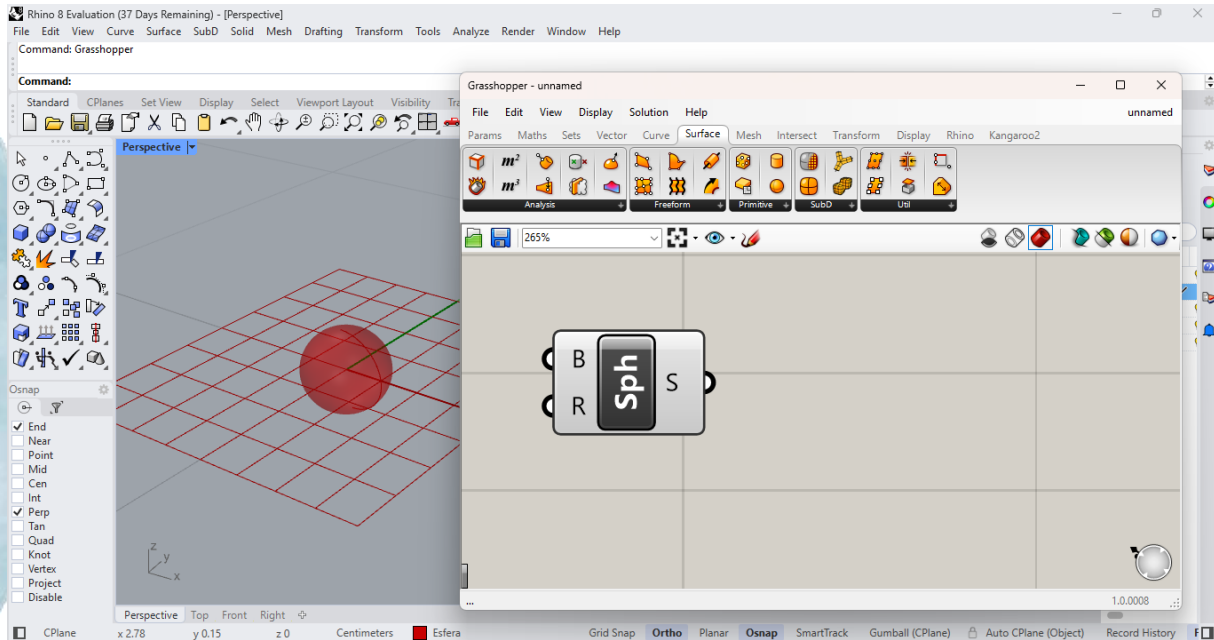


O Grasshopper é um editor de **programação visual** dentro do Rhino. Em vez de modelar um objeto clicando em botões e arrastando, cria-se um "mapa"



Aula 08 – Grasshopper



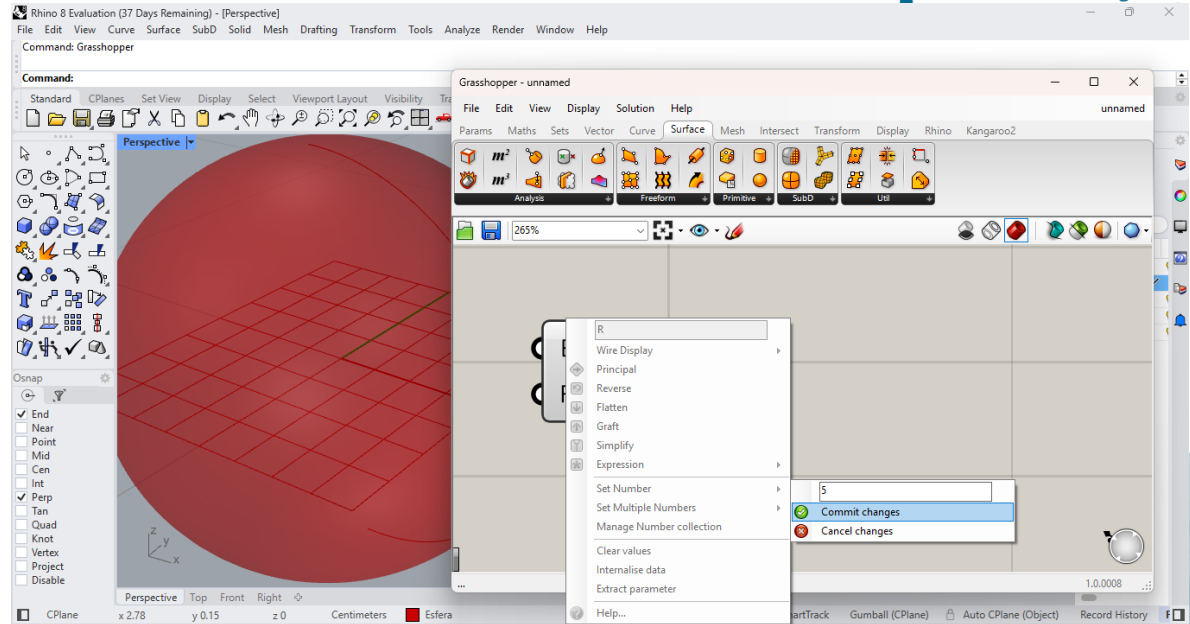


Para criar uma esfera,
por exemplo podemos
ir ao painel de cima e
escolher a sphere ou
clicar 2x e escrever
sphere.

Aula 08 – Grasshopper

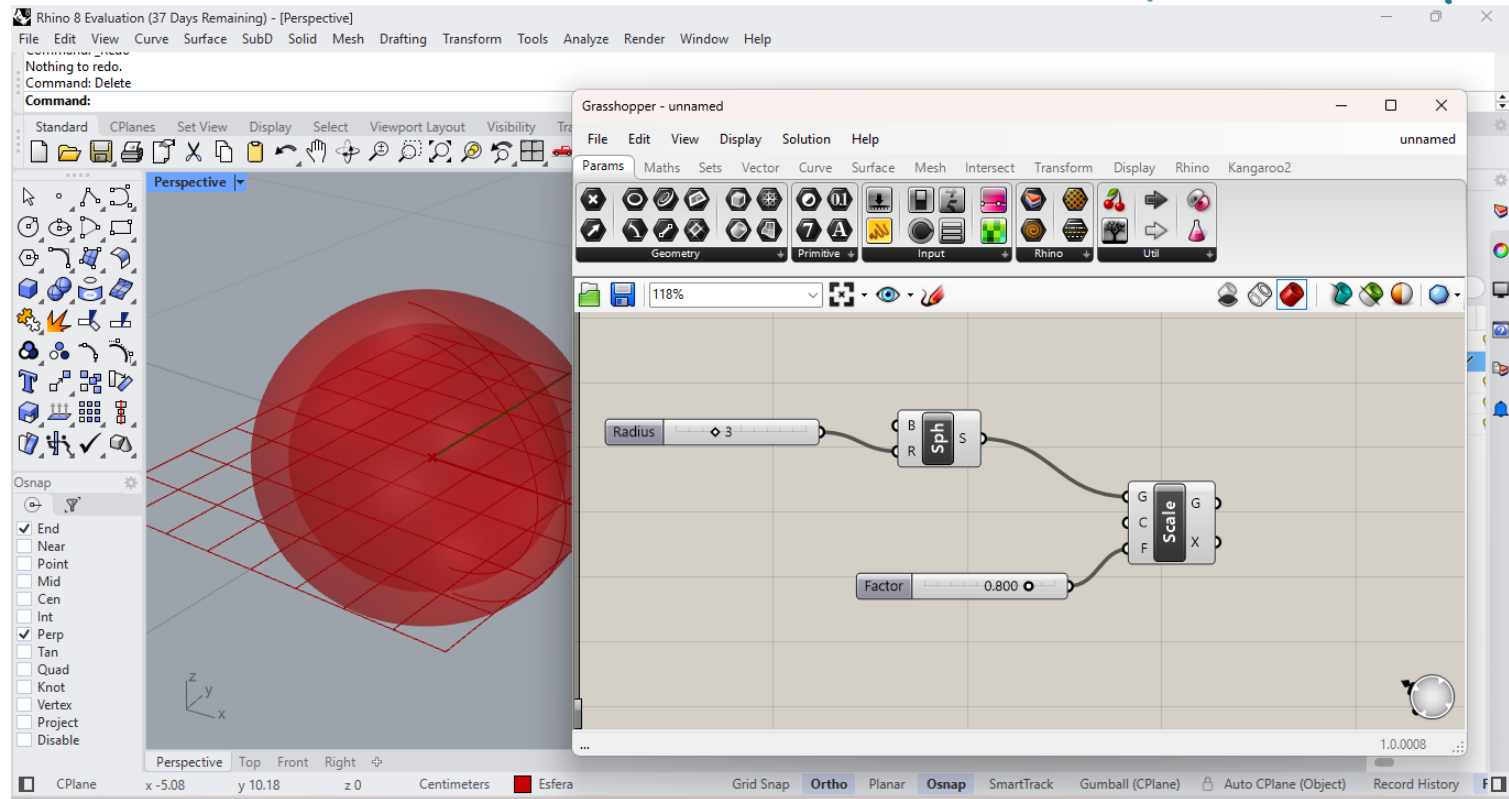


Para mudar o raio da esfera
clicar 2x no **R** e pôr o
número pretendido ou ir ao
number slider e liga-lo ao **R**.



Aula 08 – Grasshopper

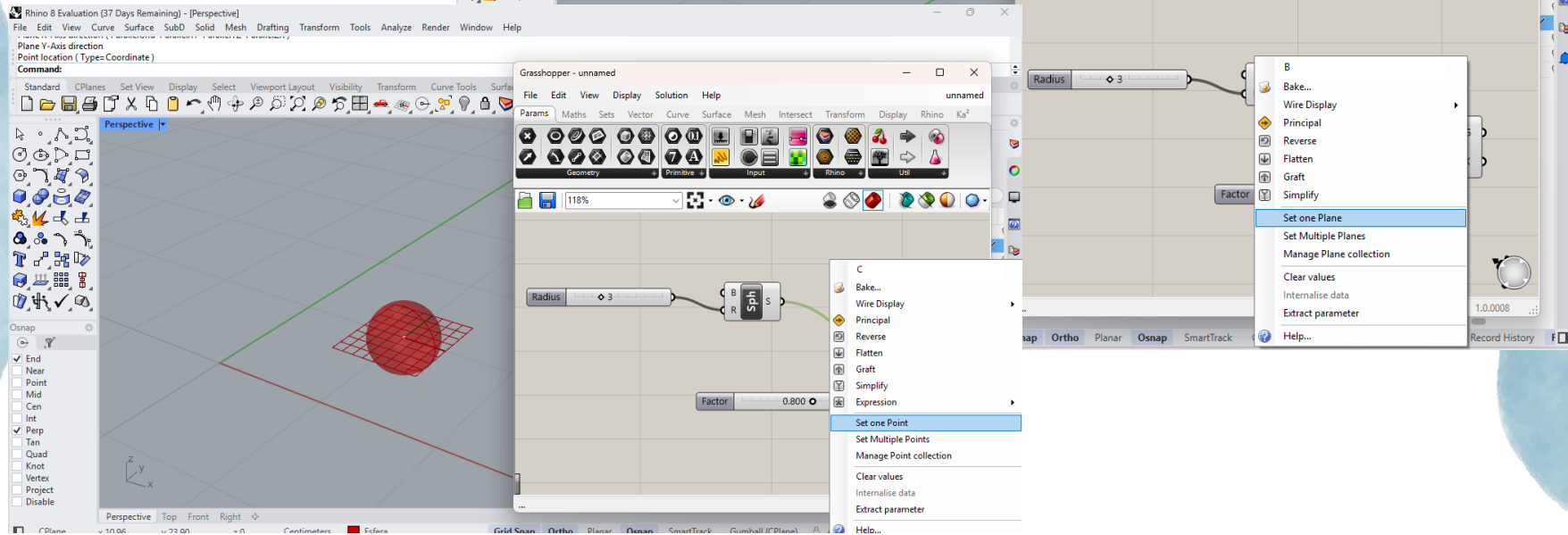




Aula 08 – Grasshopper



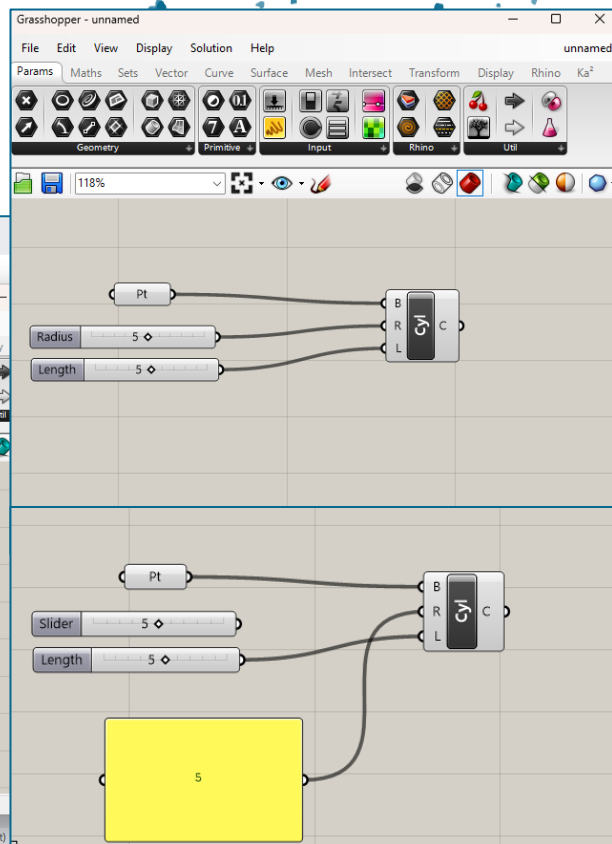
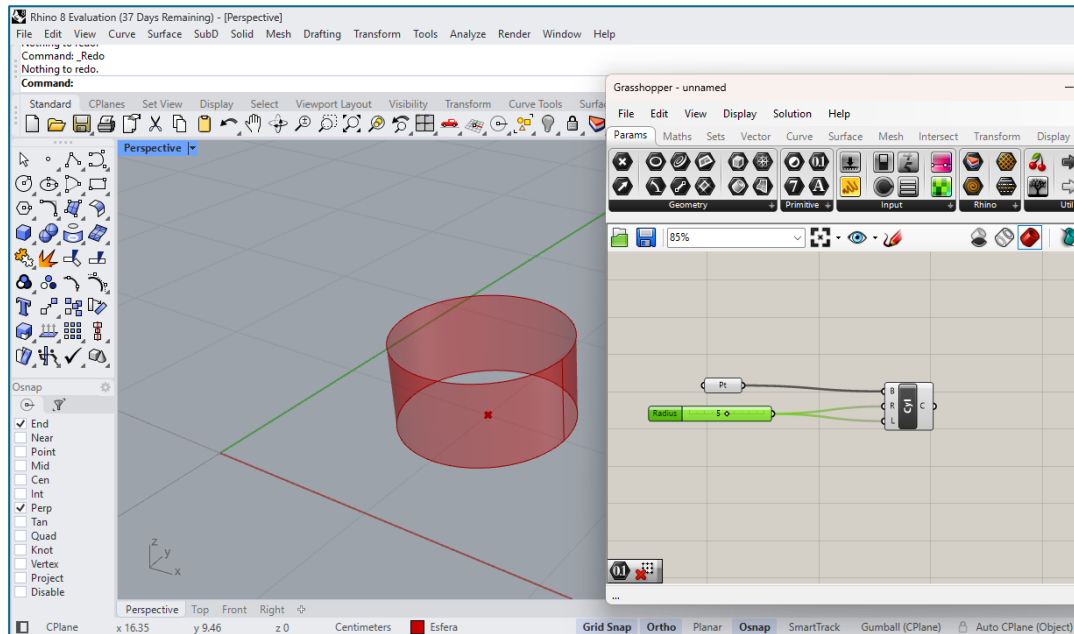
Dependendo dos comandos,
pode-se escolher um ponto ou
plano que se pretende.



Aula 08 – Grasshopper

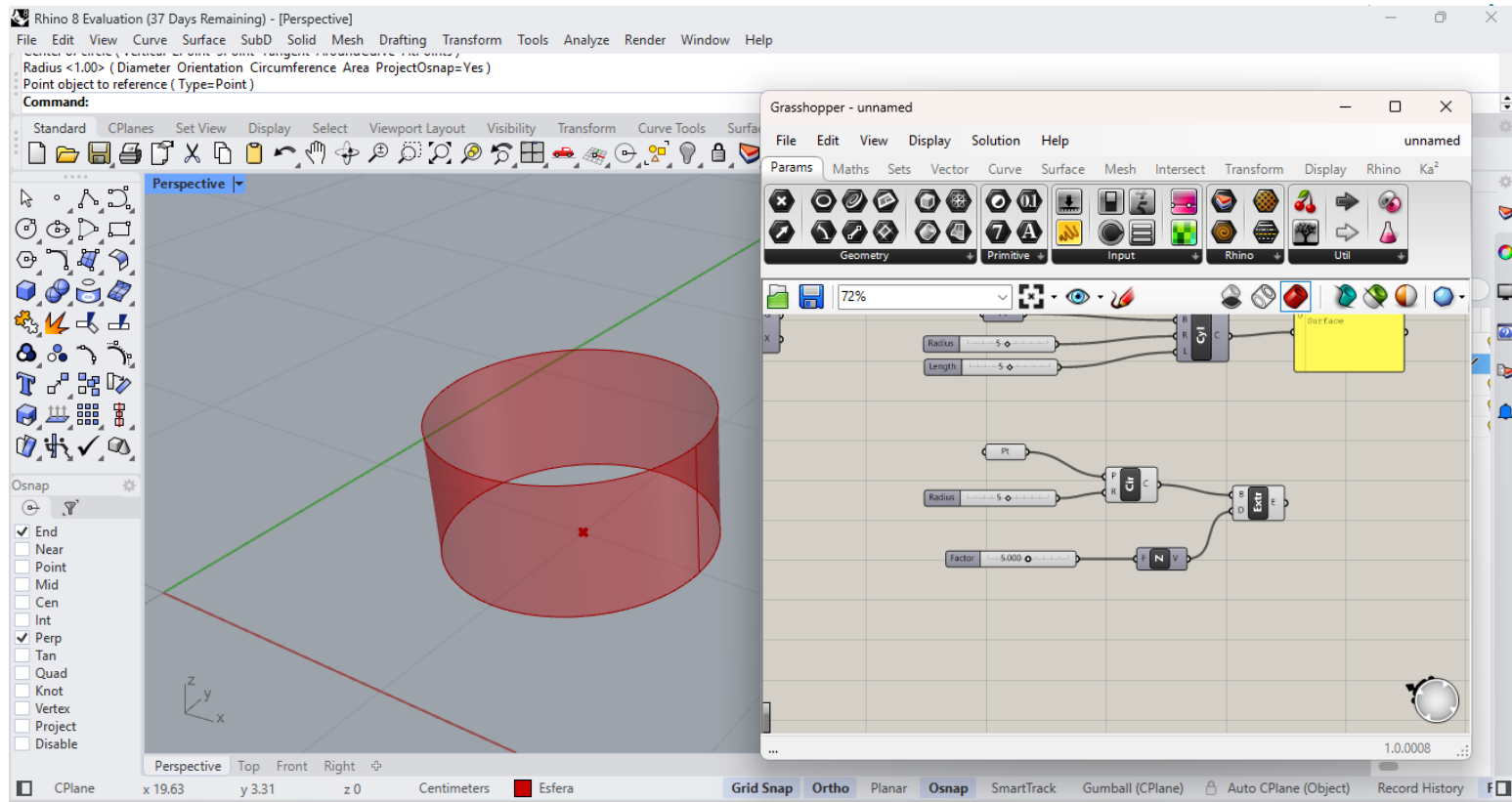


Pode-se chegar a um objeto de várias maneiras, como por exemplo fazer um cilindro com 5 de altura e de raio



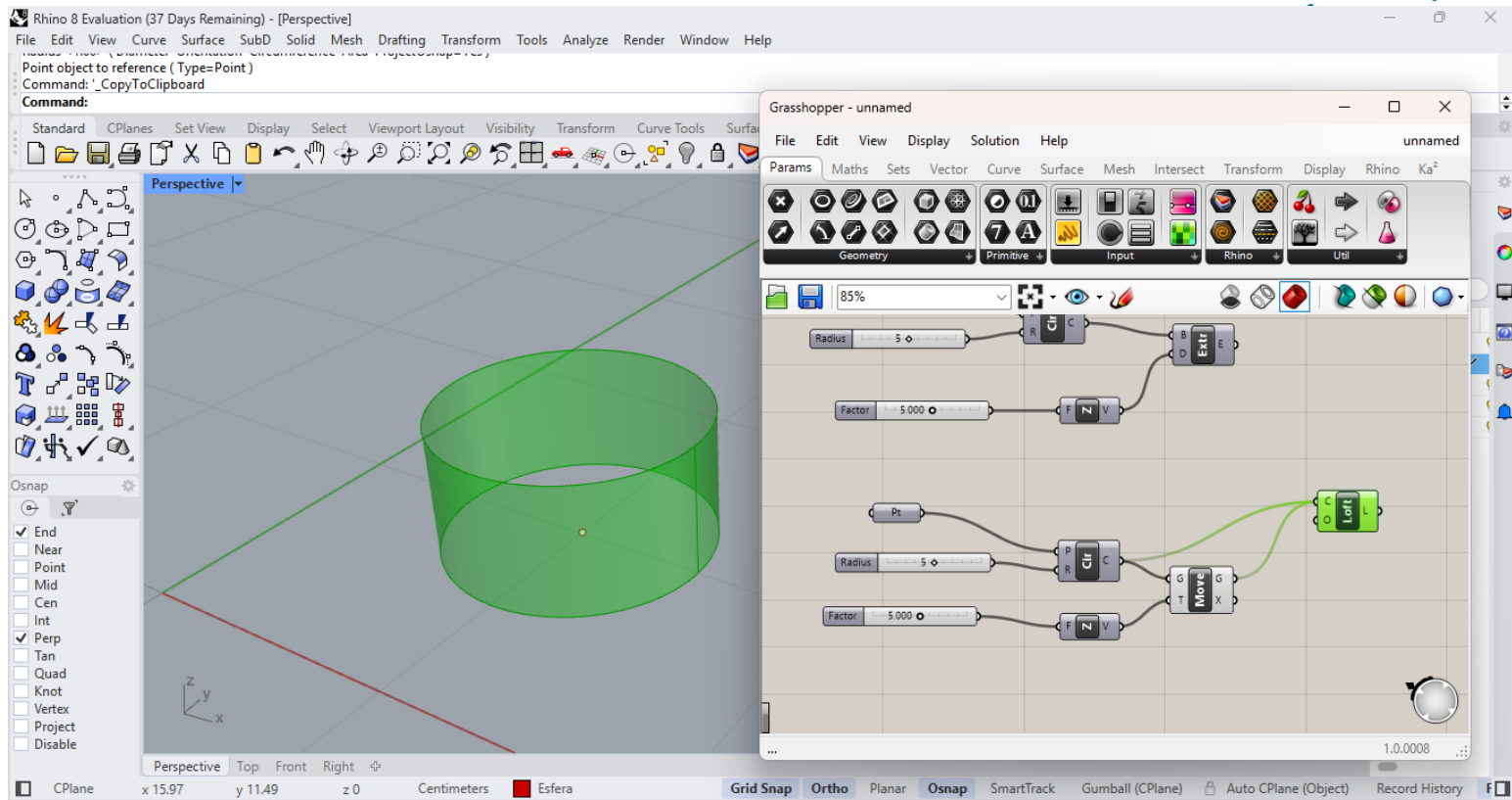
Aula 08 – Grasshopper





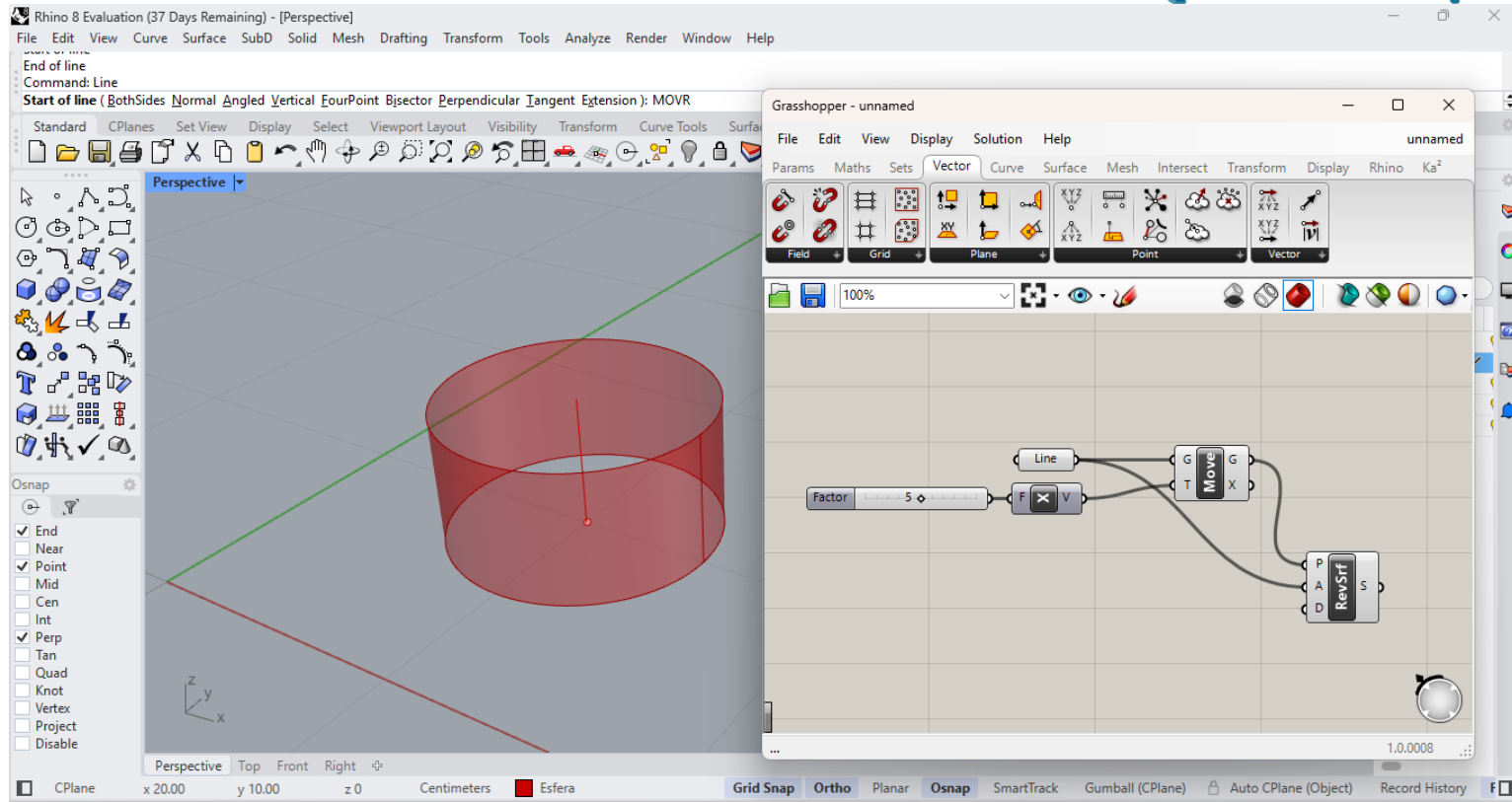
Aula 08 – Grasshopper





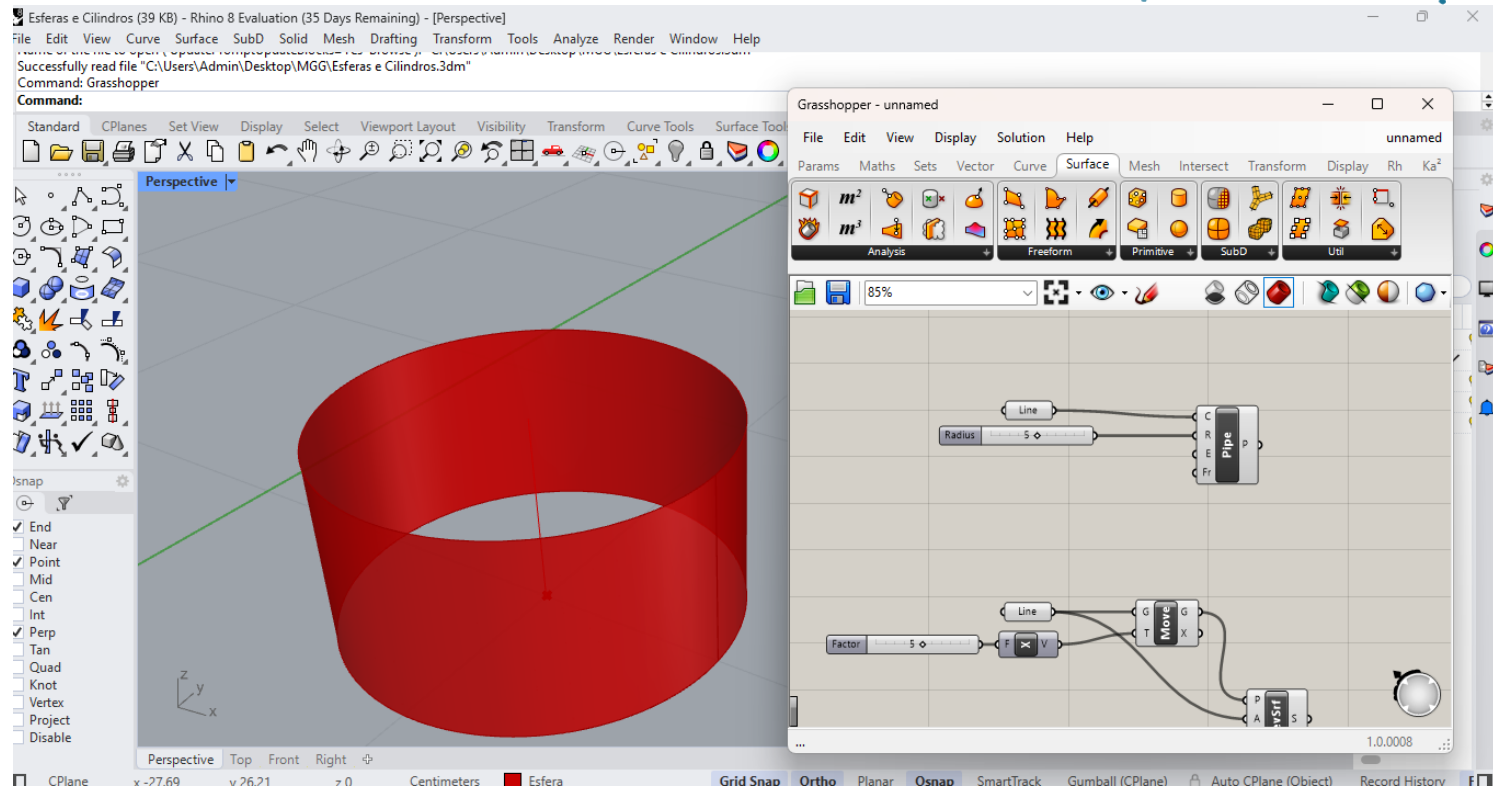
Aula 08 – Grasshopper





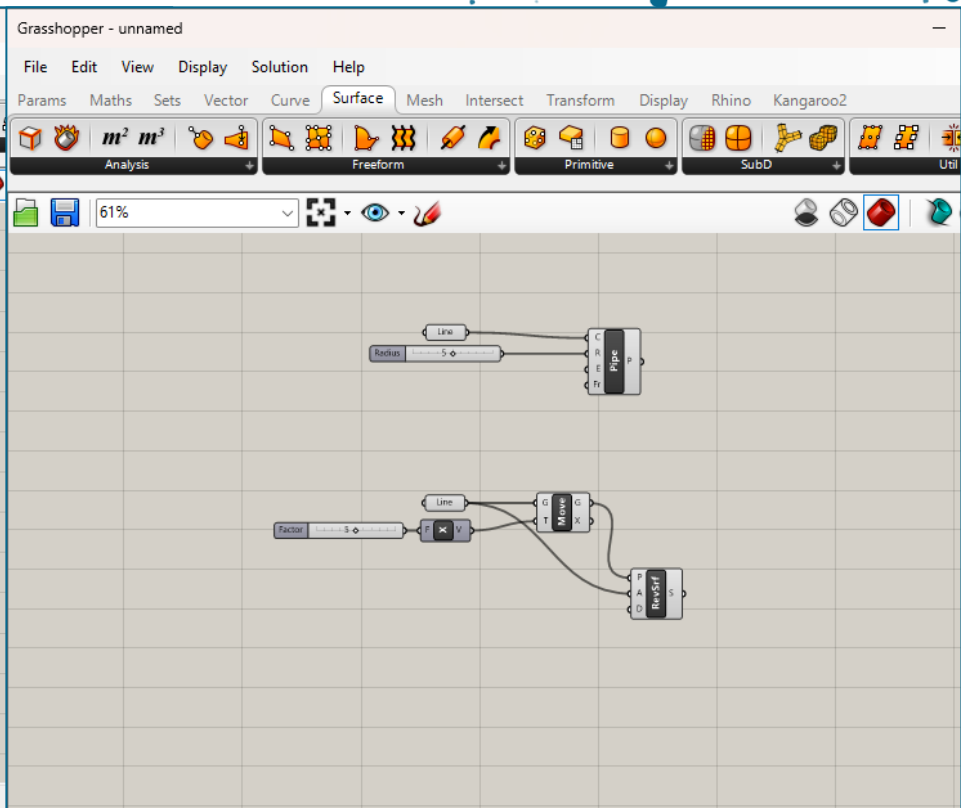
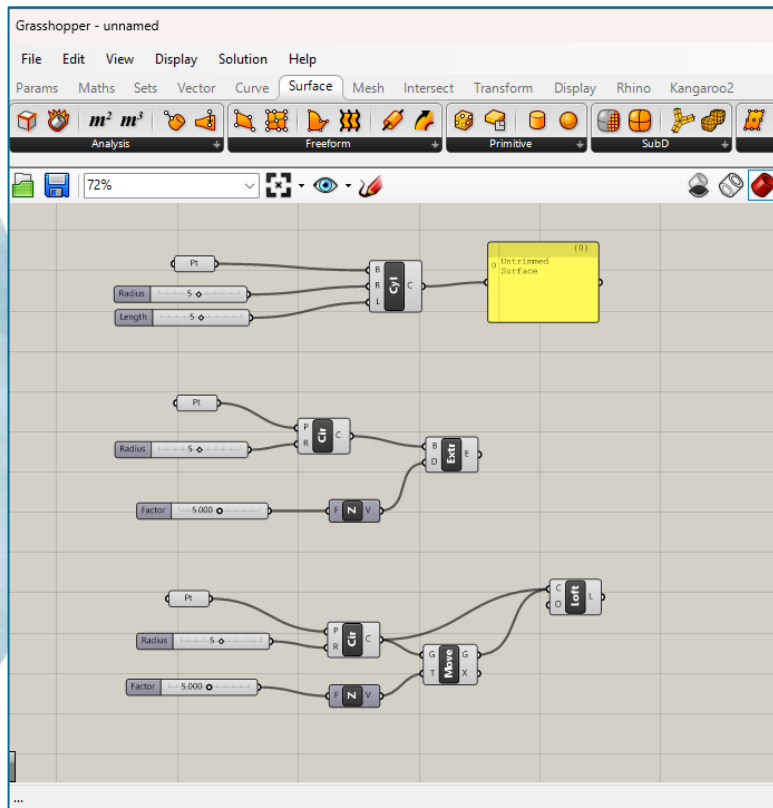
Aula 08 – Grasshopper





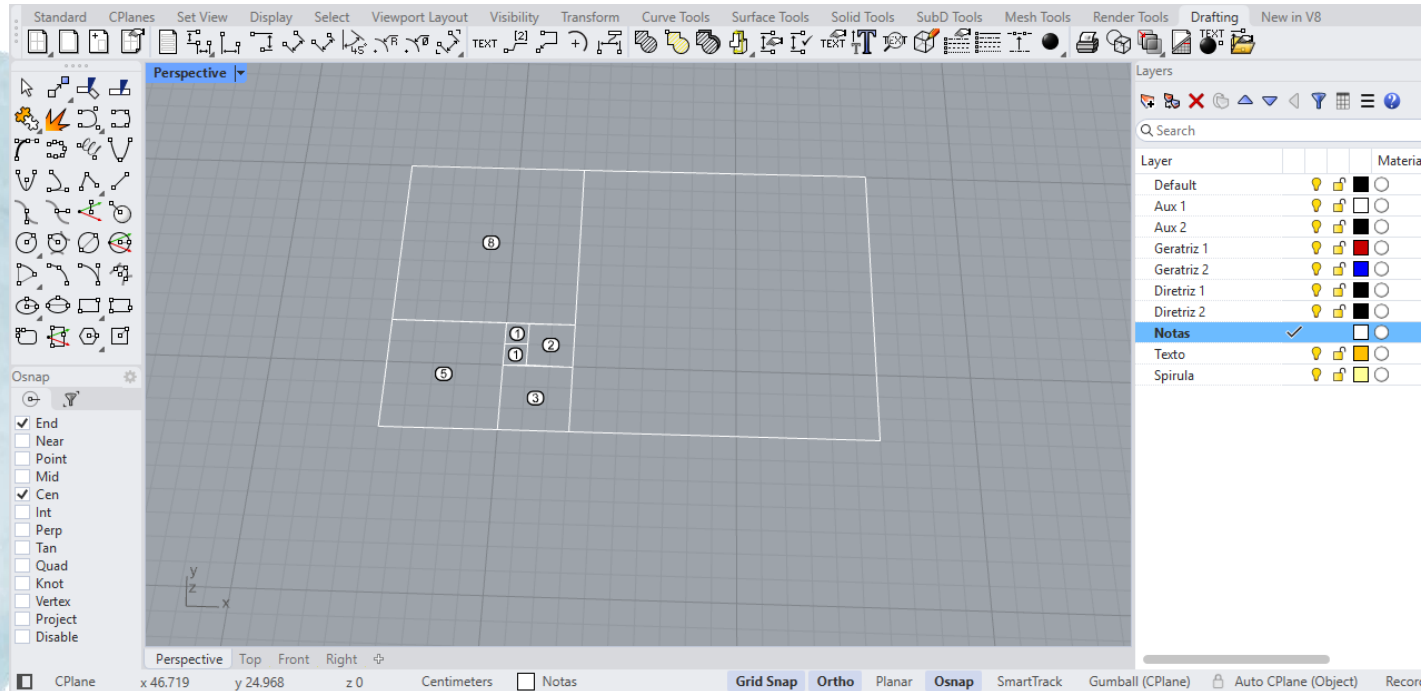
Aula 08 – Grasshopper





Aula 08 – Grasshopper



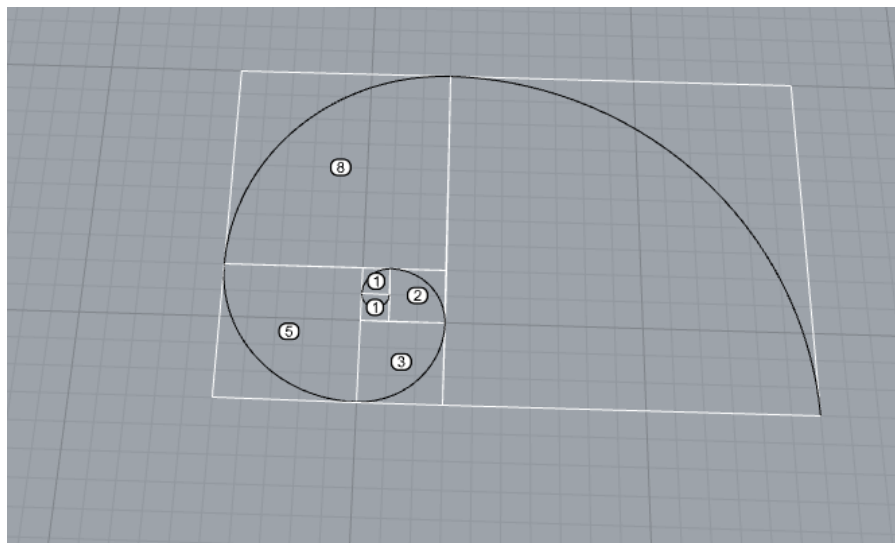
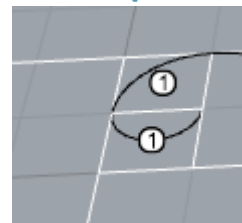


Construção da base de
spirula, fazendo
quadrados a partir da
sequência Fribonacci
(em que um número é
igual á soma dos dois
anteriores)

Aula 09 – Spirula



No primeiro quadrado, criar uma
semicircunferência

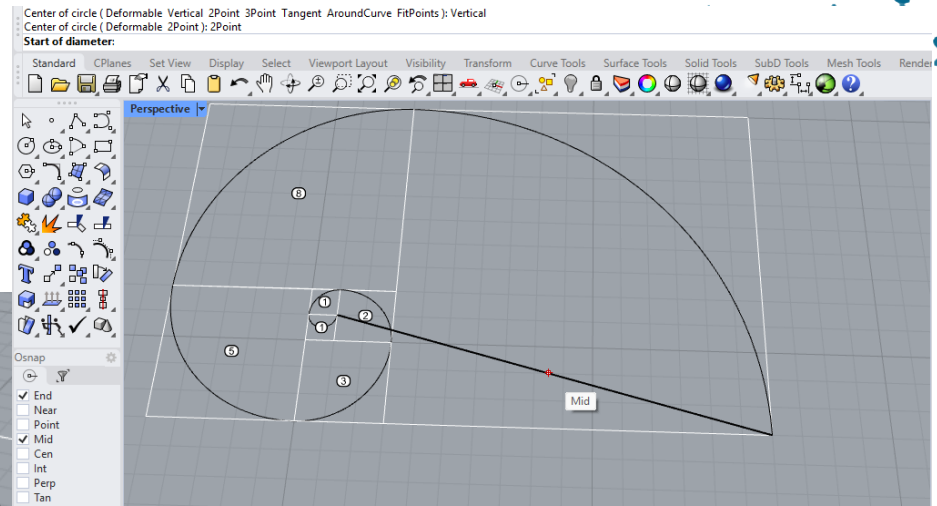


Com **arc**, colocar arcos
em todos os restantes
quadrados, de forma a
criar uma linha curva
contínua, com o
aspeto da spirula.
(fazer join)

Aula 09 – Spirula



De seguida, realizar uma linha reta
do centro até ao final da linha curva

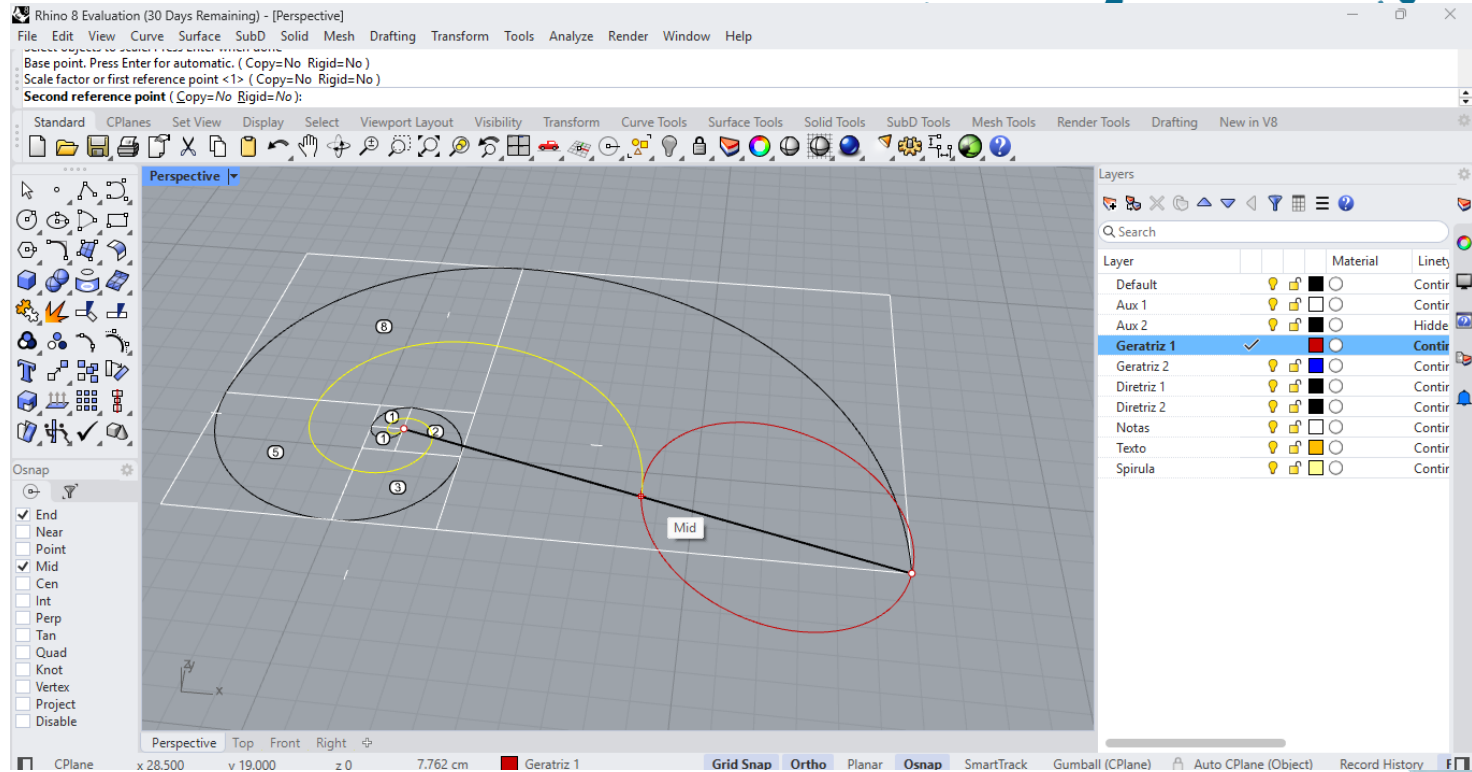


Construir uma circunferência vertical,
em que o diâmetro seja metade da linha
reta feita anteriormente e que fique na
extremidade

Aula 09 – Spirula

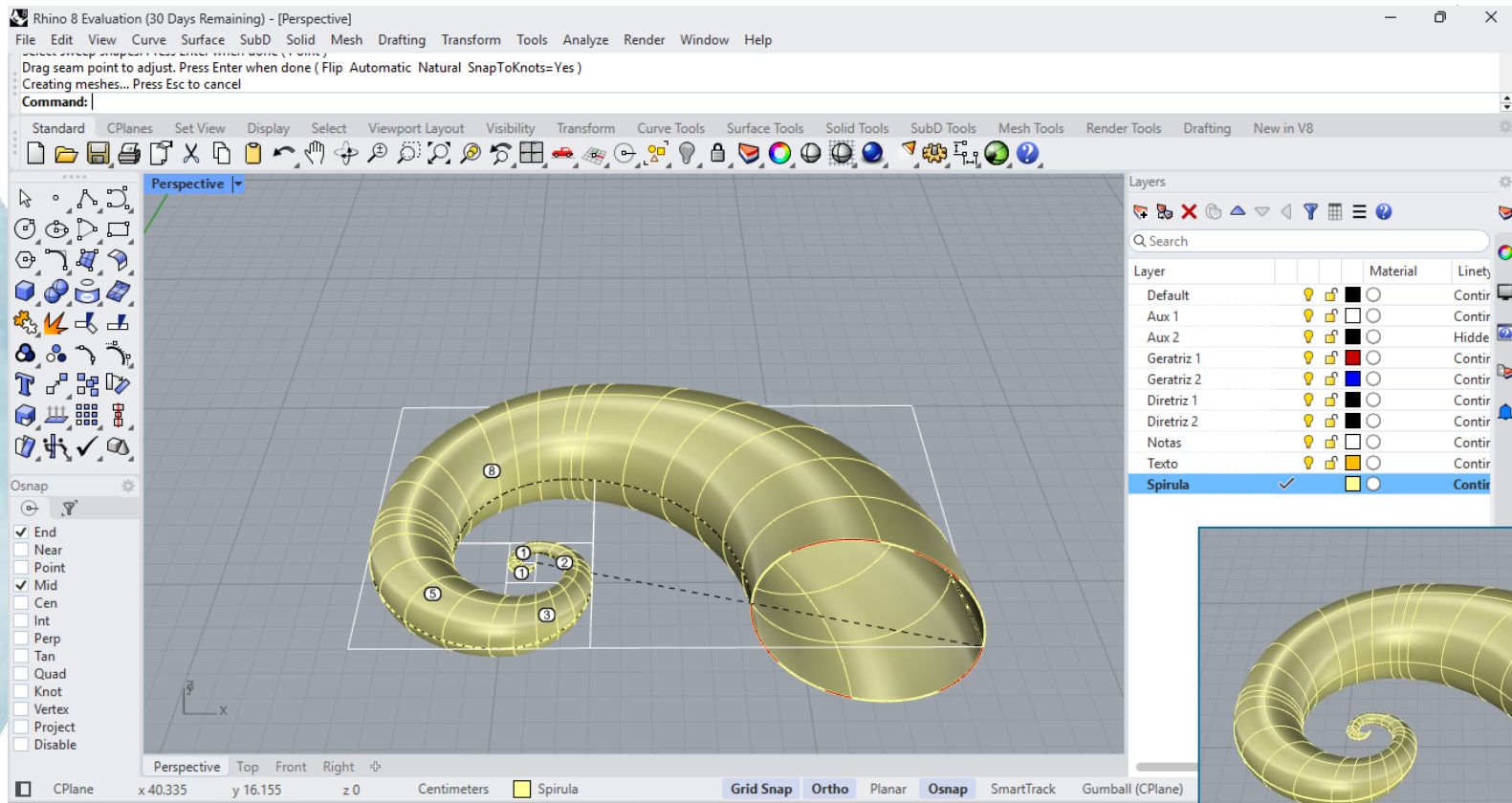


Para fazer a outra
linha curva (rail),
escalar a primeira
para o midpoint

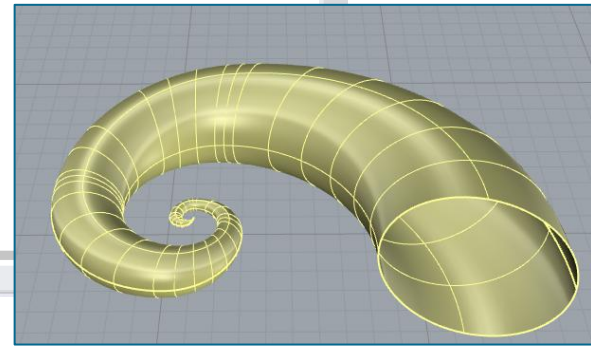


Aula 09 – Spirula



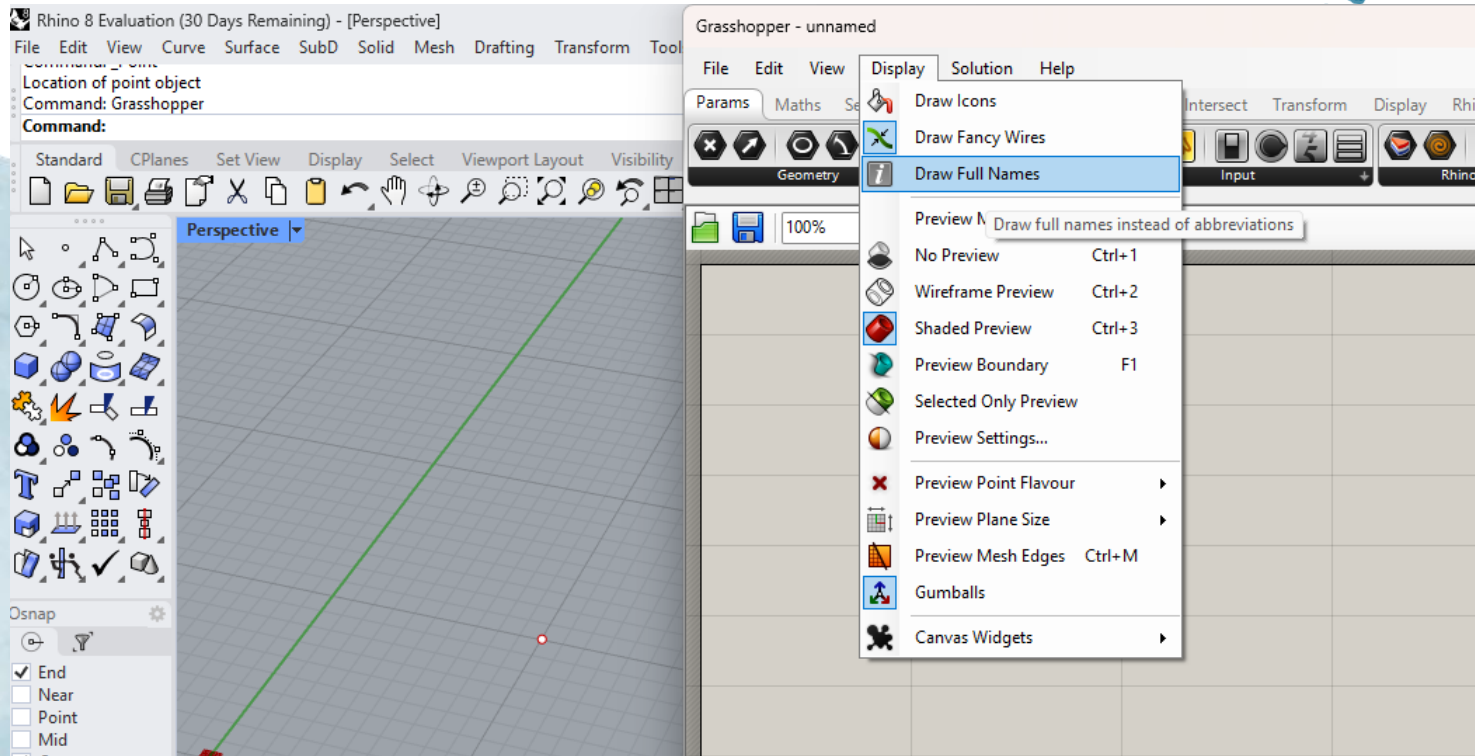


Sweep2



Aula 09 – Spirula





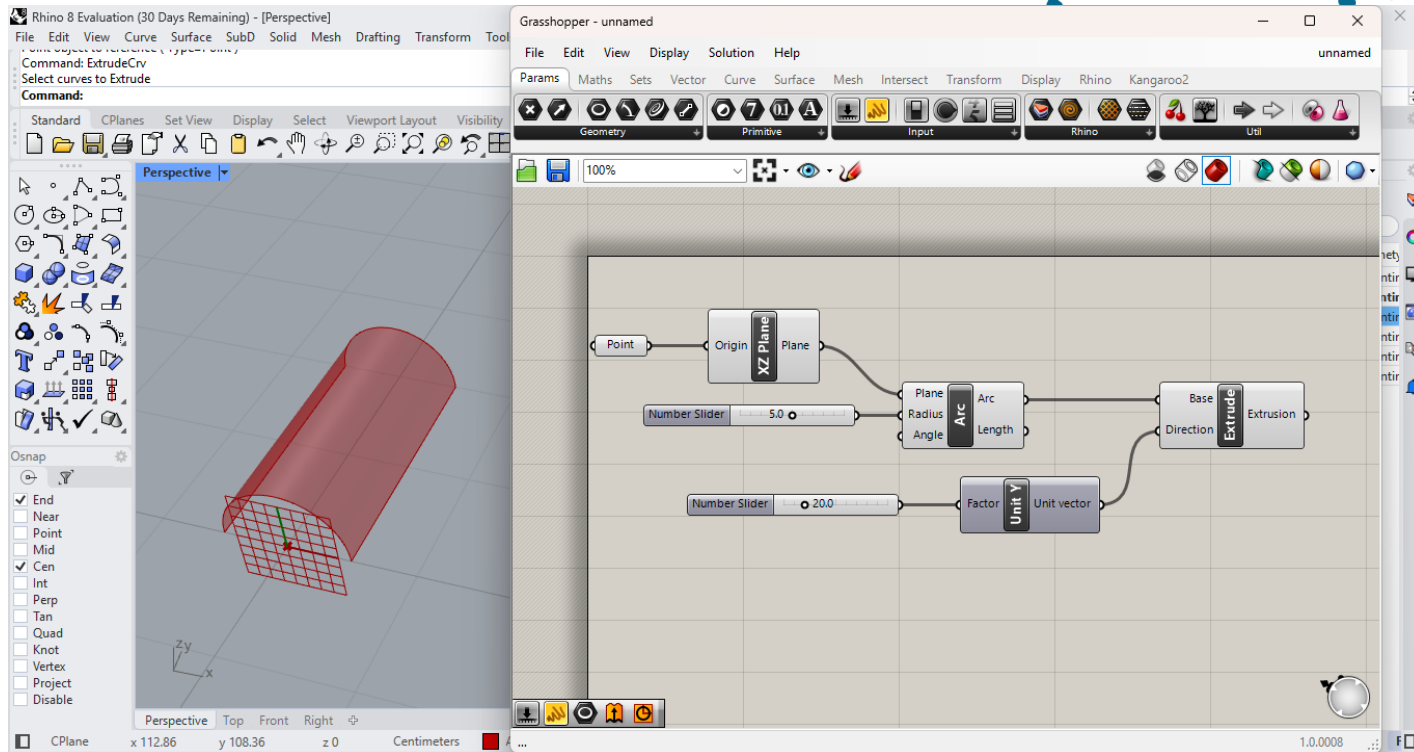
Draw full names
para aparecer os
nomes completos
nos componentes

Aula 09 – Abóbadas em Grasshopper



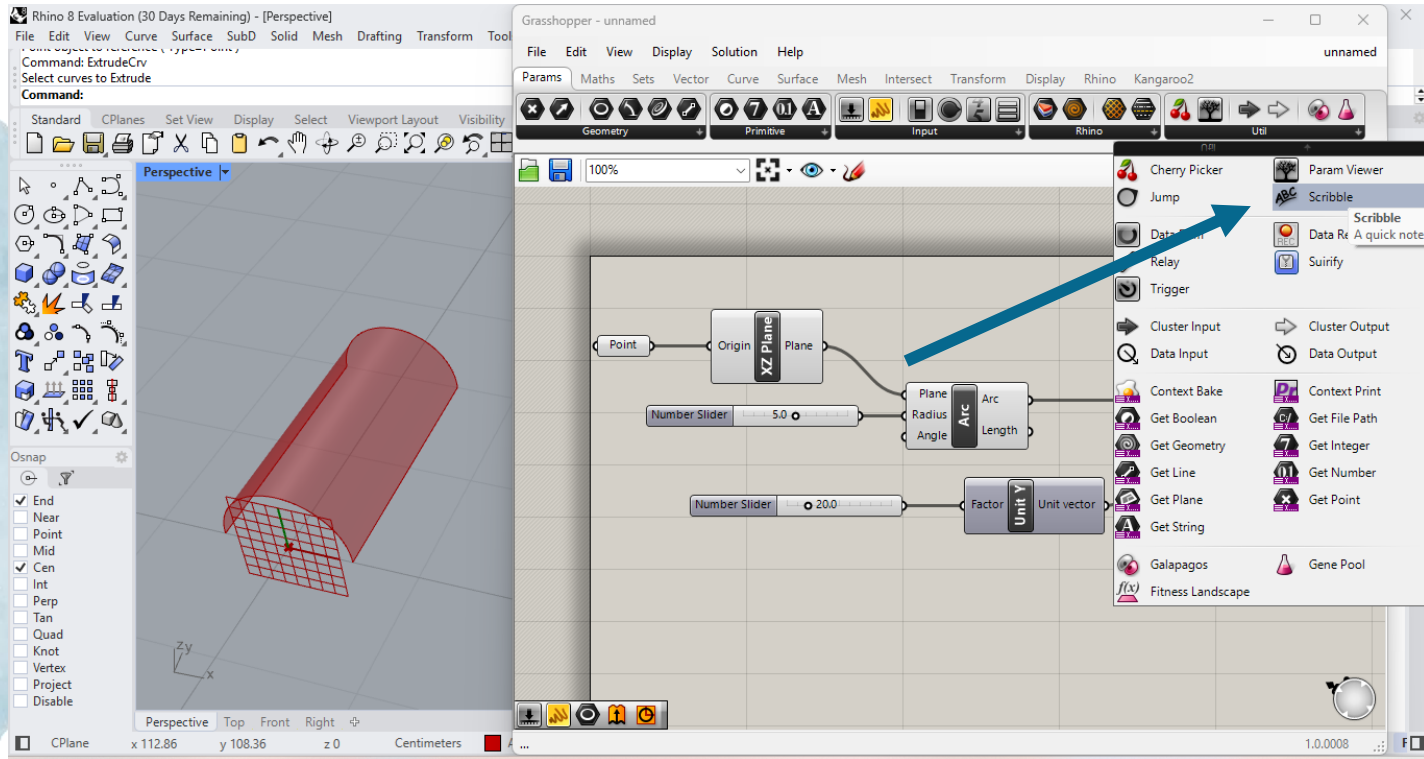
Abóbada de berço

Criar um arco vertical
(num plano XY) e
extrudí-lo em que a
direção é feita pelo
vetor Y.



Aula 09 – Abóbadas em Grasshopper



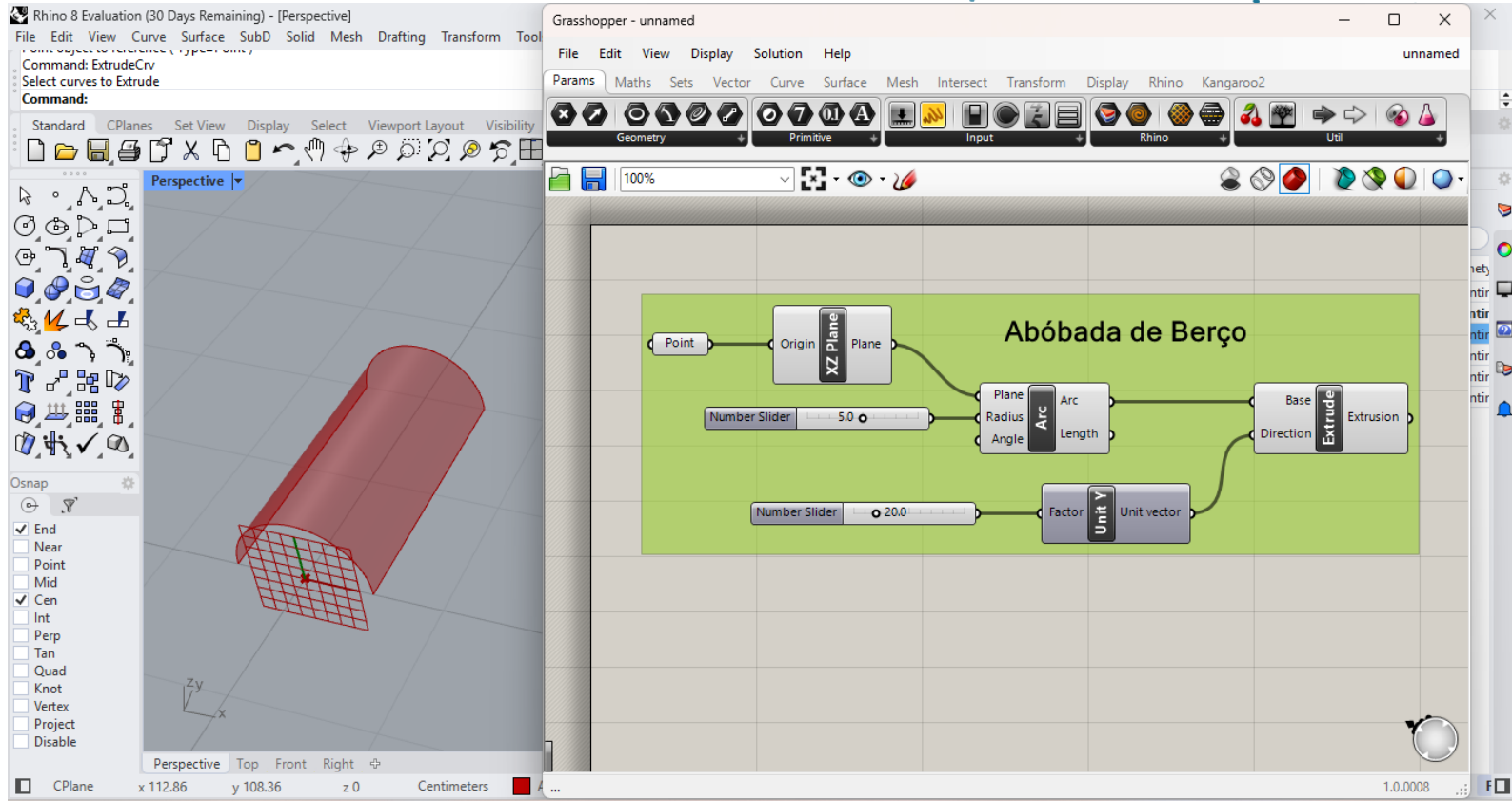


Scribble para
escrever algo

Aula 09 – Abóbadas em Grasshopper

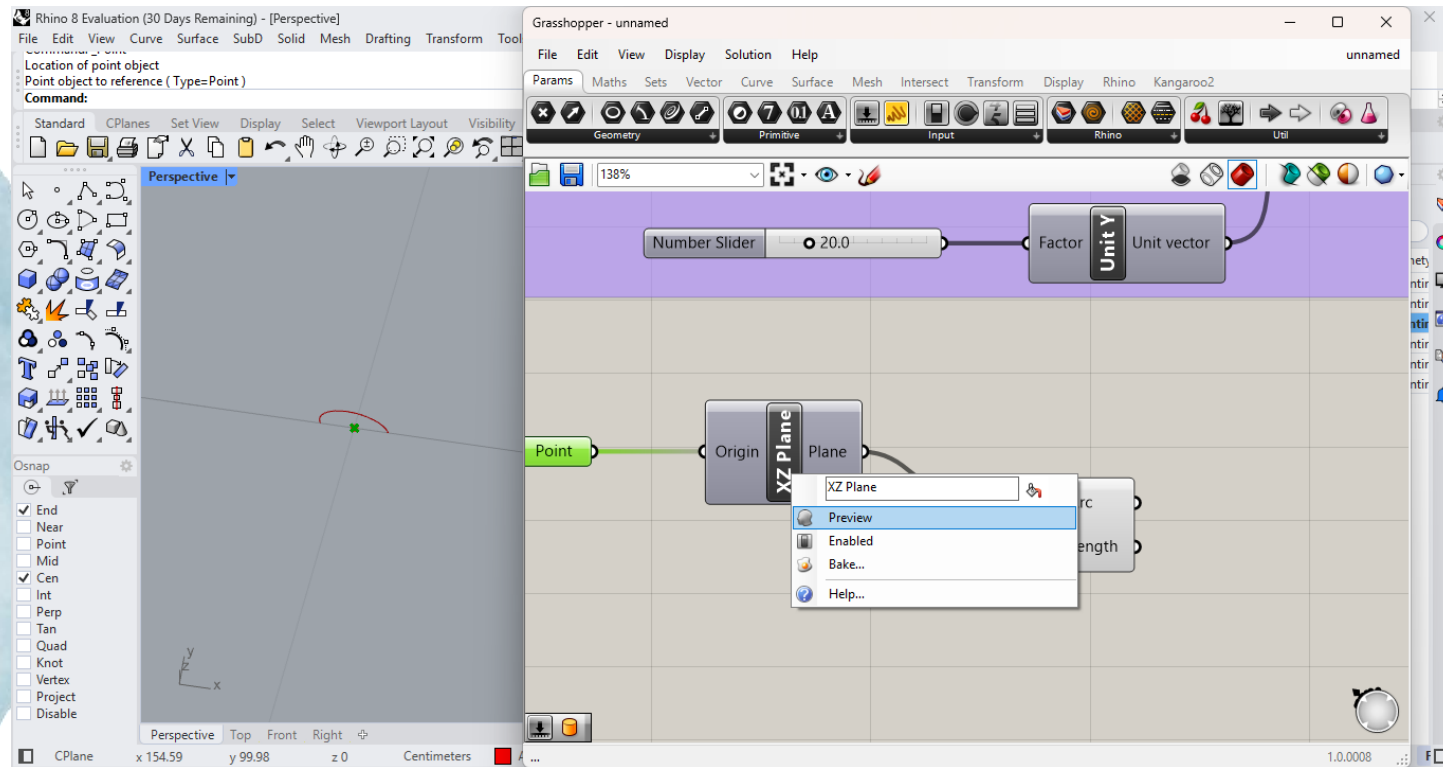


Group de todos
os elementos



Aula 09 – Abóbadas em Grasshopper





No **preview**,
podemos retirar a
grelha do plano
que aparece na
janela da
perspetiva, para
visualizar melhor.

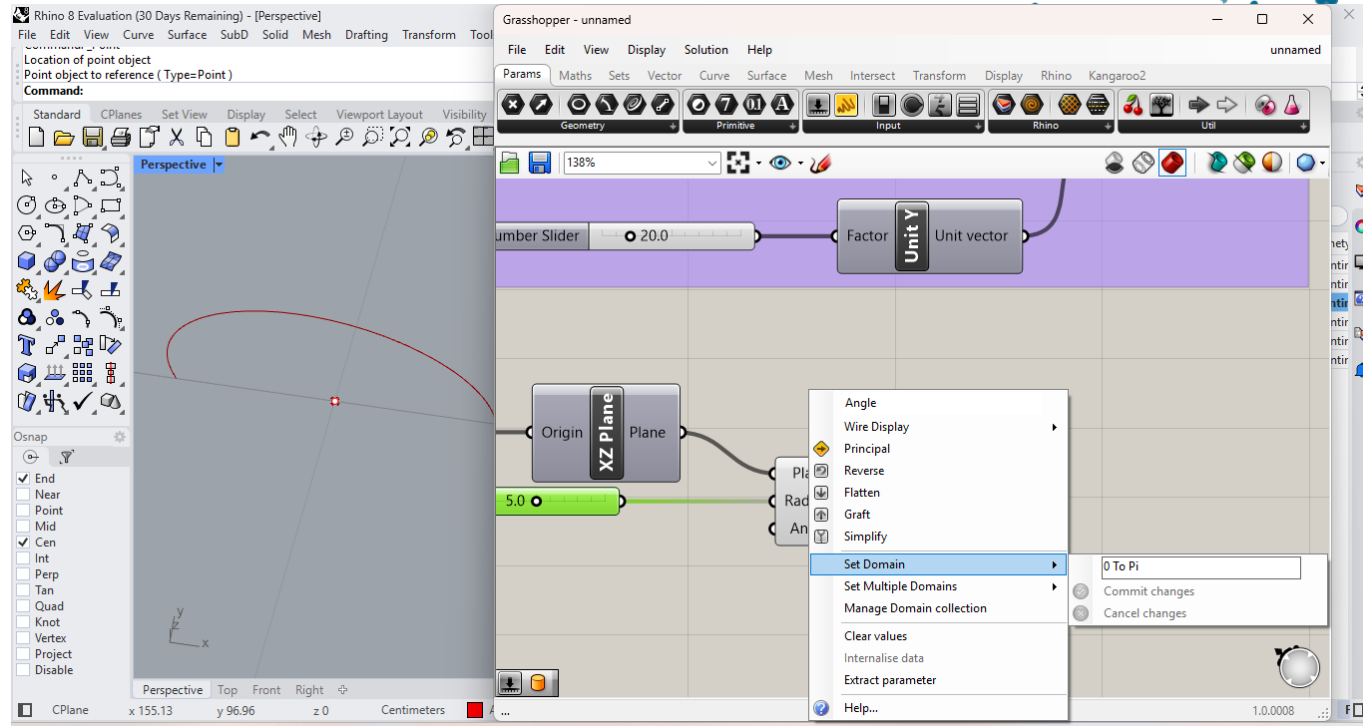
Aula 09 – Abóbadas em Grasshopper



Abóbada Ogival

Fazer um arco vertical,
igual ao primeiro arco
da abóbada de berço.

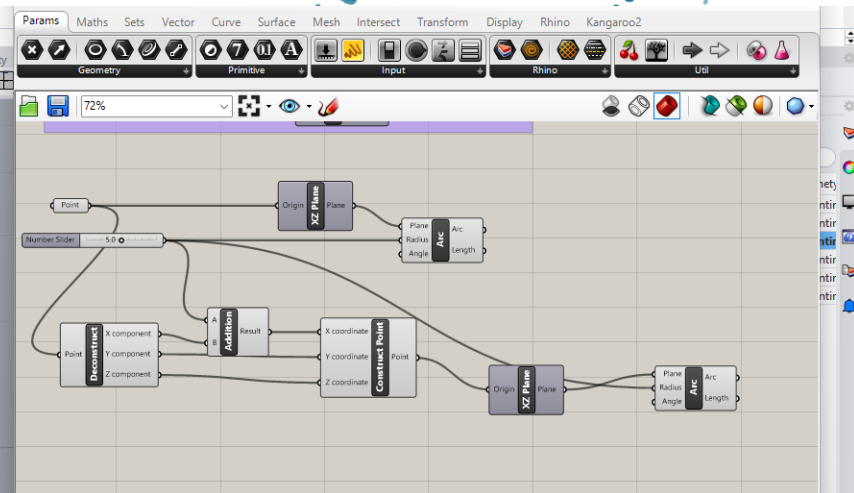
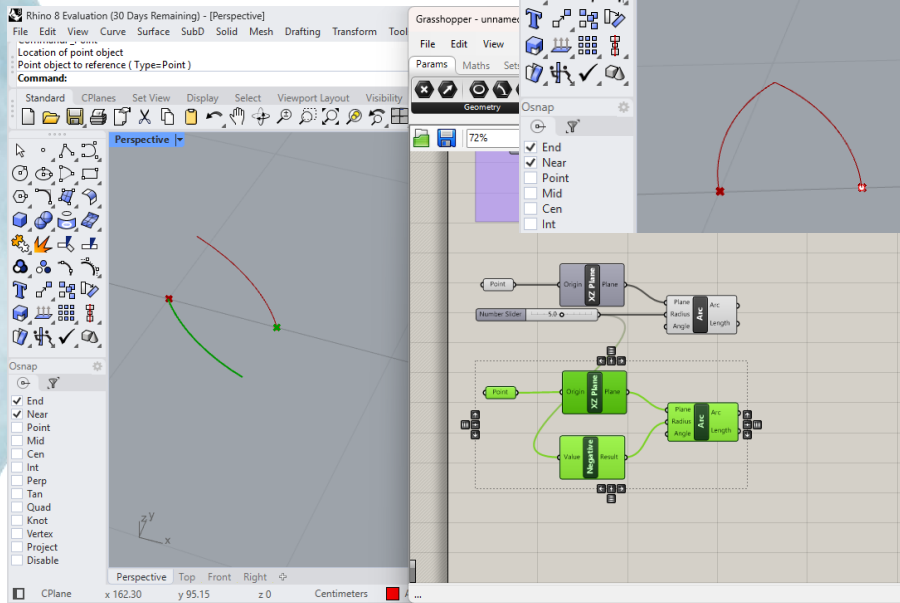
Com o botão direito
no **angle** e depois **set
domain**, muda-se o
ângulo do arco



Aula 09 – Abóbadas em Grasshopper



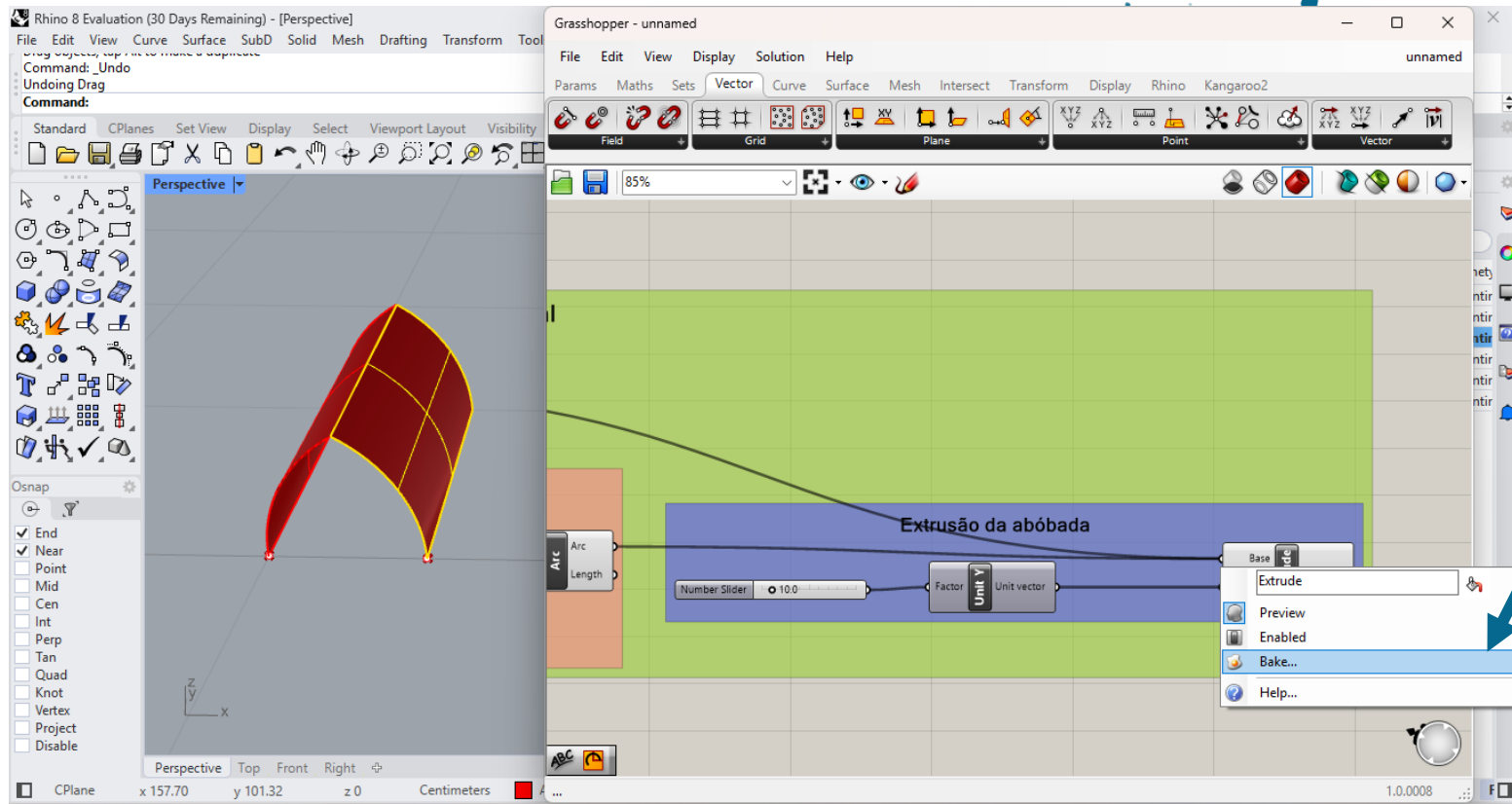
Abóbada Ogival



Criar um segundo arco e alterar certas coisas, de modo a dar a forma ogival.

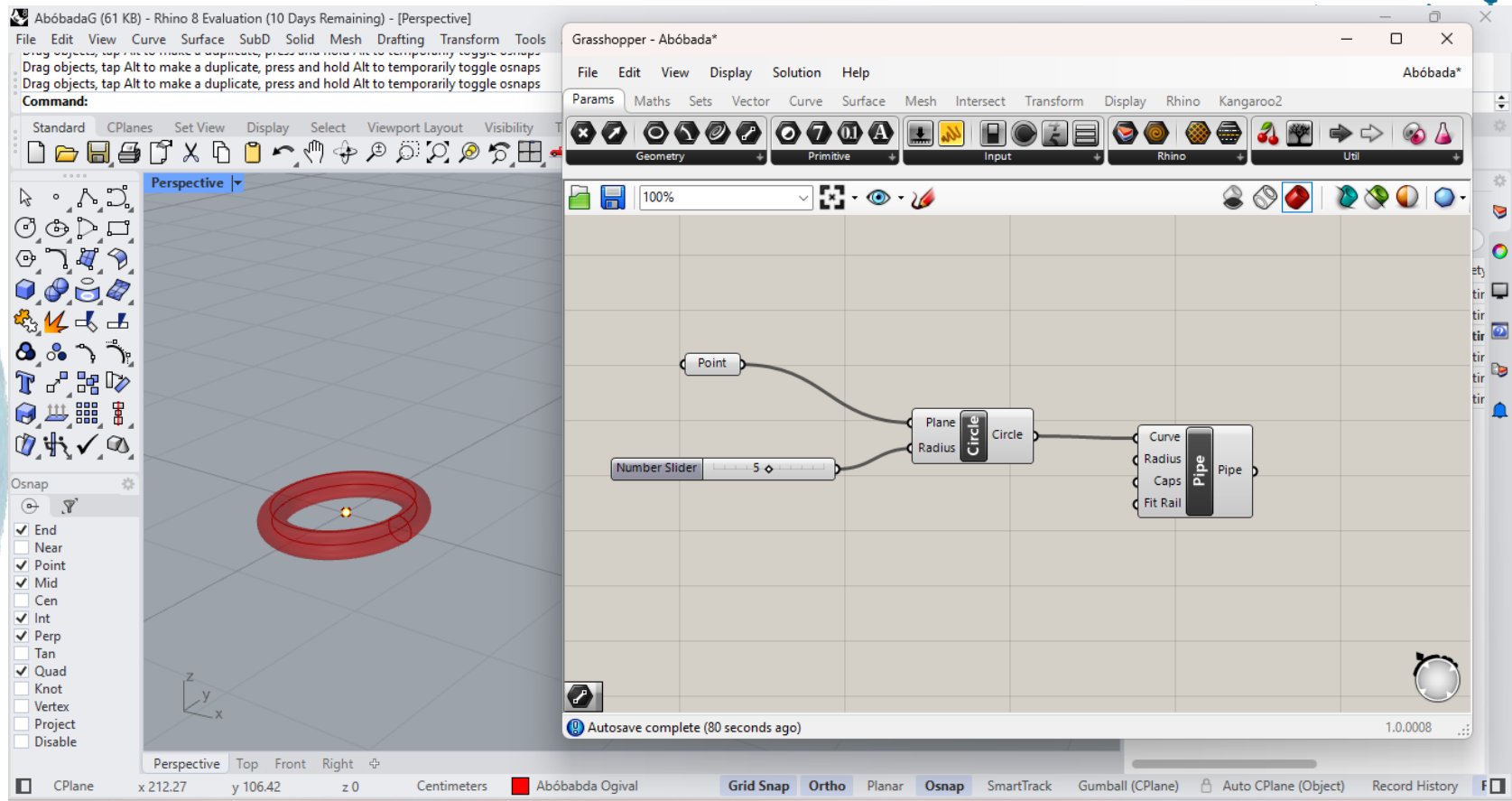
Aula 09 – Abóbadas em Grasshopper





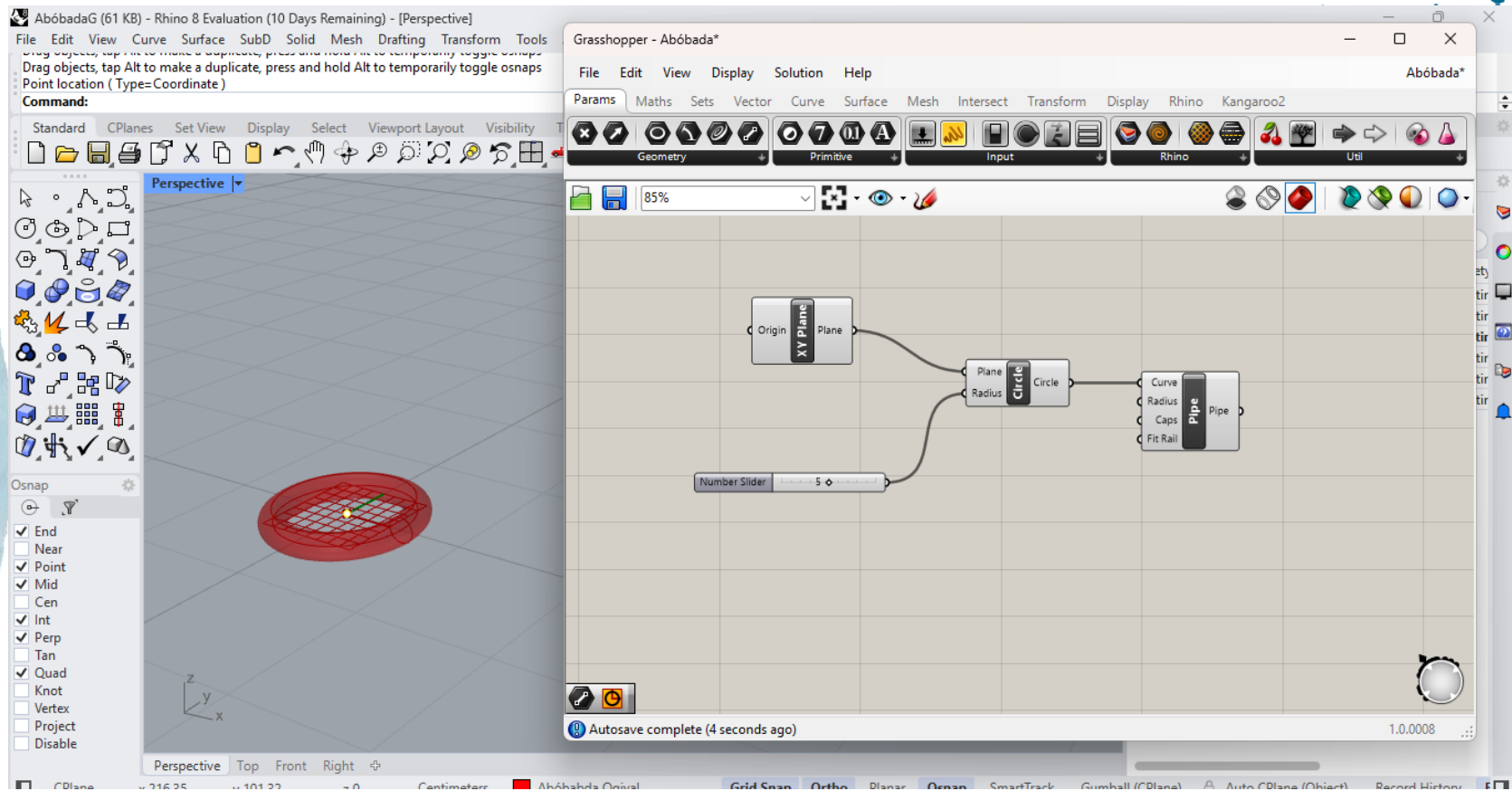
Aula 09 – Abóbadas em Grasshopper





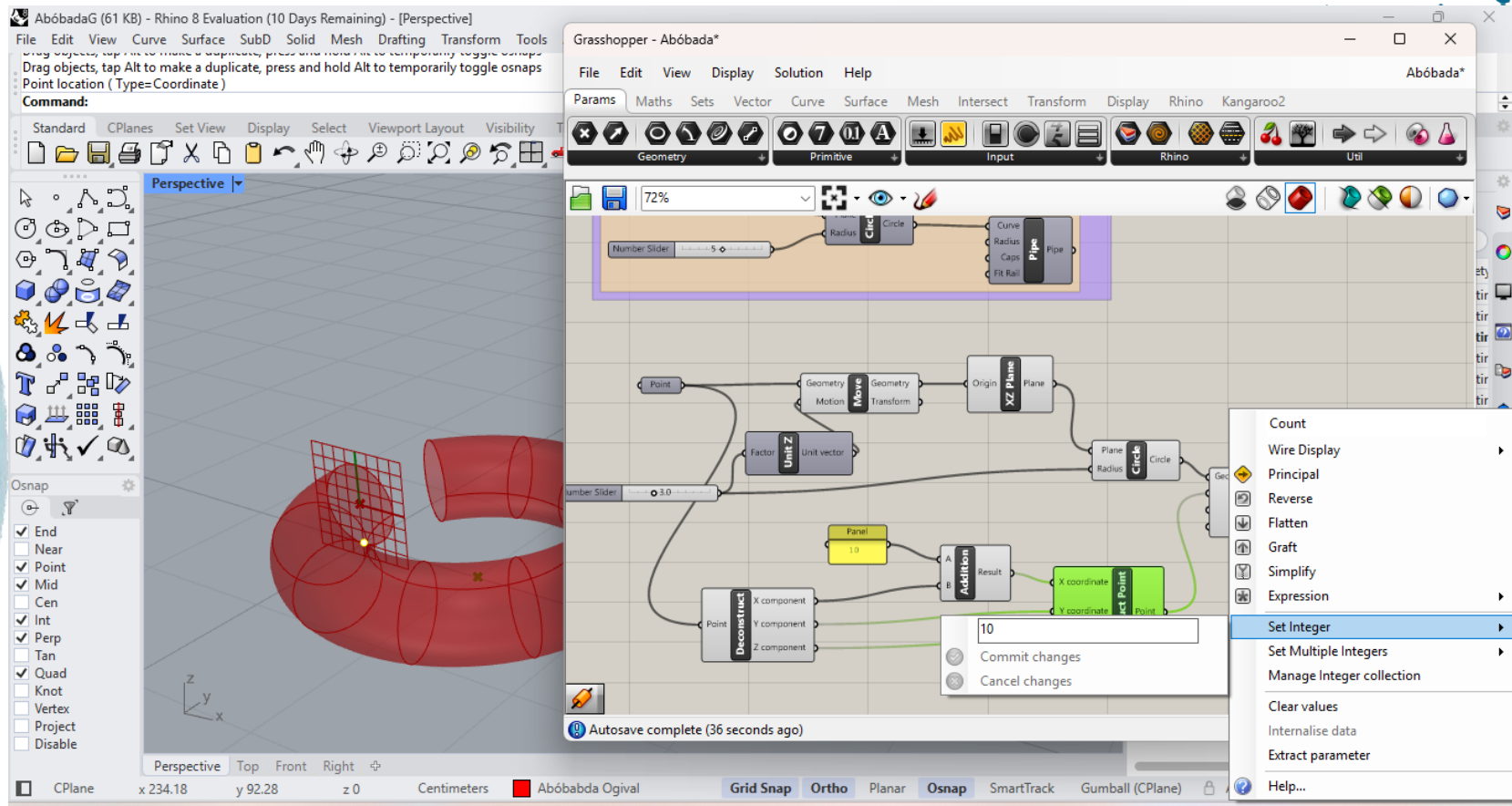
Aula 10 – Continuação do Grasshopper





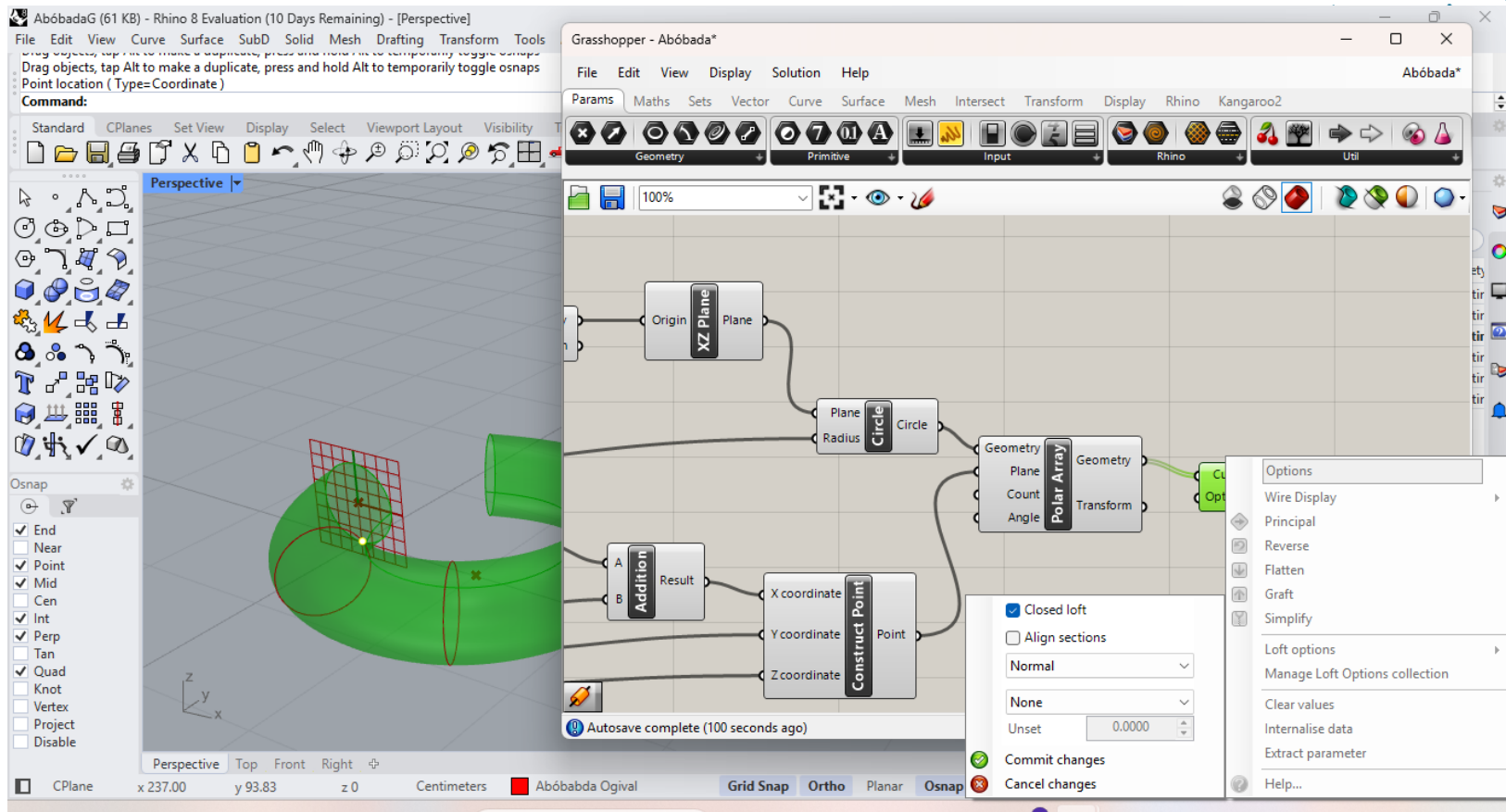
Aula 10 – Continuação do Grasshopper





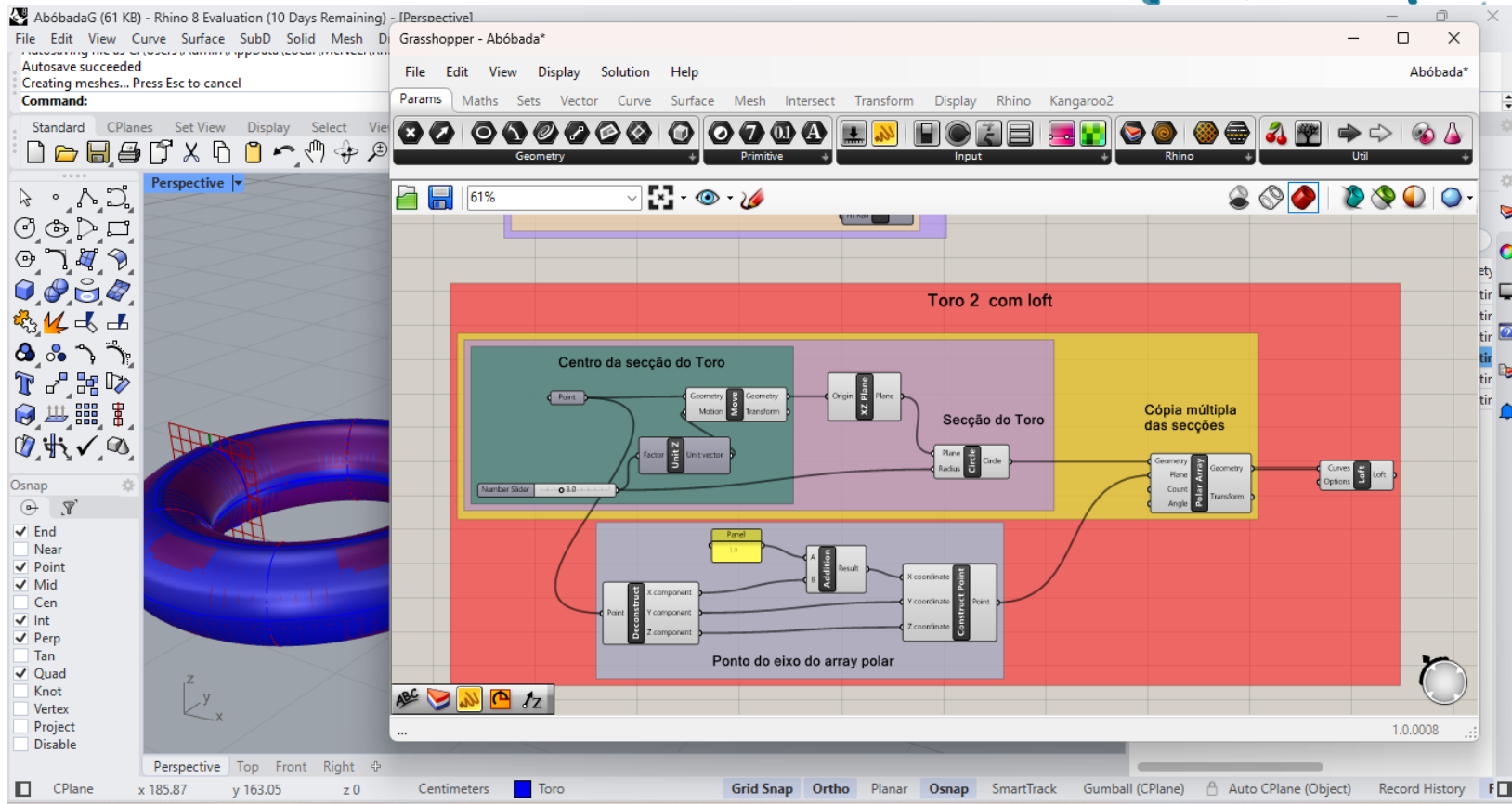
Aula 10 – Continuação do Grasshopper





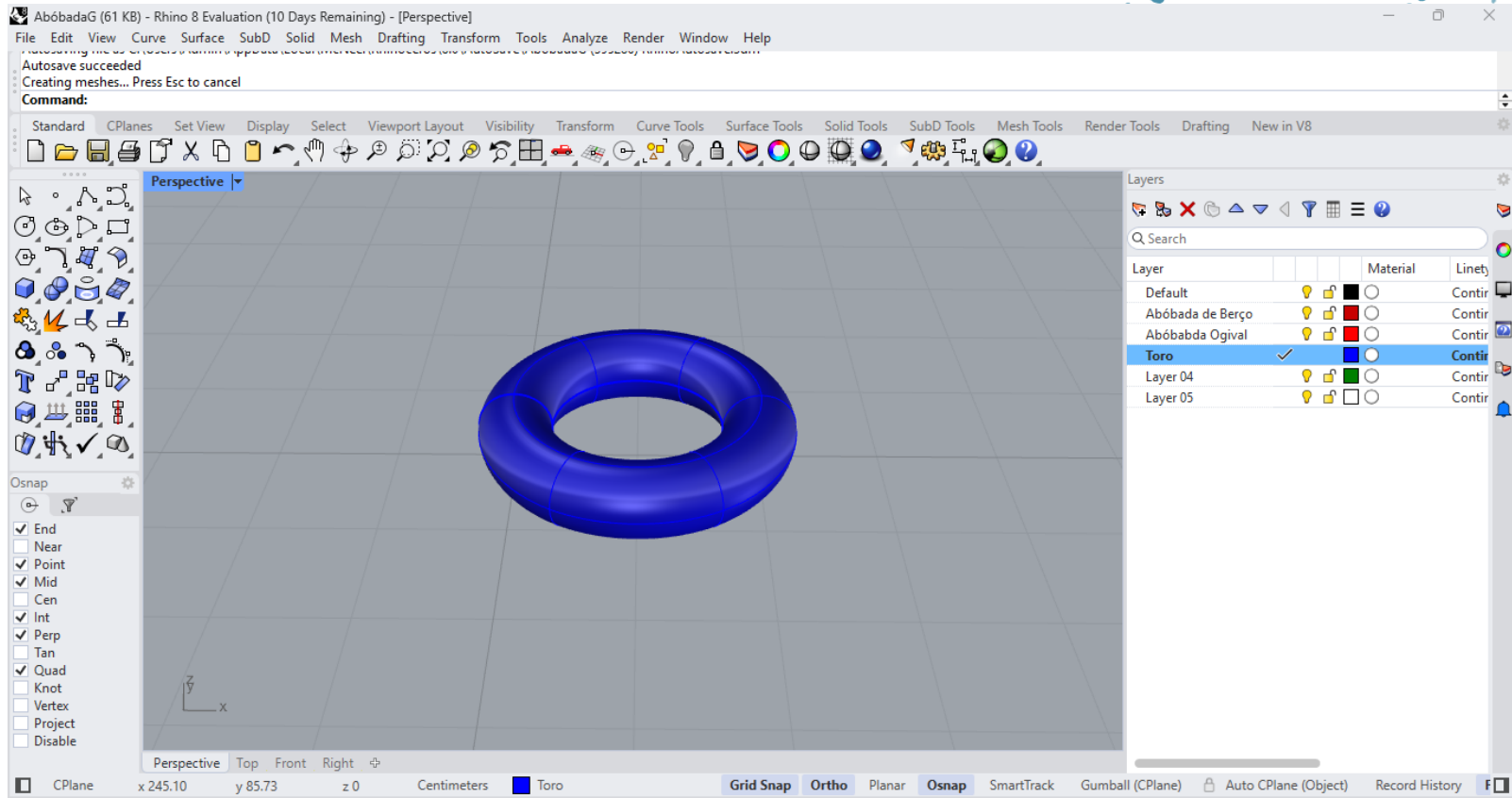
Aula 10 – Continuação do Grasshopper





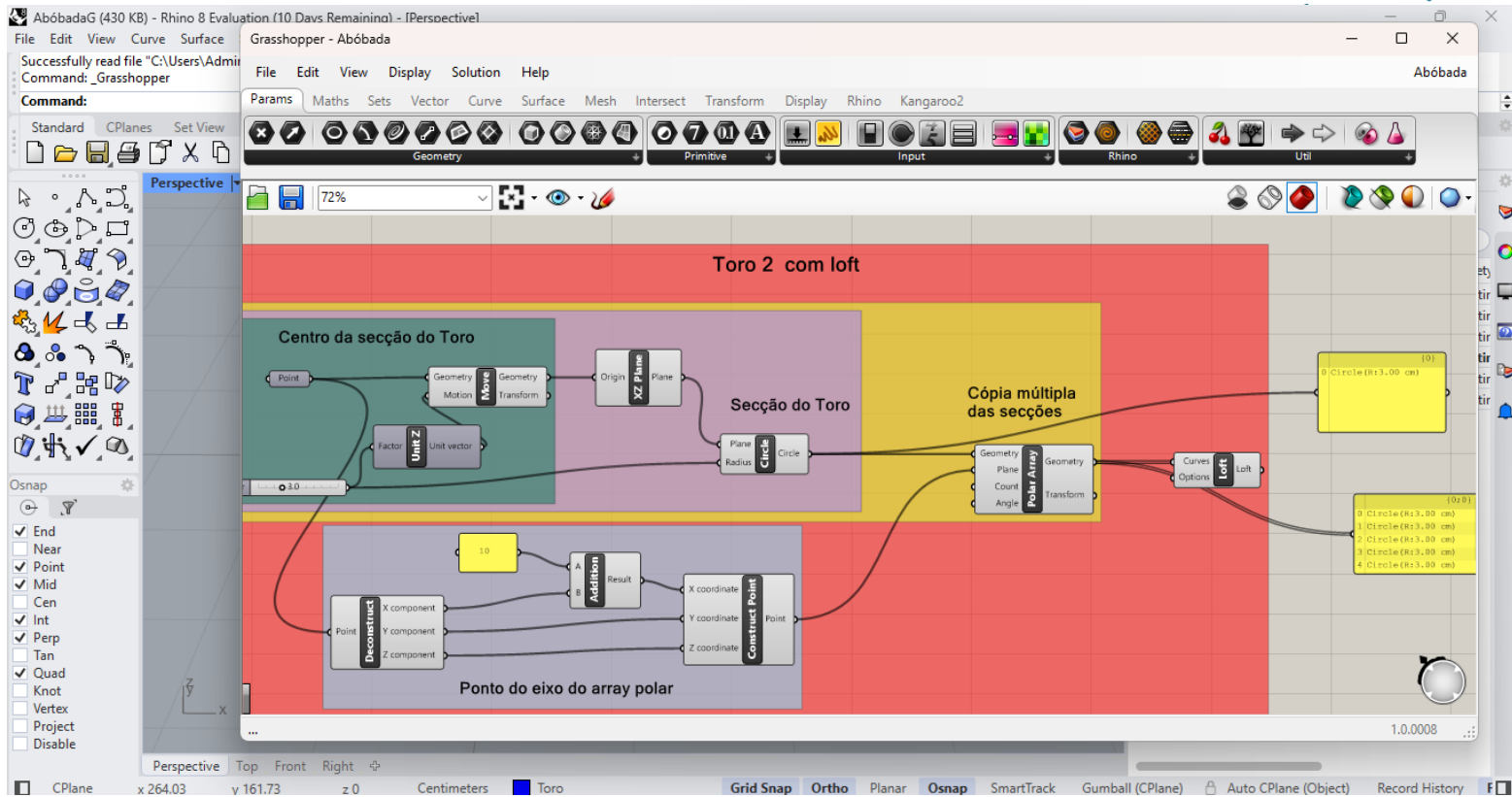
Aula 10 – Continuação do Grasshopper





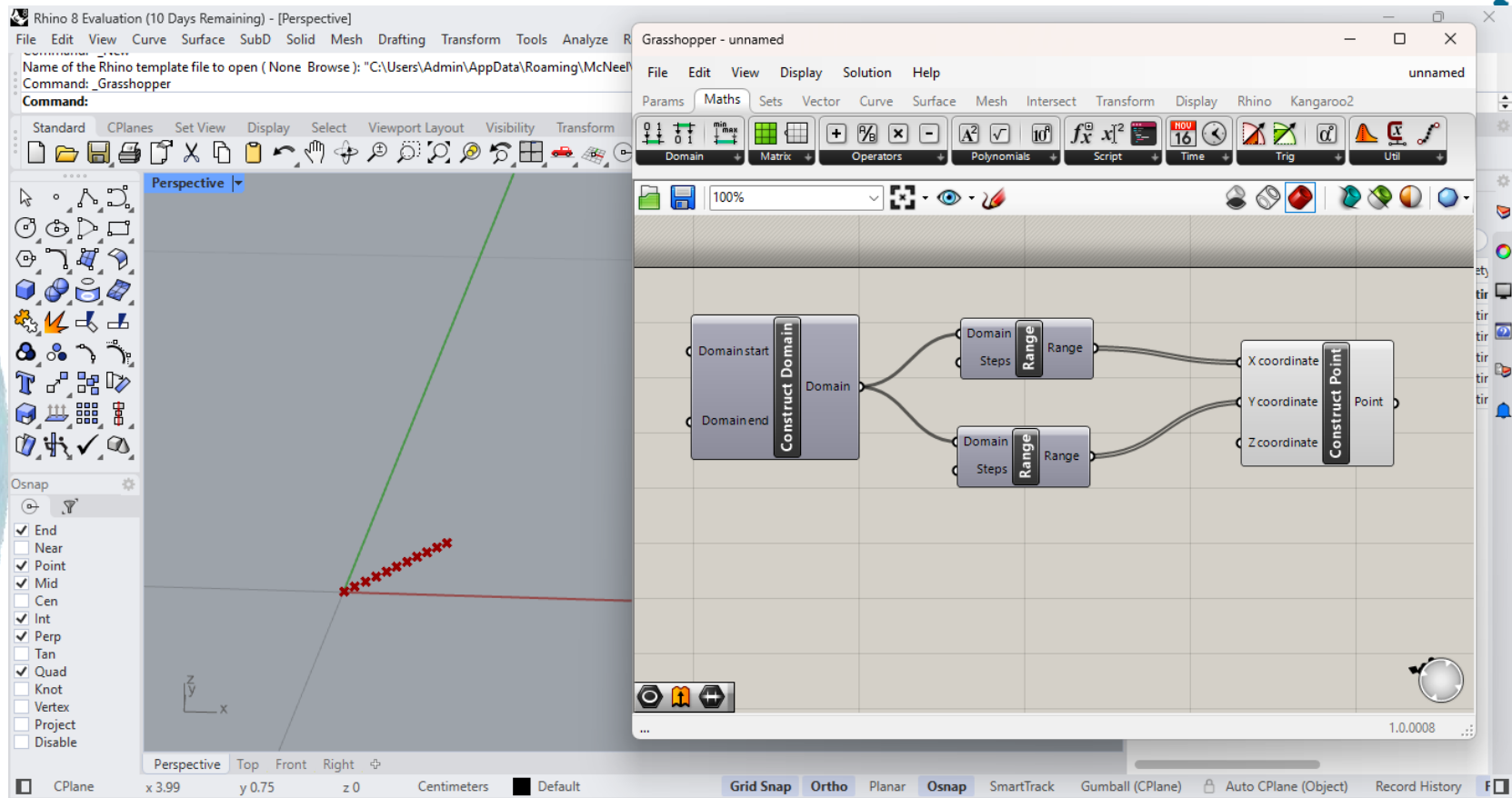
Aula 10 – Continuação do Grasshopper





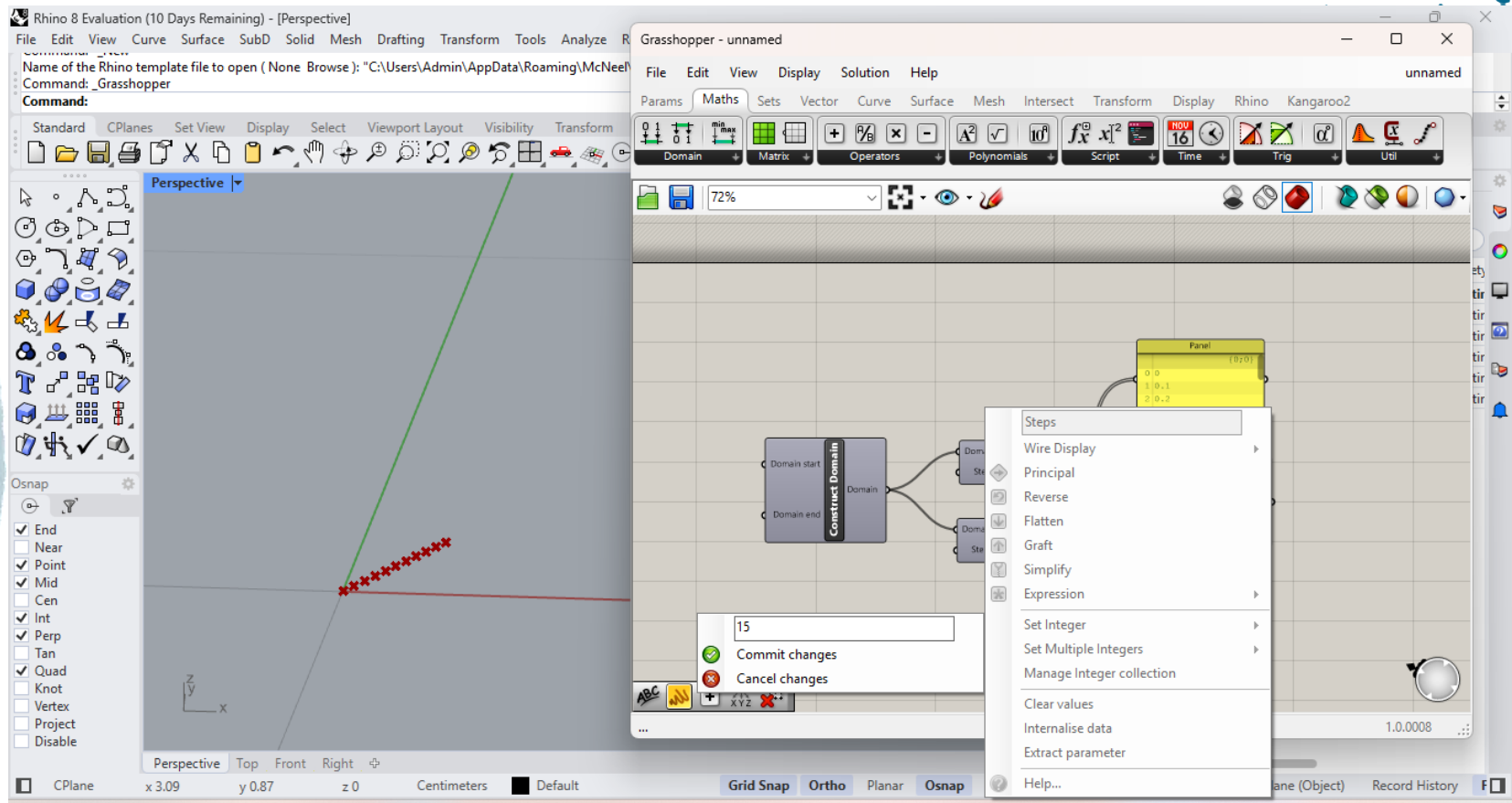
Aula 10 – Continuação do Grasshopper





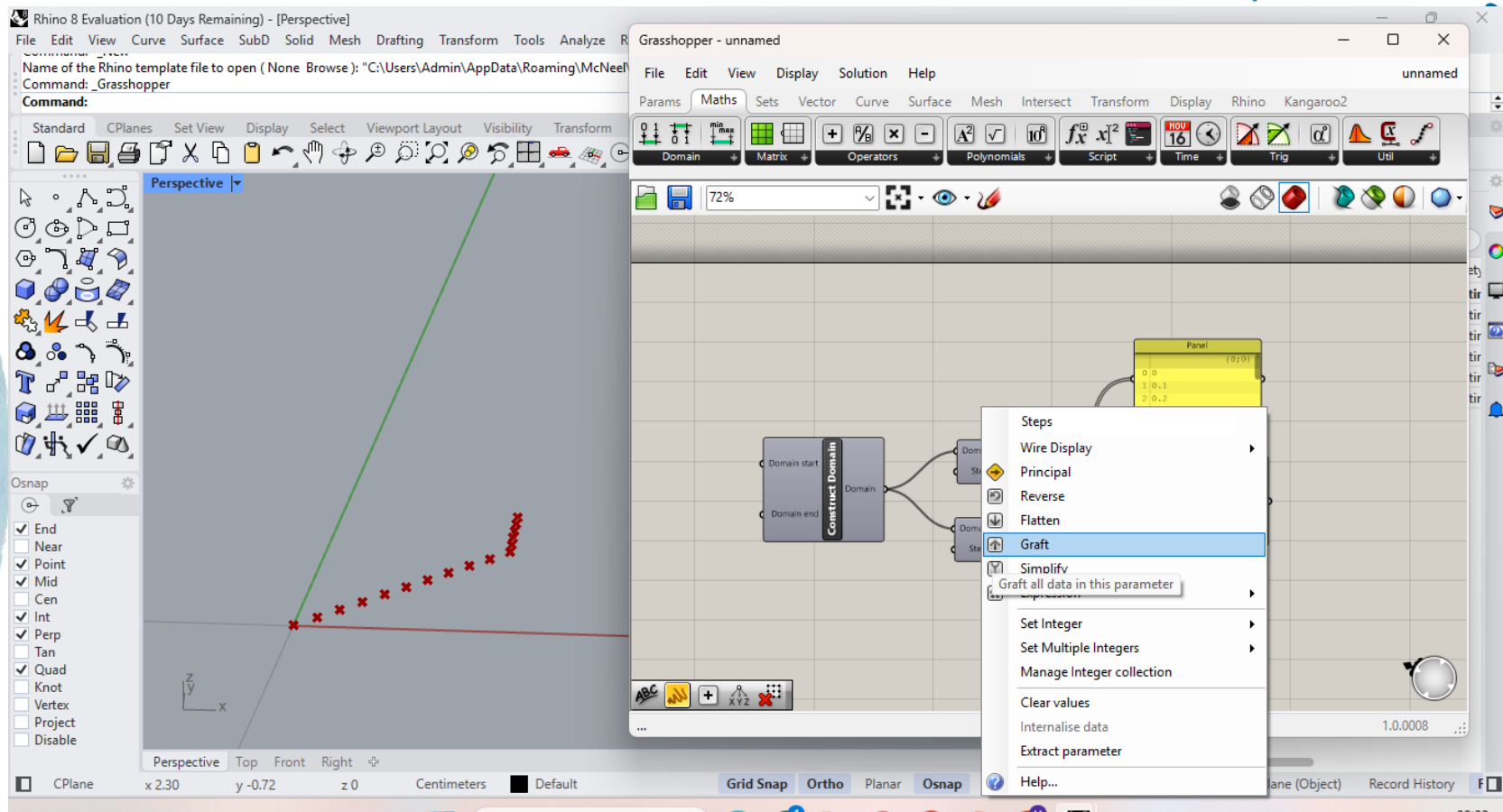
Aula 10 – Continuação do Grasshopper





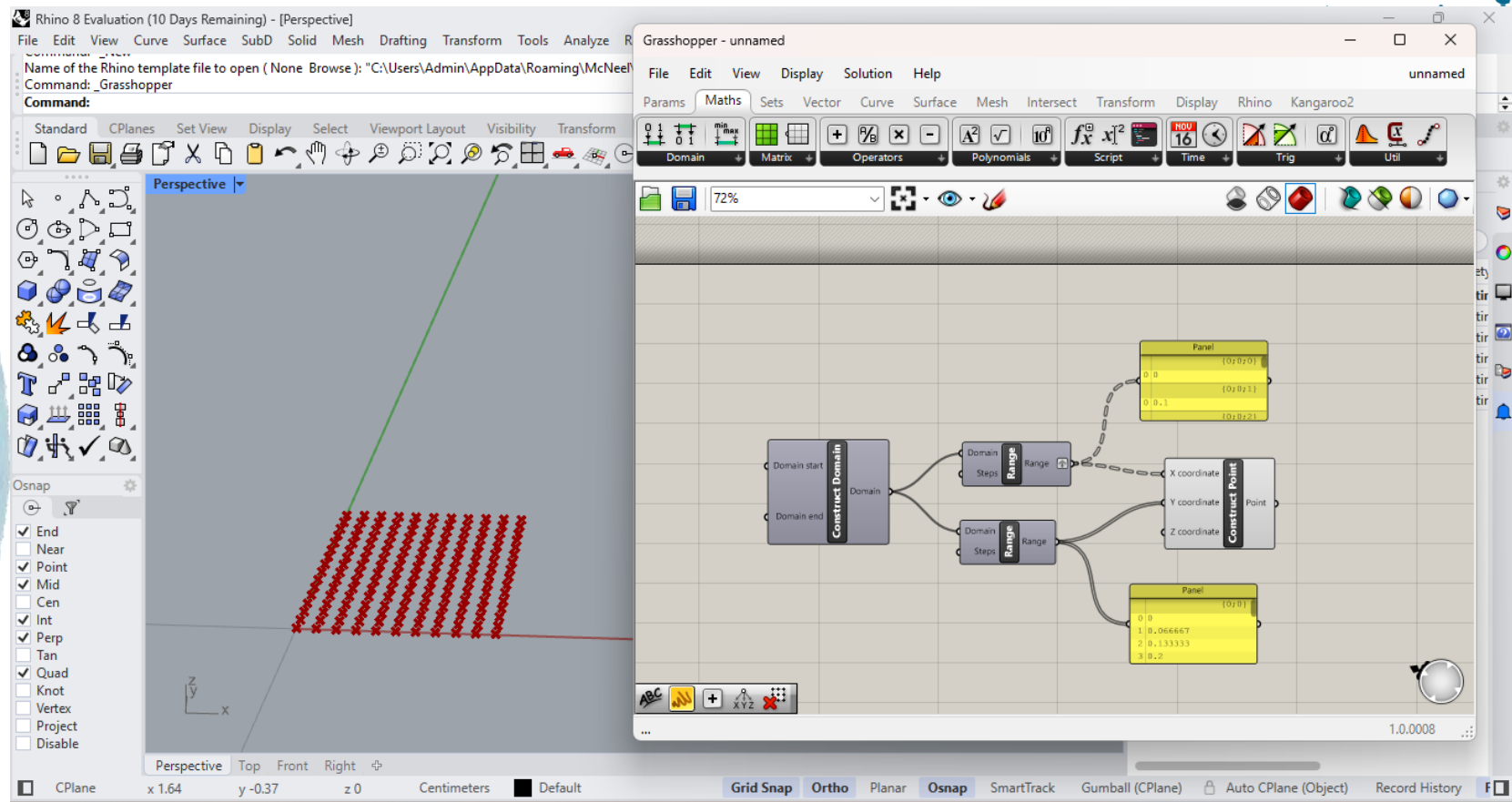
Aula 10 – Continuação do Grasshopper





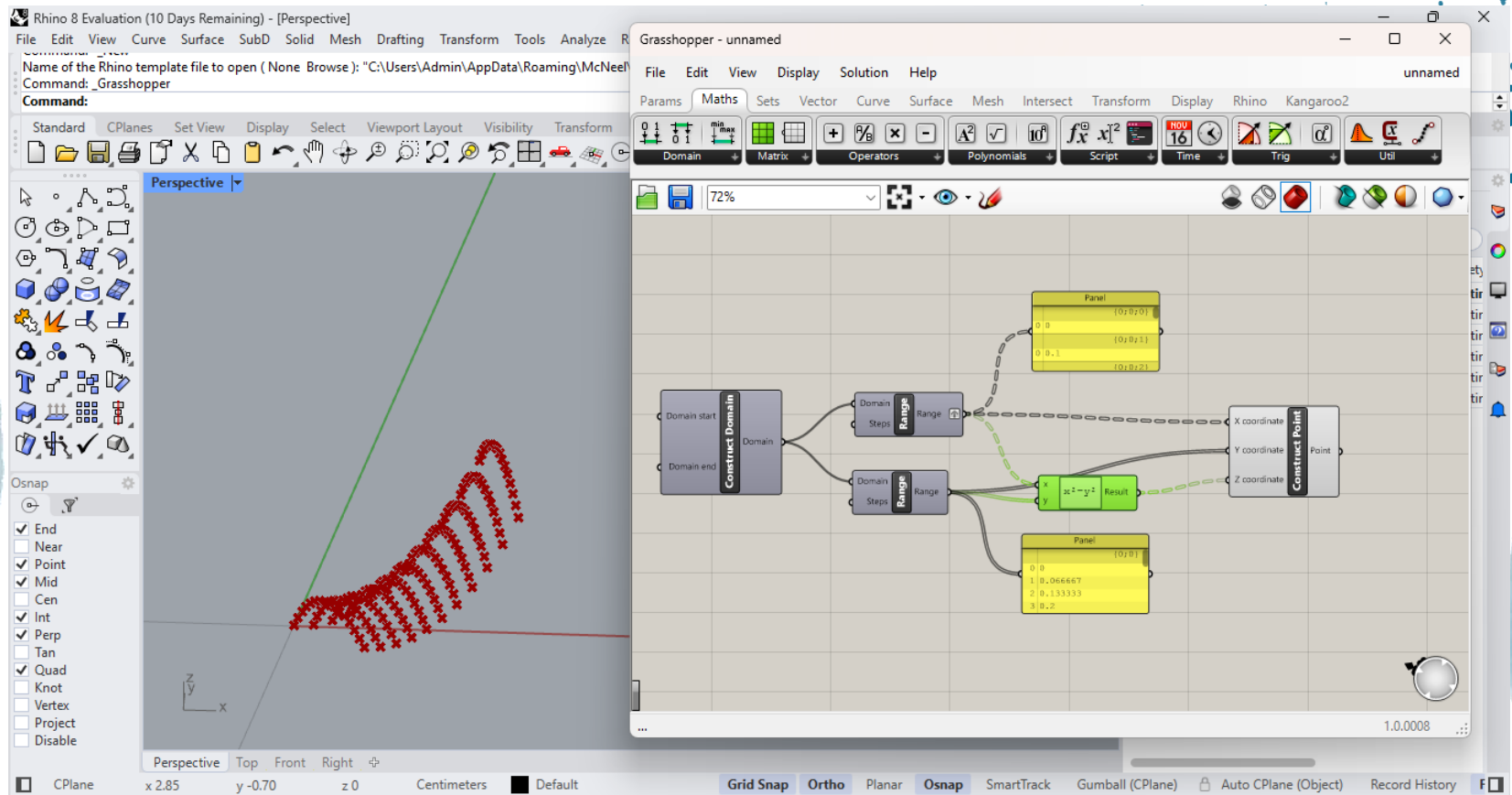
Aula 10 – Continuação do Grasshopper





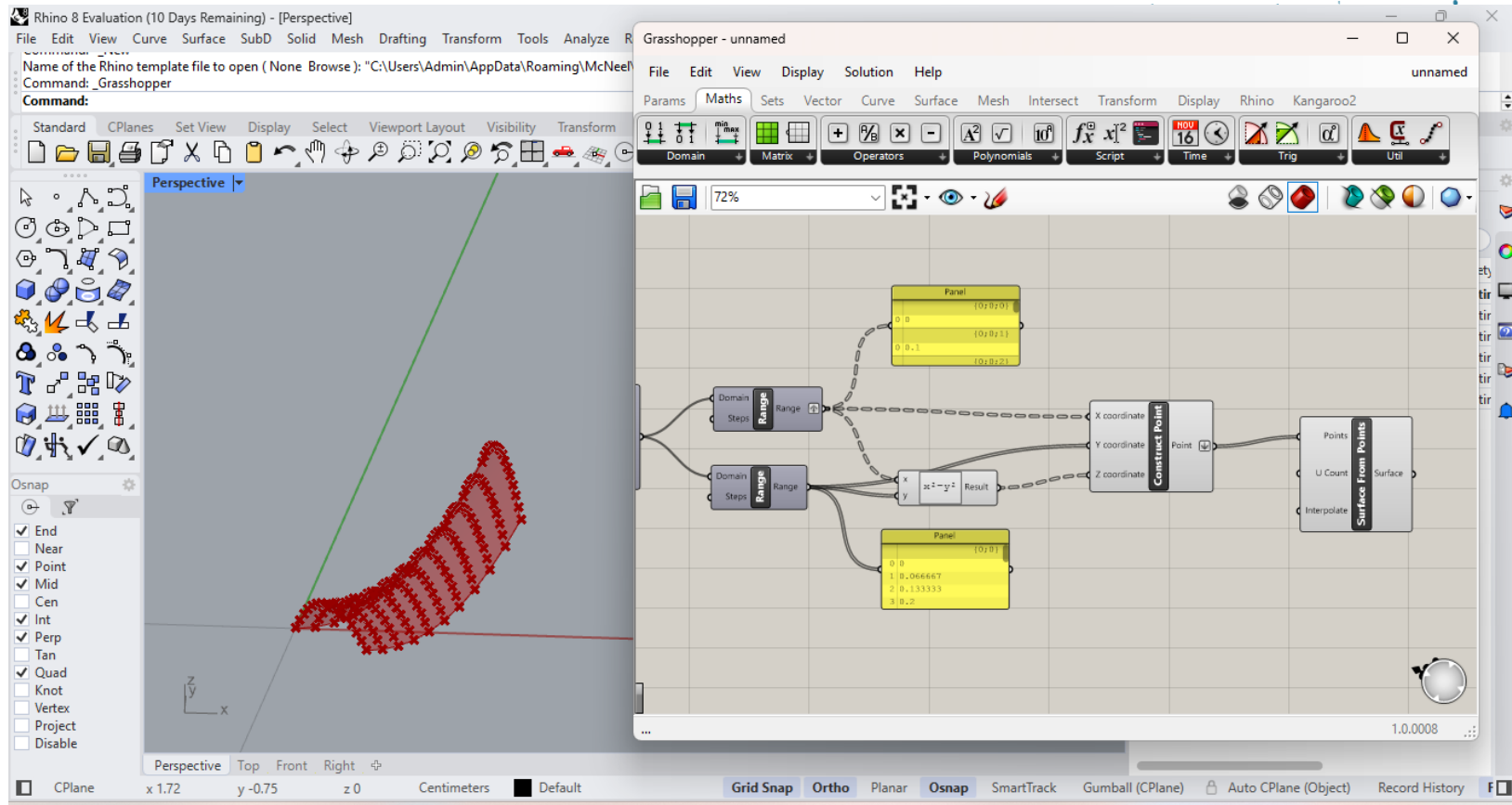
Aula 10 – Continuação do Grasshopper





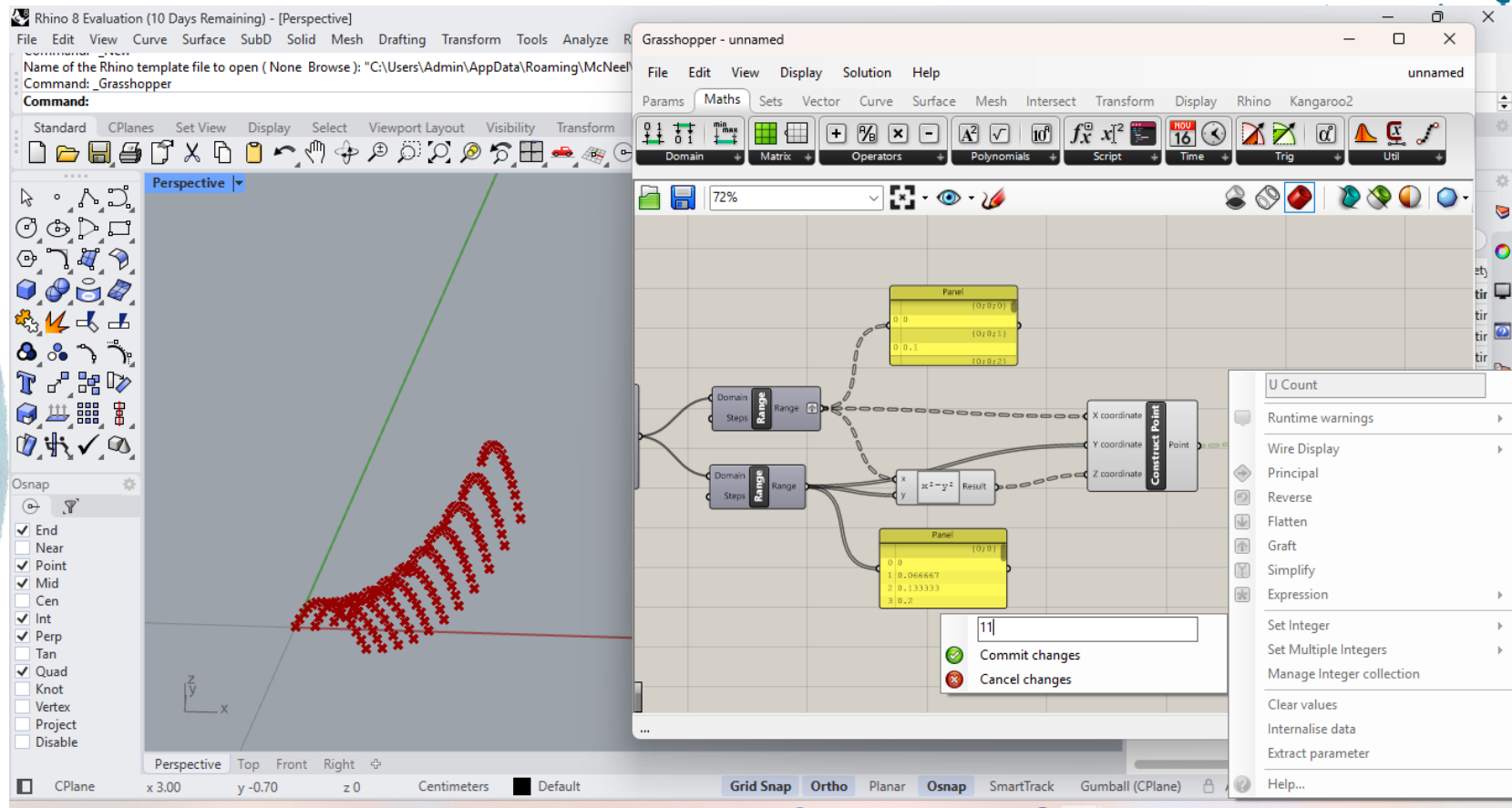
Aula 10 – Continuação do Grasshopper





Aula 10 – Continuação do Grasshopper

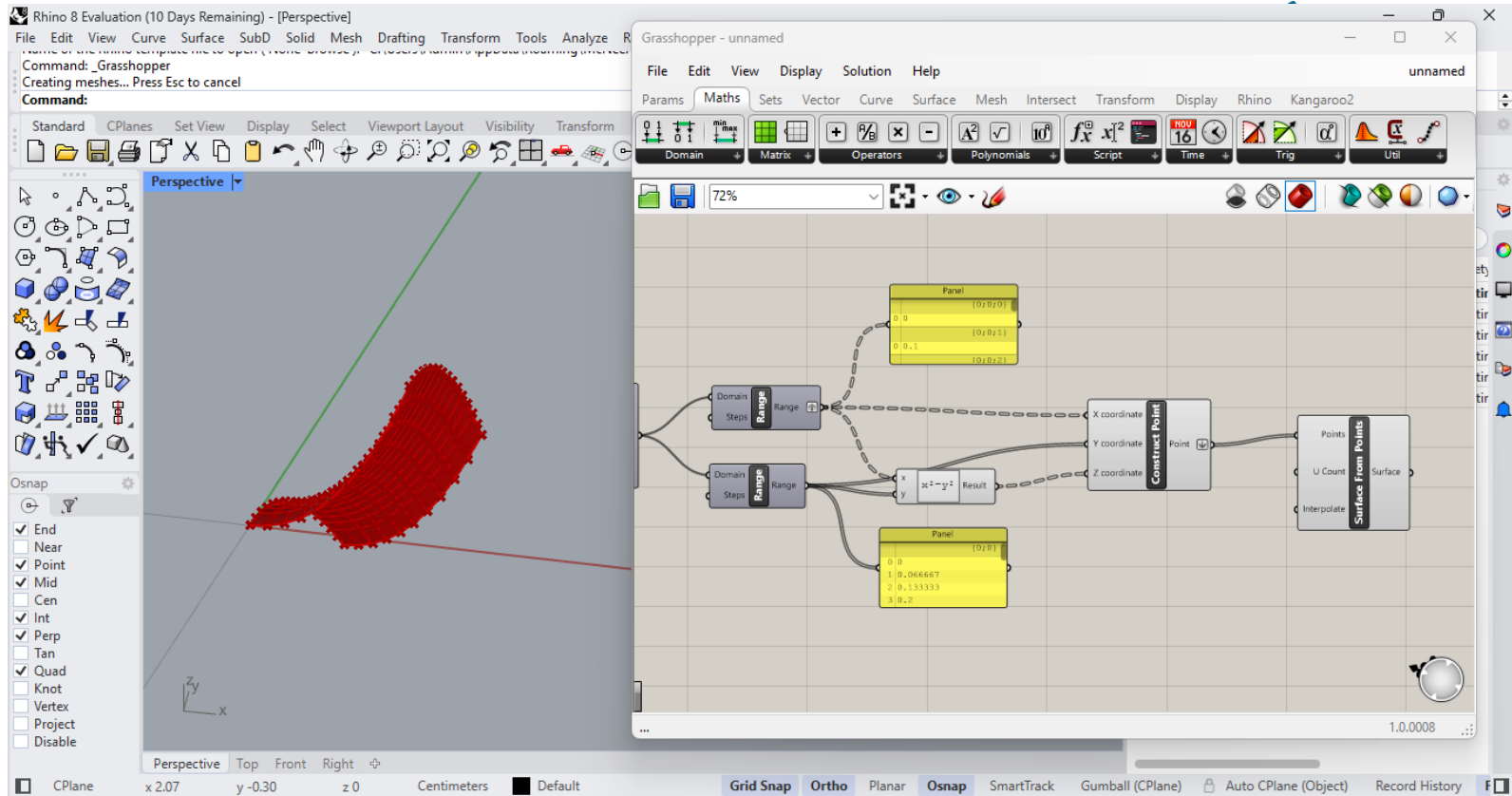




Aula 10 – Continuação do Grasshopper



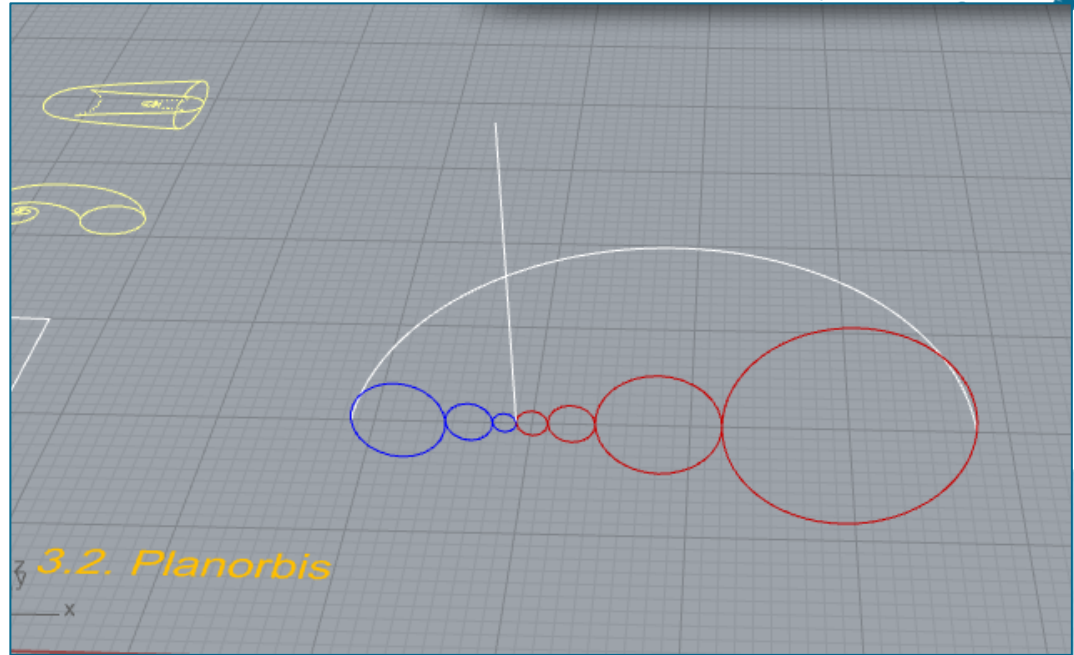




Aula 10 – Continuação do Grasshopper



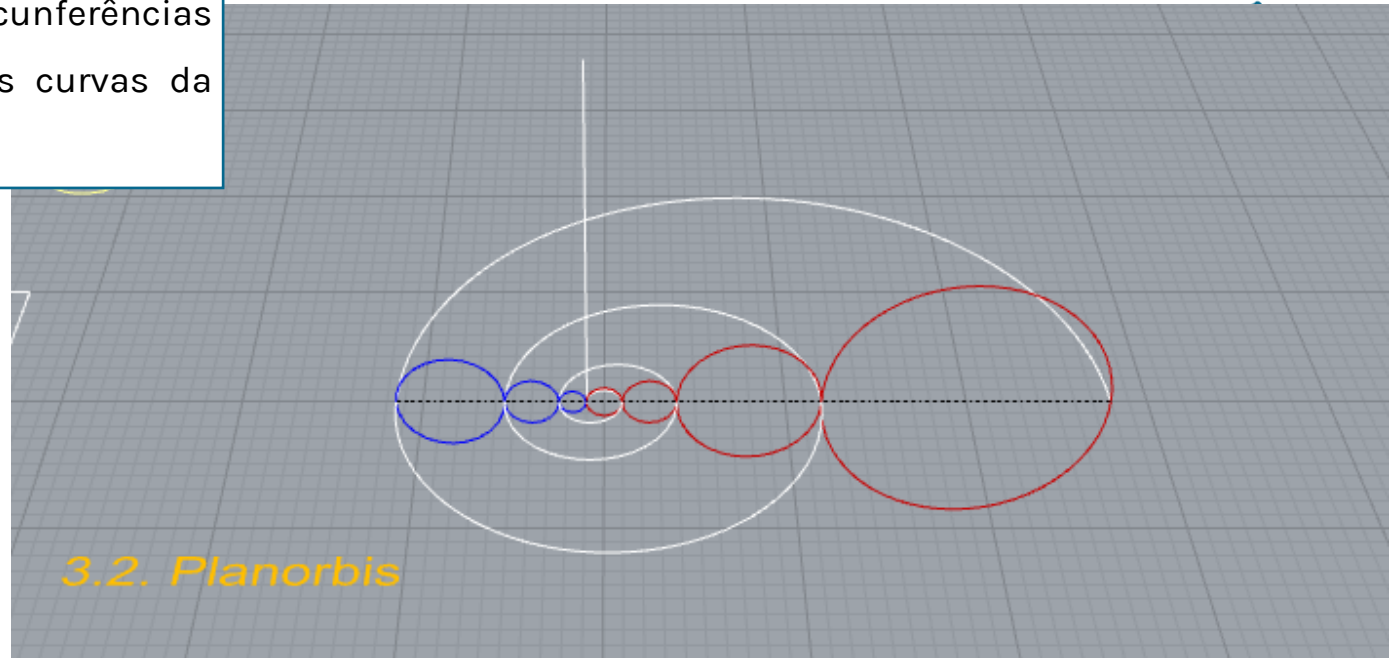
Fazer duas sequências de circunferências verticais, em que os diâmetros vão duplicando (1,5; 3; 6 e 1; 2; 4; 8). Colocar um eixo vertical na parte que liga as sequências e uma semicircunferência que tem o diâmetro igual á distância do início da sequência ao fim dela.



Aula 11 – Planorbis



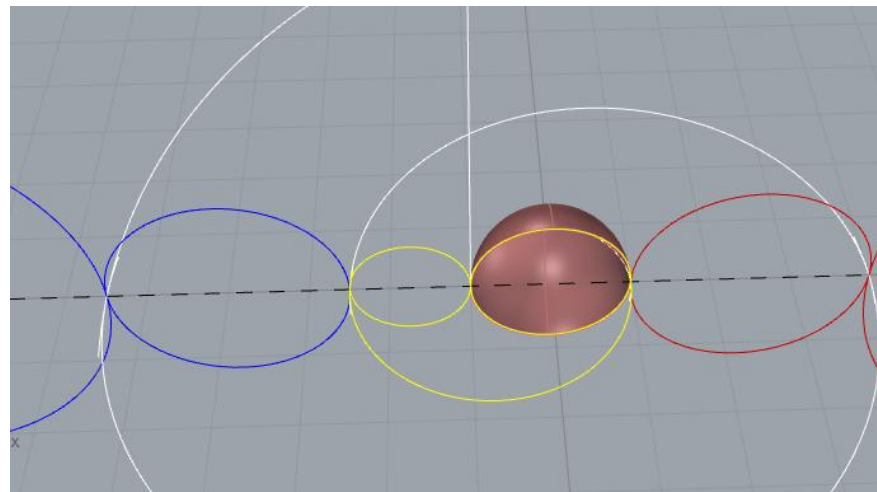
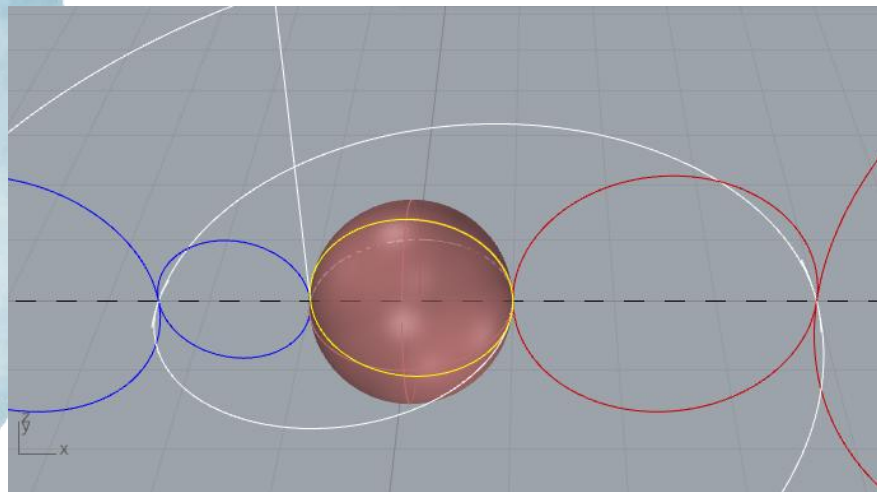
Criar semicircunferências que liguem as circunferências verticais, fazendo as curvas da forma do planorbis



Aula 11 – Planorbis

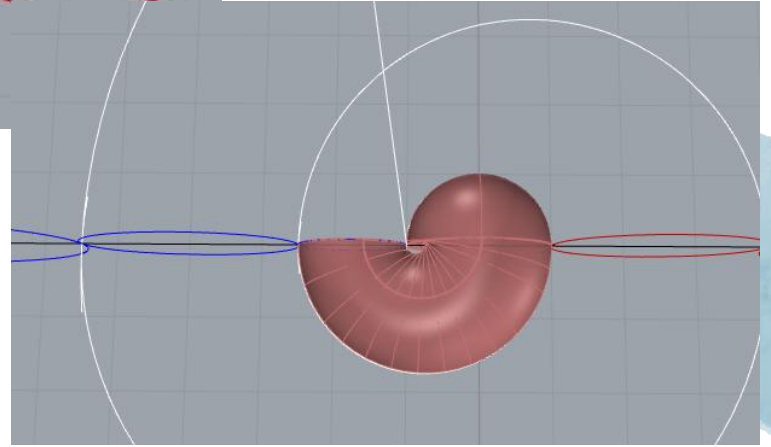
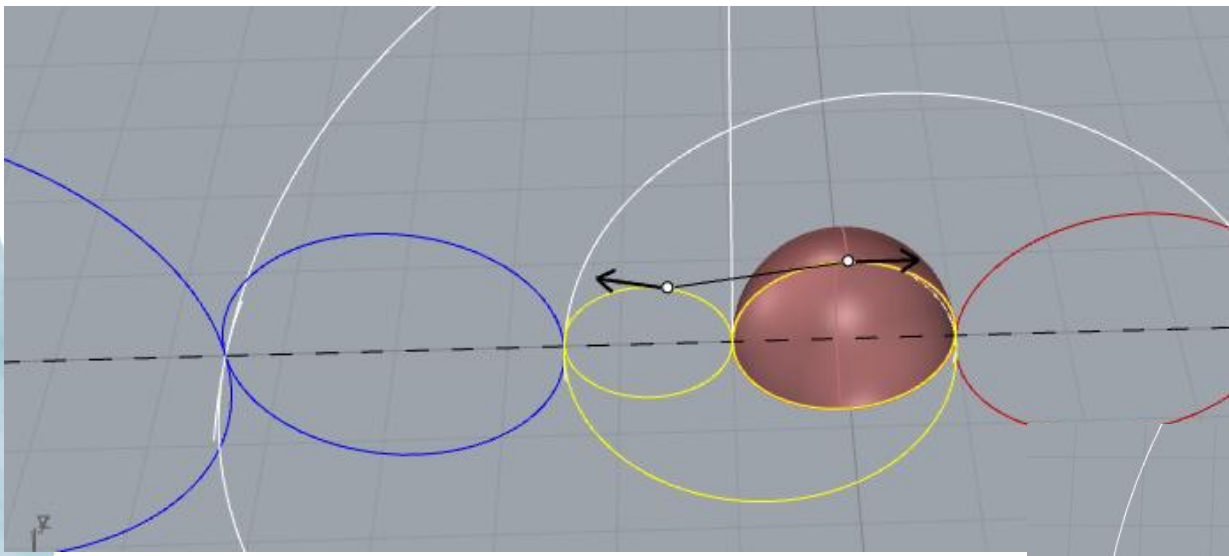


Fazer uma esfera na primeira
circunferência vertical e trim da
metade.



Aula 11 – Planorbis

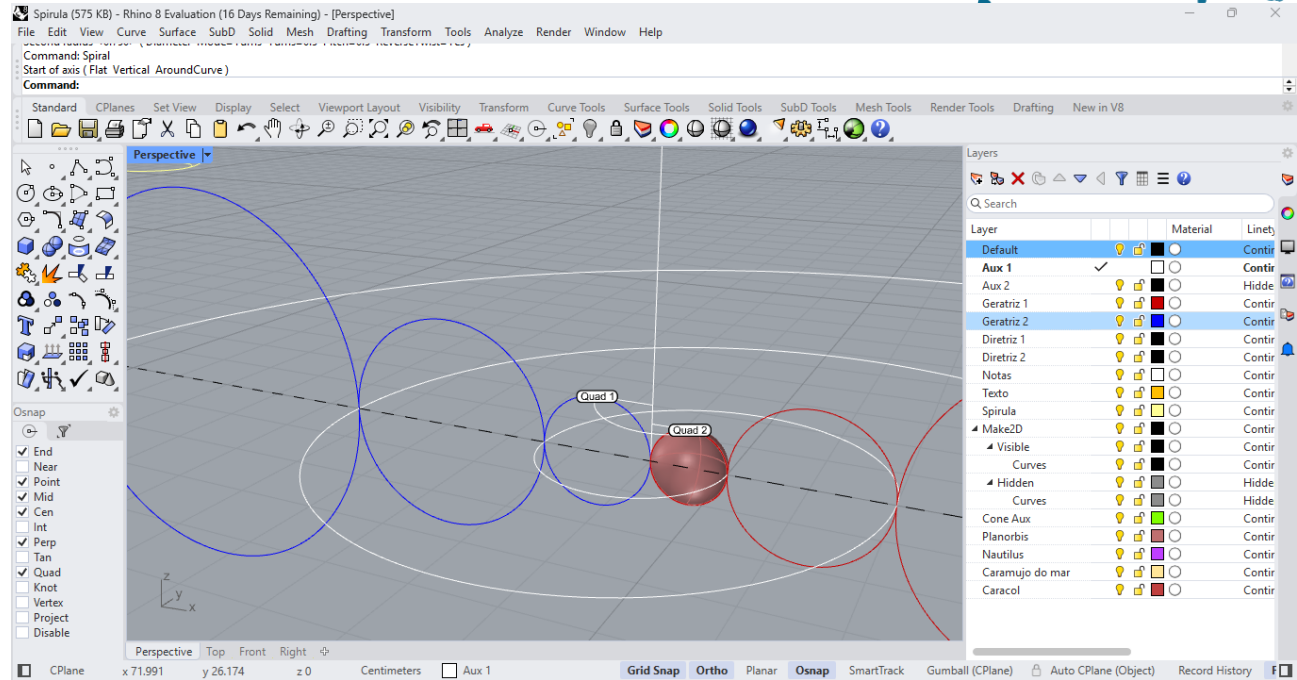




Aula 11 – Planorbis

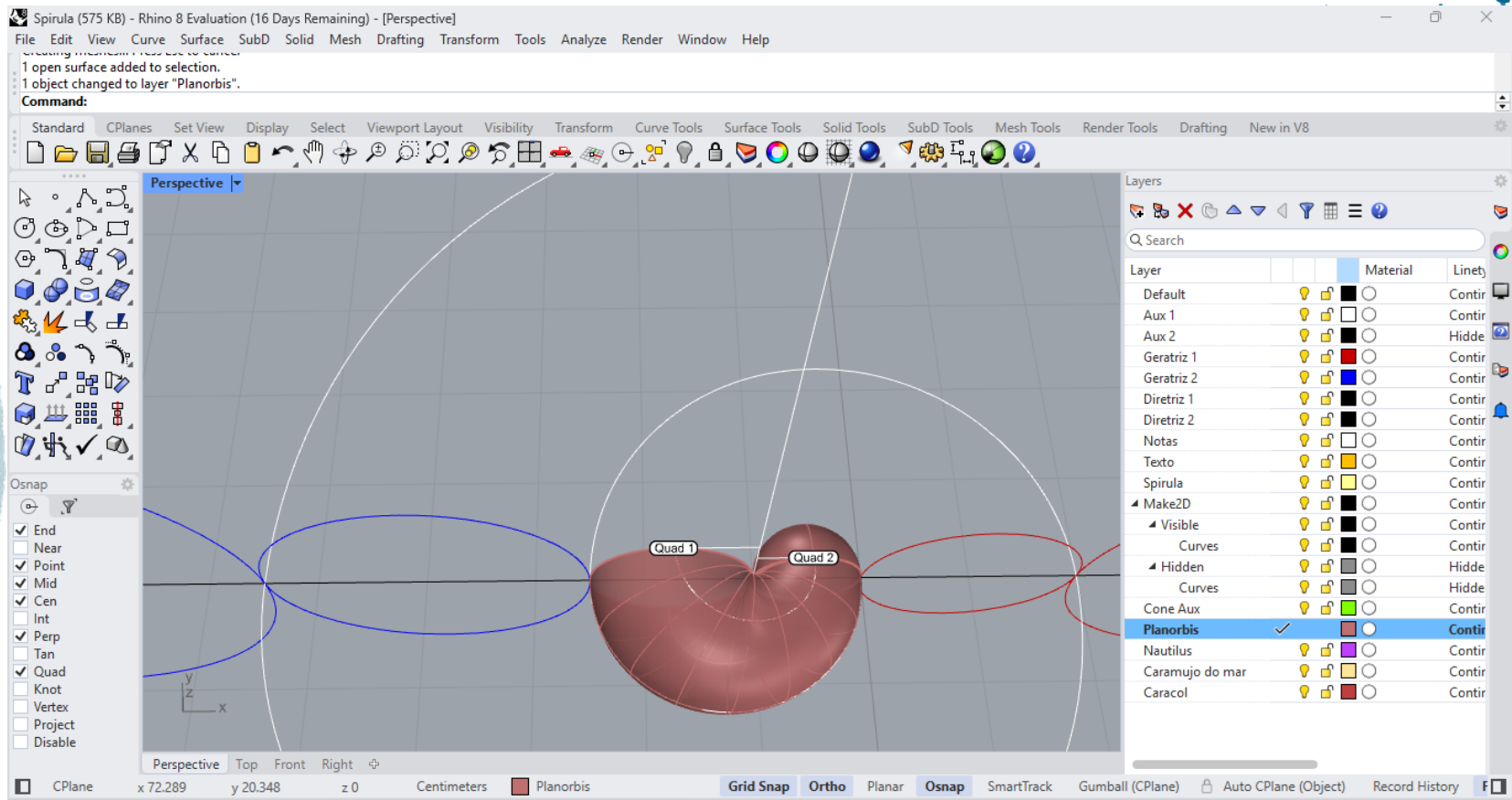


Tem de se fazer duas linhas para o eixo do centro a partir dos quadrantes das primeiras circunferências. De seguida, **Spiral** com 0.5 turns e reverse twist on. **Sweep2**



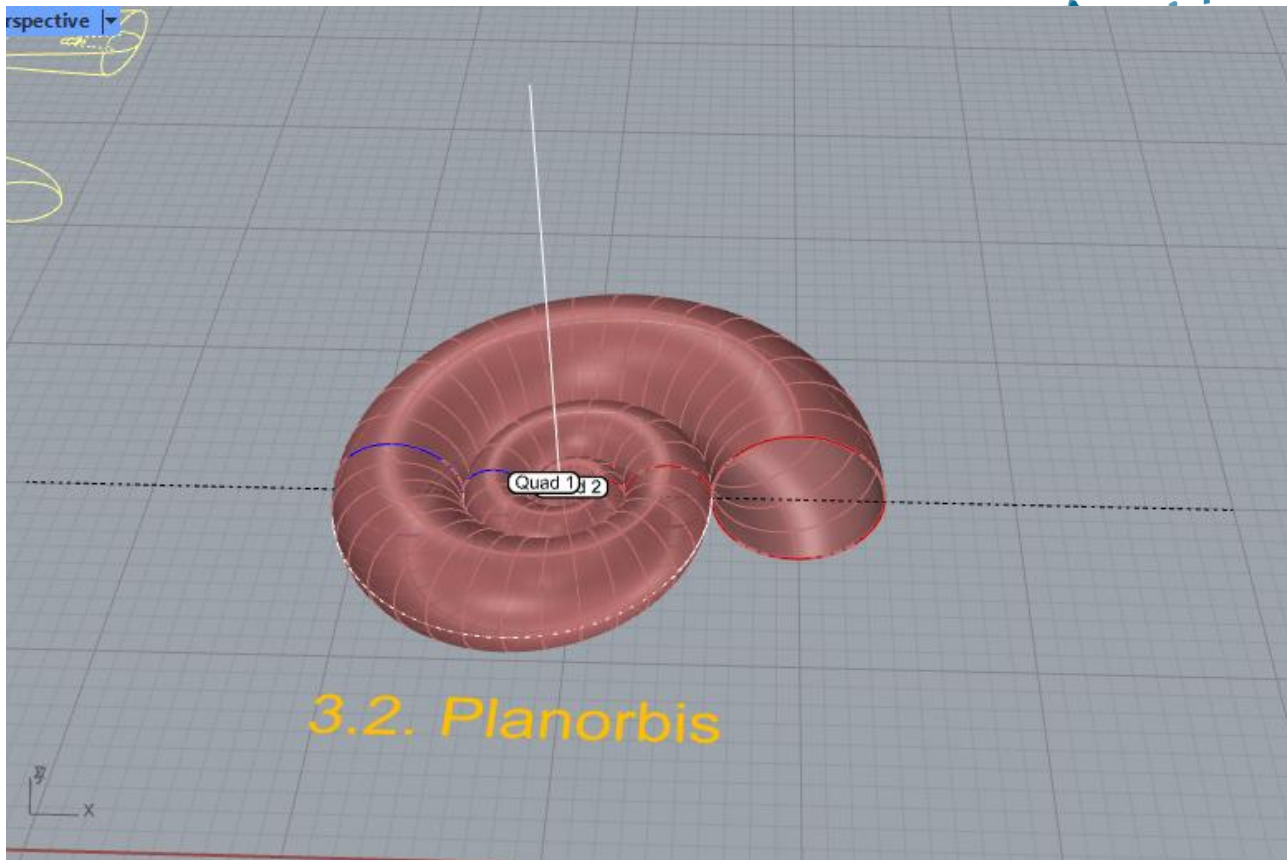
Aula 11 – Planorbis





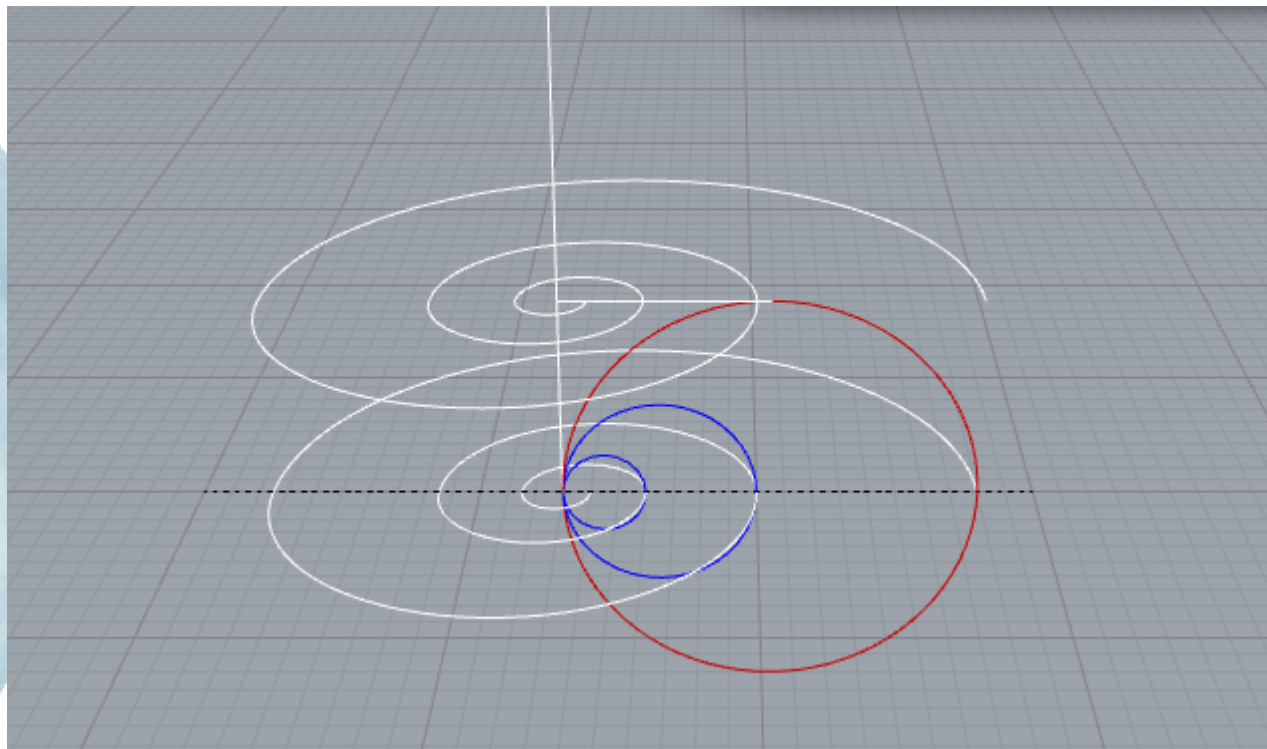
Aula 11 – Planorbis





Aula 11 – Planorbis



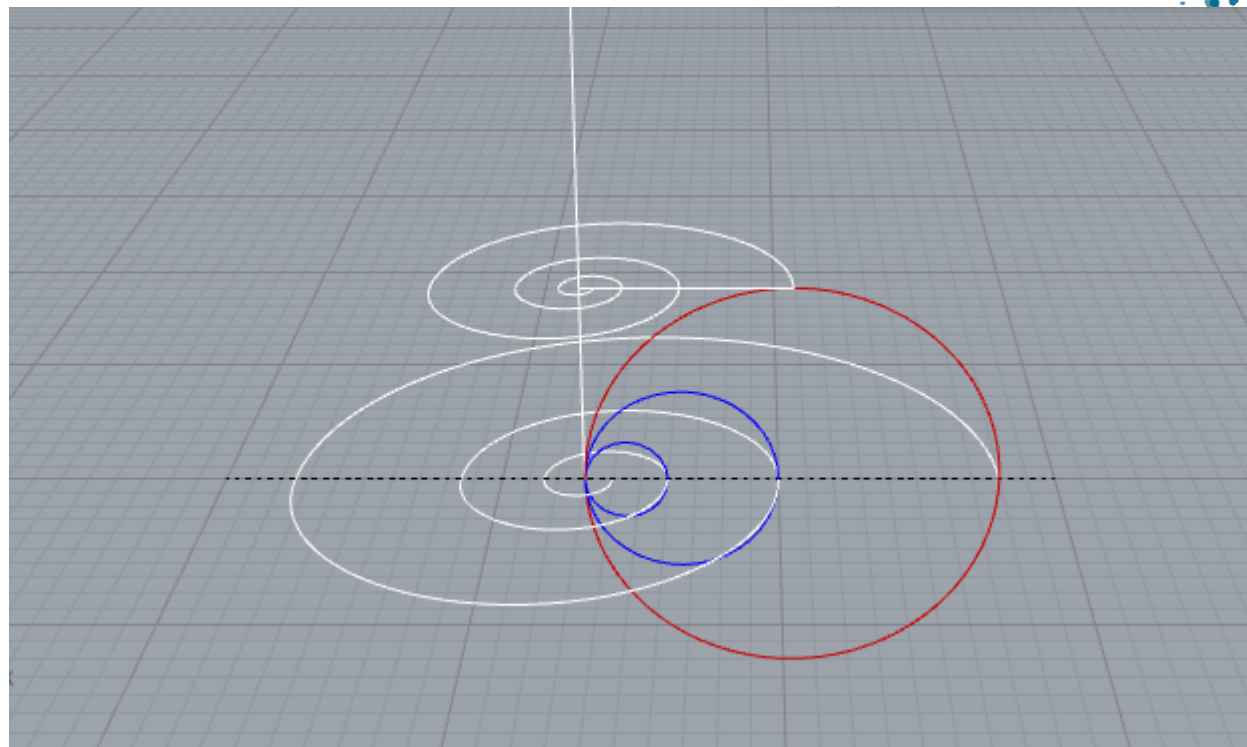


A base igual á do planorbis, a parte horizontal. Criar varias circunferências verticais de 2 pontos do centro até ás semicircunferências. Fazer linha perpendicular do quadrante para o eixo vertical do centro.

Aula 11 – Nautilus



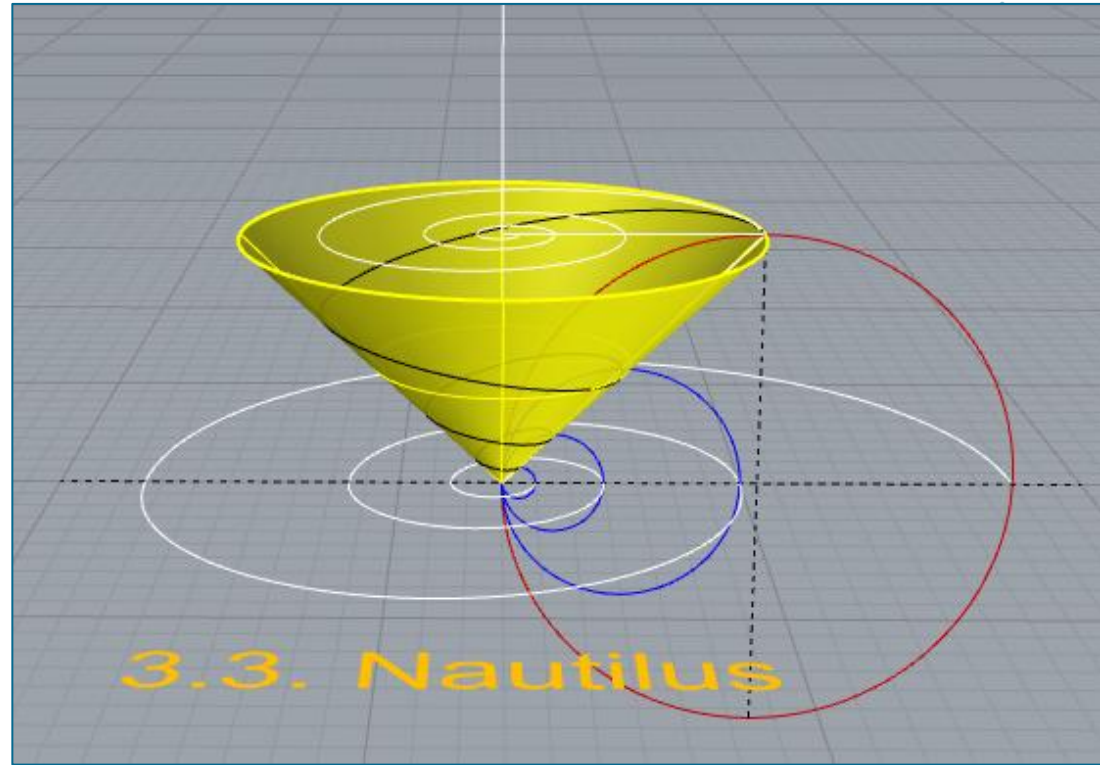
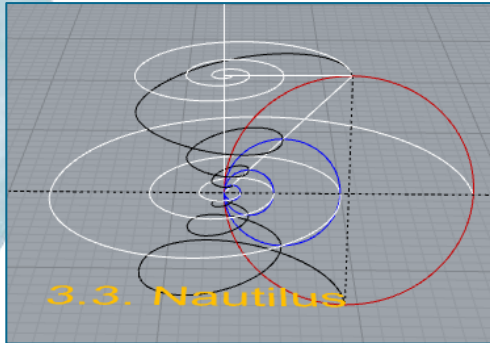
Scale da curva
de cima



Aula 11 – Nautilus



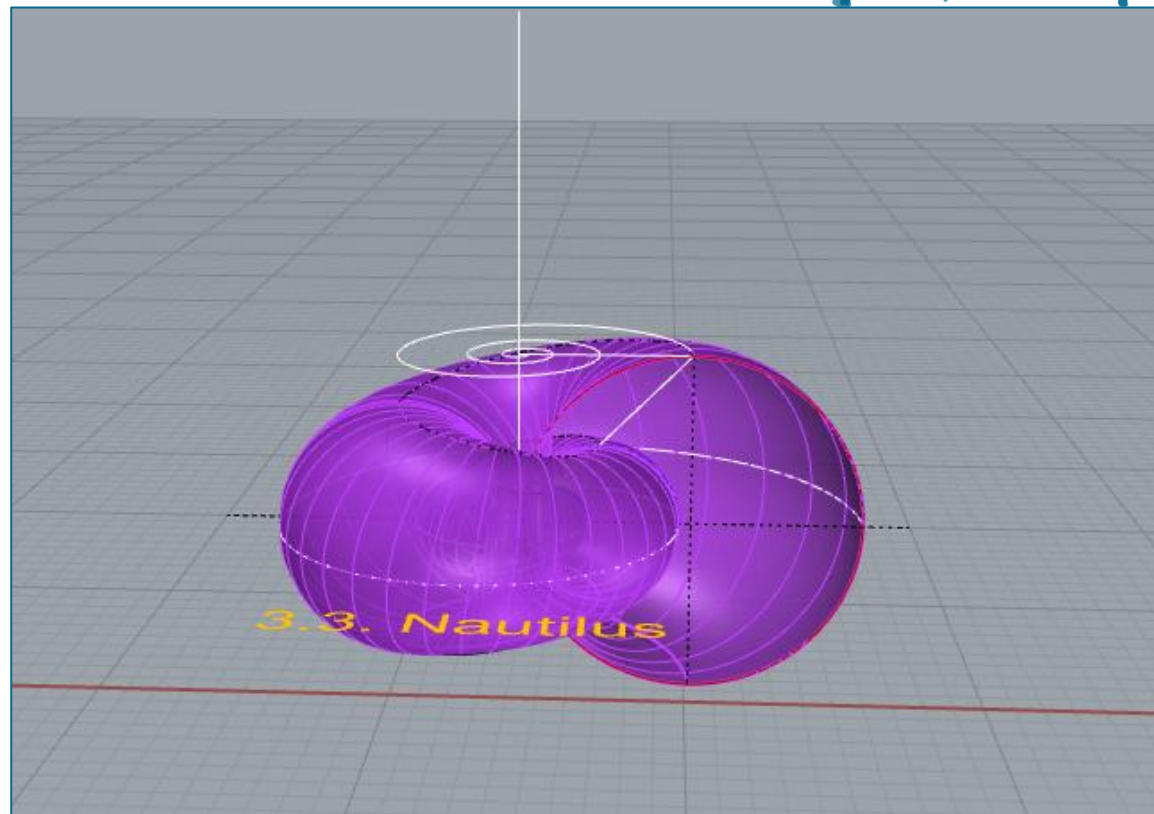
Com a ajuda de um cone,
faz-se a espiral, usando o
Revolve- para o cone
Project- para a espiral
Depois, mirror da espiral



Aula 11 – Nautilus

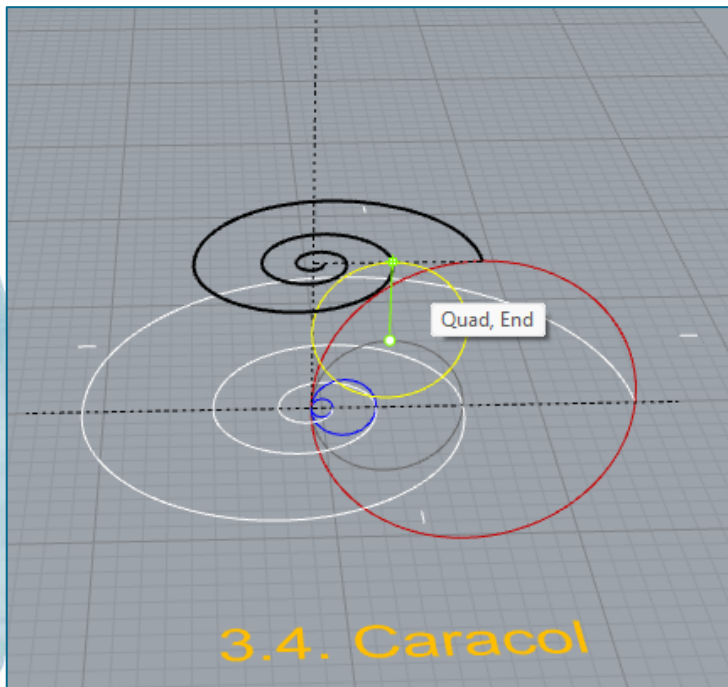


Sweep2

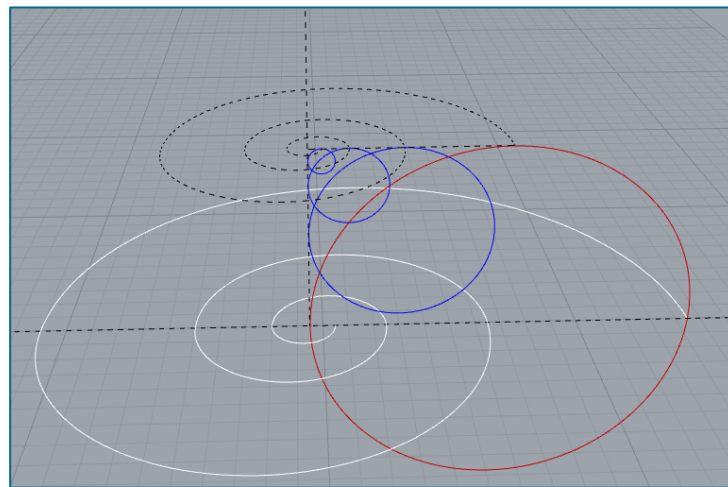


Aula 11 – Nautilus



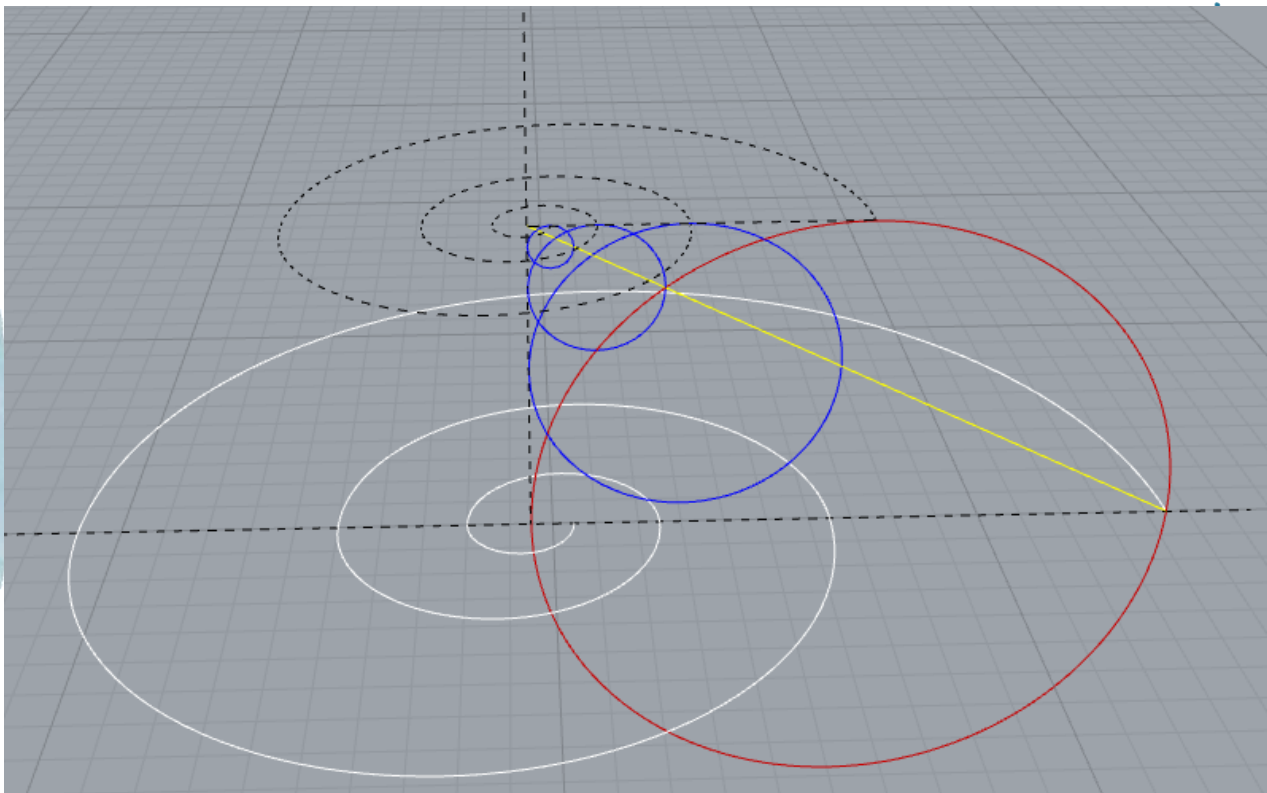


A base igual á do nautilus, contudo as
circunferências sobem até á curva de
cima **Move**



Aula 12 – Caracol

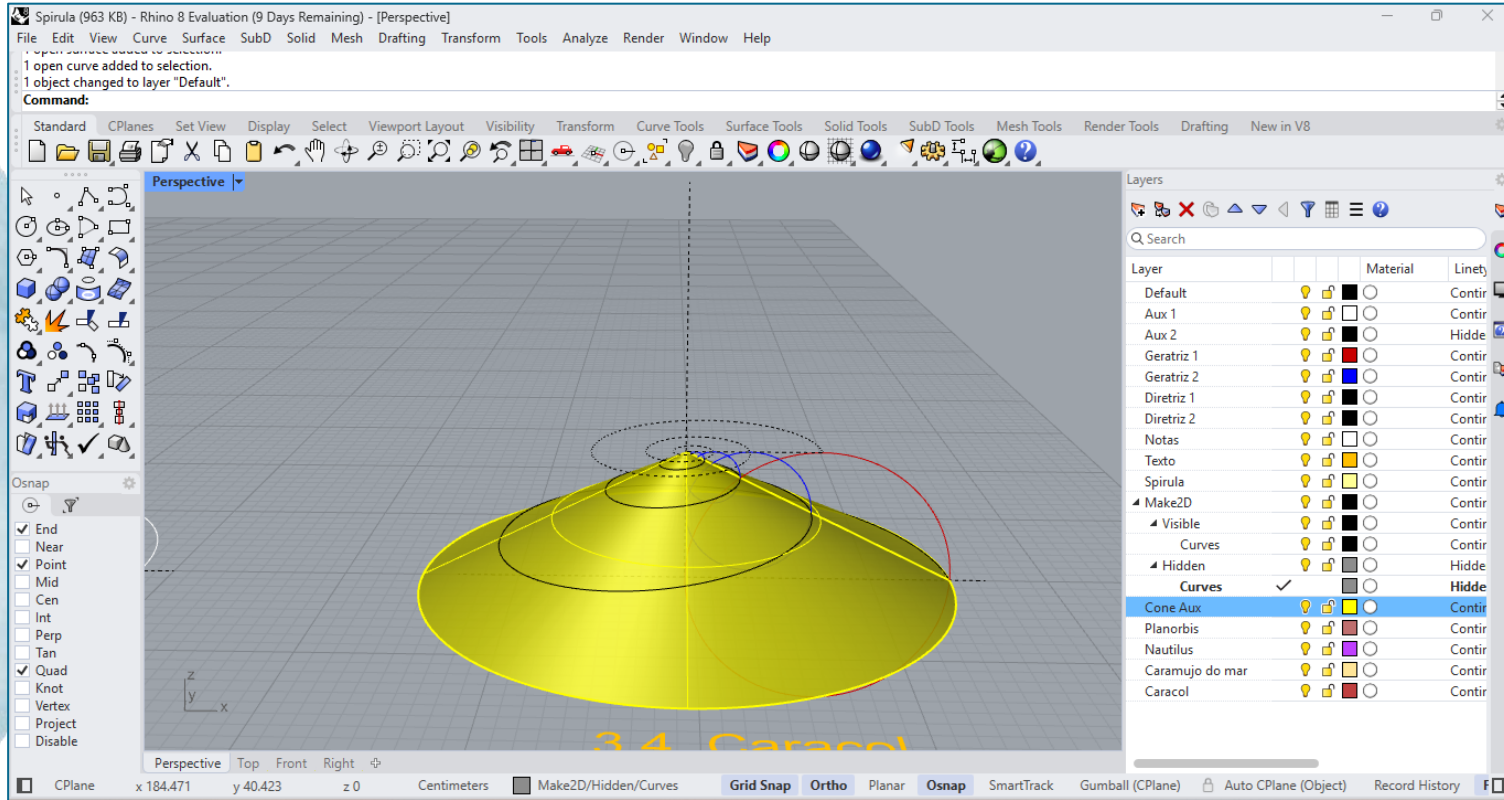




Line

Aula 12 – Caracol

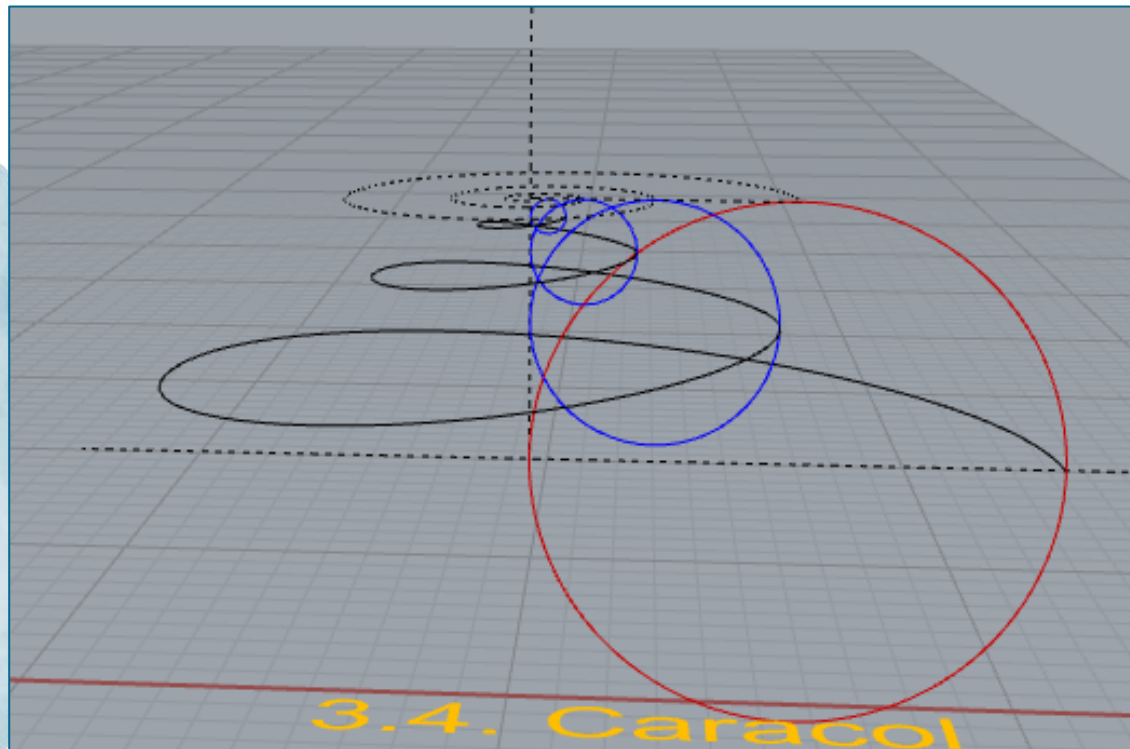




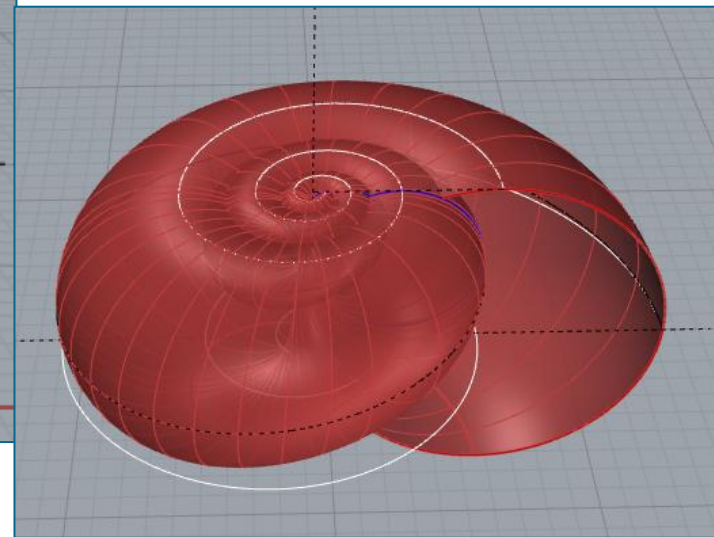
Revolve-cone
Project- Espiral

Aula 12 – Caracol



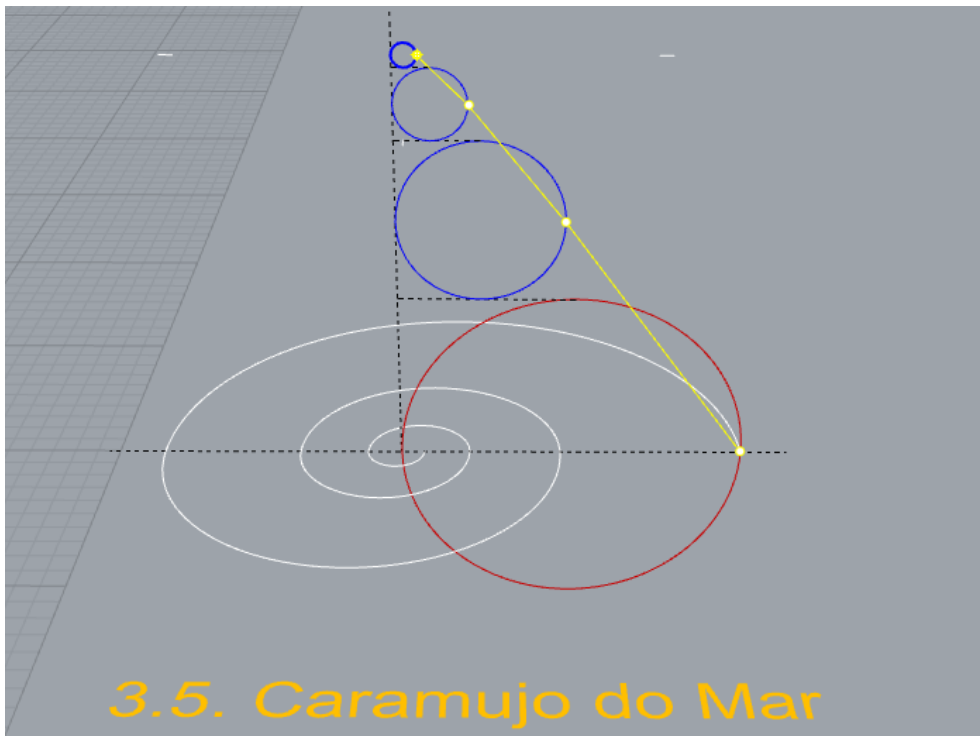


Sweep2



Aula 12 – Caracol

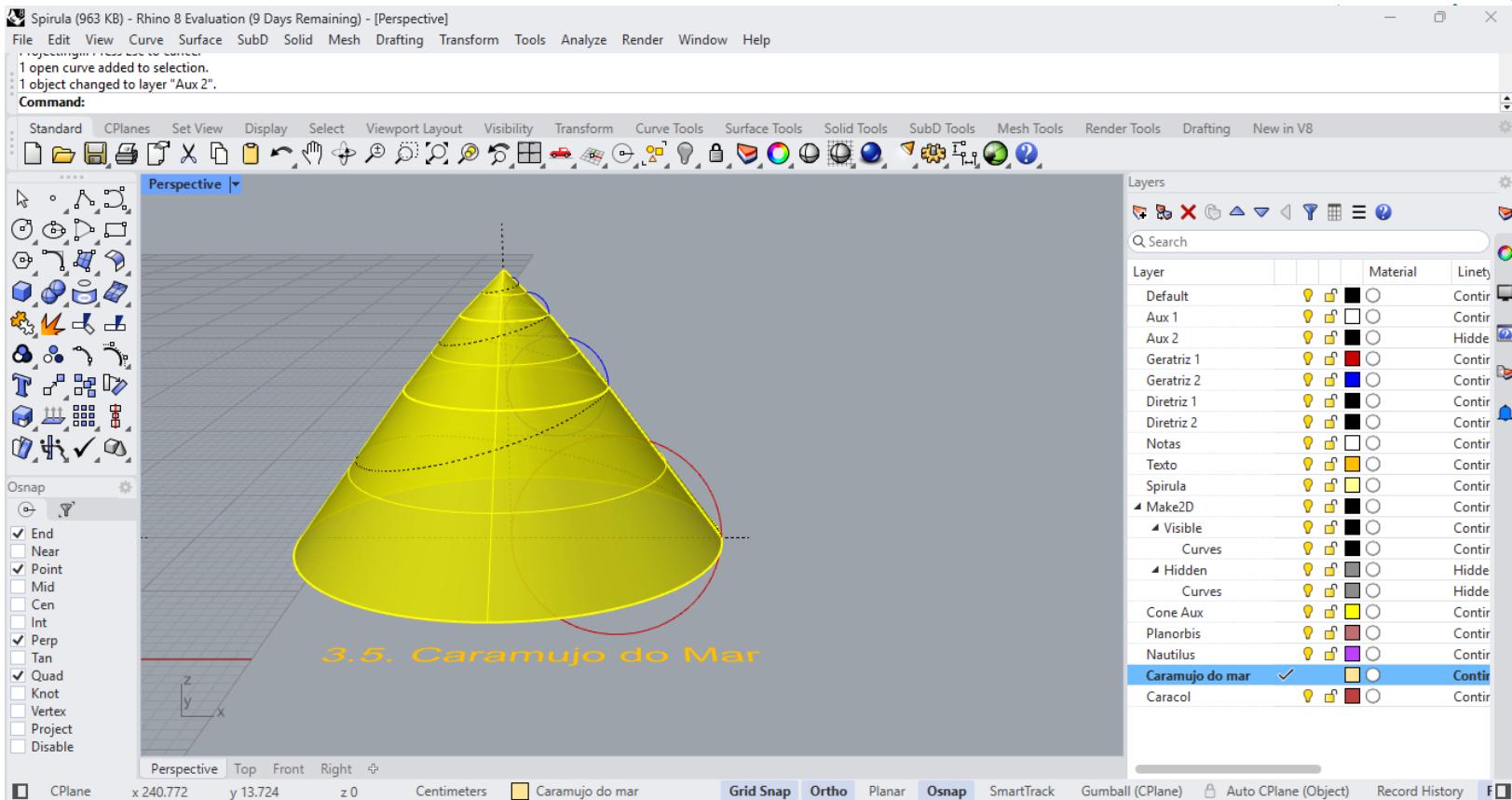




Assim como nos outros
moluscos, a base vai ser
a mesma, com as
circunferências em
sítios diferentes

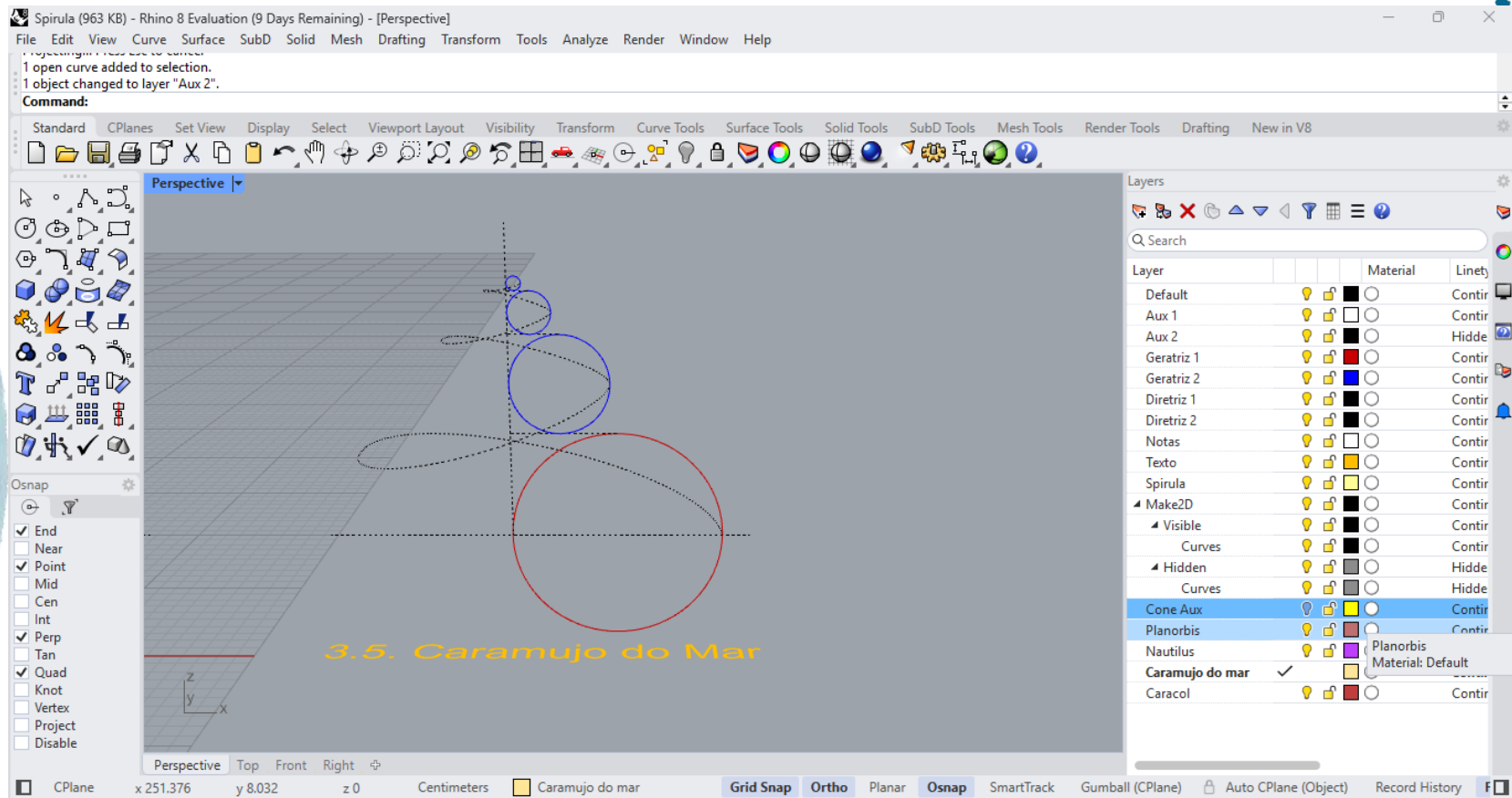
Aula 12 – Caramujo do Mar





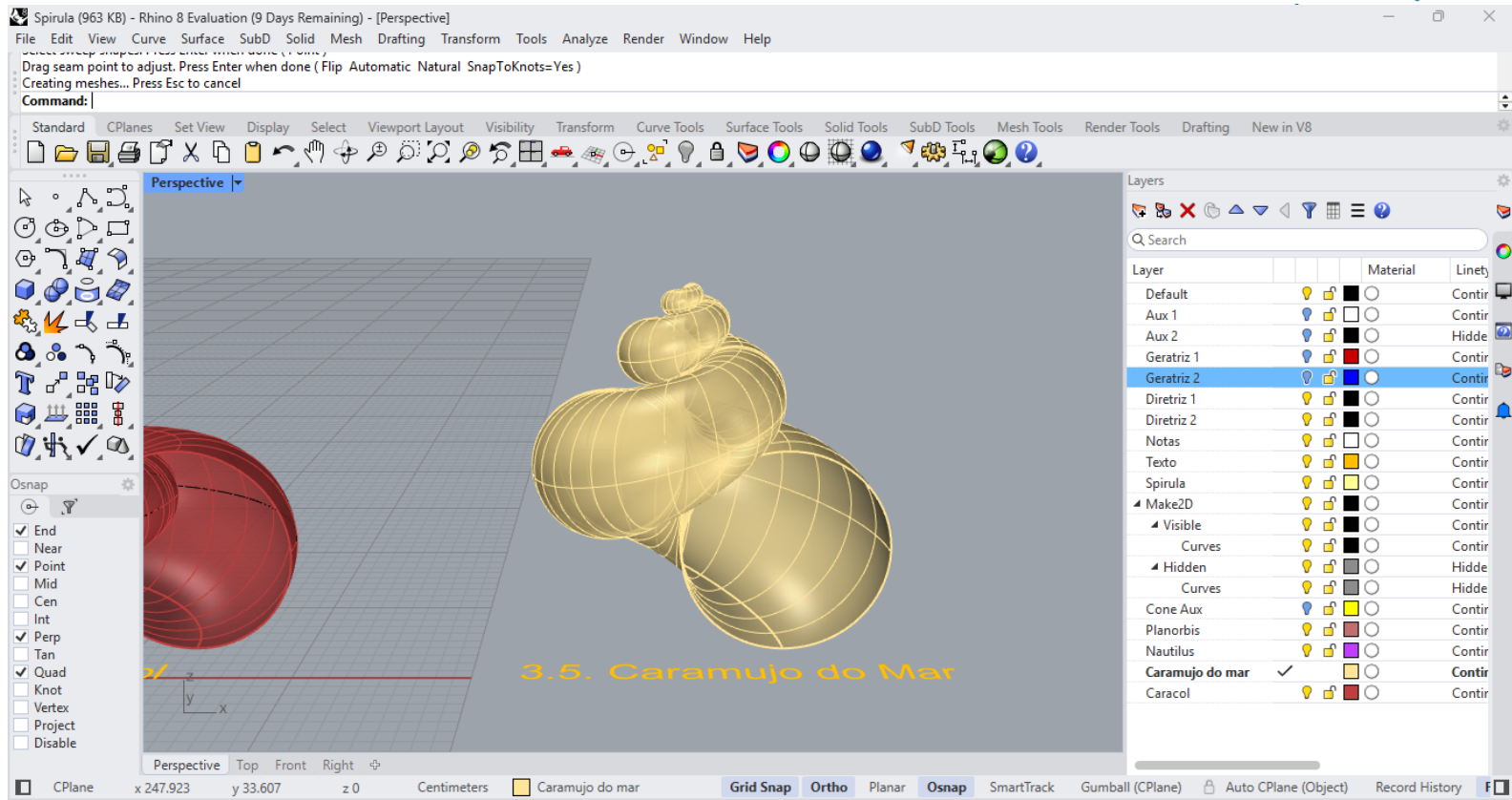
Aula 12 – Caramujo do Mar





Aula 12 – Caramujo do Mar

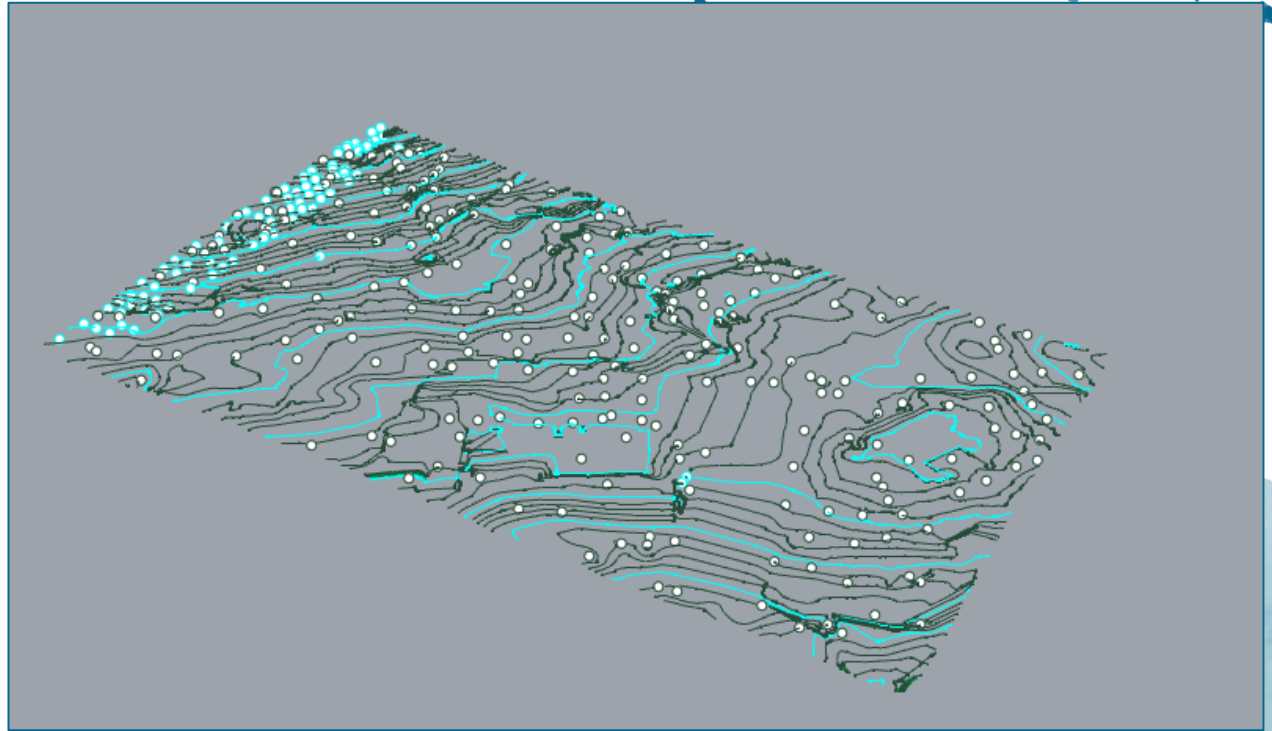




Aula 12 – Caramujo do Mar



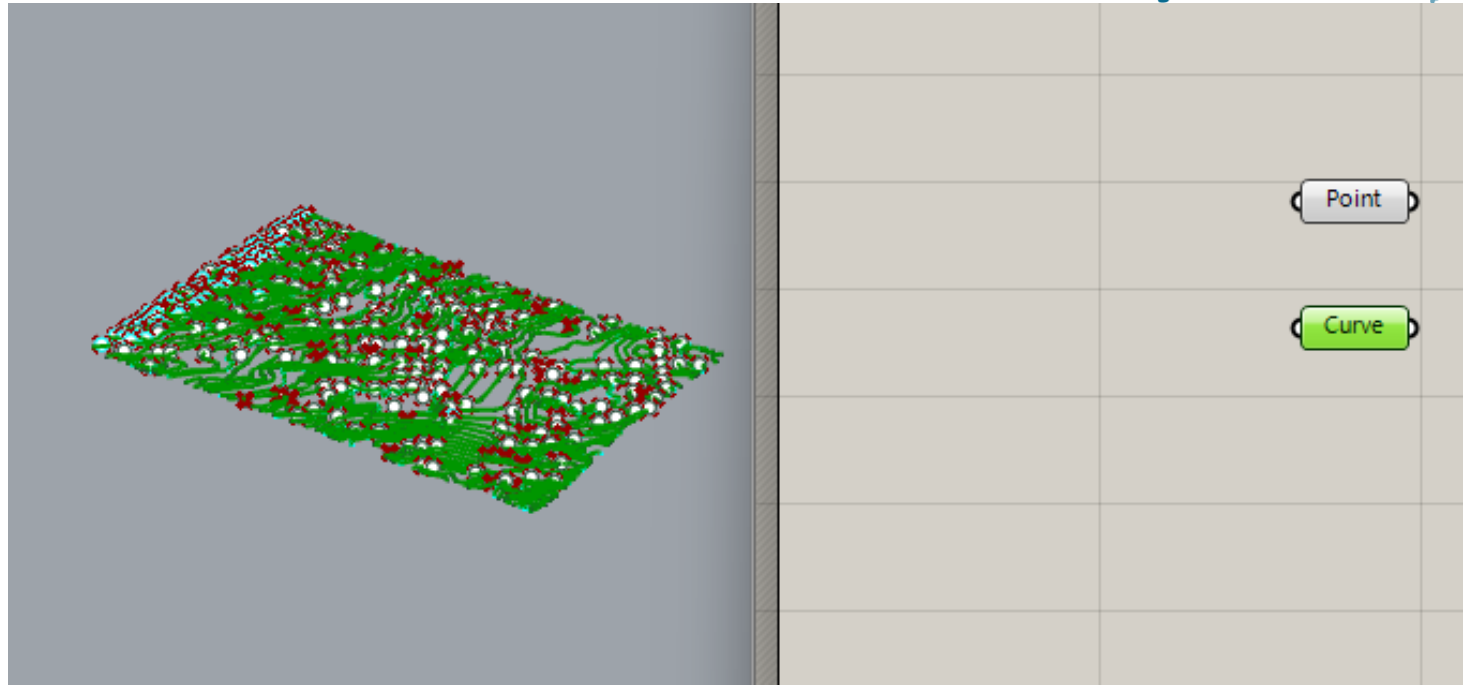
Descarregar o ficheiro
dwg do terreno para o
rhino com o import



Aula 13 – Terreno em Grasshopper

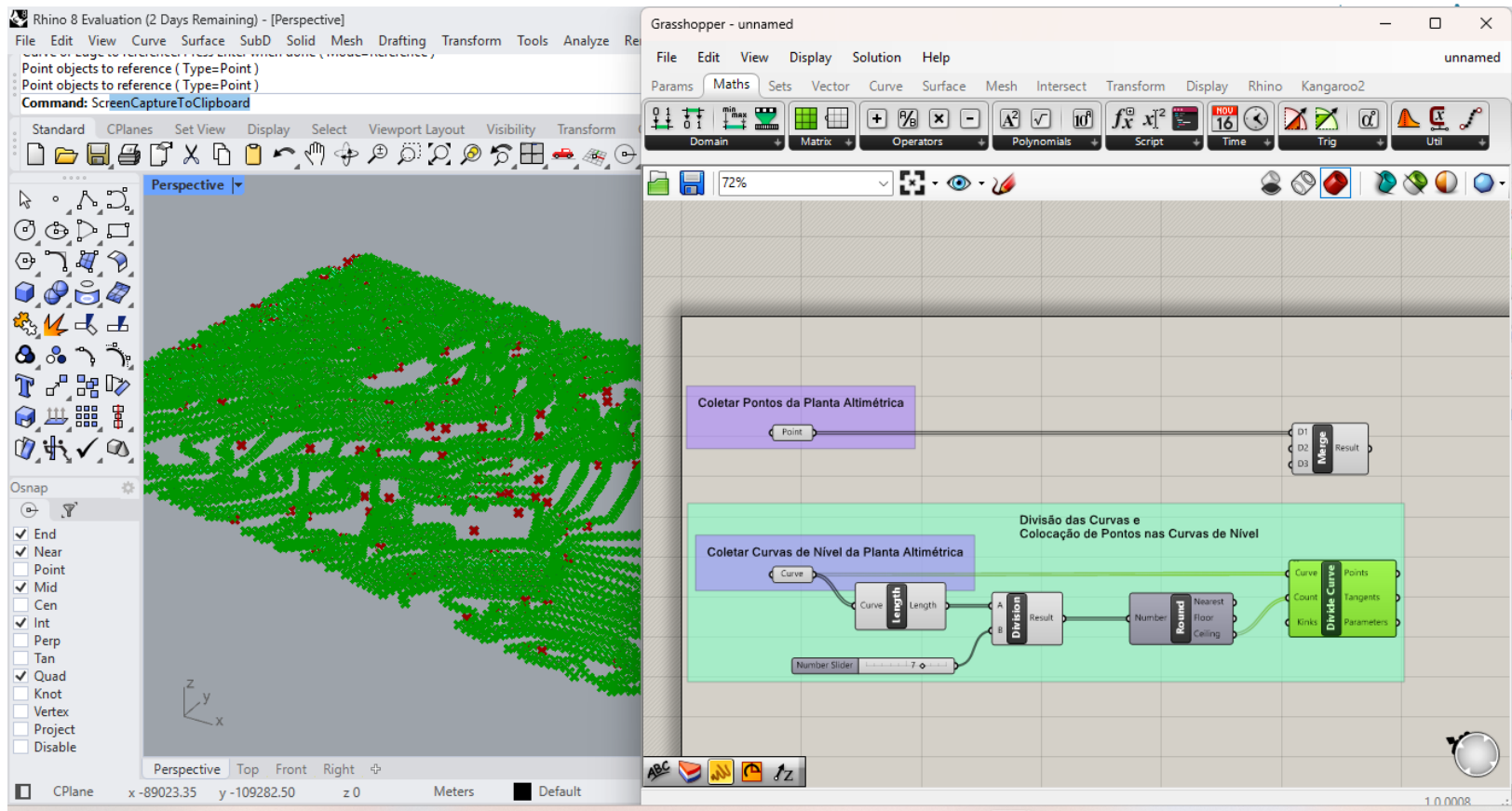


Point e **curve** no
grasshopper e
selecionar
múltiplos, todos
os do terreno



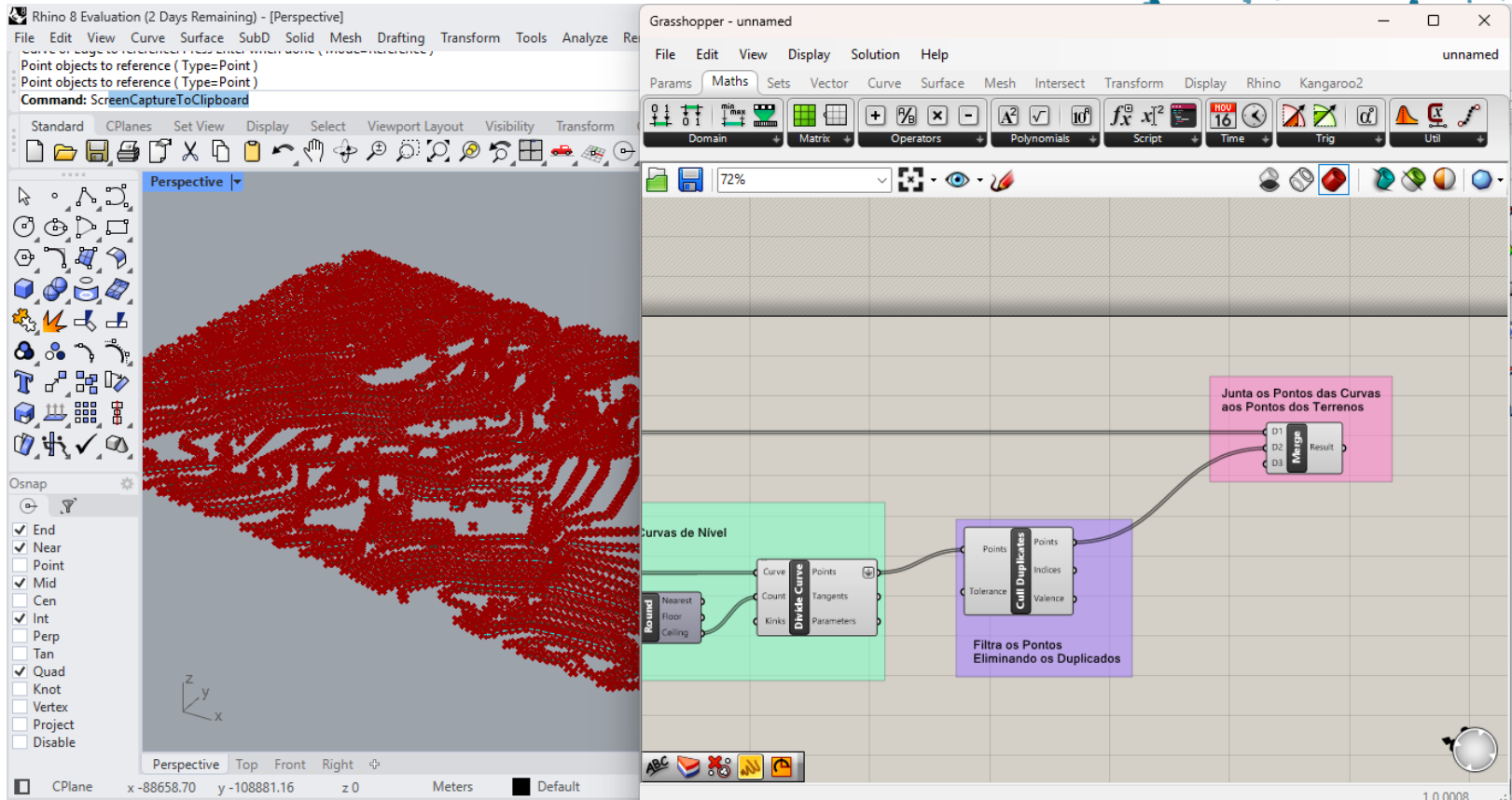
Aula 13 – Terreno em Grasshopper





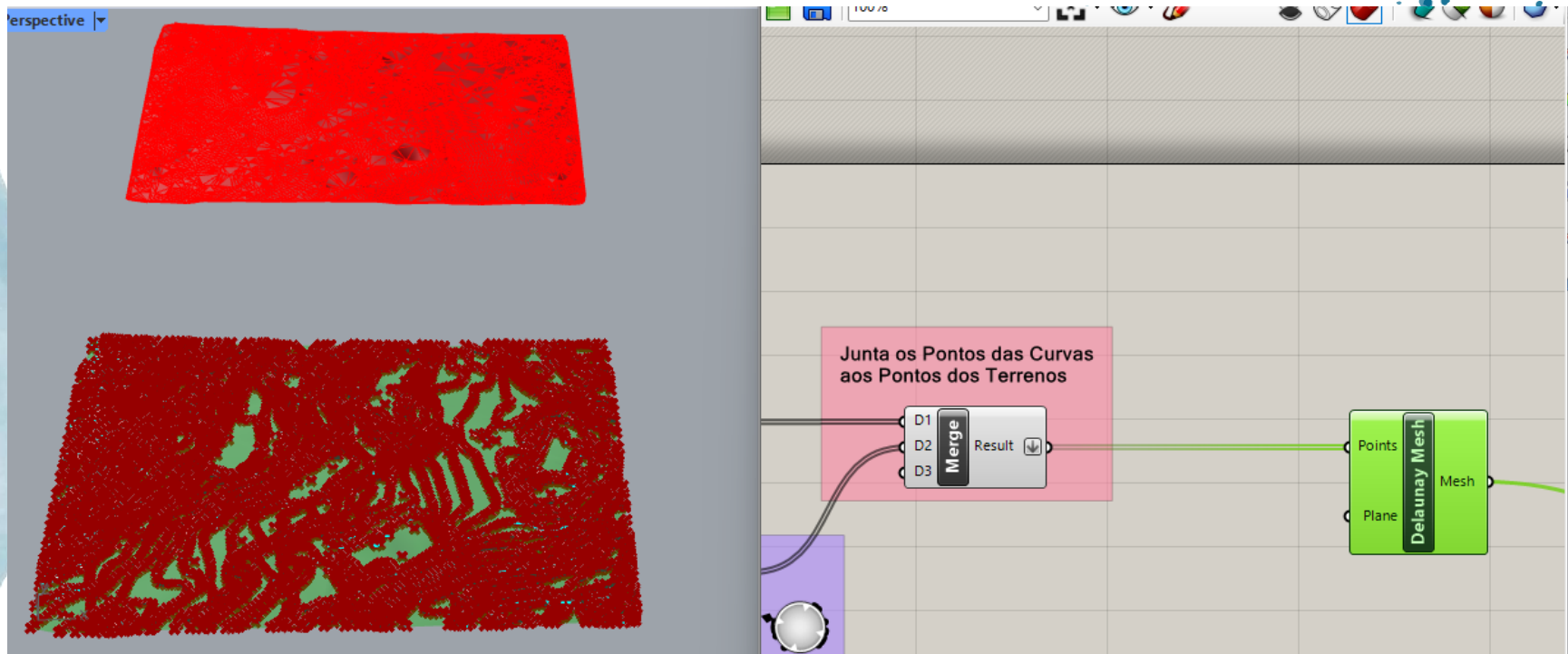
Aula 13 – Terreno em Grasshopper





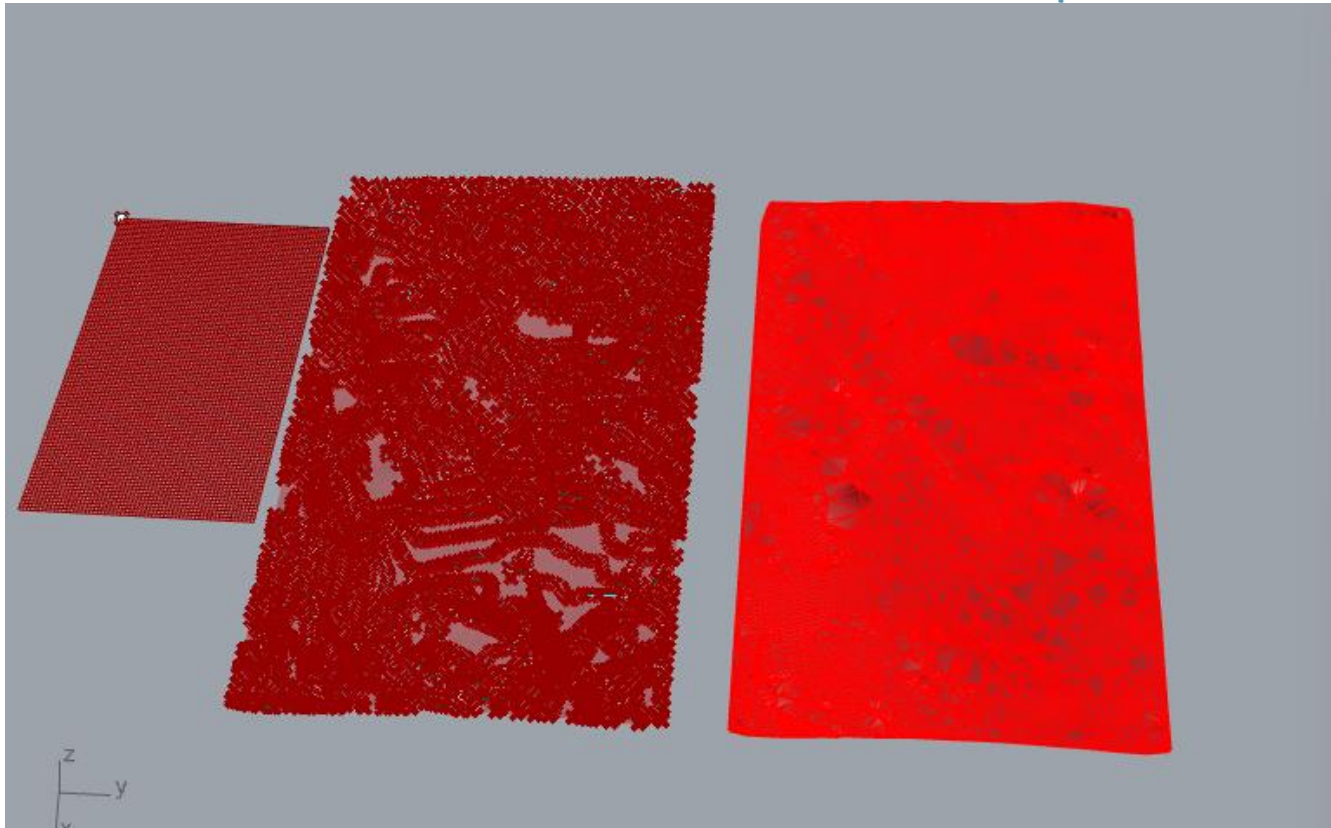
Aula 13 – Terreno em Grasshopper





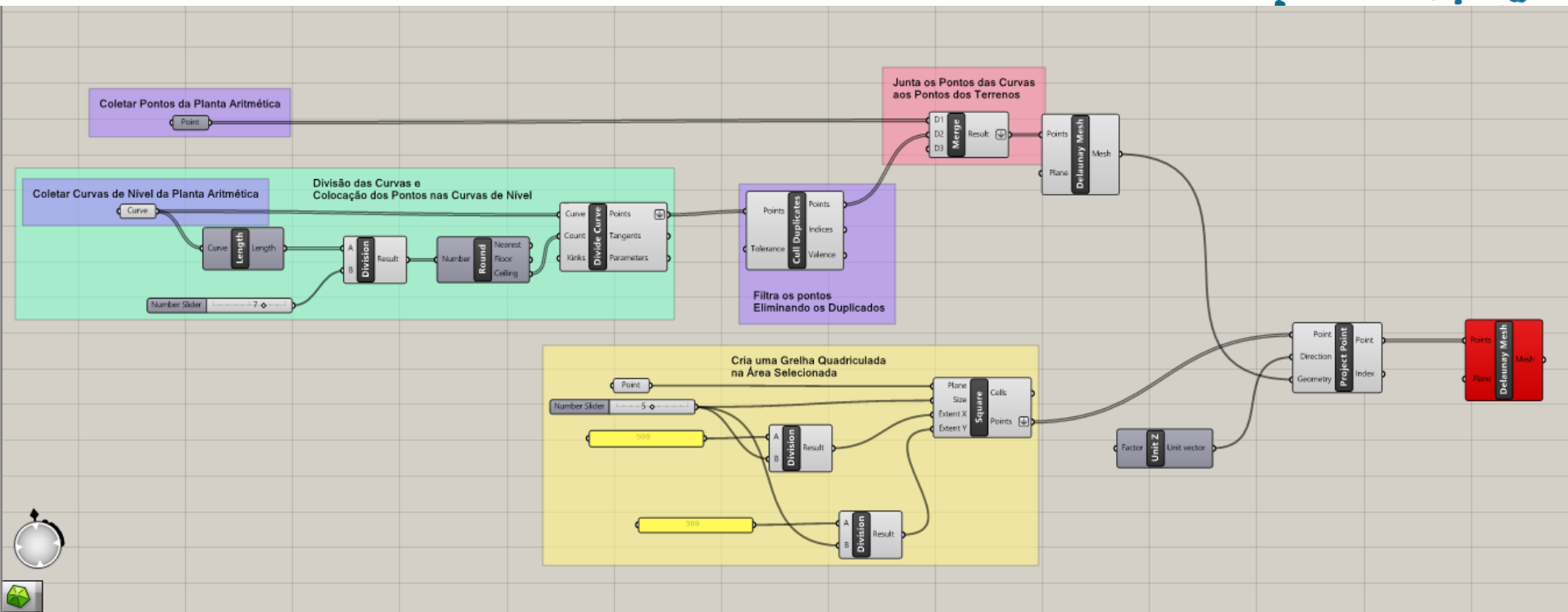
Aula 13 – Terreno em Grasshopper





Aula 13 – Terreno em Grasshopper





Aula 13 – Terreno em Grasshopper



FIM

