GeoGebra Tutorial: HKDSE 2015 Paper I #19

No.	Toolbar Icon	Command	Remarks
1.		`AC = sqrt(40^2+24^2-2*40*24*cos(80deg))`	Use Cosine rule. Result: AC=42.93
2.		`ACB=asin(sin(80°)/AC*40)/°`	Use Sine rule. Result: ACB=66.59
3.		`BCD=Slider(105deg,145deg,1deg)`	Set BCD=132° Show Label: Caption: ∠BCD = %v
4.		`halfCD=AC*cos(BCD-ACB°)`	You may enter deg for °.
5.		`height=AC*sin(BCD-ACB°)`	
6.		`A=(0,height)`	
7.		`C=(-halfCD,0)`	
8.		`D=(halfCD,0)`	
9.		`cA=Circle(A,40)`	
10.		`cC=Circle(C,24)`	
11.		`cD=Circle(D,24)`	
12.		`B=Intersect(cA,cC,2)`	
13.		`B'=Intersect(cA,cD,1)`	Zoom and pan until all points can be seen. See Figure 1.
14.		`poly1=Polygon(A,B,C)`	Color: Yellow Opacity: 25
15.		`poly2=Polygon(A,C,D)`	Color: Yellow Opacity: 25
16.		`poly3=Polygon(A,D,B')`	Color: Yellow Opacity: 25 Hide cA, cC, cD.
17.		Change the color of the 9 segments to black.	
18.		`a1=Angle(C,B,A)`	
19.		`a2=Angle(A,B',D)`	
20.		`a3=Angle(D,C,B)`	

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21.		`theta=Slider(0deg,150deg,1deg)`	
22.		Hide axes and grid in Graphics View. Show Graphics 3D view. Hides axes and clipping box.	
23.		`B'_1=Rotate(B,-theta,Line(A,C))`	Show Label: Caption: `B`
24.		`poly4=Polygon(B'_1,C,A)`	Color: Yellow Opacity: 25
25.		`B'_2=Rotate(B',theta,Line(A,D))`	Show Label: Caption: `B'`
26.		`poly5=Polygon(A,D,B'_2)`	Color: Yellow Opacity: 25
27.		Hide a1, a2 and a3. Hide poly1 and poly3 in Graphics 3D. Hide poly4 and poly5 in Graphics. Change the color of all 15 segments to black.	See Figure 2.
28.		`BP=24sin(ACB°)`	P is the projection of B onto AC (but it will not be created).
29.		`AP=AC-24cos(ACB°)`	
30.		`CAD=180°-2(BCD-ACB°)`	
31.		`PN=AP*tan(CAD/2)`	N is the projection of B onto ACD (it will be created later).
32.		`BPN=acos(PN/BP)/°`	
33.		`thetaMax=(180-BPN)°`	
34.		Set the interval of `theta` as follows: Min: `0°` Max: `thetamax` Increment: `thetaMax/200` Show Label: Caption: `fold`	See Figure 3. Now B and B' should coincide when the slider is moved to the right end.
35.		`meet=B'_1==B'_2`	returns true when the slider is moved to the right end.
36.		`B''=If(meet,B'_1)` If you wish, you may now use `P=Intersect( PerpendicularPlane(B'',Line(A,C)), Line(A,C))` to create P, which is the projection of B onto AC.	Show Label: Caption: `B`

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37.		Set “Condition to Show Object” of both B'_1 and B'_2 to `!meet` .	See Figure 4.
38.		`N=(x(B''),y(B''),0)` Alternative: `N=Intersect( PerpendicularLine(B'',Plane(A,B,C)), Plane(A,B,C))`	N is the projection of B onto ACD.
39.		`BN=Segment (B'',N)`	Style: Dotted line
40.		`Volume = Volume(Pyramid(B'',A,C,D))`	
41.		Hide a1, a2 and a3 in Graphics 3D. Hide unnecessary segments in Graphics 3D. Show appropriate labels of segments.	See Figure 5.
42.		Press `Ctrl+Shift+D` to toggle “Selection Allowed” for all objects except points and sliders.	

A more sophisticated version of this applet is available on https://ggbm.at/L2U1IXWA .

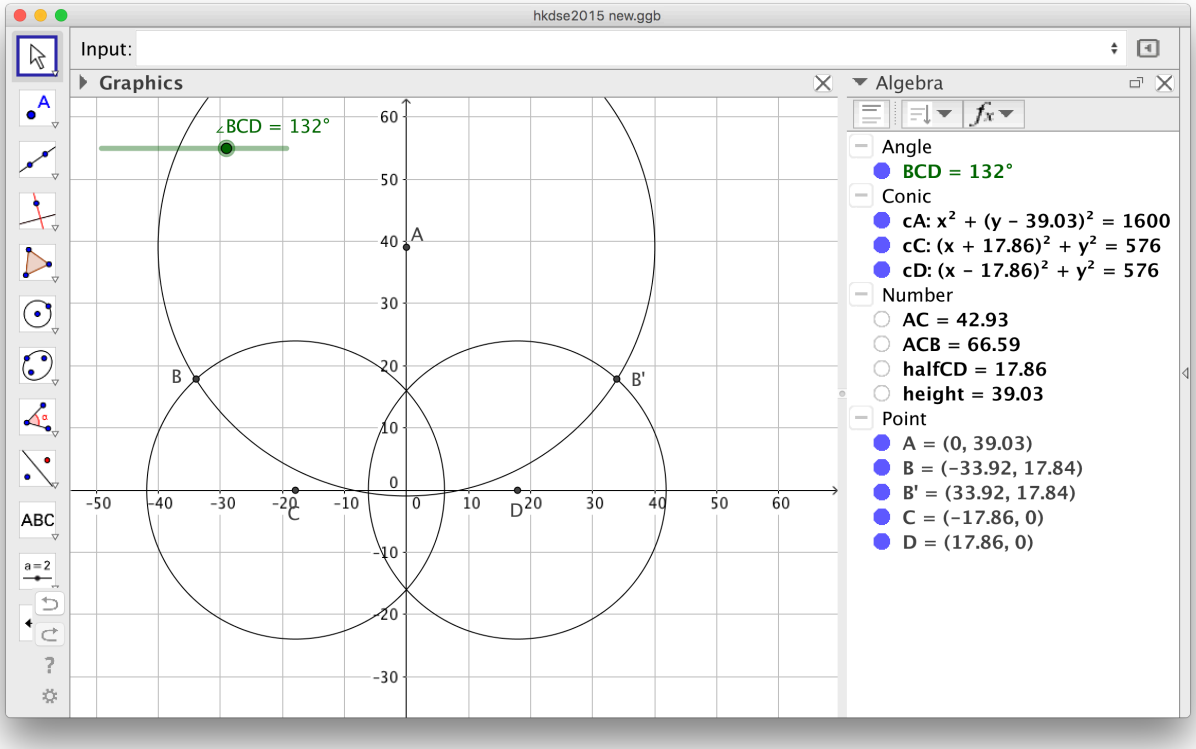

Figure 1

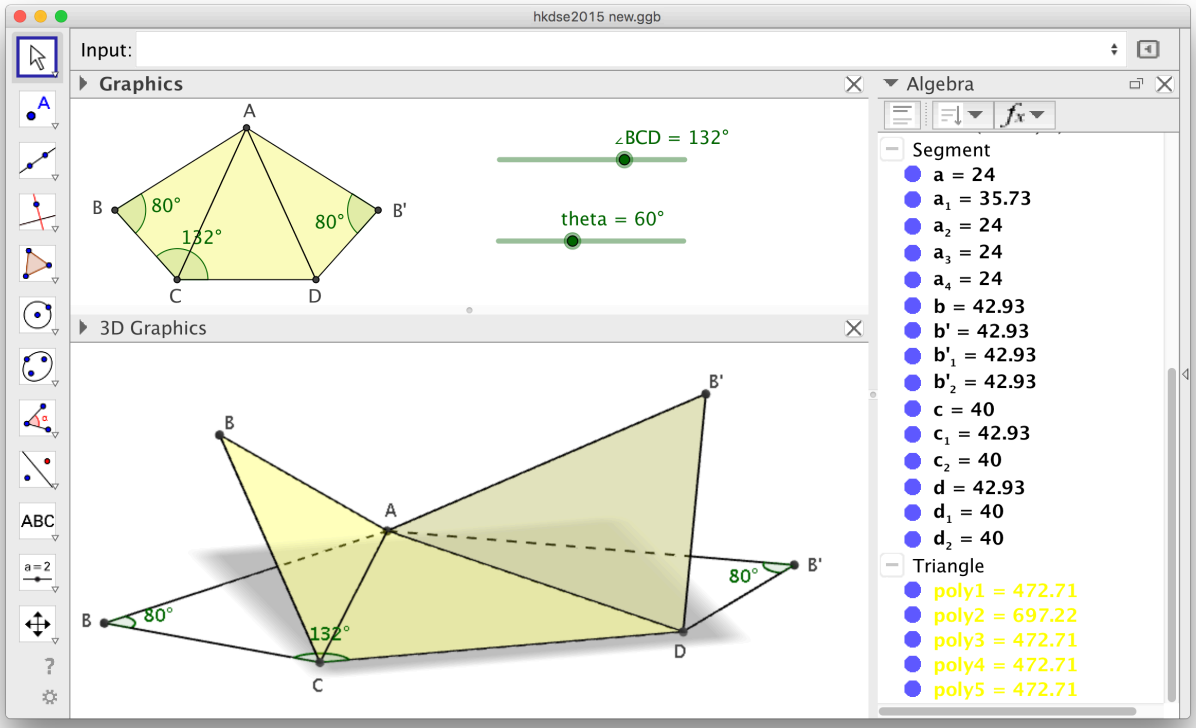

Figure 2

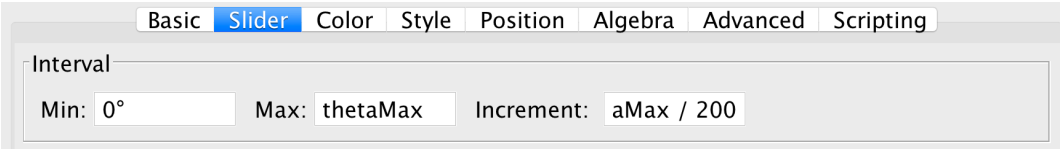

Figure 3

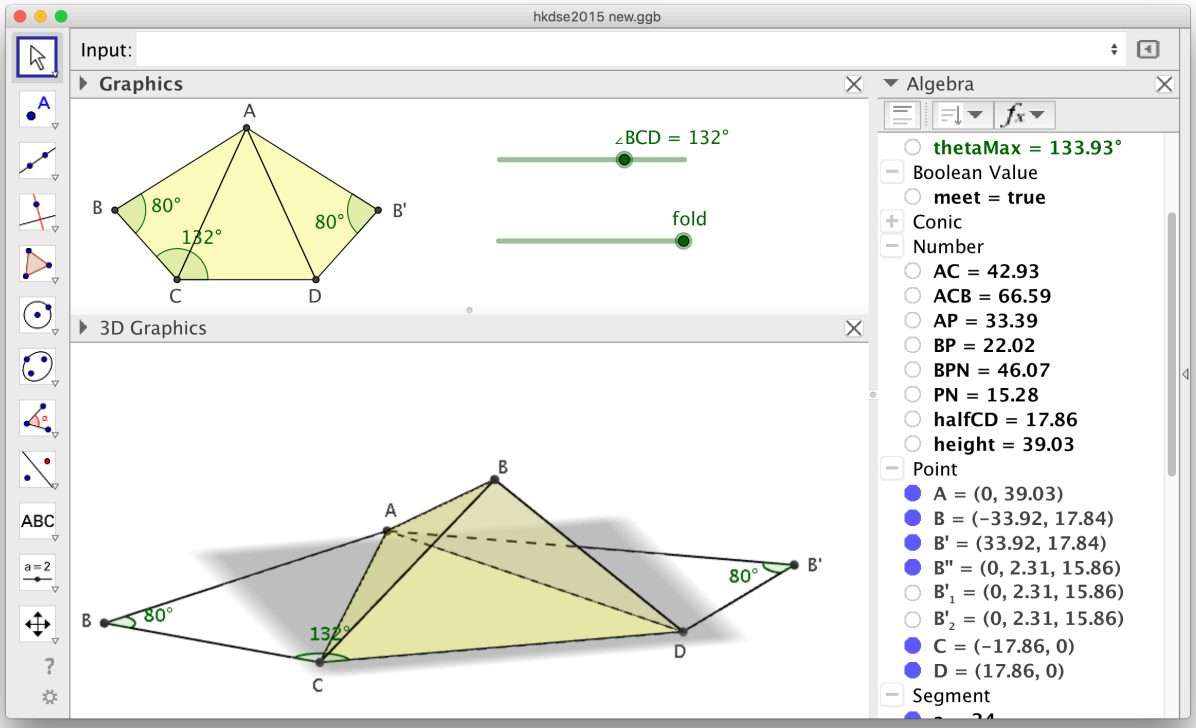

Figure 4

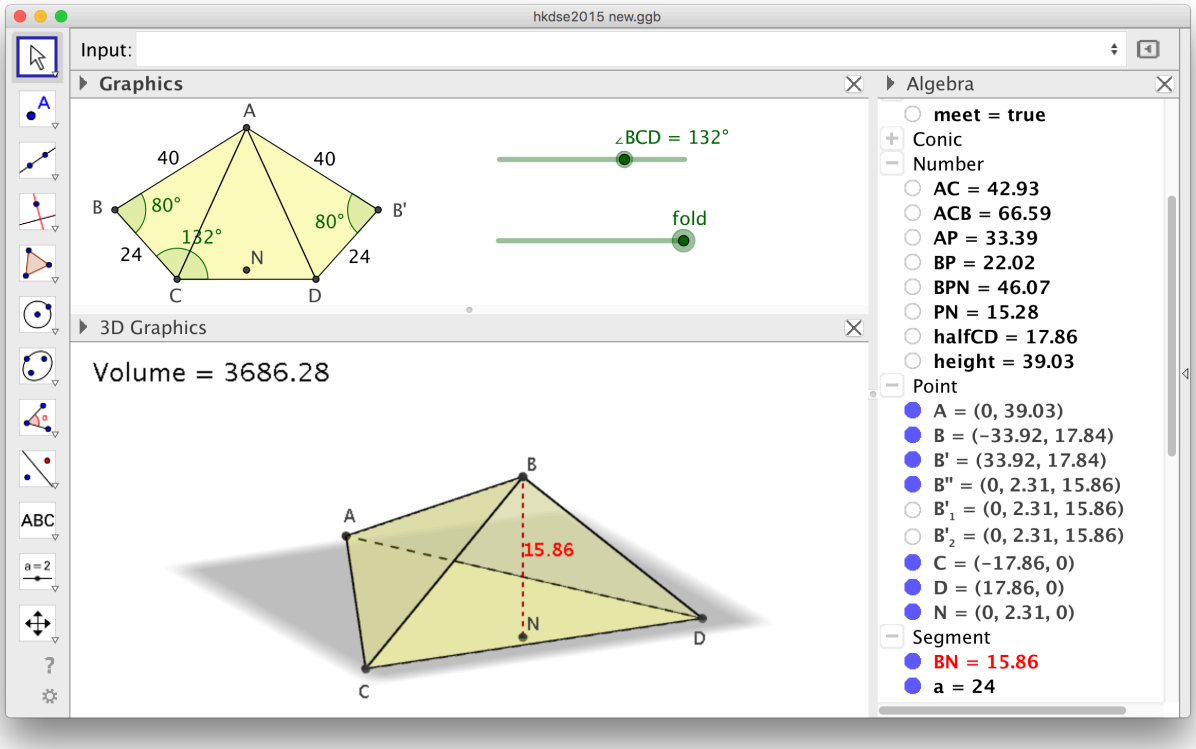

Figure 5