Lab 1

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Visualization using polygons

(1) object-revised

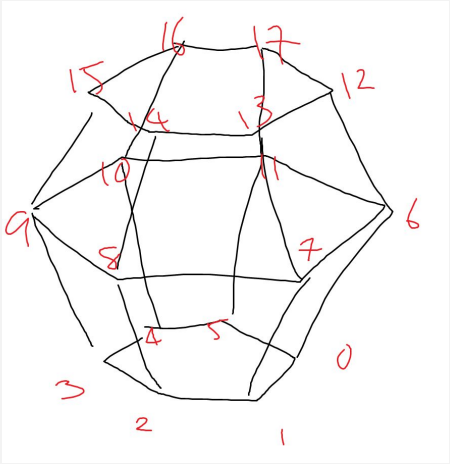

Fig 1

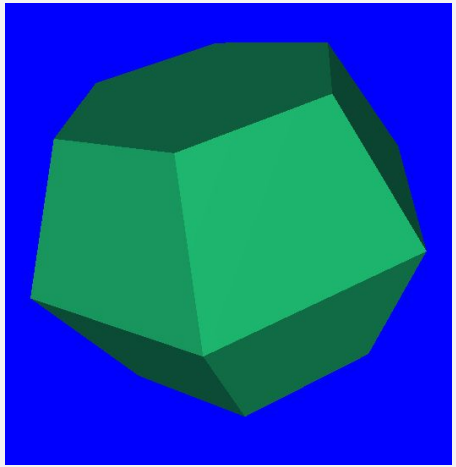

Fig 2

The file's address is ***/object-revised/object-revised.wrl***

diffuseColor is set to (0.125 0.781 0.418), which gives the polygon a greenish colour.

There diamond-shaped object was idealised and sketched with 18 vertices and 14 sides (Fig 1). For example:

6 bottom vertices are defined with these values:

1.0 -1.0 0.0, #vertex 0
0.5 -1.0 -0.875, #vertex 1
-0.5 -1.0 -0.875, #vertex 2
-1.0 -1.0 0.0, #vertex 3
-0.5 -1.0 0.875, #vertex 4
0.5 -1.0 0.875, #vertex 5

Bottom sides is defined as **(0, 5, 4, 3, 2, 1, -1)**

This gives the result in Fig 2

(2) 2d-hexagon

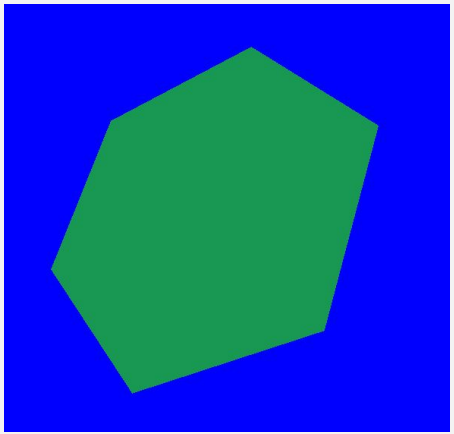

Fig 3

The file's address is **/2d-hexagon/2d-hexagon.wrl**

The colour for the hexagon is similar to the revised polygon in Fig 2.

The 2D hexagon (Fig 3) have 6 vertices and are very similar to the implementation of the revised polygon in Fig 1.

Assuming the center of the hexagon is (0, 0, 0), the vertices are spaced out at a equal distance from there.

To ensure that the hexagon can be seen from all angles, 2 sides are added to it:
(0, 5, 4, 3, 2, 1, -1) and **(0, 1, 2, 3, 4, 5, -1)**

(3) 3d-cube

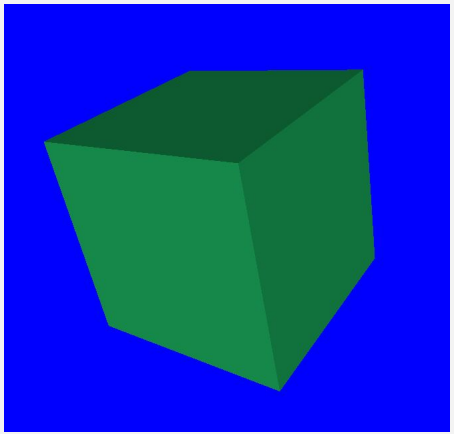

Fig 4

The file's address is ***/3d-cube/3d-cube.wrl***

The colour for the hexagon is similar to the revised polygon in Fig 2.

The 3D cube (Fig 4) have 8 vertices and 6 sides.

```
0,  3,  2,  1, -1,      #bottom square
4,  5,  6,  7, -1,      #top square
0,  1,  5,  4, -1,      #side1
1,  2,  6,  5, -1,      #side2
2,  3,  7,  6, -1,      #side3
3,  0,  4,  7, -1,      #side4
```

Since this polygon is a 3D cube, it should be perceived as a solid and all sides must be facing outwards. Facing the other direction is not needed, as opposed to Fig 3, thus it is not being implemented.

Analysis of diffuseColor

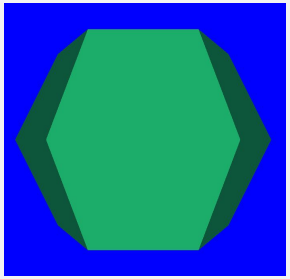

Fig 5

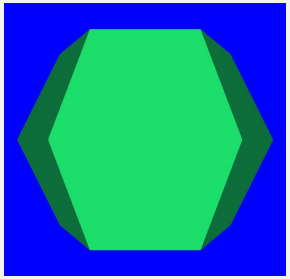

Fig 6

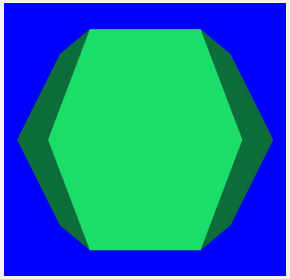

Fig 7

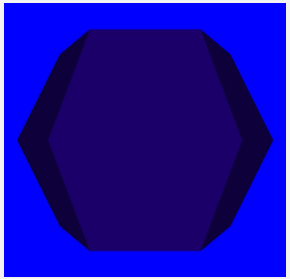

Fig 8

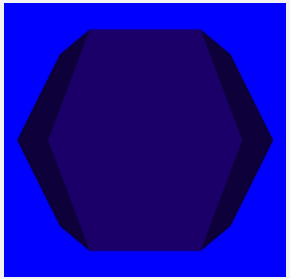

Fig 9

The files can be found in the directory ***/diffuseColor***

- Fig 5: *original.wrl*
- Fig 6: *increase.wrl*
- Fig 7: *increase-exceed.wrl*
- Fig 8: *decrease.wrl*
- Fig 9: *decrease-exceed.wrl*

diffuseColor is use to determine the colour of the sides, and follow the RGB format (Red, Green, Blue) Referencing to the revised object, 4 changes were made to the object and their diffuseColor are as followed.

Fig 5:	**0.125**	**0.781**	**0.418**	**# original**
Fig 6:	**0.125**	**1**	**0.418**	**# G → 1**
Fig 7:	**0.125**	**100**	**0.418**	**# G → 100**
Fig 8:	**0.125**	**0**	**0.418**	**# G → 0**
Fig 9:	**0.125**	**-100**	**0.418**	**# G → -100**

As seen, the higher the value of a certain colour (green in this case), the more intensified is that color (more greenish as shown in Fig 6). The lower the value, the less intensified is that color (no longer green as shown in Fig 8)

In addition, the value is capped between 0 and 1, so anything above 1 will be treated as 1 (Fig 7 is the same as Fig 6) and anything below 0 will be treated as 0 (Fig 9 is the same as Fig 8)