

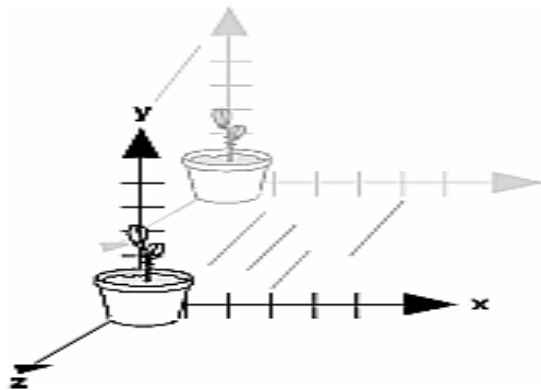
ROTATION, TRANSLATION AND SCALING

4.5 Rotation, translation and scaling

Translation

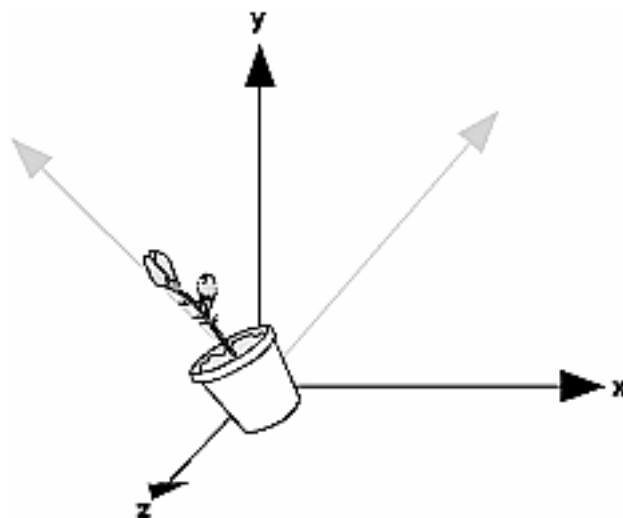
```
void glTranslate{fd} (TYPE x, TYPE y, TYPE z);
```

Multiplies the current matrix by a matrix that moves (translates) an object by the given x, y, and z values



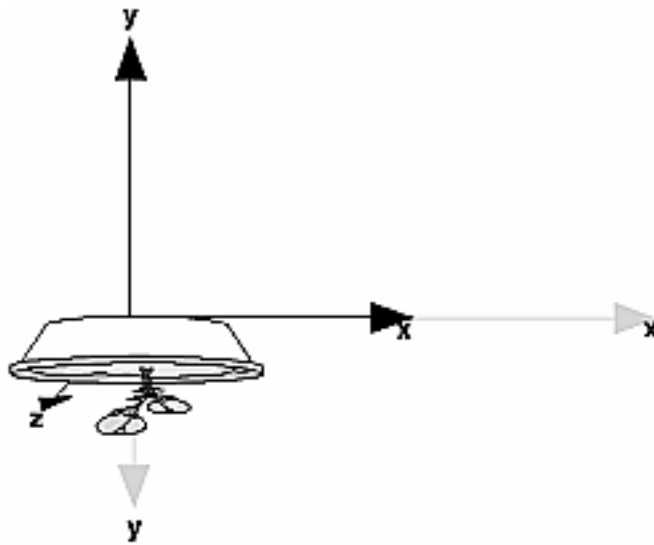
Rotation

- `void glRotate{fd}(TYPE angle, TYPE x, TYPE y, TYPE z);`
- Multiplies the current matrix by a matrix that rotates an object in a counterclockwise direction about the ray from the origin through the point (x, y, z). The angle parameter specifies the angle of rotation in degrees.



Scaling

- `void glScale{fd} (TYPEx, TYPE y, TYPEz);`
- Multiplies the current matrix by a matrix that stretches, shrinks, or reflects an object along the axes.



Equations :

- Translation: $P_f = T + P$
 $x_f = x_o + dx$
 $y_f = y_o + dy$
- Rotation: $P_f = R \cdot P$
 $x_f = x_o * \cos\alpha - y_o * \sin\alpha$
 $y_f = x_o * \sin\alpha + y_o * \cos\alpha$
- Scale: $P_f = S \cdot P$
 $x_f = sx * x_o$
 $y_f = sy * y_o$