

```

#include<stdio.h>
#include<stdlib.h>
#include<GL/glut.h>
#include<math.h>
static int
m=0,M=0,v=0,V=0,E=0,e=0,r=0,R=0,j=0,J=0,s=0,S=0,U=0,u=0,n=0,N=0,X=0,z=0,B=0,b
=0,c=0;
static GLint axis=2;
GLfloat diffuseMaterial[4]={0.5,0.5,0.5,1.0};
/*initialize material property,light source,lighting model,and depth buffer*/

void myinit(void)
{
glClearColor(0.0,0.0,0.0,0.0);
glShadeModel(GL_SMOOTH);
glEnable(GL_DEPTH_TEST);
GLfloat mat_specular[]={1.0,1.0,1.0,1.0};
GLfloat light_position[]={1.0,1.0,1.0,0.0};
glMaterialfv(GL_FRONT,GL_DIFFUSE,diffuseMaterial);
glMaterialfv(GL_FRONT,GL_SPECULAR,mat_specular);
glMaterialf(GL_FRONT,GL_SHININESS,25.0);
glEnable(GL_LIGHTING);
glEnable(GL_LIGHT0);
glLightfv(GL_LIGHT0,GL_POSITION,light_position);
glColorMaterial(GL_FRONT,GL_DIFFUSE);
glEnable(GL_COLOR_MATERIAL);
}
void display(void)
{
GLfloat position[]={0.0,0.0,1.5,1.0};
glClear(GL_COLOR_BUFFER_BIT|GL_DEPTH_BUFFER_BIT);
glColor3f(1.0,0.5,0.0);
glPushMatrix();
glRotatef((GLfloat)z,1.0,1.0,1.0);
glLightfv(GL_LIGHT0,GL_POSITION,position);
glDisable(GL_LIGHTING);
glutSolidSphere(0.8,40,16);    /*draw sun*/
glPopMatrix();

glPushMatrix();
glLightfv(GL_LIGHT0,GL_POSITION,position);
glDisable(GL_LIGHTING);
glEnable(GL_LIGHTING);
glColor3f(1.5,0.5,0.0);
glutSolidTorus(0.2,0.9,6,20);
glPopMatrix();

glPushMatrix();
glRotatef((GLfloat)M,0.0,1.0,0.0);
glTranslatef(1.5,0.0,0.0);
glRotatef((GLfloat)m,0.0,1.0,0.0);
glColor3f(1.0,0.0,0.0);
glutSolidSphere(0.2,20,8);    /*draw smaller planet mercury*/
glPopMatrix();
}

```

```

glPushMatrix();
glRotatef((GLfloat)V,0.0,1.0,0.0);
glTranslatef(2.0,0.0,1.0);
glRotatef((GLfloat)v,0.0,1.0,0.0);
glColor3f(7.5,9.5,1.0);
glutSolidSphere(0.2,20,8);    /*draw smaller plant venus*/
glPopMatrix();

glPushMatrix();
glRotatef((GLfloat)E,0.0,1.0,0.0);
glTranslatef(3.5,0.0,0.0);
glRotatef((GLfloat)e,0.0,1.0,0.0);
glColor3f(0.1,6.5,2.0);
glutSolidSphere(0.2,20,8);    /*draw smaller plant earth*/
glRotatef((GLfloat)X,0.0,1.0,0.0);
glTranslatef(0.3,0.2,0.0);
glColor3f(4.3,3.5,8.0);
glutSolidSphere(0.1,20,14);   /*draw moon*/
glPopMatrix();

glPushMatrix();
glRotatef((GLfloat)R,0.0,1.0,0.0);
glTranslatef(5.0,0.0,3.0);
glRotatef((GLfloat)r,0.0,1.0,0.0);
glColor3f(1.0,0.2,0.0);
glutSolidSphere(0.2,20,8);    /*draw smaller planet mars*/
glPopMatrix();

glPushMatrix();
glRotatef((GLfloat)J,0.0,1.0,0.0);
glTranslatef(-2.5,0.0,1.0);
glRotatef((GLfloat)j,0.0,1.0,0.0);
glColor3f(0.9,0.7,0.3);
glutSolidSphere(0.2,20,8);    /*draw smaller planet Jupiter*/
glPopMatrix();

glPushMatrix();
glRotatef((GLfloat)S,0.0,1.0,0.0);
glTranslatef(-5.0,0.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)s,0.0,0.0,5.0);
glColor3f(4.5,0.5,0.0);
glutSolidSphere(0.5,20,16);   /*draw smaller plant Saturn*/
int i=0;
glBegin(GL_QUAD_STRIP);
for(i=0;i<=360;i++)
{
glVertex3f(sin(i*3.1416/180)*0.5,cos(i*3.1416/180)*0.5,0);
glVertex3f(sin(i*3.1416/180)*0.7,cos(i*3.1416/180)*0.7,0);
}
glEnd();
glPopMatrix();

glPushMatrix();
glRotatef((GLfloat)U,0.0,1.0,0.0);
glTranslatef(-6.5,0.0,0.0);
gluLookAt(10.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,1.0);

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glRotatef((GLfloat) u, 0.0, 0.0, 5.0);
glColor3f( 1.2, 0.6,0.2);
glutSolidSphere (0.5, 20, 16); /* draw smaller planet Uranus*/
glBegin(GL_QUAD_STRIP);
for(i=0; i<=360; i++)
{
glVertex3f(sin(i*3.1416/180)*0.5,cos(i*3.1416/180)*0.5, 0);
glVertex3f(sin(i*3.1416/180)*0.7, cos(i*3.1416/180)*0.7,0);
}
glEnd();
glPopMatrix();

glPushMatrix();
glRotatef ((GLfloat) N,0.0, 1.0, 0.0);
glTranslatef (-8.0, 0.0, 0.0);
glRotatef ((GLfloat) n, 0.0, 1.0, 0.0);
glColor3f(1.0, 2.0, 0.0);
glutSolidSphere(0.4, 20, 8);
glPopMatrix();/* draw smaller planet Neptune */

glPushMatrix();
glRotatef ((GLfloat) c, 6.0, -14.0,-6.0);
glTranslatef (5.0,3.0,-1.0);
glScalef(0.60,0.0,2.5);
glColor3f (7.5, 9.5, 2.0);
glutSolidSphere (0.2, 12, 6);
glPopMatrix();/*draw comet*/
//to put the stars as a background
glPushMatrix();
glTranslatef(0.0,-2.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(0.0,2.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(0.0,-4.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();

```

```
glTranslatef(0.0,4.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.0,-6.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.0,6.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.0,-8.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.0,8.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(8.0,0.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-8.0,-2.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(6.0,4.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-6.0,4.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(5.0,-4.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-7.0,3.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-7.0,2.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(7.0,-2.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
```

```

glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(7.0,-3.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-7.0,-3.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(7.0,2.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(1.0,-7.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(2.0,-5.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,3.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(5.0,-1.0,0.0);
gluLookAt(0.0,10.0,0.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.07,20,8);

```

```

glPopMatrix();

glPushMatrix();
glTranslatef(-6.0,7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.07,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-0.5,3.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.07,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-1.5,4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.07,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-9.0,3.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.07,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(9.0,-5.9,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(6.5,8.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(5.0,7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();

```

```
glPushMatrix();
glTranslatef(-9.0,6.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.1,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-10.5,9.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.07,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-11.0,-7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.07,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-11.0,5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-7.0,-5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-10.0,3.7,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-7.0,-2.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```



```
glPushMatrix();
glTranslatef(-8.0,5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.03,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-8.0,-5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();
glPushMatrix();
glTranslatef(-11.0,-4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(6.0,-5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-6.9,7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(5.0,-4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(6.0,4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(3.0,-4.0,0.0);
```

```
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(4.0,-7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat) b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(-4.0,-3.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(4.0,-7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(11.0,-4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(9.0,-9.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(8.0,-4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(9.0,5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
```

```

glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(7.0,7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(0.9,7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(1.0,6.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(0.8,-5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(3.0,-7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(1.0,5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(2.0,4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);

```

```

glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(0.0,7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(0.0,5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-9.0,0.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-10.0,4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(9.0,3.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-10.0,-6.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(10.0,0.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);

```

```

glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-9.0,-7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-3.0,4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-9.9,-7.5,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(1.0,5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(3.0,6.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-2.0,-5.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-3.0,-2.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);

```

```

glPopMatrix();

glPushMatrix();
glTranslatef(-4.0,-8.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(8.3,-7.1,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-10.0,7.6,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-3.0,7.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-1.4,7.5,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(3.0,6.5,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(-6.0,4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

```

```
glPushMatrix();
glTranslatef(-6.0,-6.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.05,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.7,4.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(2.0,2.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.0,0.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.0,-1.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.0,1.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
```

```
glPushMatrix();
glTranslatef(0.0,2.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,0.0,0.0,0.0);
```

```

glScalef(200.0,0.0,0.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();

glPushMatrix();
glTranslatef(8.7,9.0,0.0);
gluLookAt(0.0,10.0,2.0,1.0,0.0,0.0,0.0,0.0,1.0);
glRotatef((GLfloat)b,1.0,7.0,5.0);
glColor3f(4.3,3.5,1.0);
glutSolidSphere(0.04,20,8);
glPopMatrix();
glutSwapBuffers();
}

void reshape(int w,int h)
{
glViewport(0,0,(GLsizei)w,(GLsizei)h);
glMatrixMode(GL_PROJECTION);
glLoadIdentity();
gluPerspective(60.0,(GLfloat)w/(GLfloat)h,1.0,20.0);
glMatrixMode(GL_MODELVIEW);
glLoadIdentity();
gluLookAt(0.0,0.0,5.0,0.0,0.0,0.0,0.0,1.0,0.0);
}

void keyboard(unsigned char key,int x,int y)
{
switch(key)
{
case 'z':z=(z+50)%360;
glutPostRedisplay();
break;
case 'm':m=(m+3)%360;
glutPostRedisplay();
break;
case 'M':M=(M+12)%360;
glutPostRedisplay();
break;
case 'v':v=(v+2)%360;
glutPostRedisplay();
break;
case 'V':V=(V+10)%360;
glutPostRedisplay();
break;
case 'e':e=(e+5)%360;
glutPostRedisplay();
break;
case 'E':E=(E+8)%360;
glutPostRedisplay();
break;
case 'r':r=(r+6)%360;
glutPostRedisplay();
break;
case 'R':R=(R+6)%360;
glutPostRedisplay();
break;
case 'j':j=(j+10)%360;

```



```

        glutPostRedisplay();
        break;
case 'J':J=(J+4)%360;
        glutPostRedisplay();
        break;
case 's':s=(s+9)%360;
        glutPostRedisplay();
        break;
case 'S':S=(S+3)%360;
        glutPostRedisplay();
        break;
case 'u':u=(u+8)%360;
        glutPostRedisplay();
        break;
case 'U':U=(U+2)%360;
        glutPostRedisplay();
        break;
case 'n':n=(n+7)%360;
        glutPostRedisplay();
        break;
case 'N':N=(N+1)%360;
        glutPostRedisplay();
        break;
case 'b':b=(b+10)%360;
        glutPostRedisplay();
        break;
case 'c':c=(c+1)%360;
        b=(b+10)%360;
        glutPostRedisplay();
        break;
case 'X':X=(X+5)%360;
        glutPostRedisplay();
        break;
case 'a':z=(z+50)%360;
        b=(b+10)%360;
        m=(m+3)%360;
        v=(v+2)%360;
        e=(e+5)%360;
        r=(r+6)%360;
        j=(j+10)%360;
        s=(s+9)%360;
        u=(u+8)%360;
        n=(n+7)%360;
        c=(c+1)%360;
        glutPostRedisplay();
        break;
case 'A':z=(z+50)%360;
        b=(b+10)%360;
        M=(M+12)%360;
        V=(V+10)%360;
        E=(E+8)%360;
        R=(R+6)%360;
        J=(J+4)%360;
        S=(S+3)%360;
        U=(U+2)%360;
        N=(N+1)%360;
        c=(c+1)%360;

```

```

        glutPostRedisplay();
        break;
case 'B': z=(z+50)%360;
        b=(b+10)%360;
        c=(c+1)%360;
        m=(m+3)%360;M=(M+12)%360;
        v=(v+2)%360;V=(V+10)%360;
        e=(e+5)%360;E=(E+8)%360;
        r=(r+6)%360;R=(R+6)%360;
        j=(j+10)%360;J=(J+4)%360;
        s=(s+9)%360;S=(S+3)%360;
        u=(u+8)%360;U=(U+2)%360;
        n=(n+7)%360;N=(N+1)%360;
        glutPostRedisplay();
        break;
case 27:exit(0);
        break;
default:break;
}
}

void mouse(int btn ,int state,int x,int y)
{
if(btn==GLUT_LEFT_BUTTON && state==GLUT_DOWN)
{
z=(z+50)%360;
b=(b+10)%360;
c=(c+1)%360;
m=(m+3)%360;M=(M+12)%360;
v=(v+2)%360;V=(V+10)%360;
e=(e+5)%360;E=(E+8)%360;
r=(r+6)%360;R=(R+6)%360;
j=(j+10)%360;J=(J+4)%360;
s=(s+9)%360;S=(S+3)%360;
u=(u+8)%360;U=(U+2)%360;
n=(n+7)%360;N=(N+1)%360;
glutPostRedisplay();
}
if(btn==GLUT_MIDDLE_BUTTON && state==GLUT_DOWN)
{
z=(z+50)%360;
b=(b+10)%360;
c=(c+1)%360;
m=(m+3)%360;M=(M+12)%360;
v=(v-2)%360;V=(V-10)%360;
e=(e+5)%360;E=(E+8)%360;
r=(r-6)%360;R=(R-6)%360;
j=(j+10)%360;J=(J+4)%360;
s=(s-9)%360;S=(S-3)%360;
u=(u+8)%360;U=(U+2)%360;
n=(n-7)%360;N=(N-1)%360;
glutPostRedisplay();
}
if(btn==GLUT_RIGHT_BUTTON && state==GLUT_DOWN)
{
z=(z-50)%360;
b=(b-10)%360;

```

```

c=(c+1)%360;
m=(m-3)%360;M=(M-12)%360;
v=(v-2)%360;V=(V-10)%360;
e=(e-5)%360;E=(E-8)%360;
r=(r-6)%360;R=(R-6)%360;
j=(j-10)%360;J=(J-4)%360;
s=(s-9)%360;S=(S-3)%360;
u=(u-8)%360;U=(U-2)%360;
n=(n-7)%360;N=(N-1)%360;
glutPostRedisplay();
}
}
int main(int argc, char **argv)
{
glutInit(&argc,argv);
glutInitDisplayMode(GLUT_DOUBLE|GLUT_RGB|GLUT_DEPTH);
glutInitWindowSize(500,500);
glutInitWindowPosition(100,100);
glutCreateWindow("planets amidst stars");
myinit();
glutDisplayFunc(display);
glutReshapeFunc(reshape);
glutKeyboardFunc(keyboard);
glutMouseFunc(mouse);
glEnable(GL_DEPTH_TEST);
glutMainLoop();
return 0;
}

```