# Placing Text on the Graphics screen

GLUT supports two type of font rendering: stroke fonts, meaning each character is rendered as a set of line segments; and bitmap fonts, where each character is a bitmap generated with `glBitmap`. Stroke fonts have the advantage that because they are geometry, they can be arbitrarily scale and rendered. Bitmap fonts are less flexible since they are rendered as bitmaps but are usually faster than stroke fonts.

## glutBitmapCharacter

`glutBitmapCharacter` renders a bitmap character using OpenGL.

### Usage

```
void glutBitmapCharacter(void *font, int character);
```

`font`
: Bitmap font to use.

`character`
: Character to render (not confined to 8 bits).

### Description

Without using any display lists, `glutBitmapCharacter` renders the `character` in the named bitmap `font`. The available fonts are:

`GLUT_BITMAP_8_BY_13`
: A fixed width font with every character fitting in an 8 by 13 pixel rectangle. The exact bitmaps to be used is defined by the standard X glyph bitmaps for the X font named:

  `-misc-fixed-medium-r-normal--13-120-75-75-C-80-iso8859-1`

`GLUT_BITMAP_9_BY_15`
: A fixed width font with every character fitting in an 9 by 15 pixel rectangle. The exact bitmaps to be used is defined by the standard X glyph bitmaps for the X font named:

  `-misc-fixed-medium-r-normal--15-140-75-75-C-90-iso8859-1`

`GLUT_BITMAP_TIMES_ROMAN_10`
: A 10-point proportional spaced Times Roman font. The exact bitmaps to be used is defined by the standard X glyph bitmaps for the X font named:

  `-adobe-times-medium-r-normal--10-100-75-75-p-54-iso8859-1`

`GLUT_BITMAP_TIMES_ROMAN_24`

A 24-point proportional spaced Times Roman font. The exact bitmaps to be used is defined by the standard X glyph bitmaps for the X font named:

```
-adobe-times-medium-r-normal--24-240-75-75-p-124-iso8859-1
```

`GLUT_BITMAP_HELVETICA_10`
A 10-point proportional spaced Helvetica font. The exact bitmaps to be used is defined by the standard X glyph bitmaps for the X font named:

```
-adobe-helvetica-medium-r-normal--10-100-75-75-p-56-iso8859-1
```

`GLUT_BITMAP_HELVETICA_12`
A 12-point proportional spaced Helvetica font. The exact bitmaps to be used is defined by the standard X glyph bitmaps for the X font named:

```
-adobe-helvetica-medium-r-normal--12-120-75-75-p-67-iso8859-1
```

`GLUT_BITMAP_HELVETICA_18`
A 18-point proportional spaced Helvetica font. The exact bitmaps to be used is defined by the standard X glyph bitmaps for the X font named:

```
-adobe-helvetica-medium-r-normal--18-180-75-75-p-98-iso8859-1
```

***Where does the character appear on the screen?*** In OpenGL, bitmaps are handled differently from geometric primitives. Bitmaps appear in the size specified at a location called the **raster position**, which is part of the OpenGL state. This position determines where the lower-left corner of the next bitmap will appear on the display. The raster position can be set with the function `glRasterPos*()`

```
void glRasterPos{234}{sifd}(TYPE x, TYPE y, TYPE z, TYPE w);
```

This function specifies the raster position. The position is mapped to screen coordinates, using the current model-view and projection matrices.

The generated call to `glBitmap` will adjust the current raster position based on the width of the character.

# 10.2 glutBitmapWidth

`glutBitmapWidth` returns the width of a bitmap character.

**Usage**

```
int glutBitmapWidth(GLUTbitmapFont font, int character)
```
`font`
Bitmap font to use.
`character`
Character to return width of (not confined to 8 bits).

### Description

`glutBitmapWidth` returns the width in pixels of a bitmap character in a supported bitmap font. While the width of characters in a font may vary (though fixed width fonts do not vary), the maximum height characteristics of a particular font are fixed.

## 10.3 glutStrokeCharacter

`glutStrokeCharacter` renders a stroke character using OpenGL.

### Usage

```
void glutStrokeCharacter(void *font, int character);
```

`font`
: Stroke font to use.

`character`
: Character to render (not confined to 8 bits).

### Description

Without using any display lists, `glutStrokeCharacter` renders the `character` in the named stroke `font`. The available fonts are:

`GLUT_STROKE_ROMAN`
: A proportionally spaced Roman Simplex font for ASCII characters 32 through 127. The maximum top character in the font is 119.05 units; the bottom descends 33.33 units.

`GLUT_STROKE_MONO_ROMAN`
: A mono-spaced spaced Roman Simplex font (same characters as `GLUT_STROKE_ROMAN`) for ASCII characters 32 through 127. The maximum top character in the font is 119.05 units; the bottom descends 33.33 units. Each character is 104.76 units wide.

Rendering a nonexistent character has no effect. A `glTranslatef` is used to translate the current model view matrix to advance the width of the character.

## 10.4 glutStrokeWidth

`glutStrokeWidth` returns the width of a stroke character.

### Usage

```
int glutStrokeWidth(GLUTstrokeFont font, int character)
```

`font`
: Stroke font to use.

`character`

Character to return width of (not confined to 8 bits).

**Description**

`glutStrokeWidth` returns the width in pixels of a stroke character in a supported stroke font. While the width of characters in a font may vary (though fixed width fonts do not vary), the maximum height characteristics of a particular font are fixed.