Textures OpenGL Exercises

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1 Easy Difficulty

These only require the change of some signs or variables!

Exercise 1. Mirror the image on the vertical axis in the Fragment Shader
Hint: write `texCoord` as a vec2 composed of `texCoord`'s x and y coordinates

Exercise 2. Only display the Red color channel
Hint: take a look at `glTexImage2D()`

2 Medium Difficulty

This requires a bit more typing!

Exercise 1. Make it such that you get 9 textures in your square
Hint: modify the vertices data

Exercise 2. Transform your square into a triangle and make sure the texture is mapped properly
Hint: don't forget there is more to modify than just the vertices data

3 Hard Difficulty

This requires figuring out texture coordinates pretty well!

Exercise 1. Finish 2.1 and 2.2 and then make it such that only the central image in the triangle appears
Hint: use `GL_CLAMP_TO_BORDER` and also modify the texture coordinates

Solutions

Each image shows the solution to one exercise

Ex1.1 - default.frag

```
16 void main()
17 {
18     FragColor = texture(tex0, vec2(-texCoord.x, texCoord.y));
19 }
```

Ex1.2 - Texture.cpp

```
34 glTexImage2D(texType, 0, GL_RED, widthImg, heightImg, 0, format, pixelType, bytes);
```

Ex2.1 - Main.cpp

```
14 // Vertices coordinates
15 GLfloat vertices[] =
16 { //     COORDINATES     /        COLORS      /   TexCoord  //
17     -0.5f, -0.5f, 0.0f,     1.0f, 0.0f, 0.0f,   0.0f, 0.0f, // Lower left corner
18     -0.5f,  0.5f, 0.0f,     0.0f, 1.0f, 0.0f,   0.0f, 3.0f, // Upper left corner
19      0.5f,  0.5f, 0.0f,     0.0f, 0.0f, 1.0f,   3.0f, 3.0f, // Upper right corner
20      0.5f, -0.5f, 0.0f,     1.0f, 1.0f, 1.0f,   3.0f, 0.0f  // Lower left corner
21 };
```

Ex2.2 - Main.cpp

```
14 // Vertices coordinates
15 GLfloat vertices[] =
16 { //     COORDINATES     /        COLORS      /   TexCoord  //
17     -0.5f, -0.5f, 0.0f,     1.0f, 0.0f, 0.0f,   0.0f, 0.0f, // Lower left corner
18      0.0f,  0.5f, 0.0f,     0.0f, 1.0f, 0.0f,   1.5f, 3.0f, // Upper left corner
19      0.5f, -0.5f, 0.0f,     1.0f, 1.0f, 1.0f,   3.0f, 0.0f  // Lower right corner
20 };
21
22 // Indices for vertices order
23 GLuint indices[] =
24 {
25     0, 2, 1, // Upper triangle
26 };
...
113     glDrawElements(GL_TRIANGLES, 3, GL_UNSIGNED_INT, 0);
```

Ex3.1 - Main.cpp

```
14 // Vertices coordinates
15 GLfloat vertices[] =
16 { //     COORDINATES     /        COLORS      /   TexCoord  //
17     -0.5f, -0.5f, 0.0f,     1.0f, 0.0f, 0.0f,   -1.0f, -1.0f, // Lower left corner
18      0.0f,  0.5f, 0.0f,     0.0f, 1.0f, 0.0f,    0.5f,  2.0f, // Upper left corner
19      0.5f, -0.5f, 0.0f,     1.0f, 1.0f, 1.0f,    2.0f, -1.0f  // Lower right corner
20 };
```

Ex3.1 - Texture.cpp

```
25 // Configures the way the texture repeats (if it does at all)
26 glTexParameteri(texType, GL_TEXTURE_WRAP_S, GL_CLAMP_TO_BORDER);
27 glTexParameteri(texType, GL_TEXTURE_WRAP_T, GL_CLAMP_TO_BORDER);
28
29 // Extra lines in case you choose to use GL_CLAMP_TO_BORDER
30 float flatColor[] = {0.8f, 0.76f, 0.7f, 1.0f};
31 glTexParameterfv(GL_TEXTURE_2D, GL_TEXTURE_BORDER_COLOR, flatColor);
```