Rendering

Rendering is the process of making an image from a 2D or 3D model (or a scene) by means of computational processes. The result of this is a render. A scene contains objects in a defined data structure including geometry, viewpoint, texture, lighting, and shading information as a description of the virtual scene.
Specifications

Before a rendering can be made it must be defined (if only by default), including:

Resolution - size in pixels (HD, XGA, 800x600)
Aspect ratio - the ratio of width to height
Format - JPG, PNG, TGA, EXR
Color depth - 8, 16, 24 bit
Channels - RGB, Alpha, Z, motion blur
Image sequences

If you’re rendering an animation save the frames as separate images with an alpha channel, not in a video format. There are several reasons for this:

1 - you can include an alpha channel for editing;
2 - you preserve maximum editability;
3 - you preserve maximum image quality;
4 - if your machine crashes during the rendering process you still have the images to that point.
Image compression - 1

Most image formats use compression to reduce the size of the resulting file. File sizes vary depending on their:

**Format** - different formats use different methods

**Content** - photos of a forest and a white wall will produce different file sizes for the same resolution

**Resolution** - the number of pixels to be compressed

**Color depth** - the number of bits per pixel per channel

**Aspect ratio** - square images compress slightly better

**Number of channels** - the number of channels to be included
Image compression - 2

Compression can be **lossy** or **lossless**.

Lossy compression throws away data that will not be perceived by the user; this information cannot be recovered but can result in very small files that look or sound the same as the original.

Lossless compression is not so effective in reducing size but allows all the original data to be recovered.
Video formats include two types of compression:

**Spatial compression** - where each frame is individually compressed, as in separate images

**Temporal compression** - where sequences of frames (a group of pictures, or GOP) are compared and similar areas over that time are reduced to a common element
Shaders

Shaders calculate material appearance from the angle of faces to the camera, lighting, color, specularity, and many other properties. Writing shaders is a specialized profession.

**Lambert** - calculates brightness due to diffuse reflection
**Phong** - calculates ambient, diffuse, and specular lighting
**Anisotropic** - simulates brushed metal surfaces

there are many other shaders, often specific to the software and rendering engine, such as Maya’s Arnold shaders