The beginner's explanation of **Gamma Correction** and Linear Workflow
What is Gamma?

It’s all to do with how devices display images

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What is Gamma?

To display images on screen an input voltage is applied
What is Gamma?

Which outputs as light intensity on the screen

Input: Voltage

Output: Light Intensity
What is Gamma?

In a perfect world, the input would equal the output linearly.
What is Gamma?

But it actually looks something like this (a ‘powerlaw’ function)
What is Gamma?

Compensation is added to make it linear again.

Input: Voltage

Output: Light Intensity

Compensation is added to make it linear again.
What is Gamma?

The numerical value of this exponent is given the name Gamma.

Input: Voltage
Output: Light Intensity

Gamma

Input Signal

Light Intensity

Output: Light Intensity

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What is Gamma?

How does this affect 3D applications?
What is Gamma?

Floating point render engines like LightWave and modo work in linear space internally
What is Gamma?

But texture images and colour pickers already have gamma applied so they can be seen properly on screen*

* This doesn’t apply to HDR image formats, as they are in linear space.
Some colour pickers can remove gamma from picked colours (e.g. Jovian for LightWave)
What is Gamma?

Which means the resulting render has elements with mixed gamma.
What is Gamma?

If you don’t de-gamma textures and colours, but apply gamma on the final image, you double the gamma on the textures and colours that already had it, making them look washed out.
What is Gamma?

The trick is to de-gamma the images and picked colours.

De-Gamma \((1.0 \div \text{Target Gamma})\)

Linear Internally
What is Gamma?

This is so everything remains in linear space throughout, this is called ‘Linear Workflow’
What is Gamma?

But you must apply your target gamma at the end so it displays it correctly on screen.

De-Gamma \((1.0 / \text{Target Gamma})\)

Linear Internally

Linear Workflow

Apply Gamma

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What is Gamma?

But you must apply your target gamma at the end so it displays it correctly on screen.
Gamma w/textures