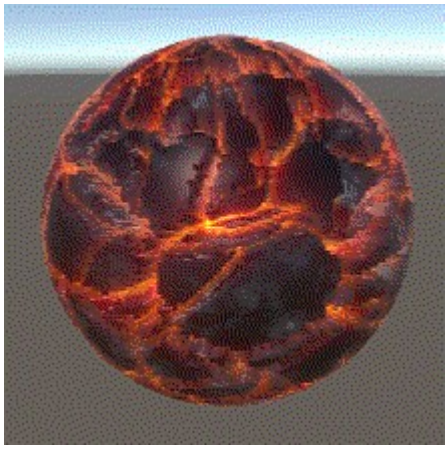
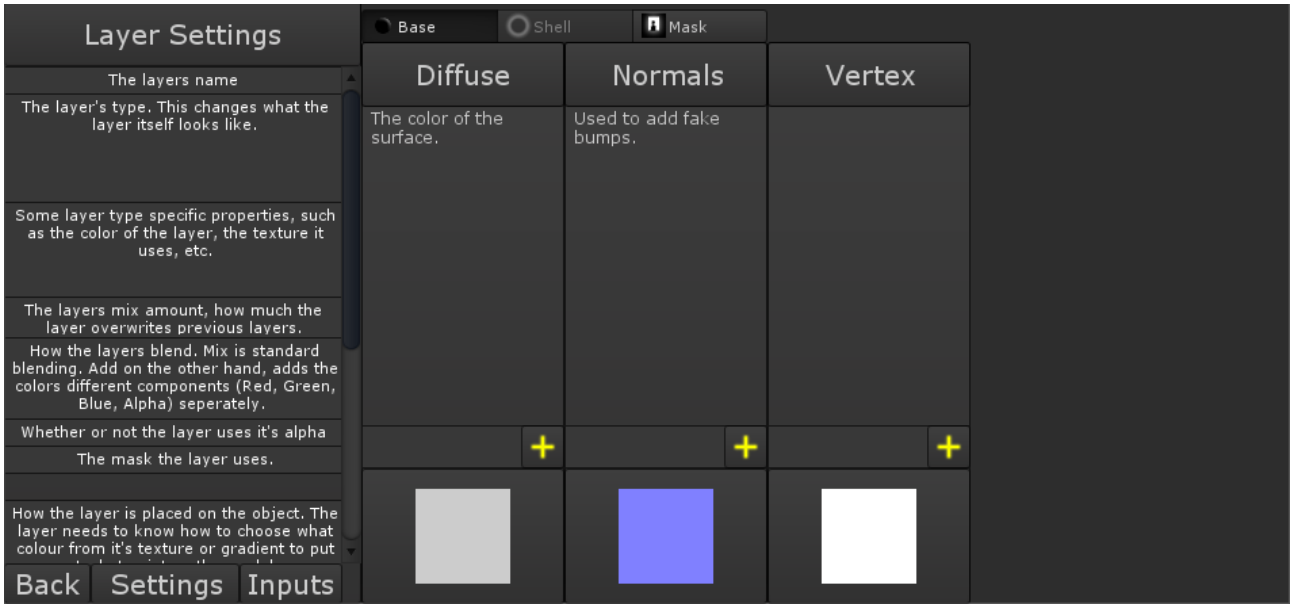
Beginner Tutorials Part 3 – Molten Fun!

Note: This is a copy of the online tutorial, so all links link to webpages. I'd suggest using the online documentation since it can be updated and added to easily, but if you'd like a pdf, then here it is :).

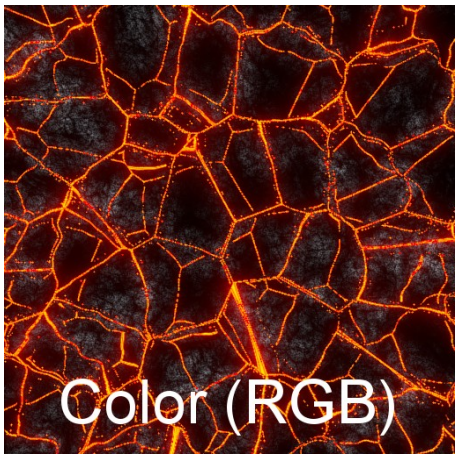
Hello again! Ready for something a lot more interesting?! All right, for the final beginner tutorial we'll be making a kick-ass molten rock shader thing, like so:

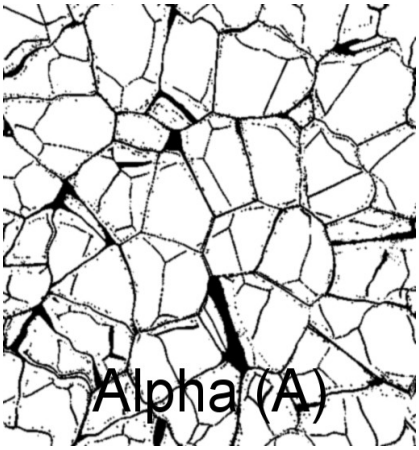


It's got depth, it's got movement, it's got it all! Well, let's get going! For this we'll have to make a new shader, so just click File->New.



So, for the first thing we'll add is a texture, so just add a layer to the diffuse channel and set its type to Texture. Then click the !, click yes and it's good to go. For this shader you should probably use the provided LavaAsh.png texture. Its got some cool looking ashy fire stuff; the alpha channel has complete transparency at the firey parts, and opaqueness at the ashy parts.

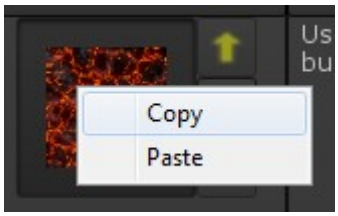


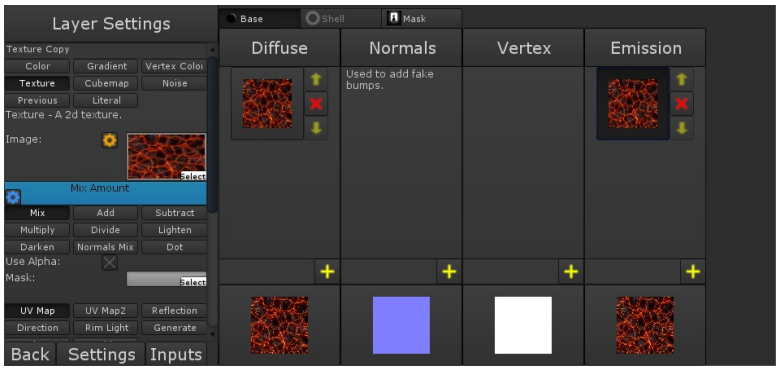


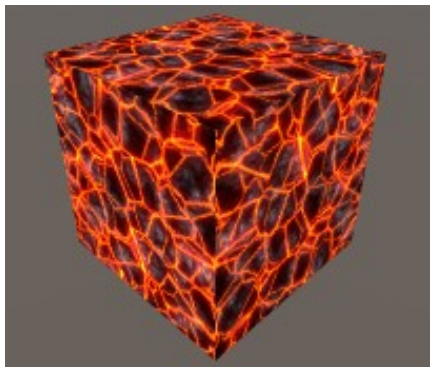
All right, it already looks kinda interesting - a good shader never makes up for neat art - but we can do more. We're going to make the lava parts really pop-out and glow, along with making them slightly animated.

To start, lets enable Emission just like we did last tutorial. Go into the Settings panel, tick the Emission box, then go back to the Layers panel.

We're going to copy the texture layer from the Diffuse channel into the Emission channel. Right-click on the texture layer and copy it. Then right-click in the Emission channel and paste it.





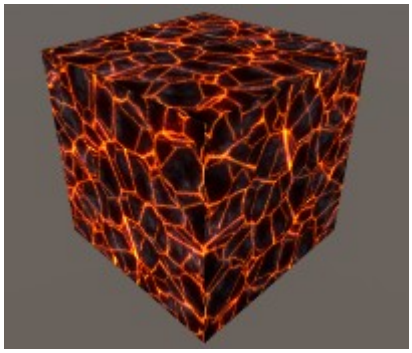


Already the shader is glowing, however it's not quite what we want. We want only the lava parts to glow, and to do this we need to only have the lava parts get mixed into the emission. Lets play around with the blend modes! Since we have an alpha channel that isolates the lava, we need to make it use alpha. Down in the blending area there's an option for that (Use Alpha):

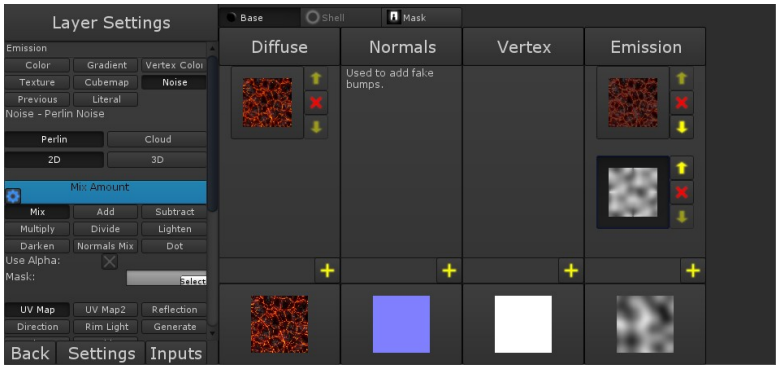
After checking it, you'll notice it does the exact opposite of what we want, making only the ash parts show, and the lava parts transparent. We need to invert the alpha, on to the effects panel!

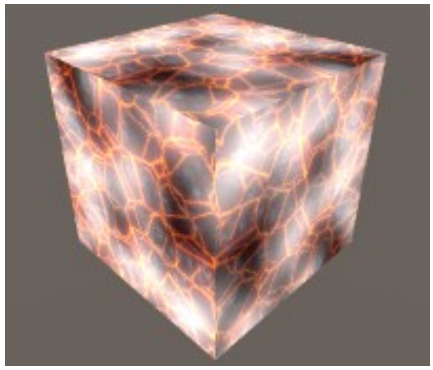
To invert the alpha, we are going to add the Invert effect! Click the + button next to the effects area and add the effect from Color/Invert. At first the effect will invert the colors, but we can make it only affect the alpha channel. In the effects area you'll see a grayed out A, like so: 

This changes whether the effect alters the alpha channel. A grey A means the effect only changes the colors, a yellow A means it affects the color and the alpha, while a grey, but pressed down A means it affects only the alpha. In this case we want to invert the alpha only, so click it until its a grey pressed down A, like this: 

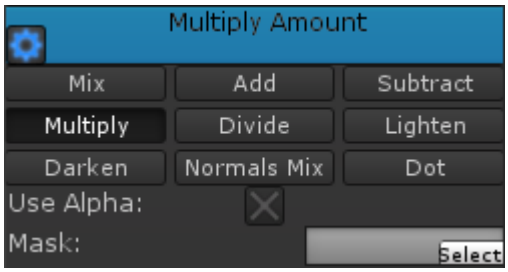


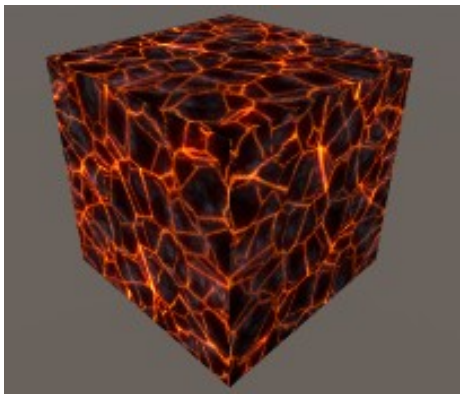
Hooray, now only the lava is glowing! The final thing to change with the glow is to make the lava look like it flows slightly, with parts dimming and glowing over time. Lets add another layer in the Emissions channel, and set it to the noise type (new and shiny!).



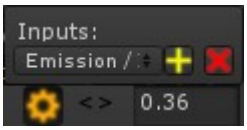


The idea is to have this noise multiply onto the emission (So it darkens different parts), and then animate it. First lets set the blend mode to multiply, like we did in part 1.

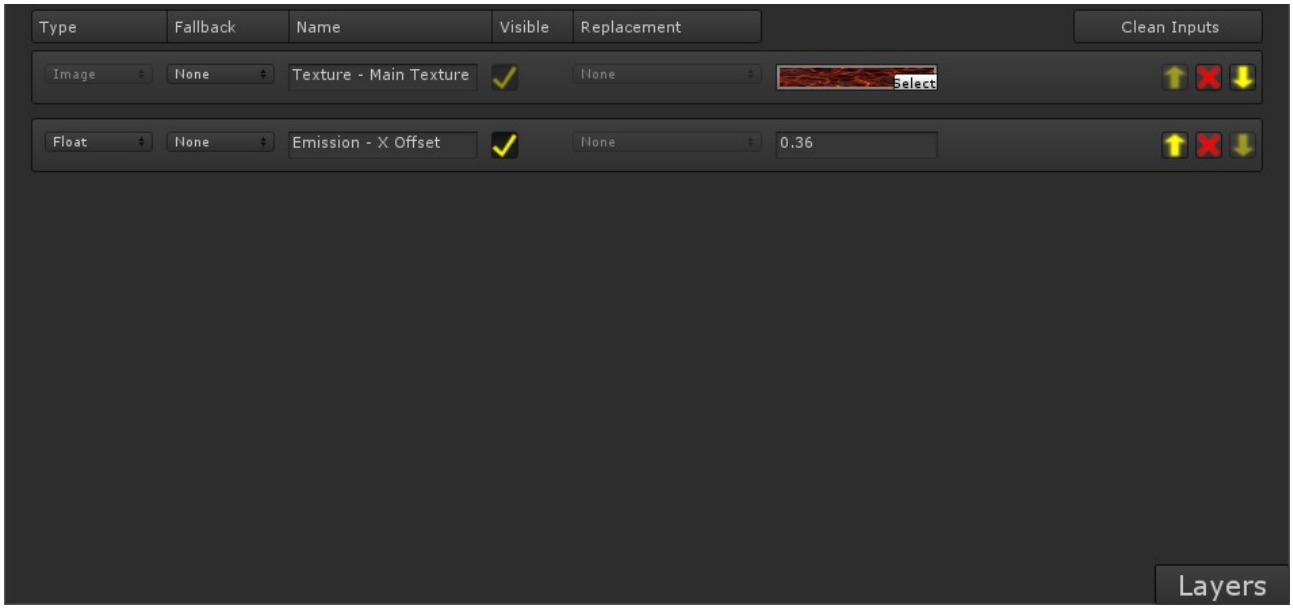




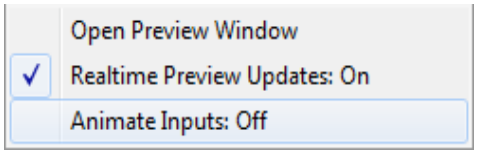
Now to animate it. We're going to add the effect Mapping/Offset. As you drag the X offset you'll see the noise scroll. Next, add an input for the X offset like so:



Now you can drag it more easily, but how are we going to make it animate automatically? For this we get to go into a new panel, the Inputs panel. At the bottom of the layer settings on the left there'll be a button called "Inputs". Click it, and the new screen will appear!

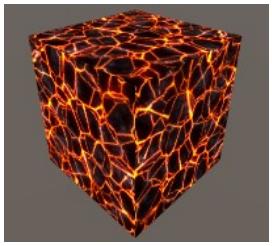


This is the Inputs panel, where all the inputs we've made over the tutorials vanish off to. Here you can change their name, default values and a bunch of other stuff including animation. At the bottom will be the X Offset input. When you turn off the Visible setting (The checkbox), then the Replacement setting will become usable. Set the replacement value to Time/Basic/Standard. And now the noise will move across!



Going back to the Layers panel will show the animation in the mini previews at the bottom of the channels. If this gets a bit slow/laggy I'd suggest turning off animation (Previews/Animate Inputs).

One last thing we might want to change about the emission is to brighten it up a bit. Add the Maths/Multiply effect to the noise layer, and set it to 5 or something. This'll make the glow brighter.



Ok, well so far we have this:

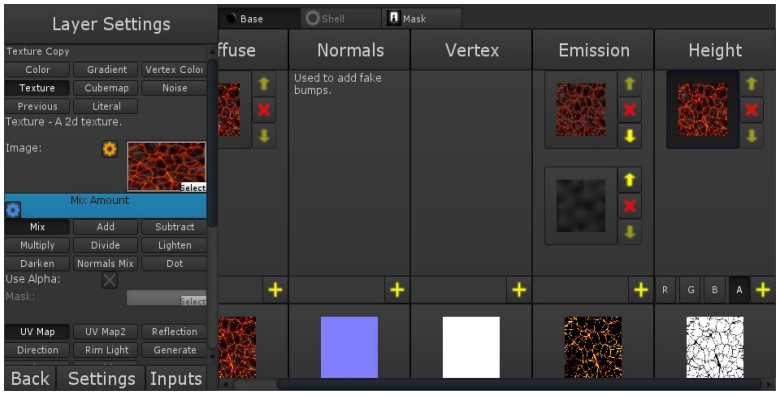
But it's missing the depth that proper lava cracks would have. The amount of detail in the cracks that we'll add would be difficult to model, and use a massive number of polygons. Instead of modeling the cracks, we're going to integrate them directly into the shader using a technique called Parallax Occlusion Mapping.

First, lets turn it on; you can find it in the Settings panel:

There are a few different settings here. The height defines how deep the cracks can go (I find around 0.1 or so works here, add an input to change it quickly). The quality defines the quality of the POM, the higher the better. I've set the quality around 25. Nothing will change yet, because we need to tell it what parts are at what height.

Head on back to the Layers panel and you'll see yet another channel, the Height channel. This is where we can add layers to define the height, with white as the normal surface level, and black as the deep parts. At the bottom of the channel you'll notice an option for R, G, B or A. Since the height is a single value and isn't a color, you can choose which color channel (Red, green, blue or alpha) to use.

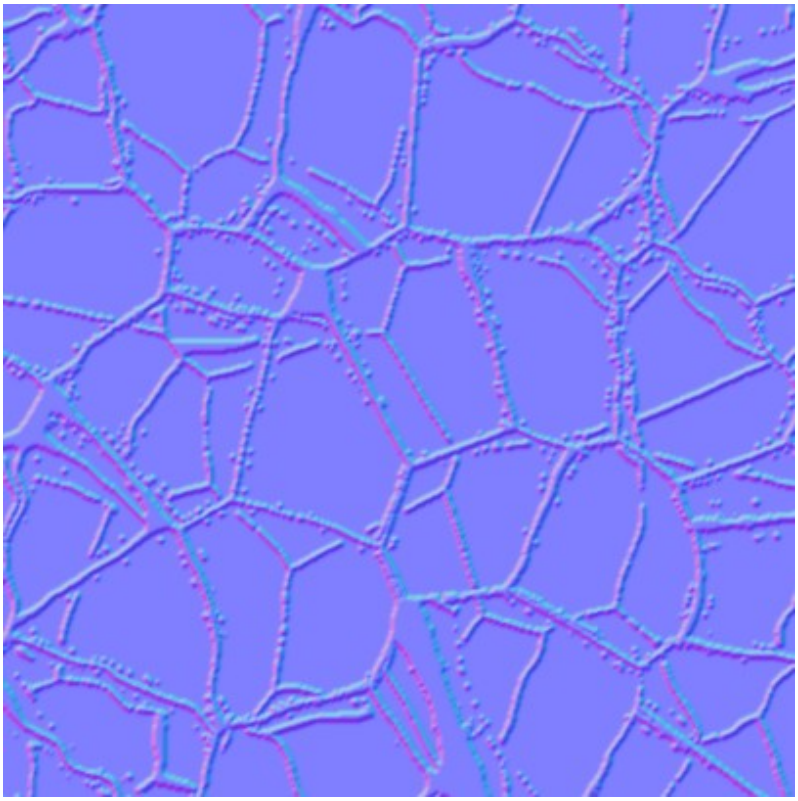
So, since the alpha channel for the texture layer has the cracks as 0 (Black), and the ash at 1 (White), we can just copy and paste the layer into the Height channel, and tell it to use the alpha. As before, right click on the texture layer (From the Diffuse channel), and choose copy. Then right click in the Height channel and paste it. Then, at the bottom of the Height channel choose the A (Out of the RGBA options) and it'll work!



All right, so what now? It looks cool, but can we make it look even more cool? Yup! We're going to add a bit of shine, and a normal map to really make the depth pop. Although not entirely accurate, as long as it looks good, who cares!

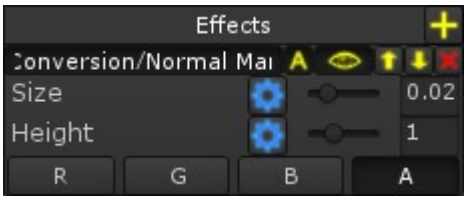
First off, let's go into the settings panel again. The main way to add shine is to enable Specular, however there's another way that will have better results (although is a bit more limited). Cycle through the Diffuse types (The two arrows) until it is set to PBR.

This'll force enable specular, and also limit a few settings. However, this sort of shine can properly reflect other objects and stuff. Now to add a normal map to really accentuate the bumps. A normal map looks like this:



When lighting an object, the shader (automagically) uses the normal of the vertex (The direction the vertex is pointing) in conjunction with the direction of the light. The normal map can bend the normals of the object per-pixel to add fake bumps and crevaces.

So, let's add normal map! In most cases a normal map is made as a seperate texture, but we are going to make ours be generated by the shader. Copy and paste the texture layer from the Diffuse channel into the Normal channel. This'll make the preview look pretty strange, because we haven't added a normal map. However, there's an effect that can convert it to a normal map.



Add the Conversion/Normal Map effect and play around with the settings. The size is the distance between samples of the texture (The smaller the less artifacts), and the height defines the strength of the normal map. The RGBA at the bottom is what channel the effect samples from, since it treats the texture like a heightmap. In this case you'll want the channel to be the alpha (A), since that is also what we use for the POM heightmap.

Good job! You've now finished the beginner tutorials and are well on your way to become a Shader Ninja! or, something.... Well, you're on your own now, have fun!