Making an individual rock

This is a two part procedure; let’s start with a rock. In the default scene, hide the camera, target, light, and ground plane so that just the default cube is visible. Select it and hit Control_5 to add a degree four subdivision surface to it (this will create a lot of vertices; your computer may slow down as a result). Apply this modifier to create a slightly cuboid sphere. Make it Smooth shaded.

Now go to Sculpt Mode using the pop-up menu in the 3D Window’s control bar.
From the Brush options top left choose Scrape/Peaks. Take its strength up to 1.000 and increase the Plane Offset to around 0.500.

Try this on the sphere. It will probably look like the image below. You need to do a few more things. First, click on the Lock icon to the left of the Area Plane option so that it looks like the image left. This keeps the tool action in the plane of the first vertex it works on. The Plane Offset value pushes the tool into the mesh.

Next, open up the Curve panel further down in the left fly-in and change the shape option to to the rightmost one at the foot of the preview graph. This removes the falloff curve in the brush and gives it the same strength – in this case the full 1.000 that we already selected – across its full width.

Then uncheck the Mirror X option in the Symmetry/Lock panel a bit further down. Hit Control_Z to return to the original sphere. Now try the sculpting brush again. Holding down the left mouse button, drag it over the sphere until you have something like this. Note that to increase the size of the brush you can either change its size in the panel or zoom out in the 3D window.
Now work around the sphere to make a rock object like the one below. You may need to adjust the brush size and Plane Offset as you do so.

Look at it in wireframe in Edit mode to see all the geometry. This is far higher resolution than needed; even if we’re instancing it across the ground with a particle system Blender still has to take account of all those verts when rendering. So let’s reduce it.

Go back into Object mode and make sure the 3D cursor is still at the center of the rock, or close to it.

Add an Icosphere with 3 subdivisions so that it completely surrounds the rock.

Give the icosphere a Shrinkwrap modifier and use the high resolution rock as the target. Apply the modifier (otherwise the icosphere will go back to being a sphere when you delete the original rock) and then delete the original rock. Give your new low resolution rock an appropriate name in the Outliner such as 1_rock.000.
One more thing and it’s done. Make the new rock smooth shaded, then add an Edge Split modifier to the rock. Adjust the Edge Angle until there is a good balance of jagged and worn surfaces. Now we have a usable rock for our landscape.

**Making a landscape**

For the next part we’ll create a landscape. Activate the ANT Landscape add-on in Preferences and then add it from the Mesh menu. It may appear inside the rock; if so don’t move or scale it or you will lose the start options in the left fly-in. Hit Slash on the keypad (or View – View Global/Local) to isolate it. You may want to change the Falloff to Type 2, which gives a faster transition to a flat plane.

For the moment, this is all we need, though change other options if you want. Now go back to Global view with the keypad slash key again and scale it up nine times with S – 9 – Enter. Use Control_A after that to normalize the scale.

Select the rock and hit M - 2 to move it to layer 2. Now go to layer 2 with the number key 2 or by selecting the second square in the control bar.
Either make another couple of rocks from scratch or use Shift_D to duplicate the rock twice. Blender will automatically give them the names 1-rock.001 and 1-rock.002. Edit each one to look different; proportional edit will help here. Finally make a small cube and scale it along the Z axis; this will be a marker so you can see how the rocks are oriented in the landscape. In edit mode move it up so that its orange pivot point dot is in the center of its bottom face.

Return to object mode (still on layer 2) and select all three rocks and the tall cube. Make them a group with Control_G; they will turn green. In the left fly-in name the group Rocks.

Go back to layer 1 by using the number key 1 or clicking the first layer icon in the control bar. Select the landscape object, go to the Particle Systems tab in Properties, and hit the + button. Choose Hair from the Type selection box. If the hair grows down, reverse the normals of the landscape object in edit mode. The default number of hairs is 1000 and they come in growing normal to the faces.
Reduce the number from the default 1000 to 100 and check the Advanced box.

Now go down to the Render tab and select Group. In the selection box choose Rocks.

A hundred rocks will be scattered on the landscape. To include all members of the group, including the stretched cube, check Pick Random under the selection box. Now you can see the long cubes as well as all three rocks, and the cube is lying along the ground. This indicates that members of the group are rotated relative to the face normals. It’s not a problem with rocks, but would be if they were skyscrapers in a city model. However, this is easy to fix.

Go up to the Rotation panel, select it, and open it. From the Initial Orientation popup box select Object X.
Now you can see the marker cubes standing vertically; their pivot points, like those of the rocks, are aligned with the faces of the landscape (if they are not, choose another option until you find one that works). The higher those pivot points are, the lower the object will be buried below the surface.

Still in the Rotation panel, increase the size to 0.100 and the Random Size to around 0.400. Change the Initial Orientation Random size to around 0.300.

The rocks and cubes appear more scattered and realistic. Go back to layer 2 briefly and delete the cube. Now we just have rocks in the landscape, but they are evenly scattered. We want to define the probability of where rocks will appear. We can do this with a weight painted vertex group.

Select the landscape and go to Weight Paint mode.

The landscape will turn dark blue, indicating that all of its vertices have a weight of zero. You can think of the weighting as like temperature: dark blue is cold (a weight of zero) and as the color gradually warms up it represents increasing weighting of the vertices. Bright red is the hottest, being a weighting of 1.00. (Yes, we know blue flames are hotter than yellow, which are hotter than red, but work with Blender here).
We are going to paint increasing weight values on it using the brush tool in the left hand fly-in. The size, strength, and falloff of the brush can be controlled as in the UV/Image Editor or the Texture Paint mode.

By default the blend mode is set to Mix, but you can change this to Add or Subtract to refine your weight paint map. Here I have defined a high likelihood of rocks at the foot of the slopes, none on the slopes, and a lesser chance further from the slope.

Return to Object mode. Nothing has changed, but this is because we still have to define this map as a parameter in the particle system. With the landscape selected, go to its Object Data tab and call this new vertex group Rocks.

If you want to define other vertex groups for other particle systems, this may be the time to do it. Grasses, for example, and trees.

Next, go back to the Particle Systems tab and scroll down to the Vertex Groups panel.
Click on Density and choose Rocks from the pop-up menu.

The distribution of rocks changes to reflect the probability defined by the weight painted vertex group.

You can adjust the weighting by going back to the Weight Paint mode and using the brush in Add or Subtract modes. The rocks will adjust themselves dynamically as you do so.