**Material Behaviours**

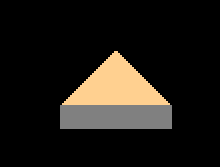
**Terminology**

Material – Type of particle (e.g. sand, water)

Particle – An instance of a material, aka a pixel on the screen or in our case a cell on a grid

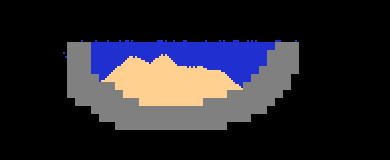
**Sand:**

* Weight = 1g per particle
* Falls at a normal rate
* Can be blown by wind (If we add wind functionality)
* Special behaviour is that it stacks on other non-reactive materials, can create a nice tower of sand
* More advanced behaviour if time allows for it, have the sand particles stack in a more realistic way (images to show the difference can be seen below)

**Normal stacking Advanced stacking**

* **Reacts with:**
* Water – not so much of a reaction but maybe if we have time we can make it so when sand is added on top of water, it will sink to the bottom and displace the water (example image shown below)
* Lava – For now it can destroy sand or melt it into more lava
* Acid – Acid will burn away the sand or convert sand into acid
* Any explosives – Will blow the sand away or just straight up destroy it
* Fire – Can melt sand into glass

**Sand displacing water**



**Water:**

* Weight = 2g per particle
* Falls slightly faster than sand
* Can be blown by wind, however it needs a stronger wind force to be moved
* Special behaviour is such that water particles will try to fill a container, so they will spread out until they find a solid material like sand, stone or metal to stop them (example shown below)
* More advanced version would be just cosmetic, we can make the top water particles simulate motion to create tiny waves.

**Water in a metal container**

http://puu.sh/tTE4y/a5a29b8cc9.png

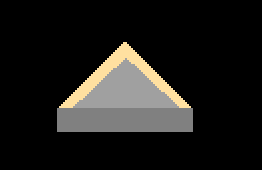
* **Reacts with:**
* Solid Materials like sand and stone – Will stop water from travelling, will displace water if dropped on top of it
* Lava – Turns water into stone, or creates steam that rises to top of screen, or even a random assortment of both
* Seed – Eats water to grow plants
* Acid – Destroys water, or converts it to acid
* Any explosives – Blow water away and perhaps create steam
* Metal – Water will slowly corrode metal and maybe turn it into rust if we get crazy with amount of materials, or it can just slowly destroy metal
* Oil – same case as with sand but in this case oil could float on top of water
* Ice – Freezes water into more ice

http://puu.sh/tTHc7/ae9e92cc08.pnghttp://puu.sh/tTH69/1dd67540ef.png **Ice freezing water Oil on top of water**

**Stone:**

* Weight = 5g per particle
* Falls at the same speed as sand
* Much stronger wind required to even blow stone
* Special behaviour is the same as sand, stacks along with other non-reactive materials
* Advanced behaviour is the same as sand, however if we want to do super complex behaviours we can make it so stone displaces any sort of dust since stone is much heavier (example below)

**Stone displacing dust**



* **Reacts with:**
* Water – will stop water from travelling, will displace water from container
* Lava – Melt stone into more lava
* Dust – Will displace dust so that the stone will be found under dust
* Acid – Destroys stone but it does it less efficiently than destroying sand or water
* Any explosives – Blow stone away and perhaps pulverise it into sand

**Lava:**

* Weight = 2g per particle
* Falls rather slow, but we can always tinker with the speeds to make them realistic
* Wind won’t blow lava away, lava is too sticky?
* Special behaviour is the same as water, but way harder to contain as it destroys pretty much anything
* We can make lava look super pretty and add bloom to it
* **Reacts with:**
* Sand – melts it into more lava or just destroys it
* Water – turns into stone or steam
* Stone – melts into more lava
* Seed – burns seed and any plants it made
* Acid – Apparently acid eats away lava? That’s what it does in powder toy
* Any explosives – Activates the explosives which then blow stuff up
* Metal – Melts it into lava, much slower than stone
* Ice – Melts ice into water

http://puu.sh/tTG8L/b09bafa1b2.png **Lava melting stone Lava melting ice into water**

**Seed:**

* Weight = 1g
* Falls at the same speed as sand
* Can be blown by wind just like sand
* Special behaviour is that it absorbs water to grow plants, for now we can have just real basic vertical growth so when it absorbs water it grows 3 cells high
* Advanced behaviour is a more randomized plant growth, perhaps even creating a brown material called plant which will grow from seeds

http://puu.sh/tTGPn/6a5ee041a8.png **Seeds absorbing water**

* **Reacts with:**
* Water – absorbs water to stimulate growth
* Lava – burns seeds and any plants it makes
* Acid – eats seeds and any plants it creates
* Any explosives – blow seeds away
* Dirt – Maybe by having dirt and water around it, we can stimulate better growth