# Particles and Smoke

* New Unity Project
* Call it Loop Machine
* In the Assets Folder Create a Folder called 0 Fire
* Save Scene as Fire and put it in the Fire Folder
* Import the Particles assets from Canvas
  + Put that into the Fire Folder
  + Name it Textures
* Set the Layout to 3 x 3

### Create a Dark Environment

#### Lighting Window

* Environmental lighting
* Set Source to Color
* Set Ambient Color to black
* Rename Directional Light to Sun
* Drag that into Sun Source

#### Main Camera

* Clear Flags to Color
* Color to black

#### Scene View

* At the very top of the scene window
  + Turn off lighting (light bulb to the right of "2D"
  + In the view dropdown turn off the Skybox
* Select the Main Camera
  + GameObject / Align View To Selected

#### Create Background Objects

* Create an Empty Game Object
  + Name it Fire 1
  + Place it at 0, 0, 0
* Create a Cylinder
  + Name it Base
  + Make it a child of Fire 1
  + Position 0,0, 0
  + Scale 1, 0.2, 0
* Create the Base Material
  + Select the Textures folder the 0 Fire Folder
  + Create a new Material
  + Call it Base
  + Render Mode: Transparent
  + Color Black with 50% alpha
  + Metallic .5
  + Smoothness .8
  + Drop it onto the Base object in the Scene
* Create the Ground
  + Create a Plane
  + Name it ground
  + Position 0, 0, 0
  + Scale 2, 1, 2
* Create the Ground material
  + Select the Textures folder the 0 Fire Folder
  + Create a new Material
  + Call it Ground
  + Render Mode: Opaque
  + Color Black
  + Metallic 0
  + Smoothness 0
  + Drop it onto the Ground object in the Scene

#### Create your first fire: a Fireball

* Make the flame material
  + Select the Textures folder the 0 Fire Folder
  + Create a new Material
  + Call it ParticleFireCloud
  + Shader Particle / Additive
  + Drag the ParticleFireCloud texture to it
* Create a Particle System
  + Name it Fireball
  + Drop it onto the Fire 1 GameObject
  + Set its location to 0, 0.5, 0
* Open the particle system renderer
  + Drag the particleFireCloud material to the material slot
  + Max Particle size 0.4
* **Particle System General Section**
  + Duration 2
  + Start Lifetime Random between 2 constants: 0.6, 2
  + Start Speed Random between 2 constants: 0.1, 0.35
  + Start Size Random between 2 constants: 0.7, 1.2
  + Start Rotation -180, 180
  + Start Color is: 1, 1, 1, .6
  + Gravity 0 Simulation space Local
  + Scaling mode: Shape
* **Particle System Options**
  + Emission 13
  + Shape Cone
  + Angle 24
  + Radius 0.04
  + Force Over Lifetime
  + 0, 0.2, 0
  + Space: World
  + Color Over Lifetime
  + Alpha start 0, 255 at 20%, 100 at 70%, 0 at 100%
  + Central color a kind of neutral brown
  + Size over Lifetime
  + Curve starts 0.3 to 1.3, 0.3

#### Create flames

* Duplicate Fire 1
  + Name the new one Fire 2
  + Set its position to -4, 0, 0
  + Delete the child particle system called Fireball
* Create a new Particle System
  + Call it Flames
  + Make it a child of Fire 2
  + Set its position to 0, 0.5, 0
* Particle System General
  + Duration 2
  + Start Lifetime Random between 2 constants: 0.6, 1
  + Start Speed 0
  + Start Size 1.2
  + Start Rotation -12, 14
  + Gravity - 0.2
  + Scaling mode: Shape
  + Max Particles 10
* Particle System Options
  + Emission 3
  + Shape Cone
    - Angle 24
    - Radius 0.04
  + Force Over Lifetime
    - 0, 0.2, 0
    - Space: World
  + Color Over Lifetime
    - Alpha start 0, 255 at 20%, 70 at 80%, 0 at 100%
    - Color white
  + Size over Lifetime
    - Curve starts 1.5 to 1.3
* Material
  + Create a material and call it particleflameSheet
  + Shader Particle Additive
  + Drag the ParticleFlameSheet texture to it
* **Particle System: Texture Sheet Animation:**
  + Select Texture Sheet Animation
  + Mode: Grid
  + Tiles 8 x 4
  + Animation Whole Sheet
  + Cycles 2
* **Particle System Renderer**
  + Drag the ParticleSheetMaterial to the material slot

#### Create Smoke

* Duplicate Fire 1
  + Name the new one Fire 3
  + Set its position to 4, 0, 0
  + Delete the child particle system called Fireball
* Create a new Particle System
  + Call it Smoke
  + Make it a child of Fire 3
  + Set its position to 0, 0.5, 0
* Create a light background (in order to see the dark smoke)
  + Create a cube
  + Name it Background
  + Position 2, 2, -4
  + Scale 4, 4, 1
* Particle System General
  + Duration 2
  + Start Lifetime 2
  + Start Speed Random between 0.7 and 1
  + Start Size Random between 1and 1.2
  + Start Rotation -180 and 180
  + Gravity 0
  + Start Color white with alpha at 75
  + Scaling mode: Shape
  + Max Particles 30
* Particle System Options
  + Emission 4
  + Shape Cone
    - Angle 5
    - Radius 0.1
  + Force Over Lifetime
    - 0, 0.9, -0.9
    - Space: World
  + Color Over Lifetime
    - Alpha start 0, Max at 80%, 0 at 100%
    - Color white at 0, orange at 20%, white at 100%
  + Size over Lifetime
    - Curve starts 0.8 to 2.0
* Material
  + Create a material and call it particlesmokeBlack
  + Shader Particle Multiply
  + Drag particleSmokeBlack Texture to it
* **Particle System Renderer**
  + Drag the ParticleSheetMaterial to the material slot

#### Create Sparks

* Duplicate Fire 1
  + Name the new one Fire 4
  + Set its position to -6, 0, 0
  + Delete the child particle system called Fireball
* Create a new Particle System
  + Call it Sparks
  + Make it a child of Fire 4
  + Set its position to 0, 0.5, 0
* Particle System General
  + Duration 2
  + Start Lifetime Random between 1.4 and 2.2
  + Start Speed Random between 0.7 and 1
  + Start Size Random between 0.005and 0.015
  + Start Rotation -180 and 180
  + Gravity 1
  + Start Color Orange
  + Simulation Space Local
  + Scaling mode: Shape
  + Max Particles 500
* Particle System Options
  + Emission 30
  + Shape Cone
    - Angle 25
    - Radius 0.3
  + Force Over Lifetime
    - 0, 0.9, -0.9
    - Space: World
  + Color Over Lifetime
    - Alpha Max until 95% then to 0
    - Color white at 0, pale orange at 20%, deep orange at 60% very dark orange at 100%
  + Collision
    - Dampen 0.2
    - Bounce 0.2
    - Collides with Everything
* Material
  + Create a material and call it ParticleSpark
  + Shader Particle Multiply
  + Drag ParticleSpark Texture to it
* **Particle System Renderer**
  + Drag the ParticleSheetMaterial to the material slot
  + Render Mode Stretched Billlboard
  + Cameral scale 0
  + Speed scale 0.025