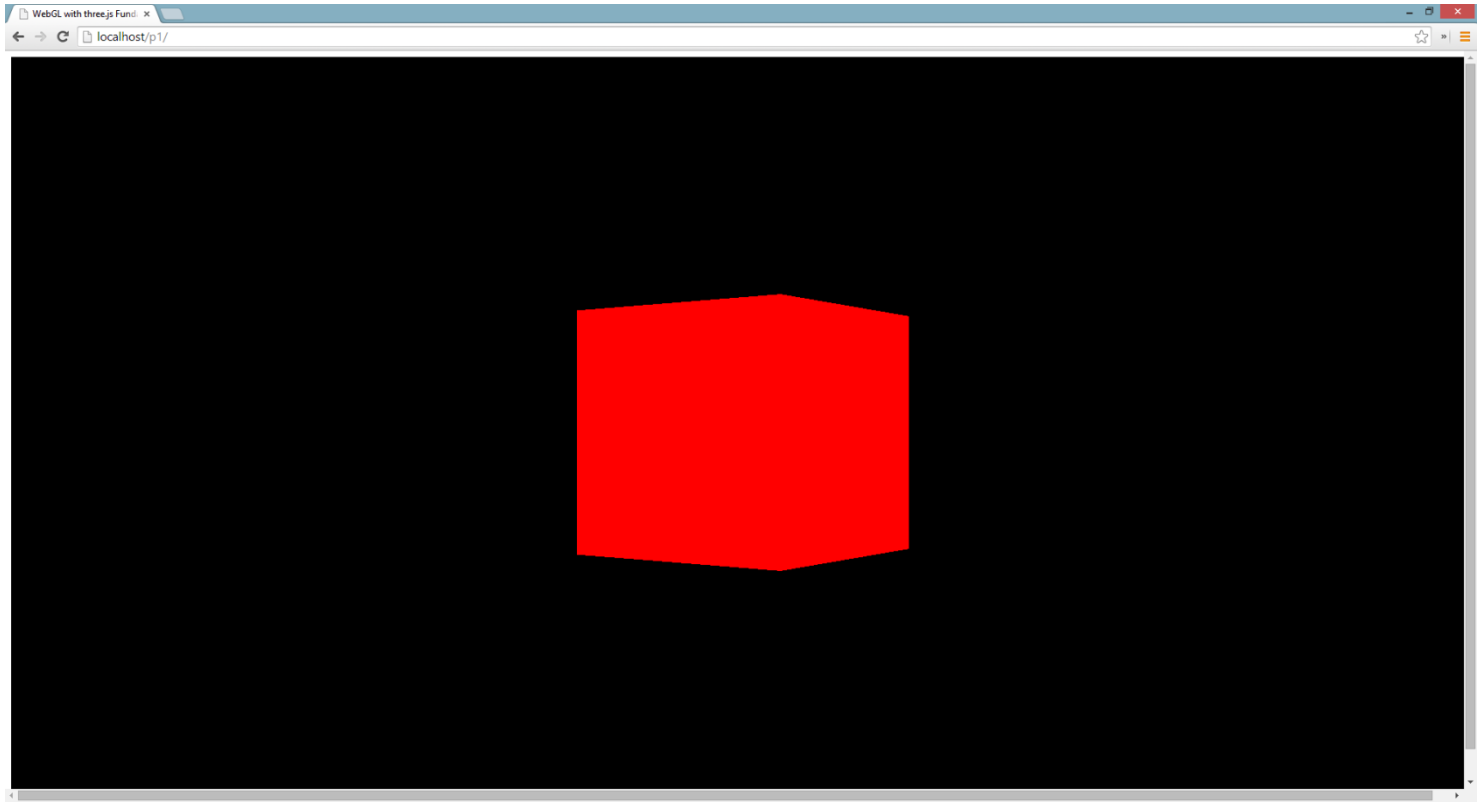
Materials, Lighting & Textures

Alex Mackey
simpleIsBest.co.uk

Introduction

- Why do we need materials & lighting?
- Materials – Basic, Lambert & Phong
- Lighting – Ambient, Point, Directional & Spot
- Textures

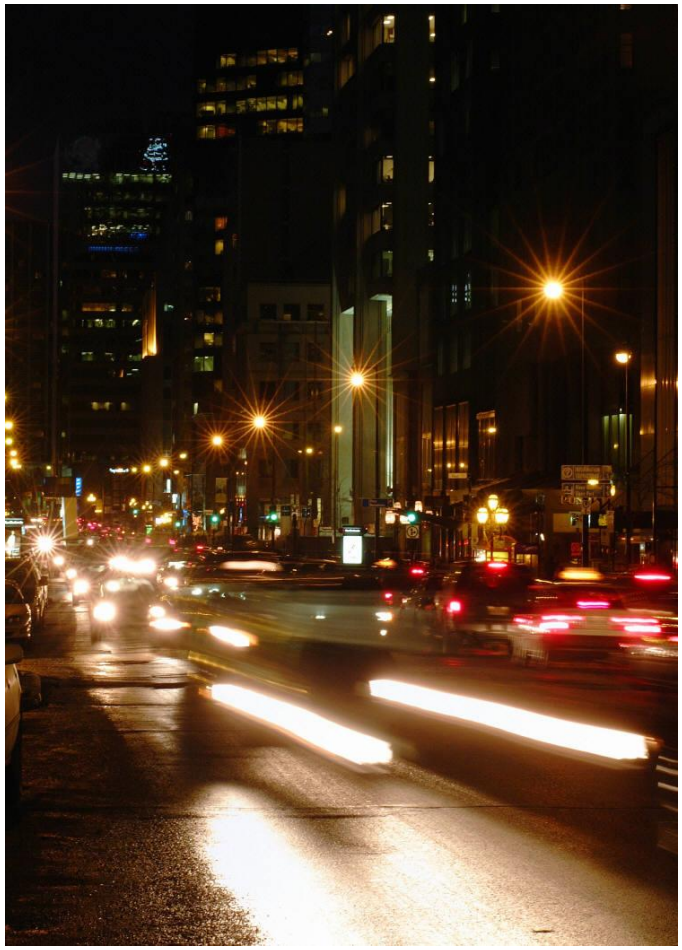
Previous Examples



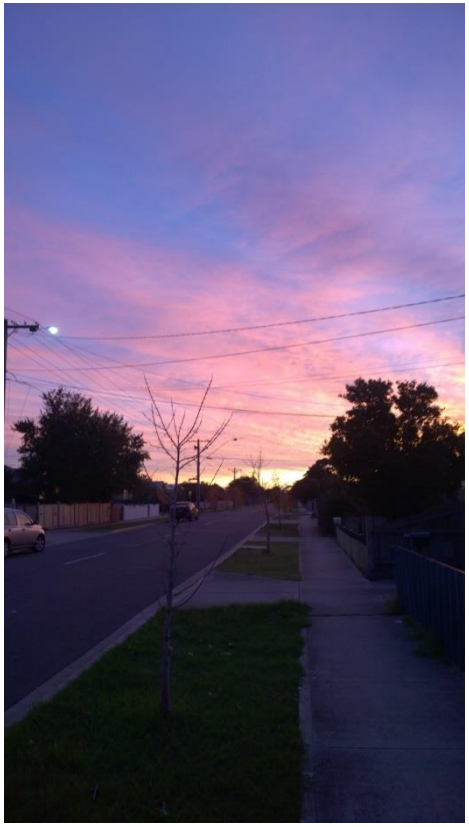
Lighting and Materials

Materials & Lighting Are Closely Linked

Importance of Lighting

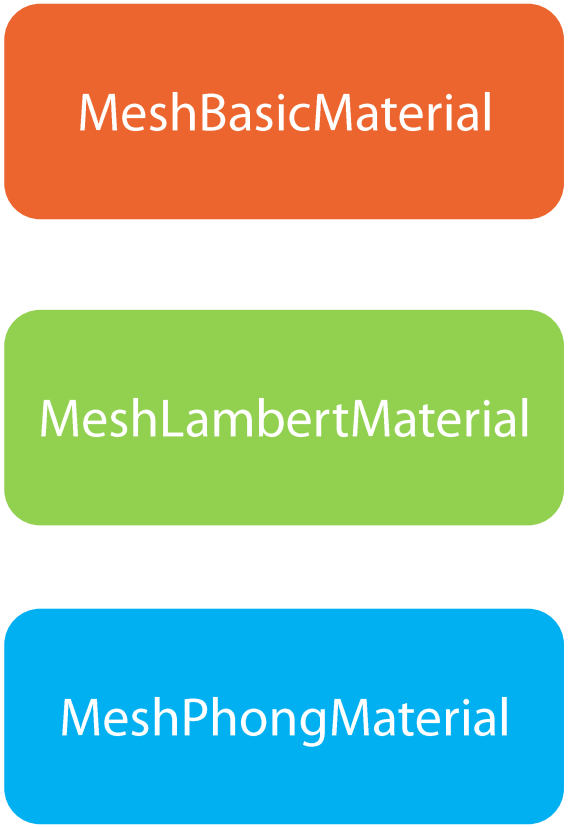


Street Lighting



Materials

Types of Materials



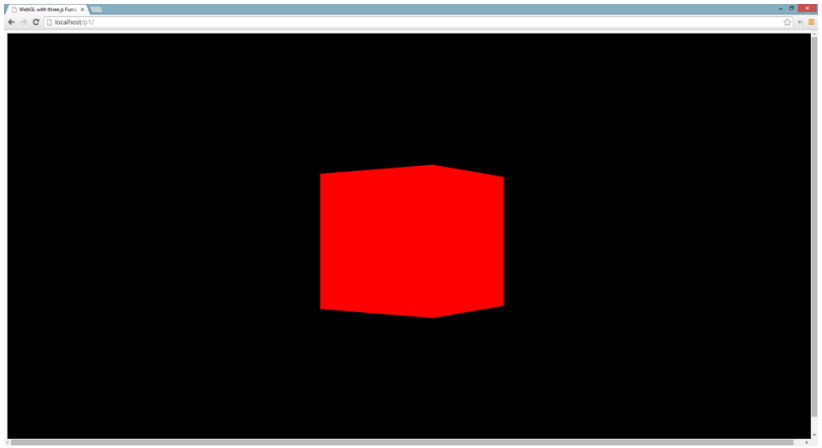
Material Properties

- color
- side - THREE.FrontSide, THREE.BackSide & THREE.DoubleSide
- map (texture to use)
- transparency & opacity
- visible
- wireframe

MeshBasicMaterial

Surface not influenced by lighting

Great for demos and debugging



MeshBasic Example

```
var material = new THREE.MeshBasicMaterial

({

 color: 0xFF0000

})
```

MeshLambertMaterial

Non shiny dull surface e.g. pottery

Needs directional, point or spot light

MeshLambertMaterial Example

```
var material = new THREE.MeshLambertMaterial

({

 color: 0xFF0000

})
```

Lambert & Phong Material Properties

ambient - multiplied by ambient light color

emissive - solid color unaffected by other lighting

MeshPhongMaterial

Shiny metallic like surface

Needs directional, point or spot light

MeshPhongMaterial Example

```
var material=new THREE.MeshPhongMaterial({
        color: 0xff00aa,
        ambient: 0x0088bb,
        specular: 0x002211,
        shininess: 100
})
```

MeshPhongMaterial Properties

- specular (how shiny & color of shine)
- shininess

Lighting

Types of Light

AmbientLight

Affects all objects equally

Can soften by specifying grey like colors

Generally used in conjunction with other types

AmbientLight Example

```
var light = new THREE.AmbientLight(color);
```

```
var light = new THREE.AmbientLight(0xffffff);
```

PointLight

Light that shines in all directions

Only affects MeshLambert or MeshPhong materials

Advanced Light Properties

- Intensity - lights strength 1 is default, 2= 2x default
- Distance – distance where intensity = 0

PointLight Example

```
var light = new THREE.PointLight(color, intensity, distance);
```

```
var light = new THREE.PointLight(0xff0000, 1, 100);
```

DirectionalLight

Sunlight

All light comes from same direction not position

DirectionalLight Example

```
var directionalLight = new THREE.DirectionalLight(color, intensity);
```

```
var directionalLight = new THREE.DirectionalLight(0xffffff, 0.5);
```

SpotLight

Theatre spot light

Can cast shadows in one direction

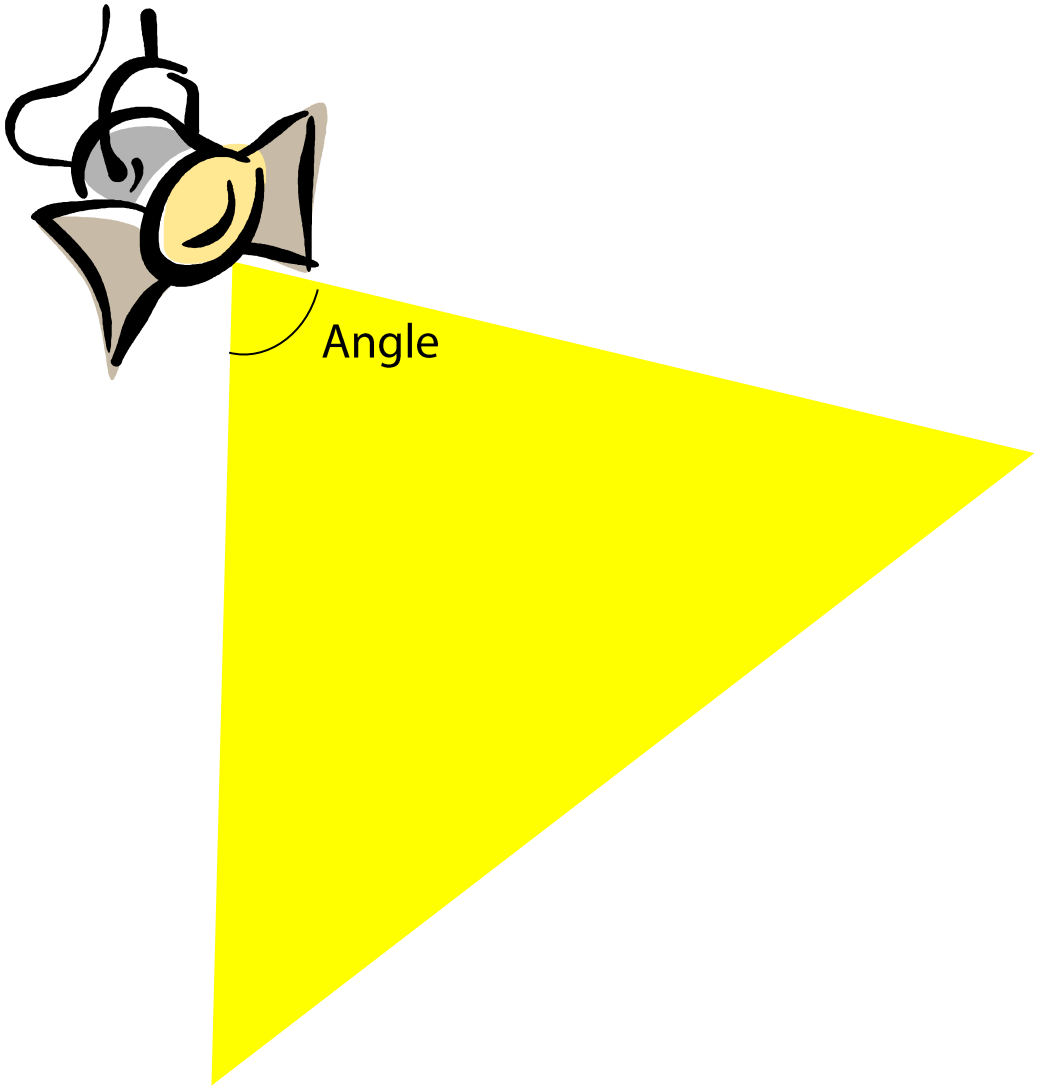
Only affects MeshLambert or MeshPhong materials

SpotLight Example

```
var spotLight = new THREE.SpotLight(color, intensity, distance, angle);
```

```
var spotLight = new THREE.SpotLight(0xffffff, 1, 100);
```

SpotLight Angle

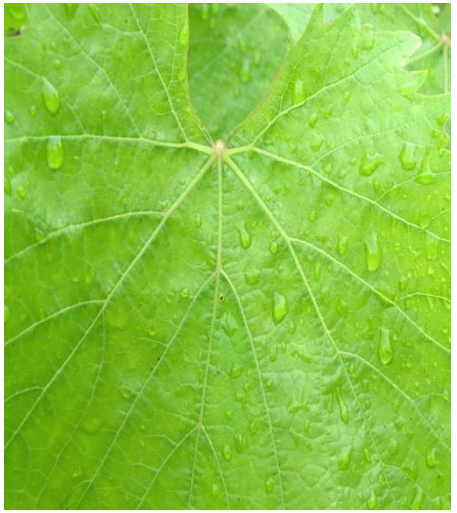


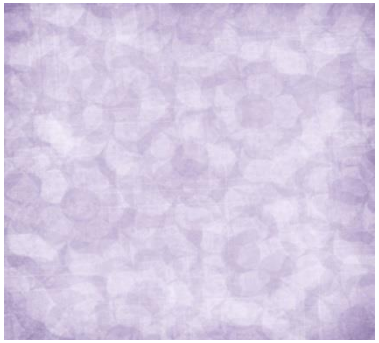
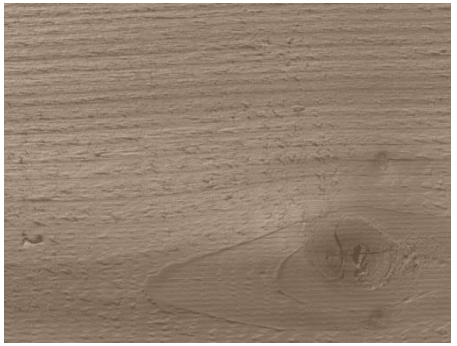
Materials and Lighting Adjustment

Shadows

Textures





Textures

```
new THREE.MeshLambertMaterial({

        map: THREE.ImageUtils.loadTexture('content/crate.gif')

})
```

Summary

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