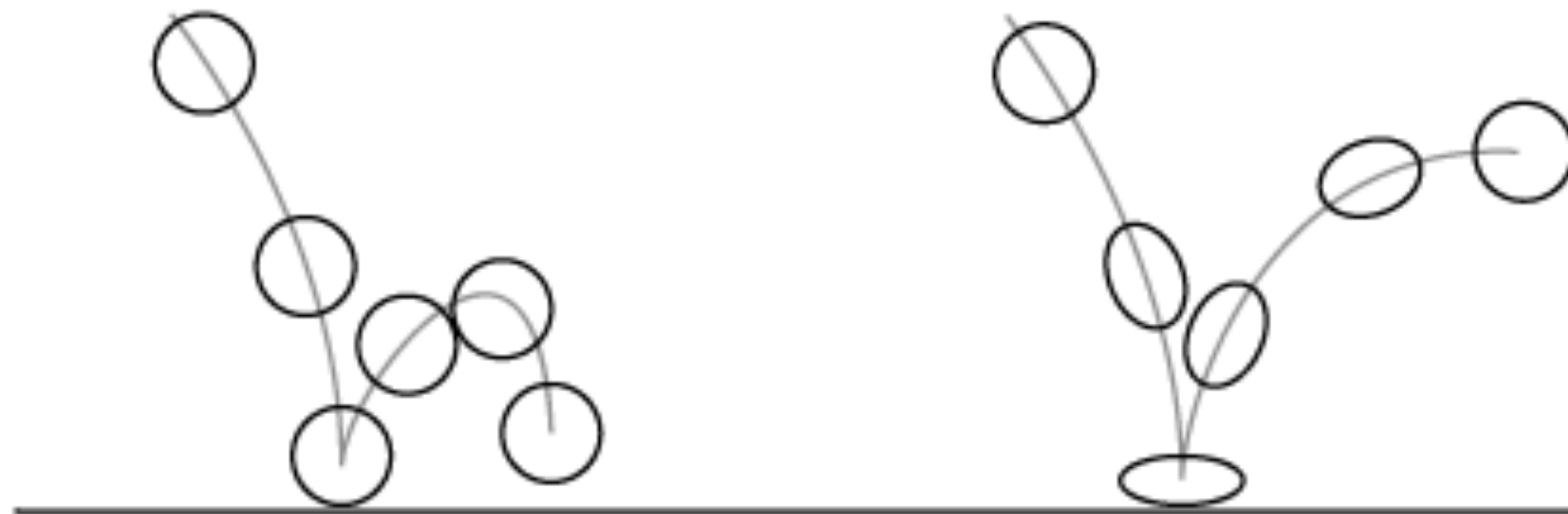
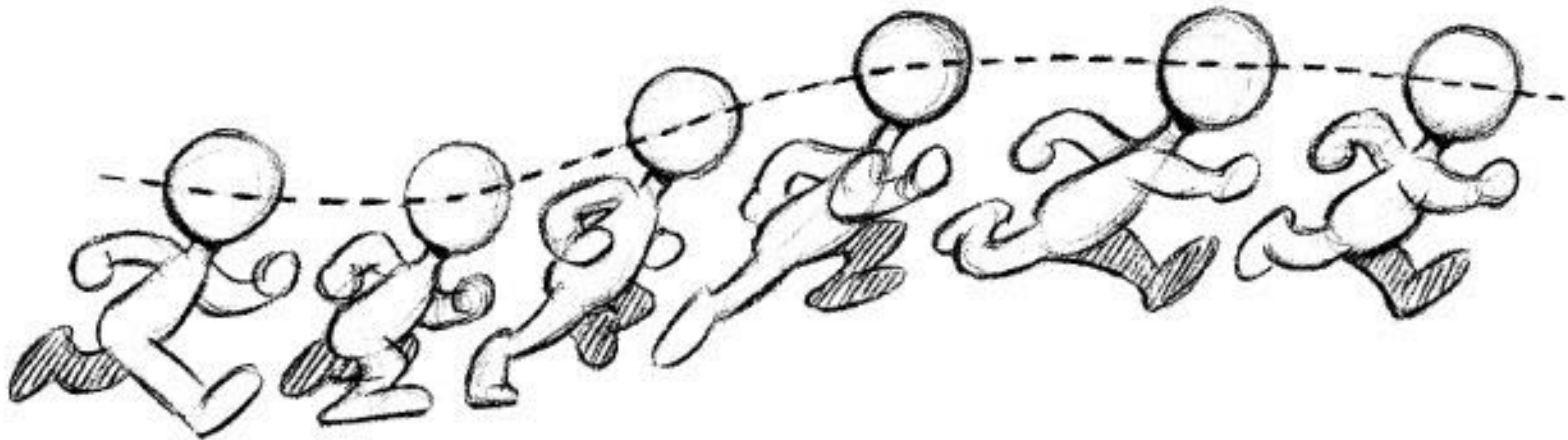


Effects and animation.

Part 1



Movement over time.





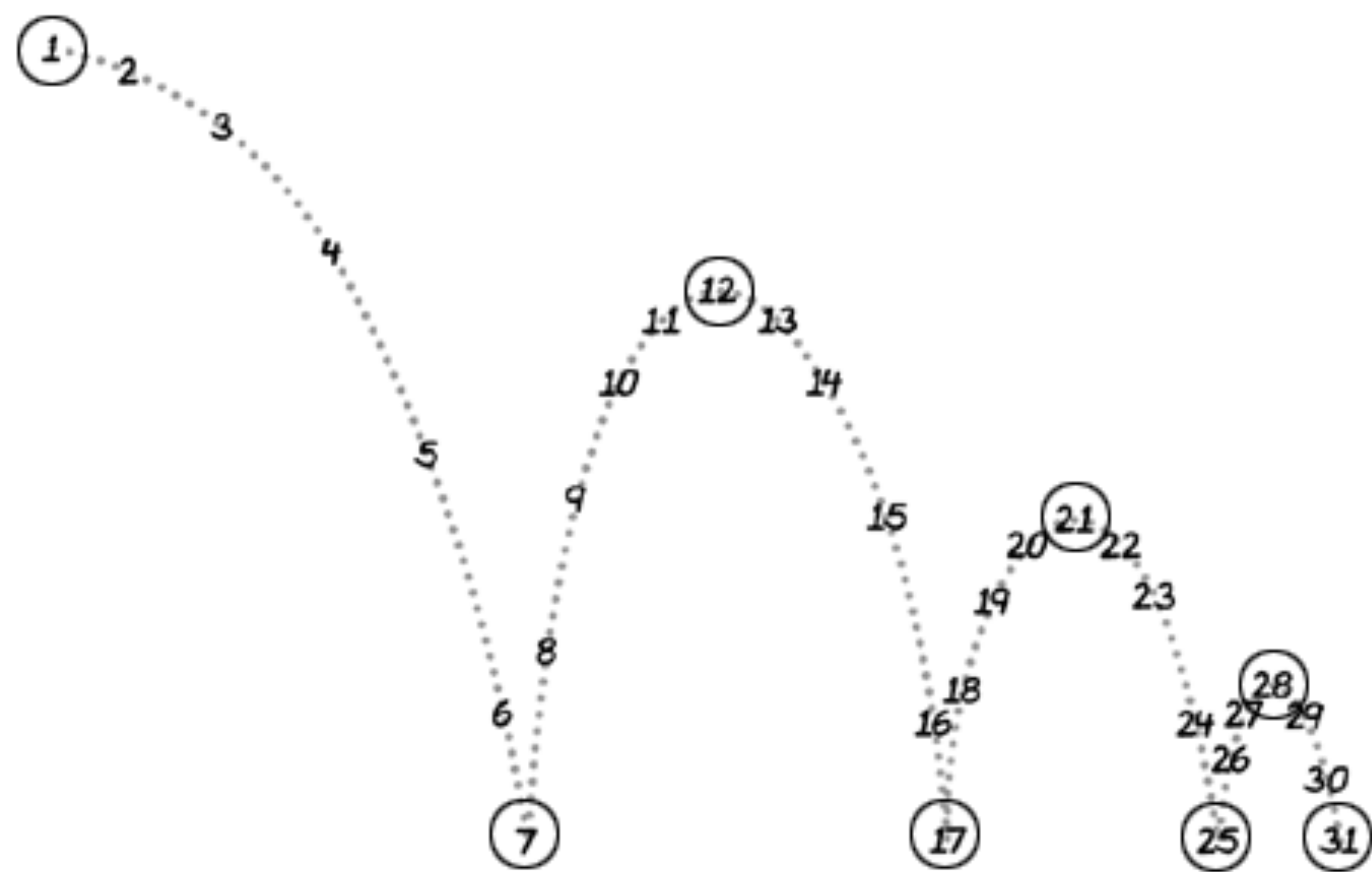
Mapping value ranges.

```
float mapValue(float value, float srcMin, float srcMax, float dstMin, float dstMax) {  
    float retVal = dstMin + ((value - srcMin)/(srcMax-srcMin) * (dstMax-dstMin));  
    if(retVal < dstMin) {  
        retVal = dstMin;  
    }  
    if(retVal > dstMax) {  
        retVal = dstMax;  
    }  
    return retVal;  
}
```

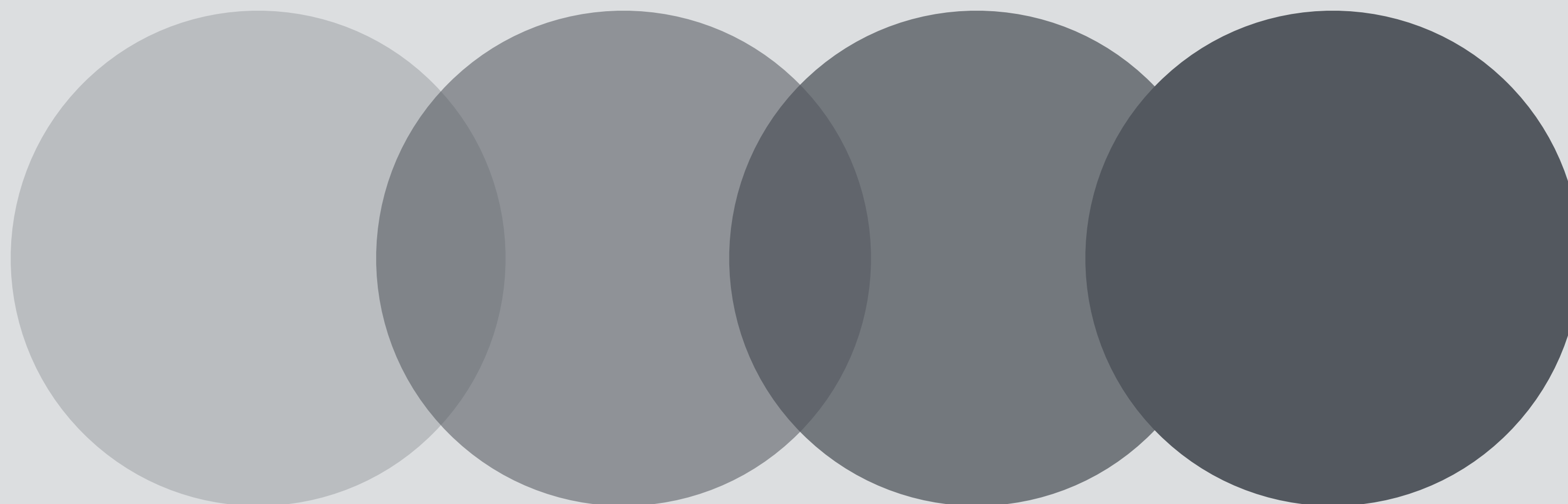
Tweneing.

In-be-tweening.





0.0

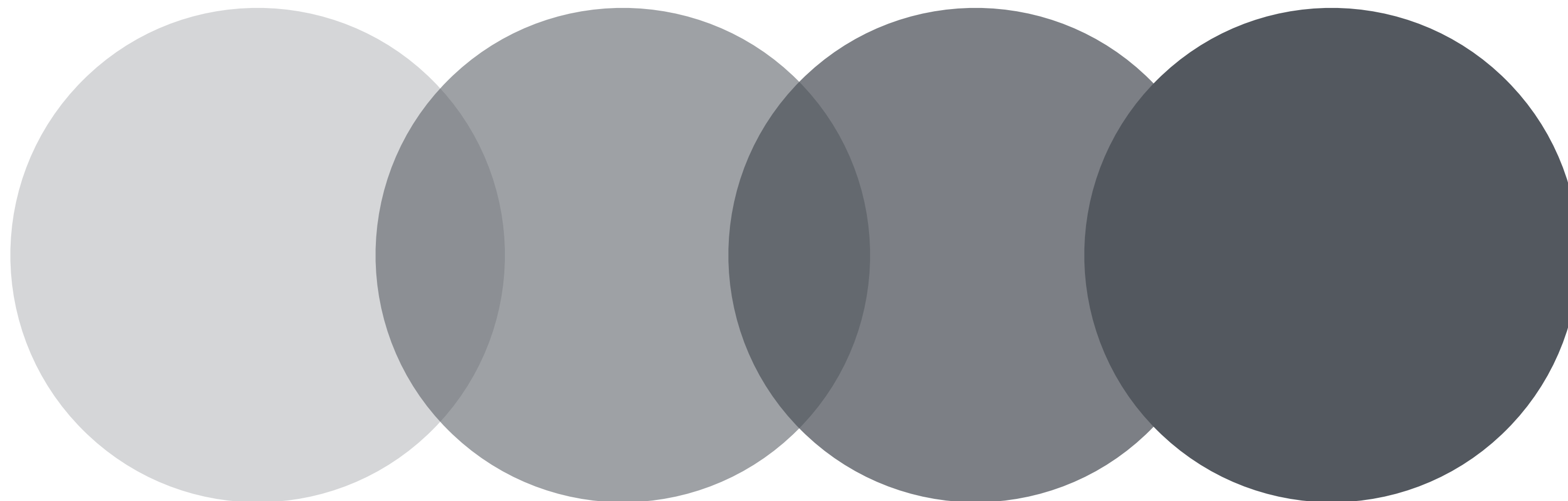


1.0



Linear interpolation.

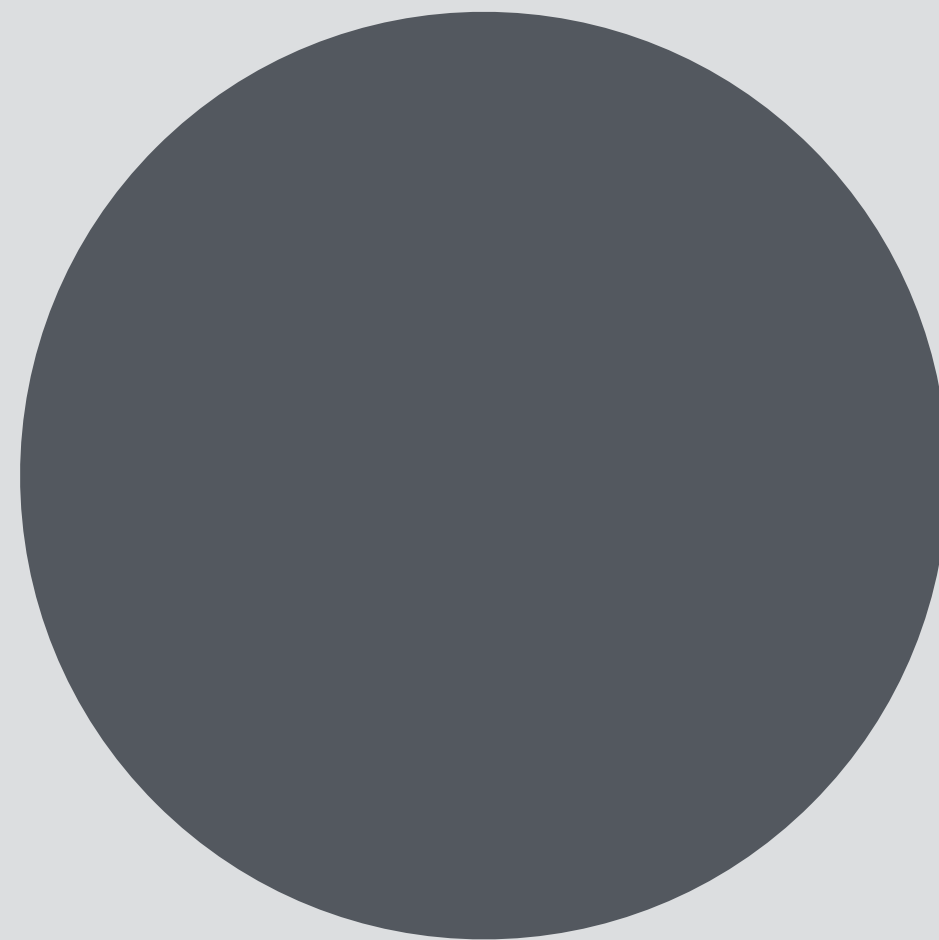
```
float lerp(float from, float to, float t) {  
    return (1.0-t)*from + t*to;  
}
```




```
float lerp(float v0, float v1, float t) {  
    return (1.0-t)*v0 + t*v1;  
}  
  
float animationTime = 0.0f;  
  
void Update(float elapsed) {  
    animationTime = animationTime + elapsed;  
  
    float animationValue = mapValue(animationTime, 5.0f, 10.0f, 0.0f, 1.0f);  
  
    modelMatrix = glm::mat4(1.0f);  
  
    float xPos = lerp(0.0, 1.0, animationValue);  
  
    glm::translate(modelMatrix, glm::vec3(xPos, 0.0, 0.0));  
}
```



0.0



1.0



Easing in.

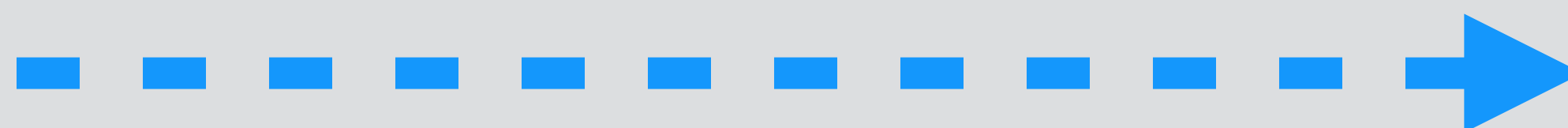
```
float easeIn(float from, float to, float time) {  
    float tVal = time*time*time*time*time;  
    return (1.0f-tVal)*from + tVal*to;  
}
```




0.0



1.0



Easing out.

```
float easeOut(float from, float to, float time) {  
    float oneMinusT = 1.0f-time;  
    float tVal = 1.0f - (oneMinusT * oneMinusT * oneMinusT *  
oneMinusT * oneMinusT);  
    return (1.0f-tVal)*from + tVal*to;  
}
```



0.0



1.0



Easing in and out.

```
float easeInOut(float from, float to, float time) {  
    float tVal;  
    if(time > 0.5) {  
        float oneMinusT = 1.0f-((0.5f-time)*-2.0f);  
        tVal = 1.0f - (oneMinusT * oneMinusT * oneMinusT * oneMinusT *  
oneMinusT) * 0.5f);  
    } else {  
        time *= 2.0;  
        tVal = (time*time*time*time*time)/2.0;  
    }  
    return (1.0f-tVal)*from + tVal*to;  
}
```



0.0



1.0

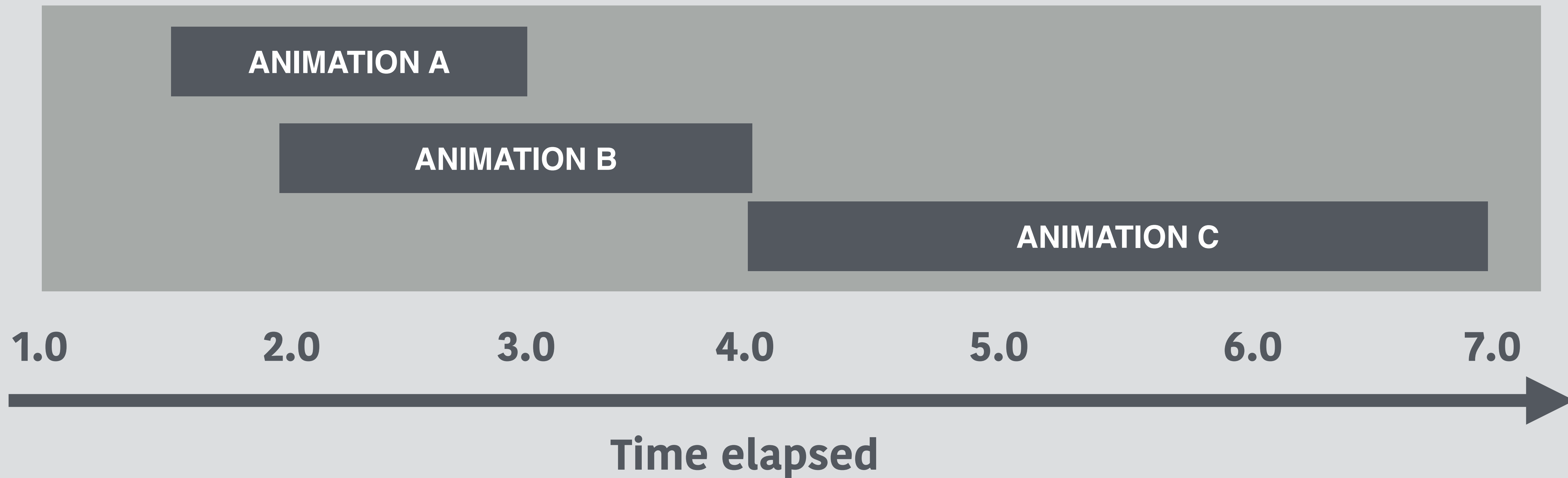


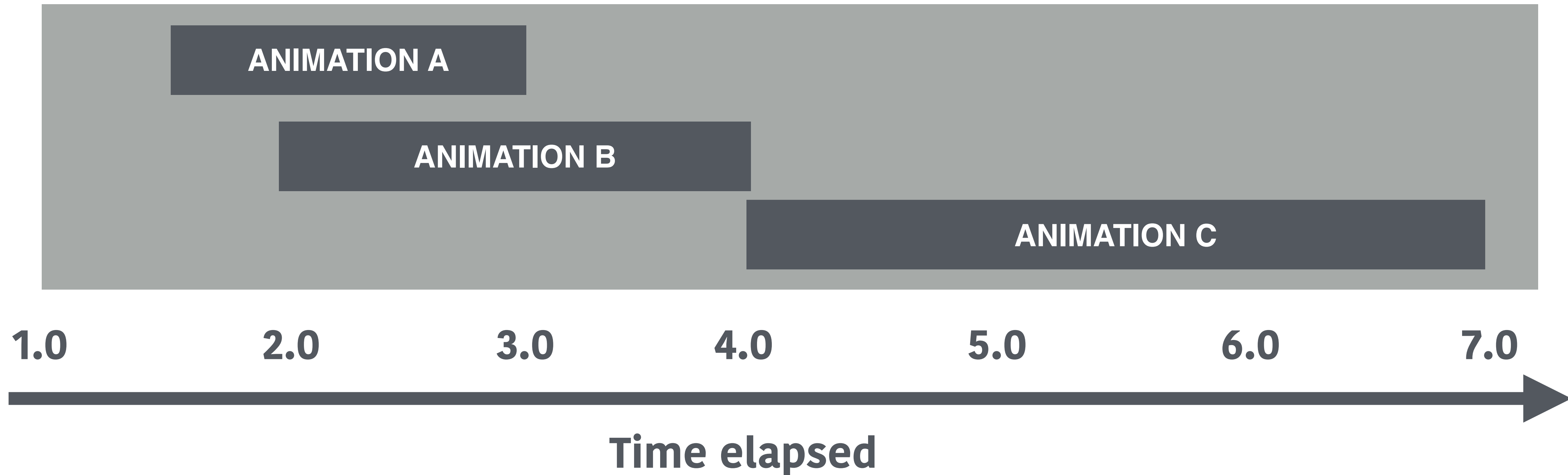
Overshooting our target.



```
float easeOutElastic(float from, float to, float time) {  
    float p = 0.3f;  
    float s = p/4.0f;  
    float diff = (to - from);  
    return from + diff + (diff*pow(2.0f,-10.0f*time) * sin((time-s)*(2*PI)/p));  
}
```

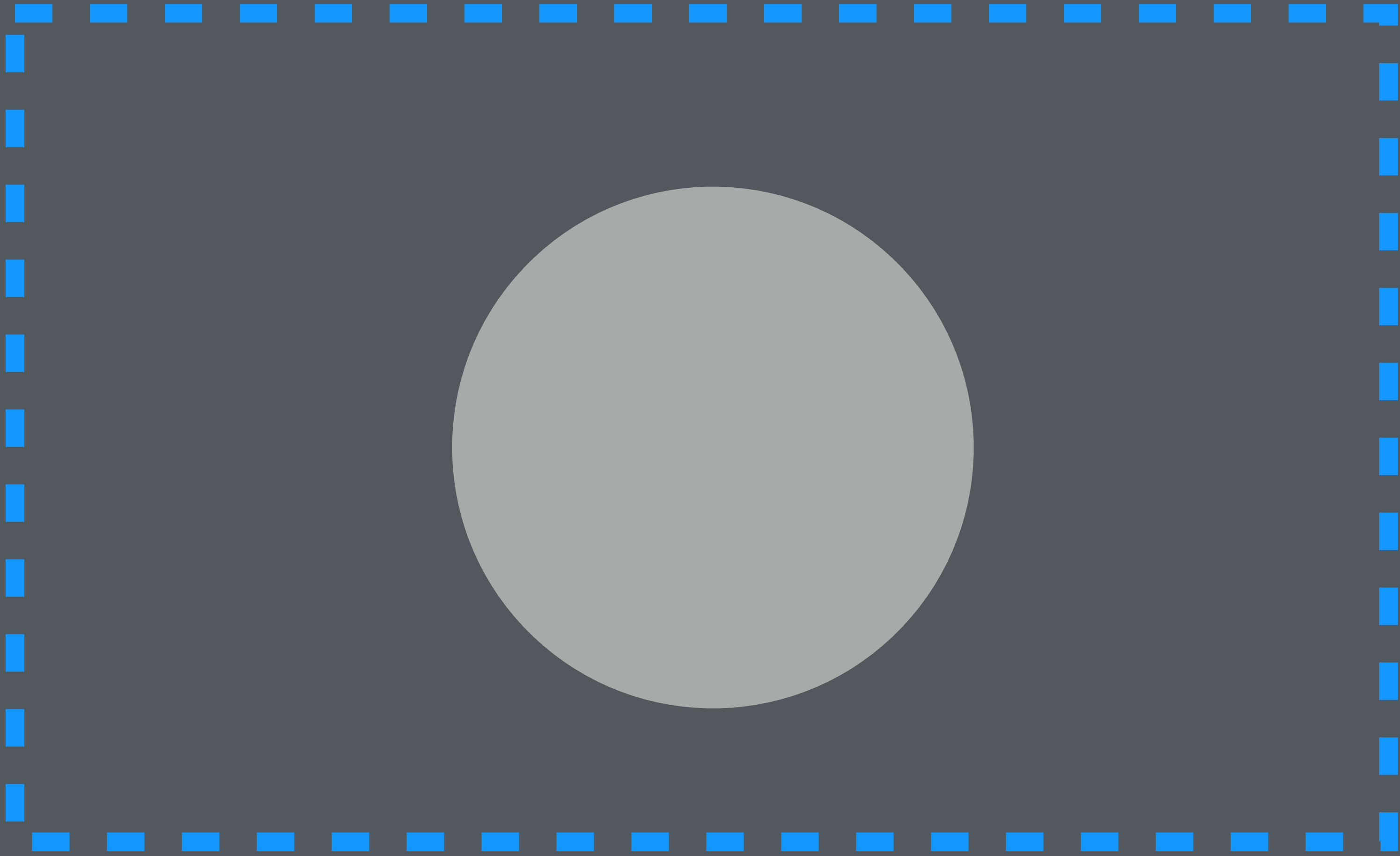
Mapping animations on a timeline.

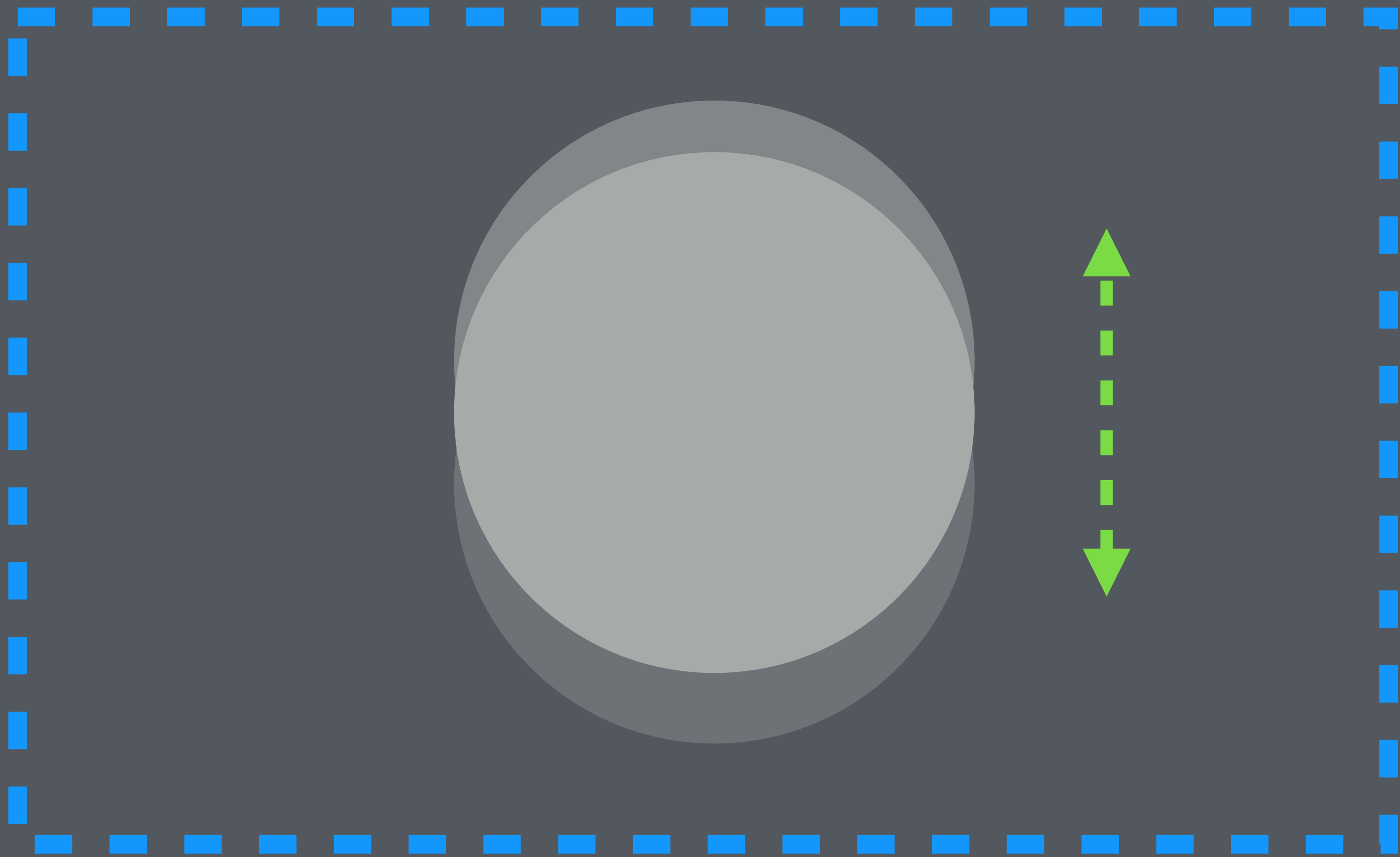


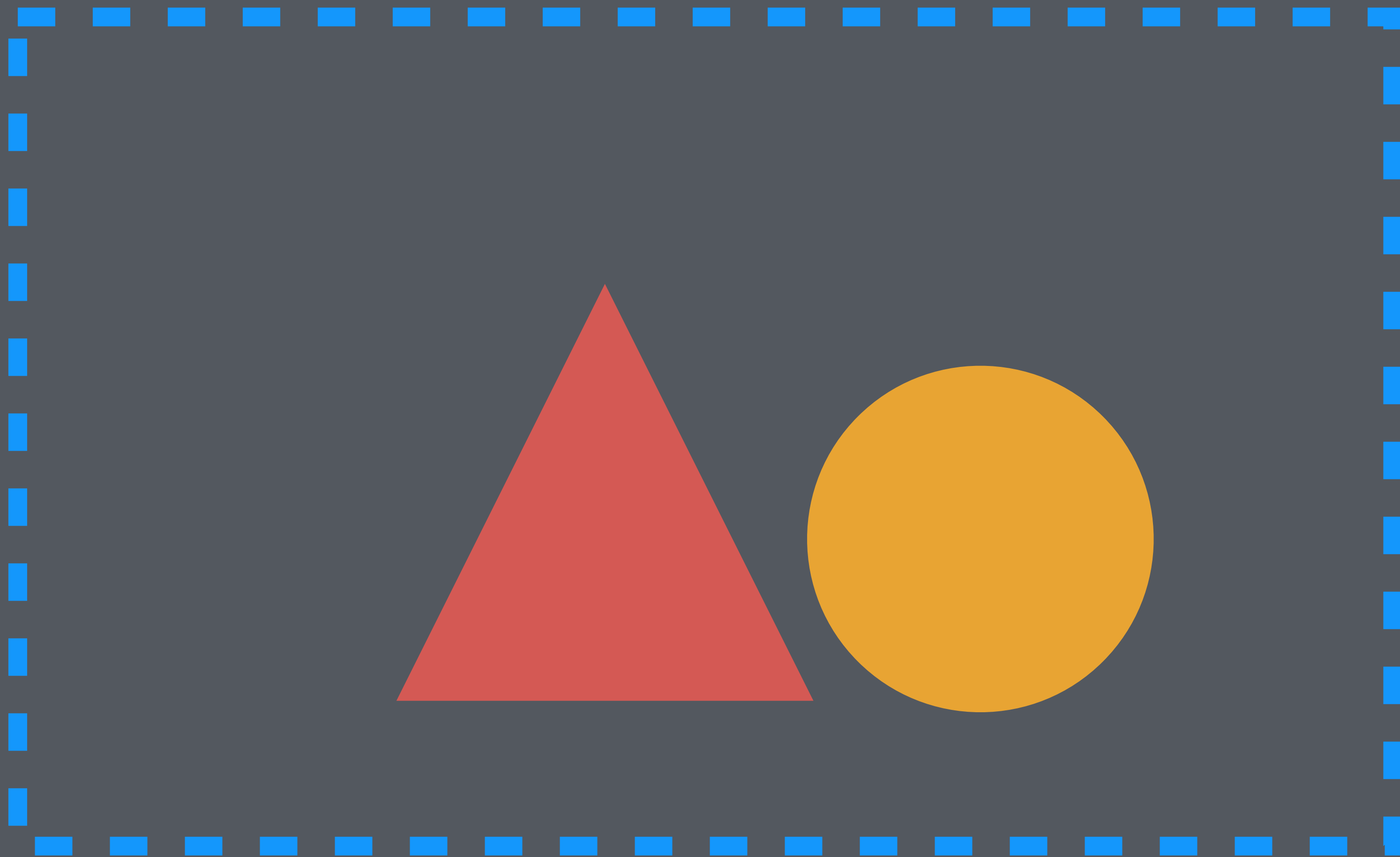


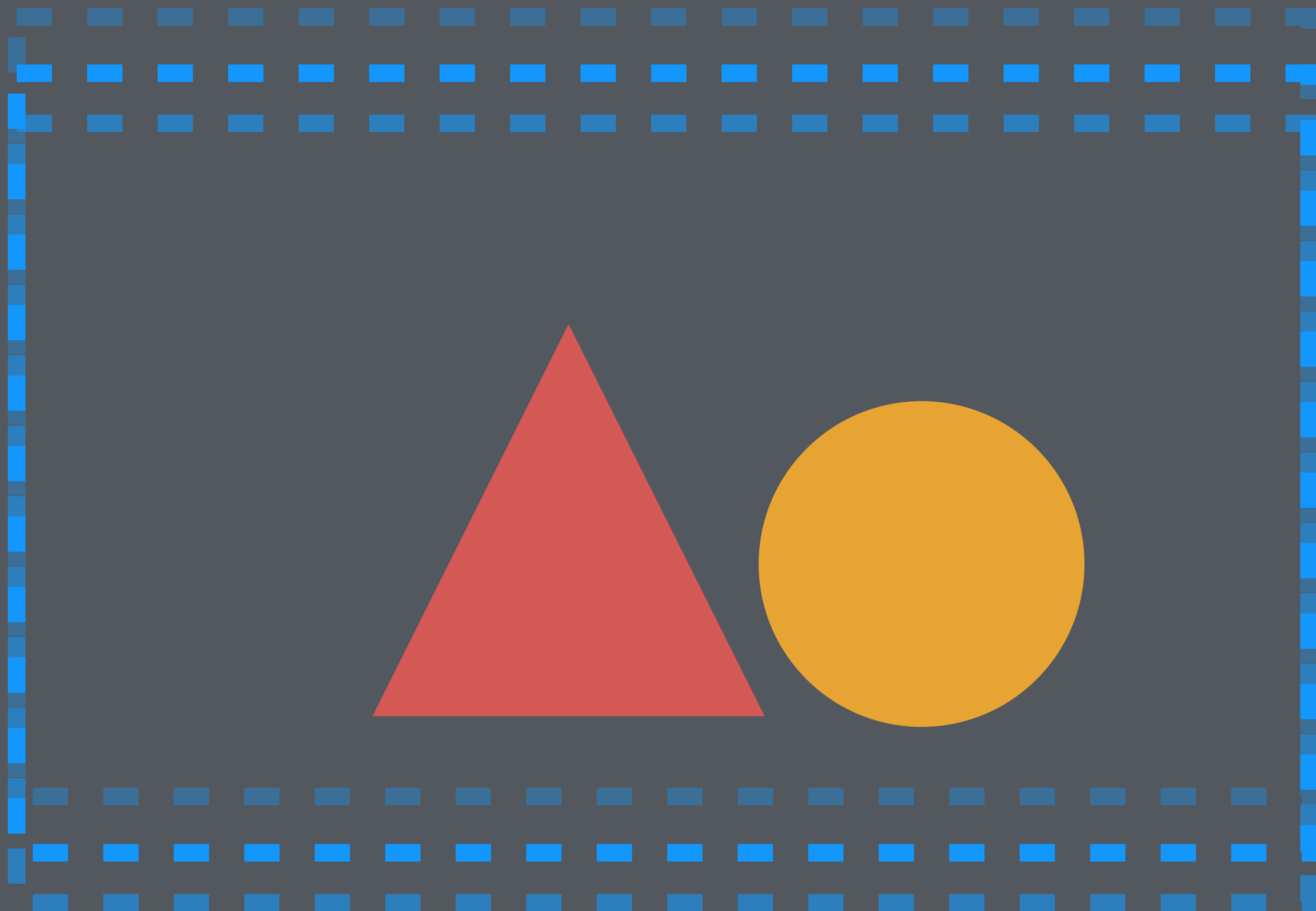
```
float animationAValue = mapValue(timeElapsed, 1.5f, 3.0f, 0.0f, 1.0f);  
float animationBValue = mapValue(timeElapsed, 2.0f, 4.0f, 0.0f, 1.0f);  
float animationCValue = mapValue(timeElapsed, 4.0f, 7.0f, 0.0f, 1.0f);
```

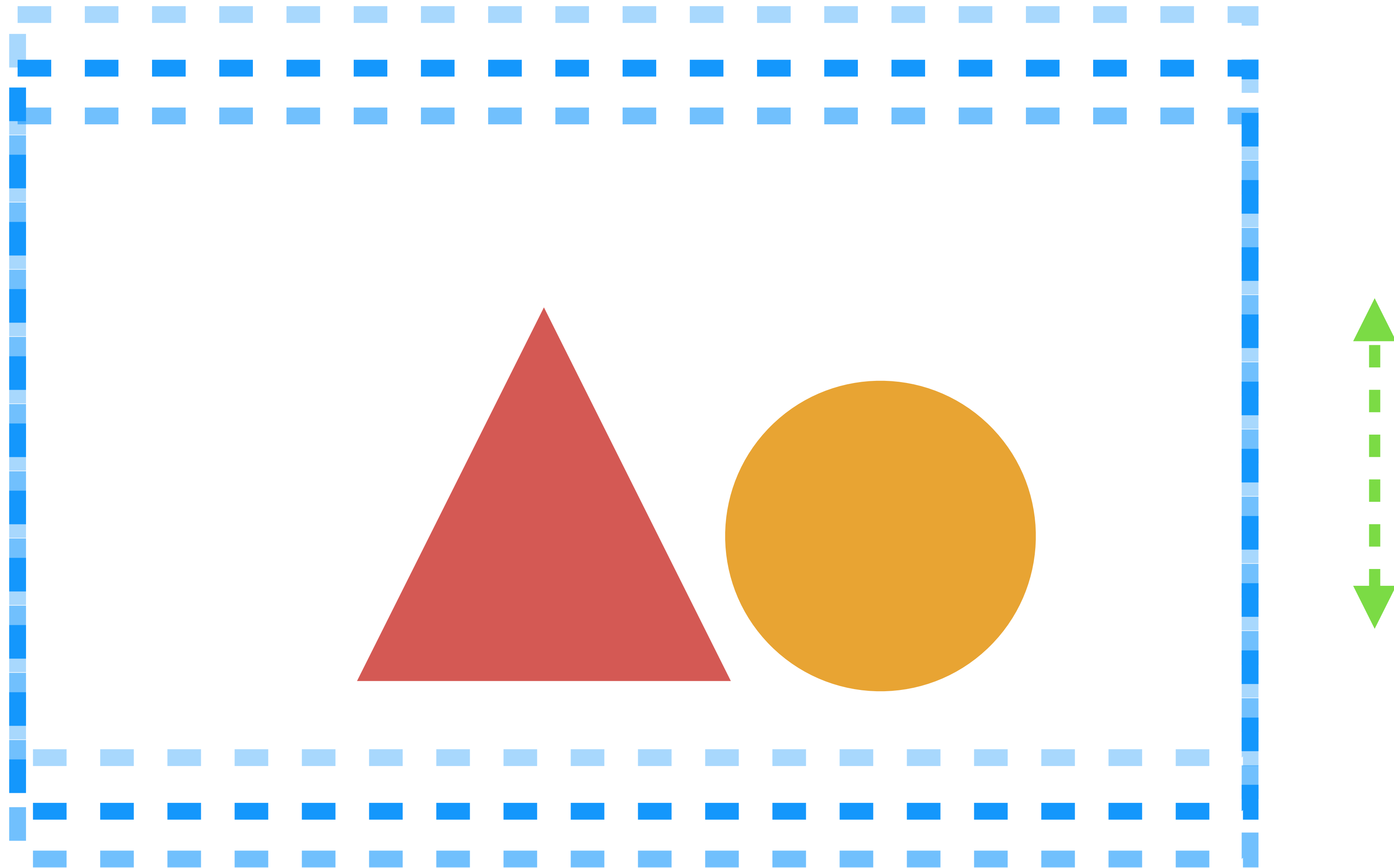
Screen Shake!











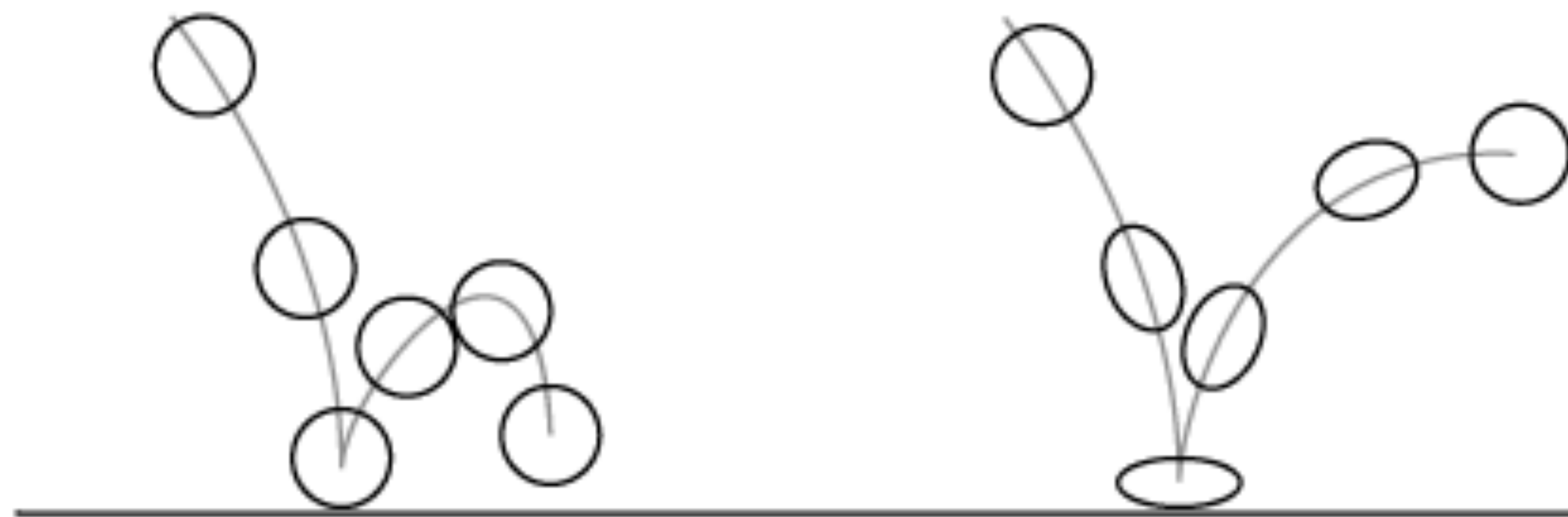
```
screenShakeValue += elapsed;
```

```
viewMatrix = glm::translate(viewMatrix, glm::vec3(0.0f, sin(screenShakeValue *  
screenShakeSpeed)* screenShakeIntensity, 0.0f));
```

You can shake it sideways or both ways!

THERE IS NO WRONG WAY TO SHAKE THE SCREEN.

Squash and stretch.

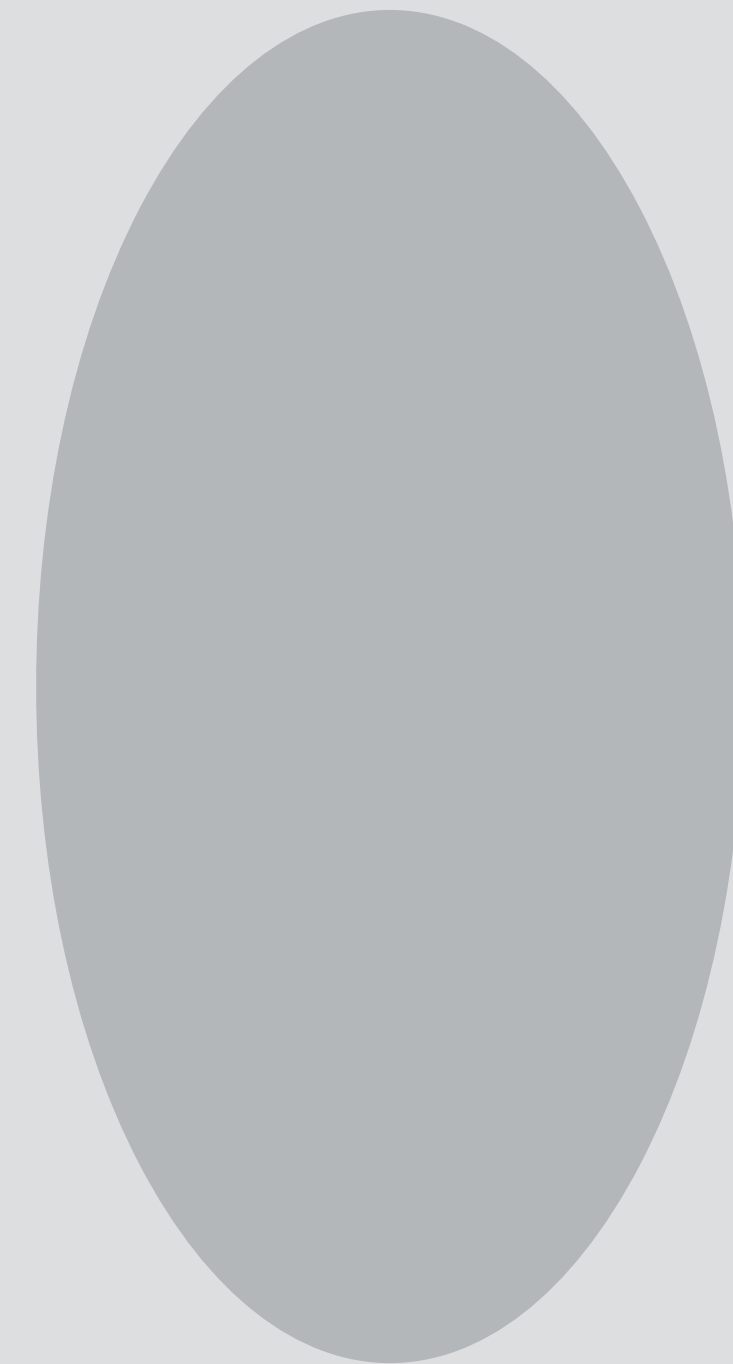


Squashing.



Fast movement on the X axis or
impact on the Y axis..

Stretching.



Fast movement on the Y axis or
impact on the X axis..

Map velocity on an axis to scale on that axis and map to the inverse of that scale on the other axis.

Map **velocity** on an **axis** to **scale on that axis** and
inverse of that scale on the other axis.

```
// map Y velocity 0.0 – 5.0 to 1.0 – 1.6 Y scale and 1.0 – 0.8 X scale
```

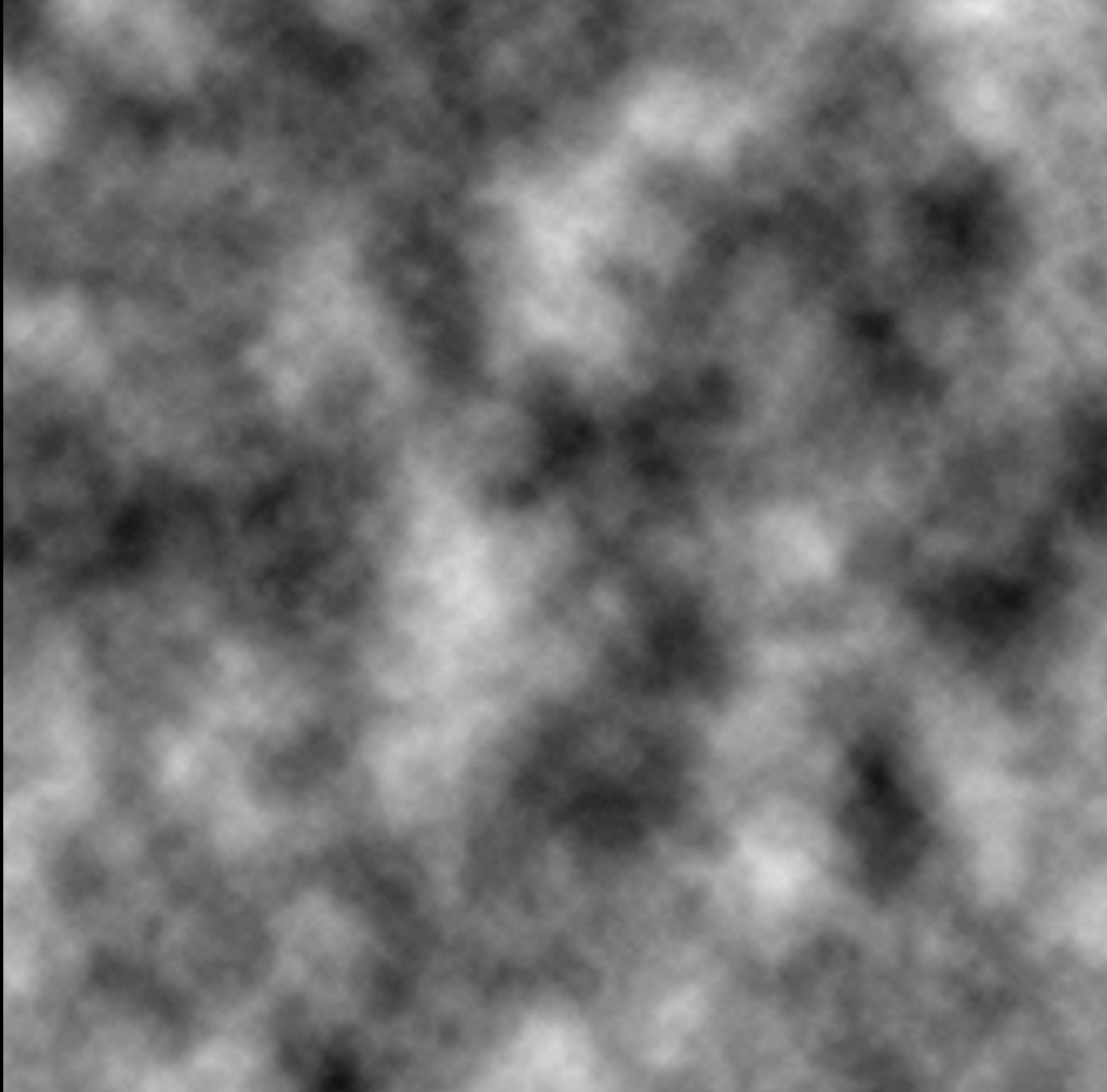
```
scale_y = mapValue(fabs(velocity_y), 0.0, 5.0, 1.0, 1.6);  
scale_x = mapValue(fabs(velocity_y), 5.0, 0.0, 0.8, 1.0);
```

Thomas was Alone.

https://www.youtube.com/watch?v=22WW4_BxpR8#t=467

Perlin noise.

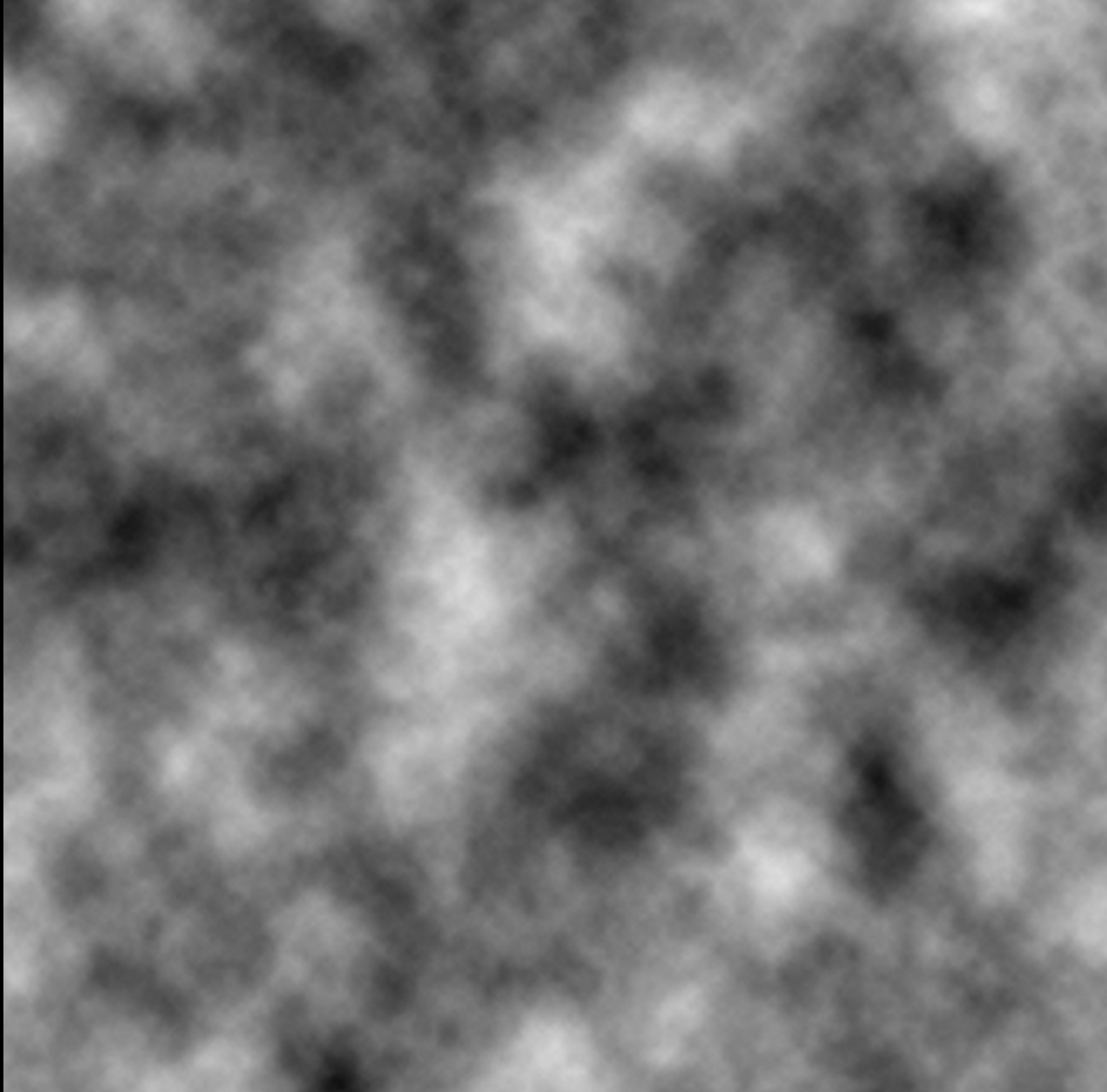
<http://mrl.nyu.edu/~perlin/doc/oscar.html>



Use **PerlinNoise.h** and **PerlinNoise.cpp**
in class repository.

noise2 returns a -1.0 to 1.0 noise value
for a 2D coordinate.

```
float coord[2] = {0.05f, 0.0};  
float val = noise2(coord);
```

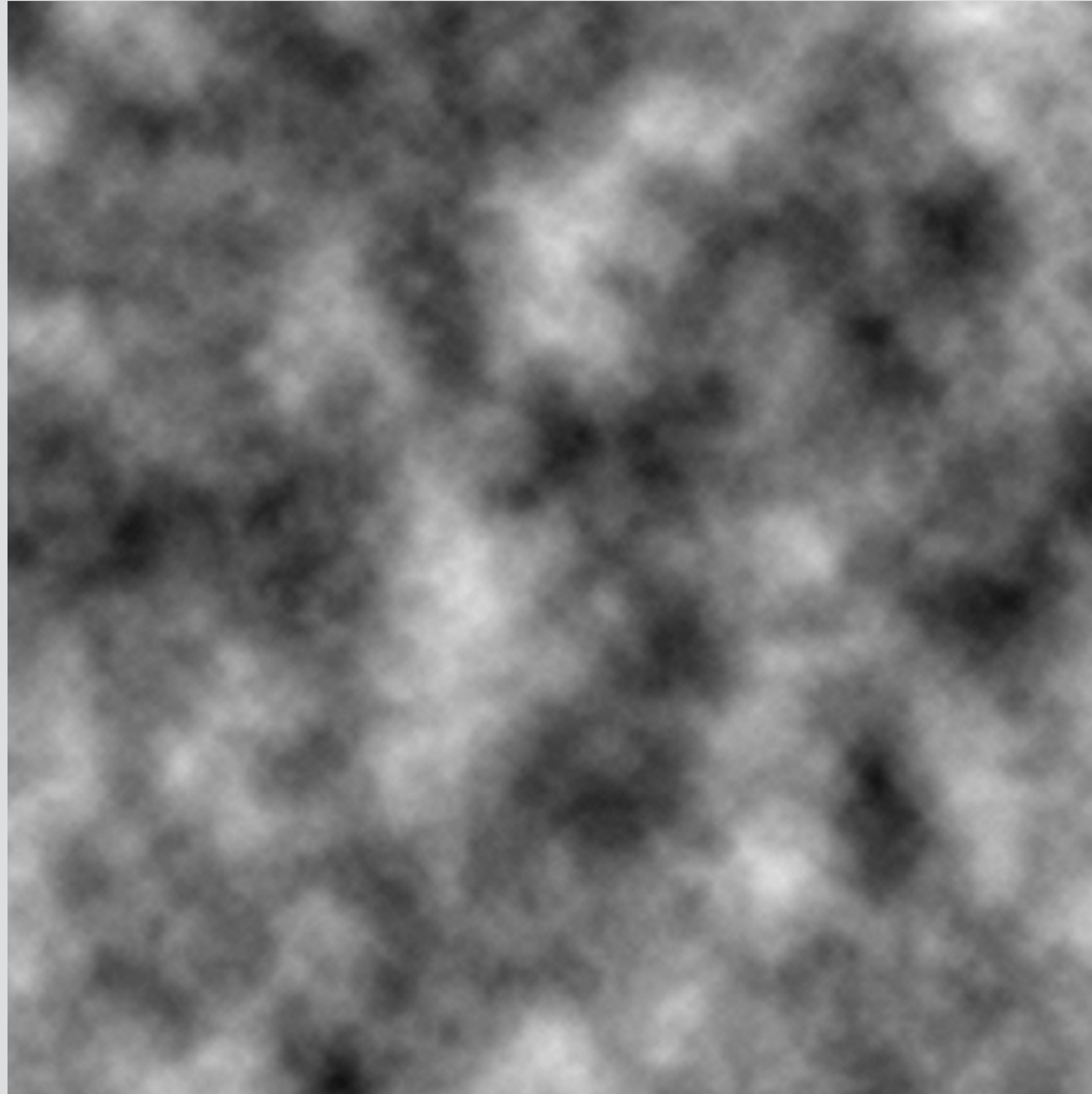
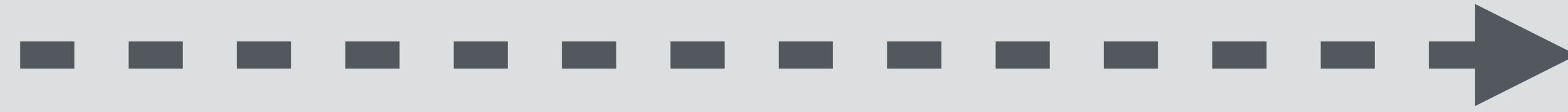
noise1 returns a -1.0 to 1.0 noise value
for a 1D coordinate.

```
float val = noise1(0.5f);
```



Using **perlin noise** for **natural movement**.

Time elapsed



Shaky cam example using 1D noise.

```
perlinValue += elapsed;
```

```
viewMatrix.Translate(noise1(perlinValue), noise1(perlinValue+ 10.0f), 0.0);
```

Shaky cam example using **2D noise**.

```
perlinValue += elapsed;  
  
float coord[2] = {perlinValue, 0.0};  
float val = noise2(coord);  
  
coord[1] = 0.5f;  
float val2 = noise2(coord);  
viewMarix.Translate(val, val2, 0.0);
```

You can use Perlin noise for good looking
screen shake too!

Or to make things **hover** realistically.

Fading in and out.

To fade the screen, you can draw a fullscreen **rectangle** after your **scene** using a **basic untextured shader** and **animate its alpha value** via a **uniform**.

```
uniform float alphaValue;  
  
void main()  
{  
    gl_FragColor = vec4(0.0, 0.0, 0.0, alphaValue);  
}
```

Don't forget to enable **blending** and set an **identity view matrix**!

