



CS74.42A Game Development

Fall 2018 ~ Ethan Wilde

Week 10



SANTA ROSA
JUNIOR COLLEGE

Welcome

- Course Outline: This Week
- Textbook Reading This Week
- Software This Week
- Phaser Concepts
 - P2 Physics: Body Shapes
 - P2 Physics: Body Properties
- Working with P2 Physics

Course Outline

1 World of Game Development	10 Physics, Particles + Effects
2 Play a Game, Learn to Code 1	11 Midterm Review / Draft GDD
3 Play a Game, Learn to Code 2	12 Prefabs + Classes / Build Sys
4 Intro to JavaScript + Systems	13 Final Project: Design Game
5 Browser-Based Games	14 Adv Development Techniques
6 Working with Sprites + Controls	15 Build + Playtest Sprint 1
7 Level Maps, Atlases + Tiles	16 Build + Playtest Sprint 2
8 UI + Sound	17 Build + Playtest Sprint 3
9 Simulating the Physical World	18 Final Exam (online)

Get all of the details in the complete syllabus on Canvas.

**Weeks 11-17 include extra credit coverage of Unity3D.*

Textbook: Phaser Game Engine

Ch. 6



pages
110-122

An Introduction to HTML5 Game Development with Phaser.js

Travis Faas, CRC Press, 2016

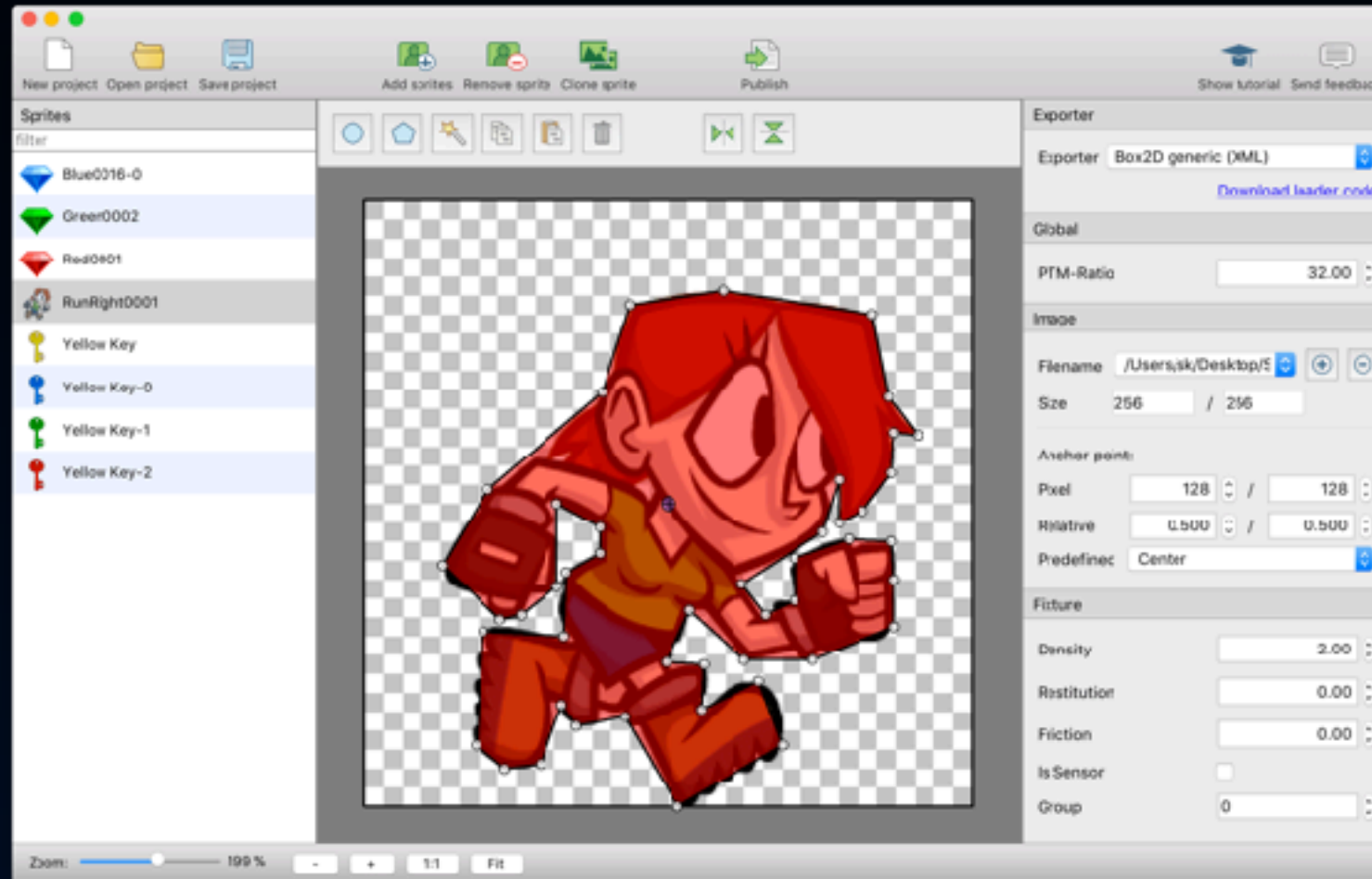
ISBN 978-1-138-92184-9 print

ISBN 978-1-315-31921-6 ebook

Software This Week

Text Editor + File Transfer	Cloud9 (Browser-based, Mac + Win)
Web Browser	Google Chrome (Preferred for Cloud9)
Game Engine	Phaser CE (v2) (Browser-based 2D Game Engine)
Physics Shape Editor	PhysicsEditor (Desktop app for editing P2 sprite body shapes) https://www.codeandweb.com/physicseditor
Free Game Assets	opengameart.org (Free Game Assets)

Software This Week



PhysicsEditor

<https://www.codeandweb.com/physicseditor>

Phaser

2D Game Engine



<https://github.com/photonstorm/phaser-ce>

Phaser Game Concepts

Physics Engines

Arcade

Used for high-speed rectangle collisions.

P2

A full-body physics system, with constraints, springs, polygon support and more.

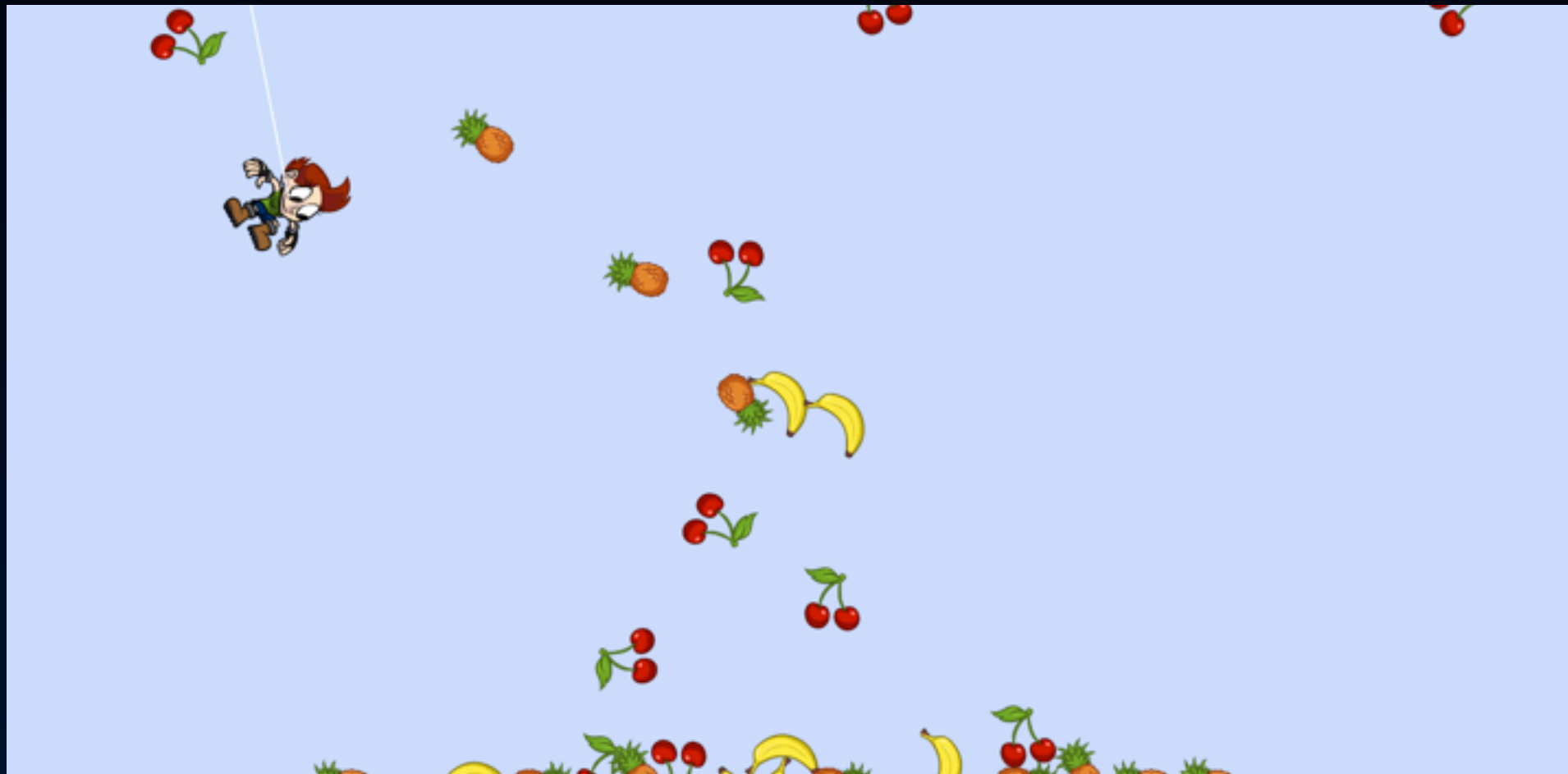
Ninja

Allows for complex tiles and slopes.

*Phaser provides three built-in **Physics Engines** we can use in our games to simulate the real world.*

Phaser Game Concepts

P2 Physics



Phaser Game Concepts

startSystem()

Phaser provides a **startSystem()** method to turn the Physics engine on for a game, used in the create game state.

```
game.physics.startSystem(Phaser.Physics.P2JS);
```



Start P2 physics

*The **startSystem()** method is how we tell Phaser we want one of the three Physics engines to be used.*

Phaser Game Concepts

P2 Physics Engine for individual sprites

Provides an **enable()** and **enableBody()** method to turn the Physics engine on for a sprite.

```
game.physics.p2.enable(mysprite);
```



Enable P2 physics on sprite

*The **enable()** method is how we tell Phaser we want the Physics engine to pay attention to this sprite.*

Phaser Game Concepts

P2 Physics Engine for groups of sprites

For groups, provides an **enable** property and **physicsBodyType** property so that each sprite added to the group gets body enabled.

```
group.enableBody = true;  
group.physicsBodyType = Phaser.Physics.P2JS;
```

Enable P2 physics on all sprites in group



*The **enable** property is how we tell Phaser we want the Physics engine to pay attention to all sprites in group.*

Phaser Game Concepts

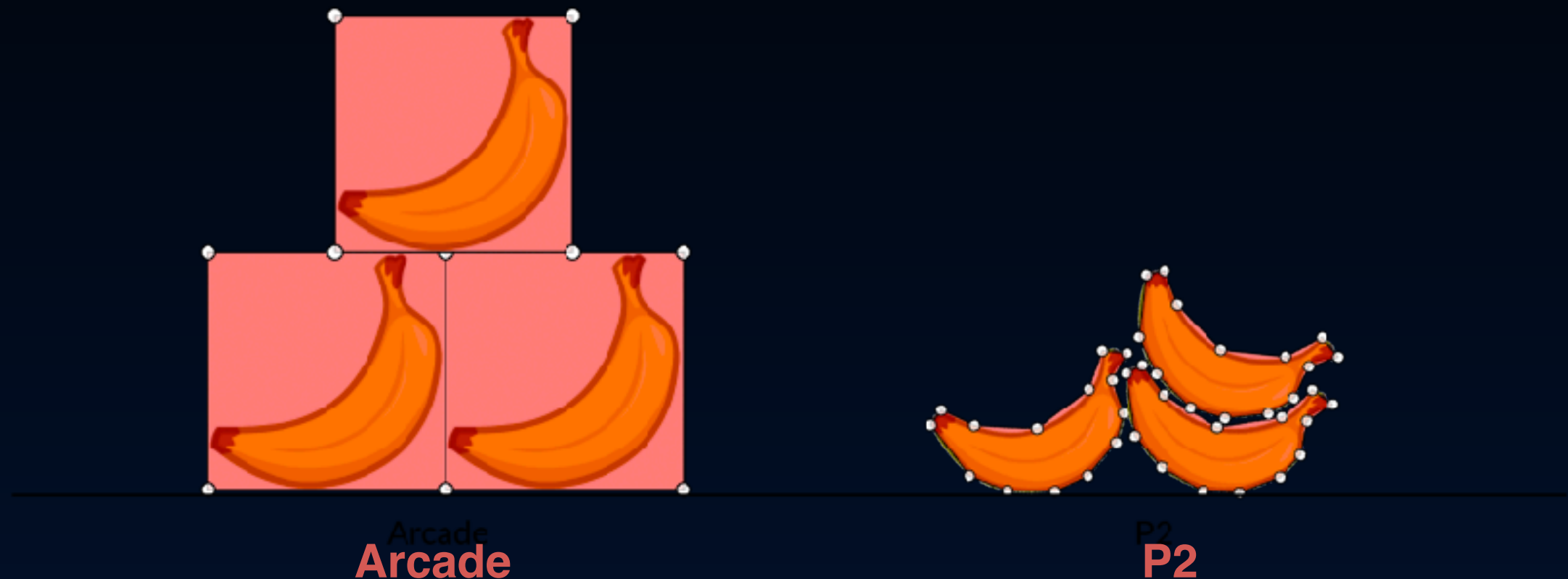
P2 Physics Engine

Provides a **body** property for each sprite.

*The **body** property is how we access all Physics-related aspects of any game object.*

Phaser Game Concepts

P2 Physics Engine



*The P2 engine's **body shape** (or hitbox) can be defined as a multisided polygon or ellipse vs. the rectangular body shape offered by Arcade physics.*

Phaser Game Concepts

Working with P2 Body Shapes

```
var ball = game.add.sprite(  
    spriteX,  
    spriteY,  
    assetkey);  
game.physics.p2.enable(ball);  
ball.body.clearShapes();  
ball.body.setCircle(32);
```

You can apply body shapes to sprite hitbox, including circles, rectangles, lines, polygons as well as other shapes. Note that the anchor point is automatically centered for any sprite that has P2 physics applied.

Phaser Game Concepts

P2 Physics body *restitution* property

```
game.physics.startSystem(Phaser.Physics.P2JS);  
game.physics.p2.restitution = 0.9;
```

In P2 physics, forces can be transmitted between colliding objects.

The percentage of force transmitted is controlled by **restitution** property.

Restitution values range between 1.0 and 0.0.

When two sprites using P2 collide, the force transmitted will be set by the restitution value.

Phaser Game Concepts

P2 Materials and Contact Materials

P2 physics pays attention to the kind of material defined for a sprite.

A **Material** is defined solely by a **name** property.

When sprites collide that have a material assigned to them, P2 uses the concept of a **Contact Material** to define how the physics of the two colliding sprites behave.

[https://photonstorm.github.io/phaser-ce/
Phaser.Physics.P2.Material](https://photonstorm.github.io/phaser-ce/Phaser.Physics.P2.Material)

Phaser Game Concepts

P2 Materials and Contact Materials

```
sprite1 = game.add.sprite(100, 100, 'asset1');  
game.physics.p2.enable(sprite1);  
var material1 = game.physics.p2.createMaterial('Mat1', sprite1.body);  
sprite2 = game.add.sprite(100, 100, 'asset2');  
game.physics.p2.enable(sprite2);  
var material2 = game.physics.p2.createMaterial('Mat2', sprite2.body);  
var contactMaterial =  
    game.physics.p2.createContactMaterial(material1, material2);
```

**[https://photonstorm.github.io/phaser-ce/
Phaser.Physics.P2.Material](https://photonstorm.github.io/phaser-ce/Phaser.Physics.P2.Material)**

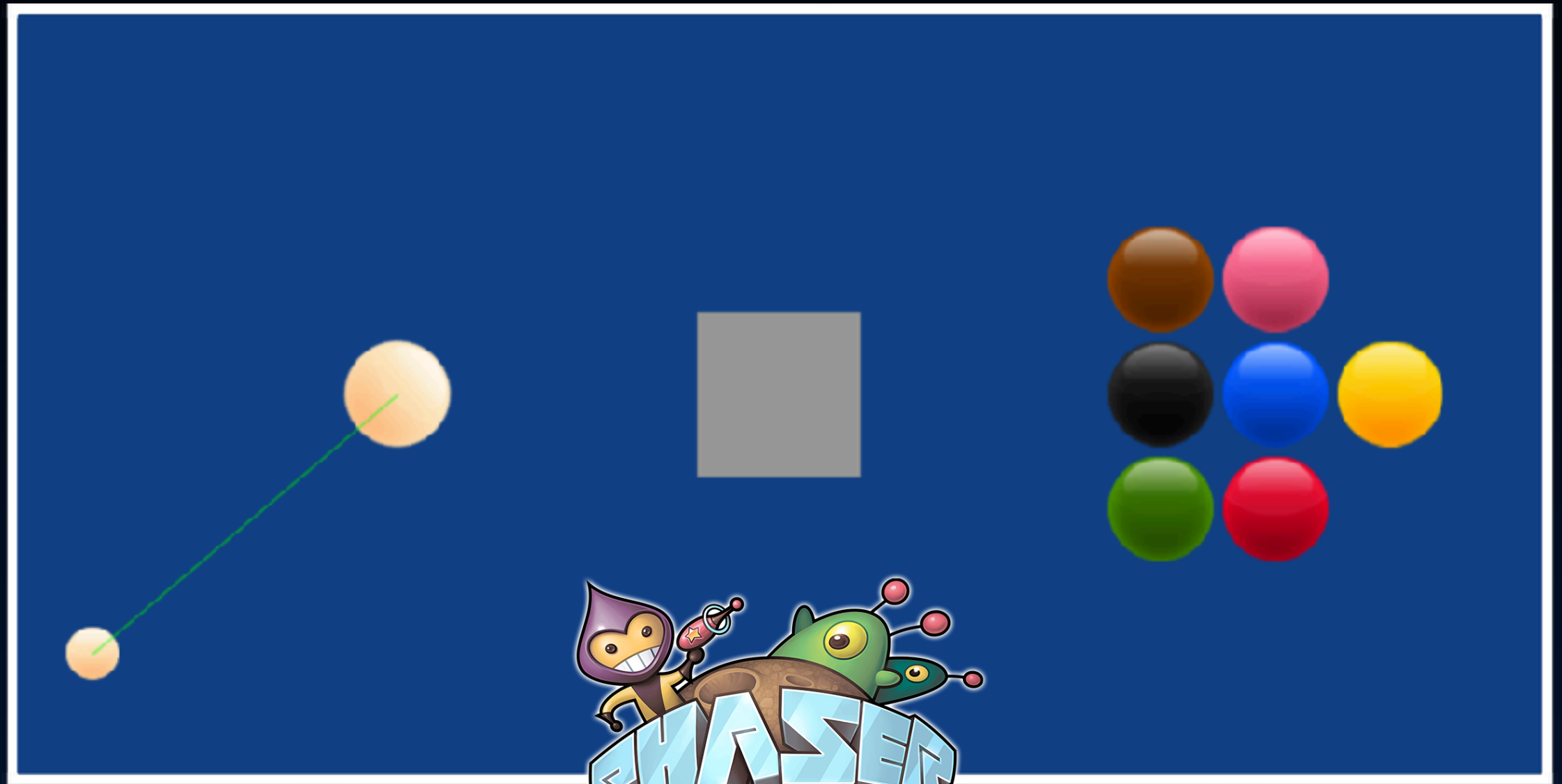
Phaser Game Concepts

Contact Materials Physics Properties

```
contactMaterial.friction = 0.3;  
contactMaterial.restitution = 1.0;  
contactMaterial.stiffness = 1e7;  
contactMaterial.relaxation = 3;  
contactMaterial.frictionStiffness = 1e7;  
contactMaterial.frictionRelaxation = 3;  
contactMaterial.surfaceVelocity = 0;
```

[https://photonstorm.github.io/phaser-ce/
Phaser.Physics.P2.Material](https://photonstorm.github.io/phaser-ce/Phaser.Physics.P2.Material)

Working with P2 Physics



Code Demo

What to Do Next

- **Reading + Watching + Doing**
 - Read *HTML5 Game Development with Phaser*, Ch. 6, pages 110-122
- **Homework**
 - **Assignment 10: P2 Physics**
 - **Discussion 4: Console Games**
 - Homework due to Canvas by **11:59pm Thurs 11/1**
- **Canvas Site**
 - All materials available there
 - **canvas.santarosa.edu/courses/33387**