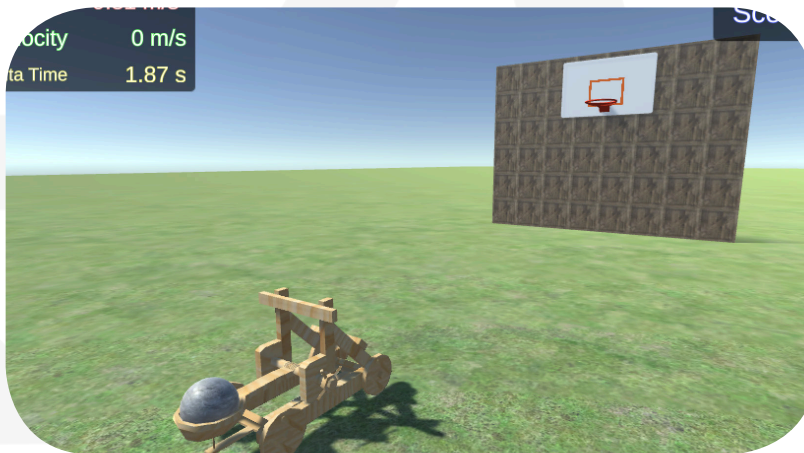


Challenge

| Score a basket, change your settings, and look at code



Challenge Overview:

Use the skills you've learned in the previous two lessons to score on a basketball hoop. After you've scored, you will have to use the hierarchy and inspector windows to manipulate the way your catapult works. When you've found out how to make changes to your catapult, try the Free Play activities again using different catapult settings. When you've finished working with the catapult settings, look at the code that calculates the values you see inside the simulation.

Challenge Outcome:

- Catapult will throw a cannonball through a basketball hoop
- Catapult settings and characteristics will be manipulated
- Editor code will be investigated

Challenge Objectives:

In this challenge, you will reinforce the following skills/concepts:

- Using mass and force sliders to send a cannonball to a specific location
- Use the hierarchy menu to select elements of your catapult
- Adjust the launch settings of your catapult using the *inspector* window in Unity
- Complete the Free Play activities without the use of the force and mass sliders
- Adjust the project settings and investigate the effect of your changes on the Free Play activities
- Look at the code that allows the physics editor to make calculations

Challenge Instructions:

- Click on the *Basketball [Challenge]* button and score a basket using the mass and force sliders
- Open the *hierarchy* and *inspector* windows and dock them so you can see both at the same time as your *EditorPhysicsConfig* window
- When you open the *hierarchy* or *inspector* windows, you should see a tab on the top left. To dock these windows on the right-hand side of your screen, click and drag the tab to move the window
- Go back to the free play activities and complete them using the *hierarchy* and *inspector* windows instead of the *mass* and *force* sliders
- Open the editor scripts and look at the physics editor's code

Challenge

Task

Hint

1 Score a basket

Score a basket using your catapult

Use what you've learned in the previous free play activities

2 The catapult simulation has set variables

Find the catapult settings

You can find the *hierarchy* and *inspector* windows in the Window -> *General* tab at the top of your screen and open the *hierarchy* and *inspector* windows

3 The catapult launches at a 45-degree angle

Adjust your catapult settings

In the *hierarchy* menu, click on *Catapult -> Arm -> Cannonball*

4 The catapult and cannonball have predetermined settings

Look through the project's *hierarchy* to find a way to adjust your cannonball's

In the *hierarchy* menu, click through the catapult options and find ways to change your cannonball settings

5 The simulation has set time and gravity values

Knock down the boxes in *Free Play [Boxes]* without hitting them with the can-

Using the menu bar at the top of the screen, click on *Edit -> Project Settings* and locate the gravity and time values

6 The simulation is built with code

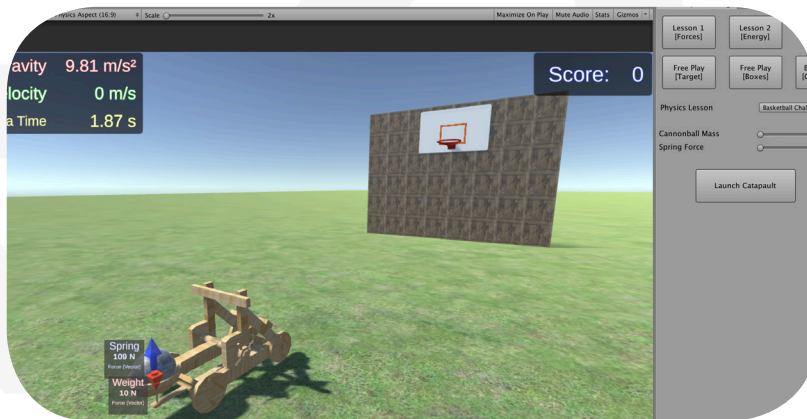
Find a way to open the code for the catapult simulation and look for the physics formulas being used

Open the project window by going to *Window -> General -> Project* and open a script file

Challenge Solution

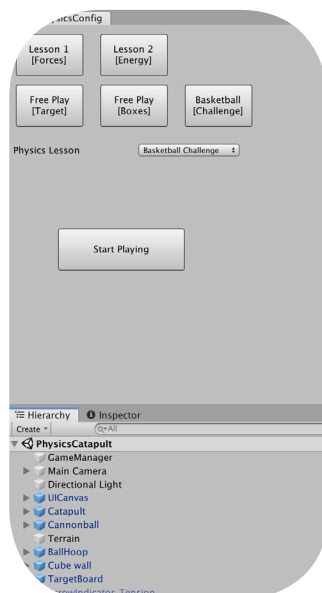
Task 1:

Use the force and mass sliders in the *EditorPhysicsConfig* window to find a set of values that sends the cannonball through the basketball hoop



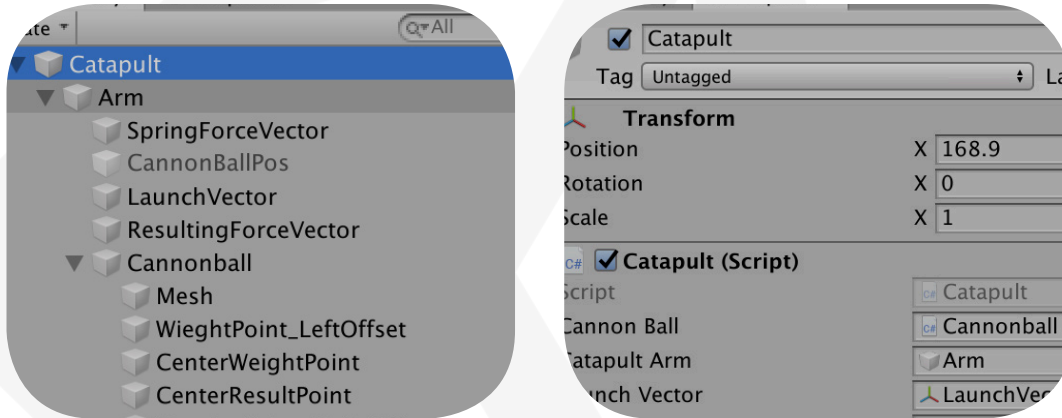
Task 2:

Open the *hierarchy* and *inspector* windows and dock them.
Select Catapult in the *hierarchy menu*.



Task 3:

Select Catapult in the *hierarchy menu* and move to the *inspector*. In the *inspector* window, change the value next to *Launch Angle*



Task 4:

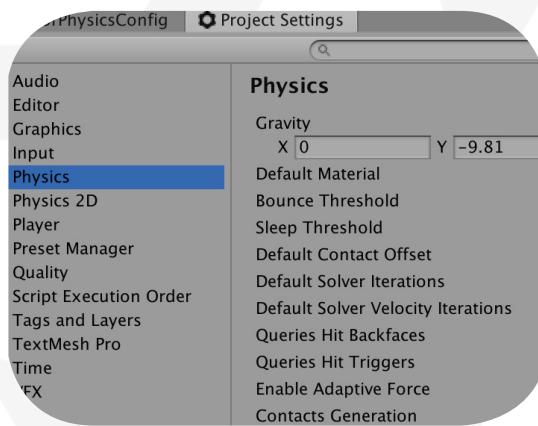
In the *hierarchy menu*, select *Catapult -> Arm -> Cannonball* and move to the *inspector* window. Scroll to the bottom of the *inspector* window so you are looking at the *RigidBody* menu. In the *RigidBody* menu, manipulate the *mass* of the cannonball until you can score a basket



Task 5:

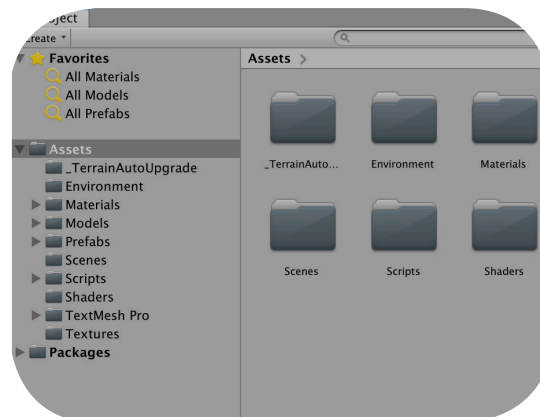
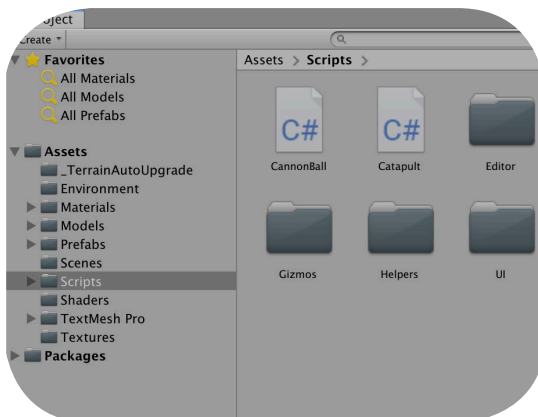
In the menu bar at the top of the screen, click *Edit -> Project Settings*.

In the *Project Settings* window, navigate to the Physics settings and manipulate the X, Y, and Z gravity values until the blocks in the *Free Play [Blocks]* activity fall over without being touched by the cannonball



Task 6:

In the menu bar at the top of the screen, click *Edit -> Project Settings*. In the *Project Settings* window, navigate to the *Physics settings* and manipulate the X, Y, and Z gravity values until the blocks in the *Free Play [Blocks]* activity fall over without being touched by the cannonball



```
        overlined = -1,
        Black = 0,
        White = 1,
        Blue = 2,
        Red = 3,
        Yellow = 4
    }

    public TargetColor highestHitColor = TargetColor.Undefined;

    // Calculate Gravitational Potential Energy (m * g * h) -> mass x gravity x height
    public float Gravitational_Potential_Energy()
    {
        return Mathf.Abs((float)Math.Round(mass * Physics.gravity.y * heightFromGround, 2));
    }

    // Weight of the Cannonball in Newtons (mass x gravity)
    public float WeightForce
    {
        get
        {
            return Mathf.Abs(Mathf.Round(mass * Physics.gravity.y)); // return the rounded Absolute value of the
the Cannon Balls Weight in Force Newtons
        }
    }

    public float Mass
    {
        get
        {
            return mass;
        }
        set
        {
            mass = value;
            rigidBody.mass = mass;
            GameManager.GetInstance().ShowMassChange();
        }
    }
}
```