



Creating “3D-Frogger”

You are a frog. Your task is simple: hop across a busy highway, dodging cars and trucks, until you get to the edge of a river, where you must keep yourself from drowning by crossing safely to your grotto at the top of the screen by leaping across the backs of turtles and logs.

**Created by: Susan Miller, University of Colorado, School of Education.
Adaptations using AgentCubes made by Cathy Brand**

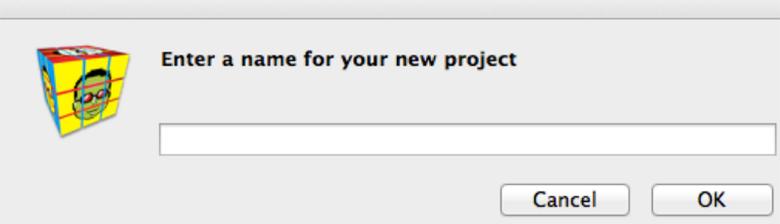
This curriculum has been designed as part of the Scalable Games Design project.
It was created using ideas from and portions of prior work completed by
Fred Gluck, Cathy Brand, Carla Hester-Croff, Jason Reub, Sandy Wilder and Mark Shouldice.

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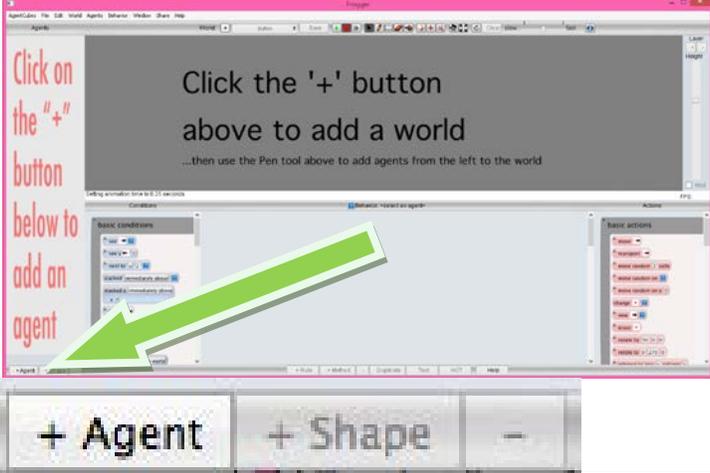
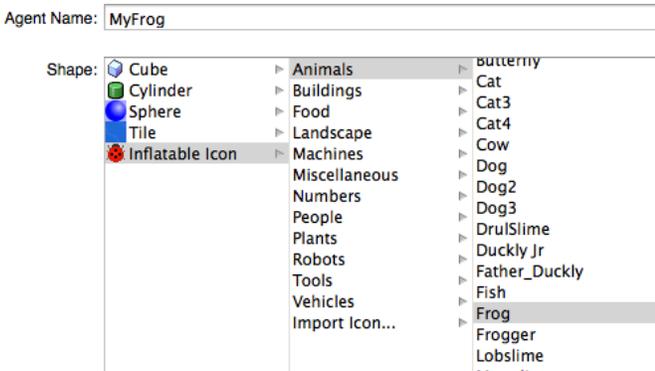
Vocabulary/Definitions

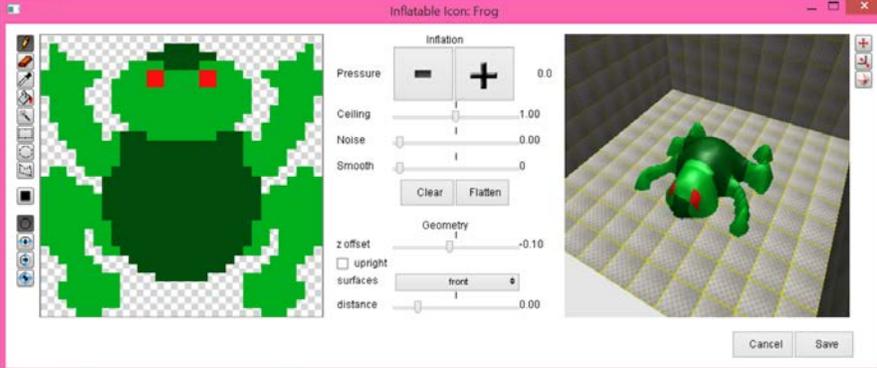
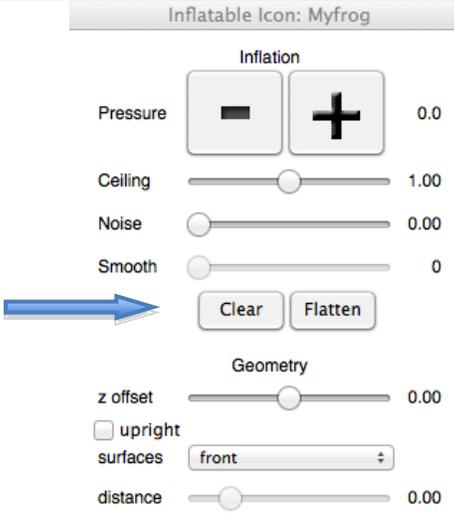
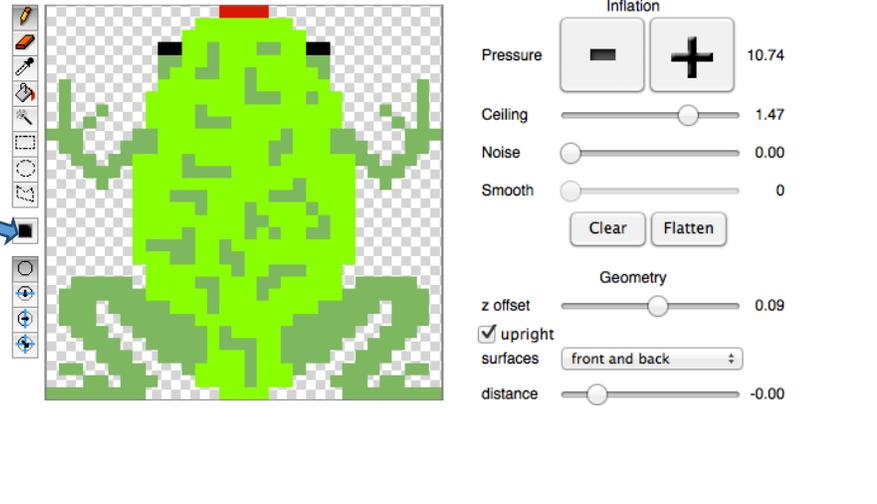
- Absorb.....**This is the opposite pattern of Generate. Instead of an agent generating other agents, an agent absorbs a flow of other agents in the absorption pattern (i.e. a tunnel absorbing cars), making them ‘disappear’
- Action.....**the requested behavior of an agent if the conditions are true
- Agent.....**a character in the game
- Array.....**a rectangular arrangement of agents
- Collision.....**the situation when two agents physically collide.
- Condition.....**the situation that must be ‘true’ for an action to occur
- Shape.....**a second image of the original agent. For example, the frog can have two shapes: what it usually looks like, and what it looks like after it has been squished
- Generate.....**the ability to create a new agent. To satisfy this pattern, an agent is required to generate a flow of other agents; for example, cars appearing from a tunnel
- Grotto.....**the land where the goal is located, which must be reached to win the game
- Transport.....**represents the situation when one agent carries another agent; the ability of an agent to be on top of, and move with, another agent

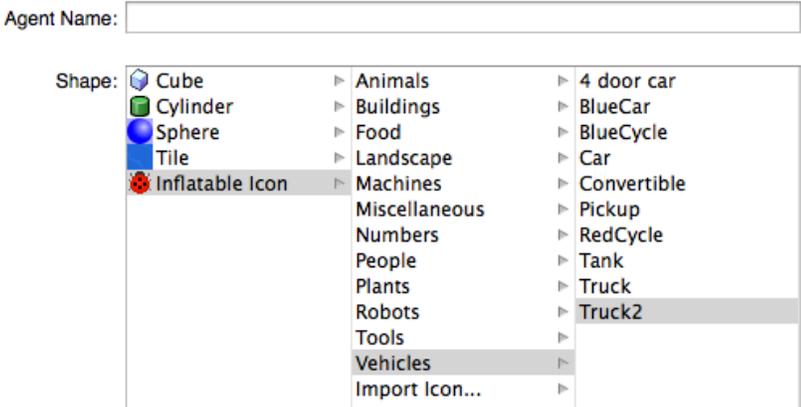
Student Handout 1A: Create a game

<p>Step 1</p>	<p>Create Game</p> <p>Click on the New Project button at the bottom of the Project Chooser Window</p> <p>Or go to the AgentCubes File menu and click on New Project</p>	
<p>Step 2</p>	<p>Name the Game</p> <p>Name it Frogger and click OK</p>	

Student Handout 1B: Create agents

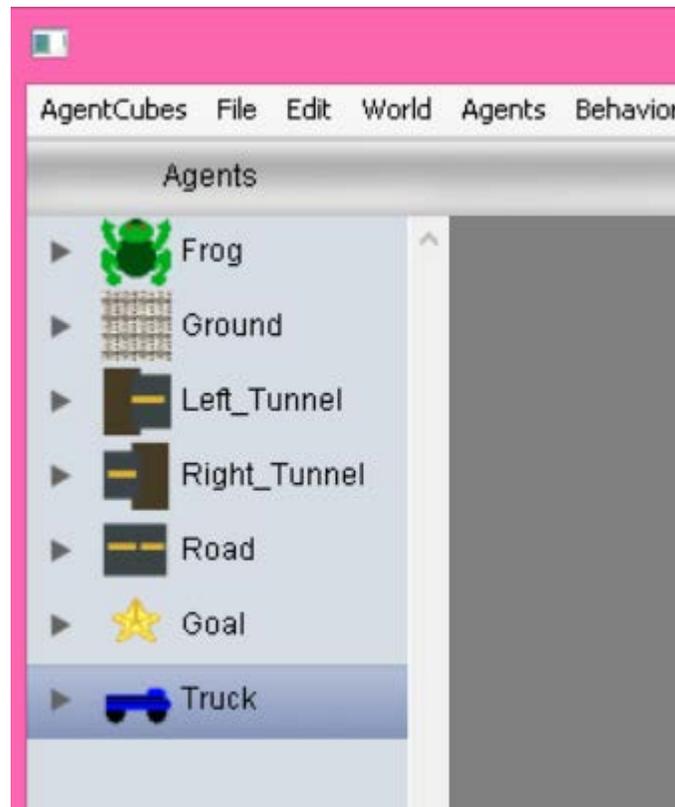
<p>Step 3</p>	<p>Create Agent</p> <p>Click on +Agent button in the lower left corner of the AC window</p>	
<p>Step 4</p>	<p>Choose Inflatable Icon from the Shape list on the left, then Animals from the center list and finally Frog from the list on the right.</p> <p>Make sure to give your agent a name like MyFrog</p> <p>Click OK to save your agent. It will appear on the left of your screen.</p>	

	<p>You can double-click on the agent to edit how it looks. This screen will appear.</p>	
<p>Step 5</p>	<p>Use the clear button to erase the frog.</p> <p>Or use the pencil tool to add details to the frog.</p>	
<p>Step 6</p>	<p>Click on Pencil tool for drawing.</p> <p>Click on color well to choose a color.</p> <p>Use the + button to inflate your drawing and make it 3D.</p> <p>Click Save</p>	

<p>Step 7</p>	<p>Create Truck, Left and Right Tunnels, street, ground, and a Grotto or Goal.</p> <p>Use the Inflatable Icon Vehicle and Landscape categories to select shapes</p>	
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You are ready to move on when you have the following agents created:

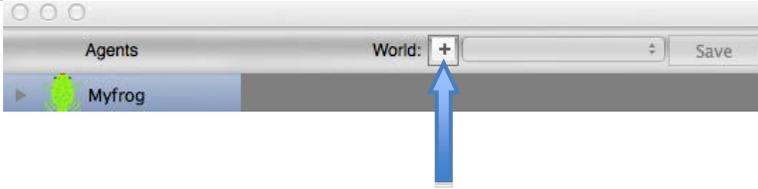
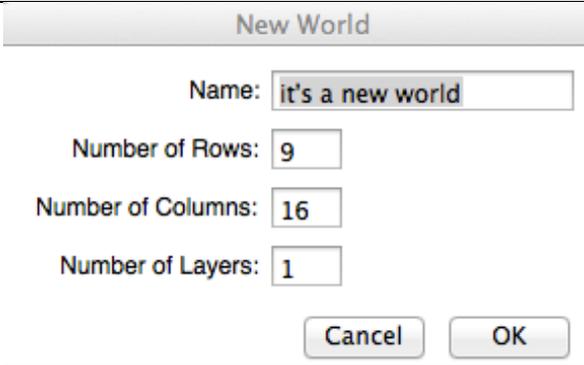
- Frog**
- Truck**
- Left tunnel**
- Right tunnel**
- Grotto/Goal**
- Street**
- Ground**



Student Handout 2: Part 2 – Create a World

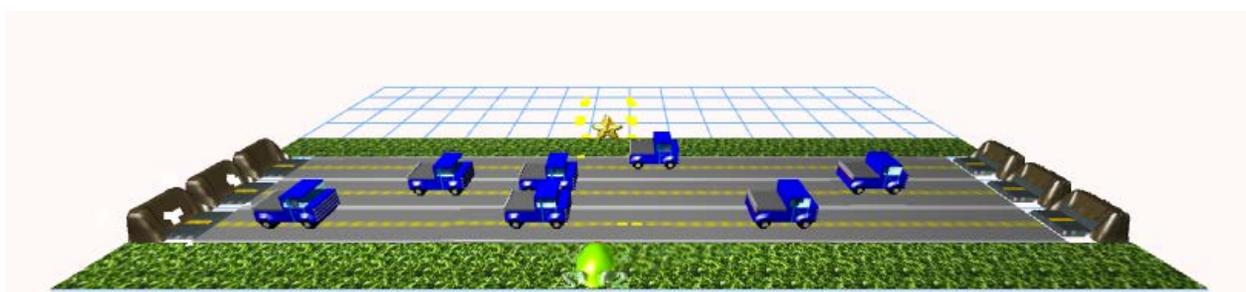
The world is the game space –

it is where the agents will perform their actions.

<p>Step 8</p>	<p>Create a world</p> <p>Click the + next to World in the top bar of the AgentCubes window</p>	
<p>Step 9</p>	<p>Name Your New World “Level 1”</p> <p>Do not change the numbers for your first world</p> <p>Click OK</p>	
<p>Step 10</p>	<p>Try out the World tools</p> <p>Select tool for moving agents</p> <p>Pencil tool for drawing agents on World</p> <p>Tile tool for drawing groups of agents</p> <p>Eraser tool</p> <p>Trigger tool that calls a user-defined method</p>	

Step 11	Use these tools to place Frogger agents on the World and make the street scene.	<p>It is important that you do not draw over the Frog with the Street agent.</p> <p>This means if you place a Frog on the worksheet, do not draw the Street over it without erasing the Frog first.</p> 
Step 12	<p>Try out the 3D movement tools</p> <p>Rotate</p> <p>Pan</p> <p>Zoom</p> <p>Move your World so that you can see the 3D shapes.</p>	   
Step 13	Use the save button next to your World name to save your World when you like the way it looks!	 <p>Only save your World when it is set up to start a game.</p> <p>Then you can use the Reset button  to return to the saved starting point for your game.</p>

Your World might look like this:



Student Handout 3: Understanding Conditions and Actions

Explain each condition or action below

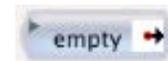
Conditions:



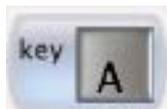
A _____



B _____



C _____



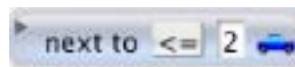
D _____



E _____

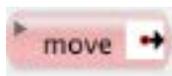


F _____



G _____

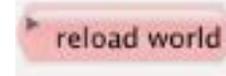
Actions:



A _____



B _____



C _____



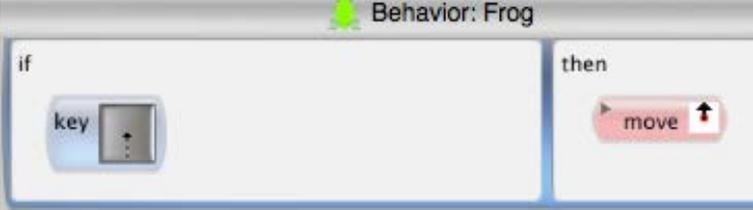
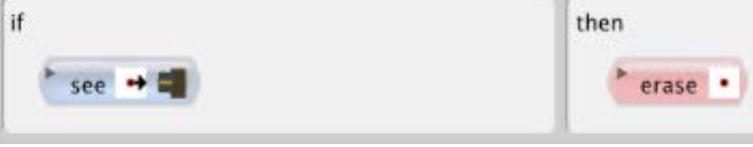
D _____

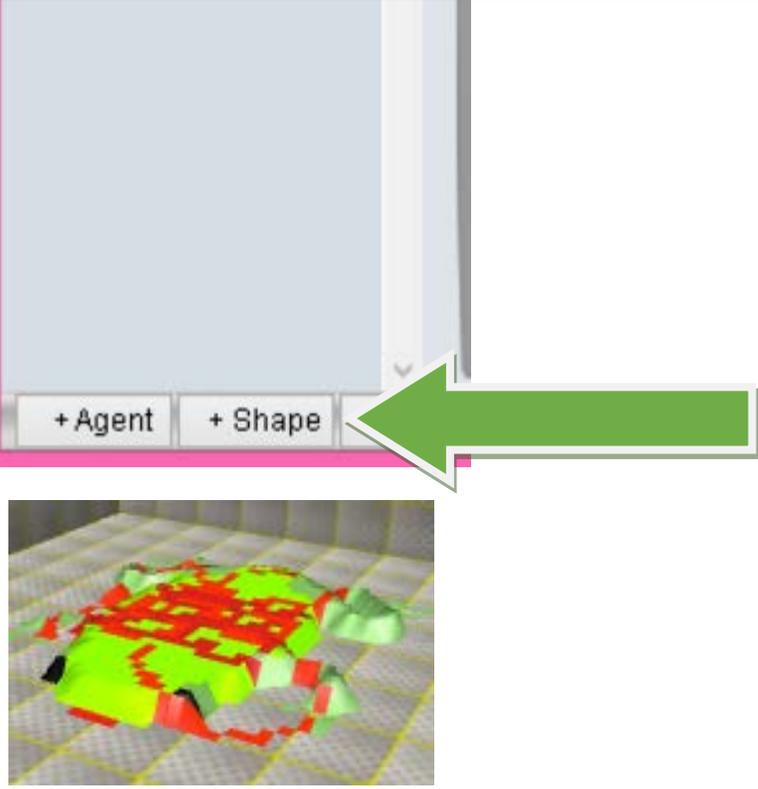
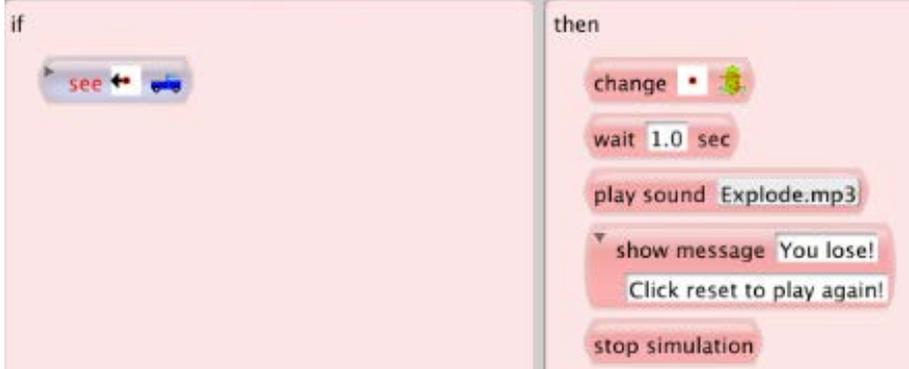


E _____

Student Handout 4: Creating Agent Behaviors

Click on the agent to add behaviors to that agent

Step 1	Open the Frog's behavior by clicking on the Frog in the list of agents or in the World.
Step 2:	<p>Cursor Control for Frog</p>  <p>This rule makes the Frog move UP when you type the UP arrow. Use the +Rule button at the bottom of the window to add 3 more rules so that the Frog moves in all 4 directions.</p>
Step 3:	<p>Click on the truck agent.</p> <p>Add a move right rule.</p> <p>Use the <u>once every</u> condition to slow the car down.</p> 
Step 4:	<p>Add a rule to the <u>left tunnel</u> behavior to generate cars.</p> <p>Use the <u>once every</u> and <u>% chance</u> conditions to control how often they appear.</p>  <p>Change the values to make the game harder or easier!</p>
Step 5:	<p>Add a rule to the <u>truck</u> so it erases itself when it sees a right tunnel.</p> <p>The tunnel <u>absorbs</u> a car.</p>  <p>IF I see the tunnel to my right.....THEN...erase me</p>

<p>Step 6:</p>	<p>Create a 'squished frog'</p> <p>Click on the Frog Agent. Then click on the +Shape button below the list of Agents.</p> <p>Give the new shape a name. <u>Double-click</u> on the image next to the name.</p> <p>Use the drawing tools to make your Frog look squashed.</p>	
<p>Step 7:</p>	<p>Play a sound and erase the <u>frog</u> when it collides with the truck.</p>	 <p>Note: the SHOW MESSAGE command has two lines of text – use the small arrow to see both lines!</p>

You are ready to move on once the following items work correctly...

- Does the frog move all directions?
- Do the trucks get generated (created) and absorbed (erased)?
- Does the Frog-Truck collision work correctly?

Student Handout 5: The River

You are tasked with creating the river scene of Frogger. Here are the rules:

Agent: River

- The Frog must drown if it falls in the river.

Agent: Log

- Float On Water. We'll have the logs float from left to right
- Logs must TRANSPORT frogs
- Logs Must Disappear when it reaches the end of the river

Agent: Log_Maker (Island)

- GENERATES Logs if there is water to the right (Logs Float from Left to Right)

Agent: Turtle

- Float On Water. Unlike the Logs, we'll have the Turtles float from right to left.
- Frog Must Be Able to hop on top of the Turtle
- Turtles Must Disappear when it reaches the end of the river

Agent: Turtle_Maker (Lily pad)

- Creates Turtles if there is water to the left (because we want our Turtles to go from right to left).

Agent: Frog: We must update the Frog Agent

- Jump on top of and move with the Logs and the Turtles
- The player loses if the frog falls in the water (the Frog Drowns)

Agent: Grotto/Goal

- If the Frog gets to the grotto, the player wins!

Step 1: Create missing agents (river, log, island, turtle, lily pad, grotto/goal) and add them to the worksheet.

Step 2: Program the island to generate logs. Program logs to disappear when they reach the end of the water.

Step 3: Program the log to float down the river, from left to right. See the log rules below. Notice that we used TRANSPORT, not MOVE. This is so that the log can carry a frog!



Step 4: Test the program. You are ready to move on when you can answer YES to these questions:

- Do Logs get created?
- Do the Logs Move across the river and disappear when they reach the Log Maker Agent?
- Does the Frog Get Transported when it jumps on the log?

Step 5: Program the lily pad to generate turtles. Program turtles to disappear when they reach the end of the water.

Make sure the turtles float from RIGHT to LEFT.

Step 6: Test your program. You are ready to move on when you can answer YES to these questions:

- Do Turtles get created?
- Do the Turtles Move and disappear when they reach the Turtle Maker Agent?
- Now, control the frog and try to jump on a turtle. What happens? Does the Frog Move with the Turtle?

Step 7: Program the game so that you win when the frog reaches the goal. Give the frog this behavior:



Step 8: Test your program. You are ready to move on when you can answer YES to these questions:

- Does a message get played or appear when the frog reaches the Grotto?
- Does everything else work like you expect it to?

End of Unit Review Sheet – Frogger

The main computational thinking patterns we covered are:

- 1) **Cursor Control**: intentionally moving an agent.
 - a. Using keyboard keys to move an agent.
 - b. Example is moving the frog.
 - 2) **Generate**: create new agents on the screen.
 - a. Use the “New” action in AgentCubes.
 - b. Examples are generating new trucks, turtles, logs in Frogger.
 - 3) **Absorb**: deleting agents on the screen.
 - a. Use the “Erase” action in AgentCubes.
 - b. Examples are erasing the trucks, turtles, and logs on the other side of the screen.
 - 4) **Transport**: transporting an agent along with another, as if one agent is carrying the other.
 - a. Use the “Transport” action in AgentCubes.
 - b. Examples are transporting the frog on the logs and turtles.
 - 5) **Collision**: when 2 agents collide (run into each other).
 - a. Use the “See” condition
 - b. Use the “Stacked” condition, OR
 - c. Use the “Next to” condition.
 - d. Examples are the truck colliding with the frog.
- B) Other concepts we covered in AgentCubes are:
- 1) Creating projects, worlds, and agents.
 - 2) Changing shapes for different circumstances, such as the ‘squished frog’ shape.
 - 3) Stopping and resetting the simulation.
 - 4) Troubleshooting the simulation, and considering rule order.
 - 5) Using sounds and messages in the game.
 - 6) Timing our actions using the “Once every” condition.
 - 7) Creating some random actions using the “% chance” condition, like when we wanted to generate trucks but not always to avoid too much traffic!
 - 8) Creating comments or notes that explain what you are doing in the code. It helps you remember what the code does when you read it later in the future, or share the code with other users.

Student Handout:

Challenge 1.0: Alligators

Before you start this challenge:

You must have a complete basic Frogger game with a street and river. The Frog should die if it is hit by a truck or if it falls in the river.

Design Challenge:

Frogs should be able to jump on the alligators back and travel on them just like they are logs. BUT...frogs should die if they are in FRONT of the alligator.

Gamelet Design Activity:

Circle nouns to identify the agents and underline the verbs to identify actions associated with each agent. Mark adjectives to identify new shapes for an agent.

Create new agent: alligator

Create agent behaviors:

- The frog can ride on the alligators back
- The frog dies if it runs into the mouth of the alligator

Alligators



Add alligators to the river.

Student Handout:

Challenge 2.0: Prevent Cheating

Before you start this challenge:

You must have a complete basic Frogger game with a street and river. The Frog should die if it is hit by a truck or if it falls in the river.

Design Challenge:

Create controls so that there is no cheating to win the game...

The frog should die if it rides all the way to the end of the water
The frog should not be able to walk on tunnels or islands or lily pads

Gamelet Design Activity:

Circle nouns to identify the agents and underline the verbs to identify actions associated with each agent. Mark adjectives to identify new shapes for an agent.

Create agent behaviors:

- The frog should die if it rides all the way to the end of the water
 - How can it do this? Which agents need new behaviors?
 - Will you use a new depiction for the frog?
- The frog should not be able to walk on tunnels or islands
 - How will you stop it from doing this?



Student Handout:

Challenge 3.0: Dodge Cars and Trucks

Before your start this challenge:

You must have a complete basic Frogger game with a street and river. The Frog should die if it is hit by a truck or if it falls in the river.

Design Challenge:

Create controls so the frog must not only avoid the trucks, but also the cars going the other direction...

New Agents:

Create a car agent

Update Worksheet

- Create one (or two!) two lane street(s). Trucks should move to the right, cars move to the left.
- Save the new worksheet

Update behaviors

- Cars are generated and absorbed (will you need new tunnels?)
- Cars move to the left
- Frogs are squished if hit by the cars
- Squished frog means the end of the game

