

Tower Defence

Pew-Pew-Pew

Play the game we are building:
[click](#)

Today's Game

Challenge: Use the turret and pathfinding to create a Tower Defense-like game.

Goal: Use everything you've learned, and a few new things.

Features:

- Leverage the pathfinding behavior again
- Learn how the turret works

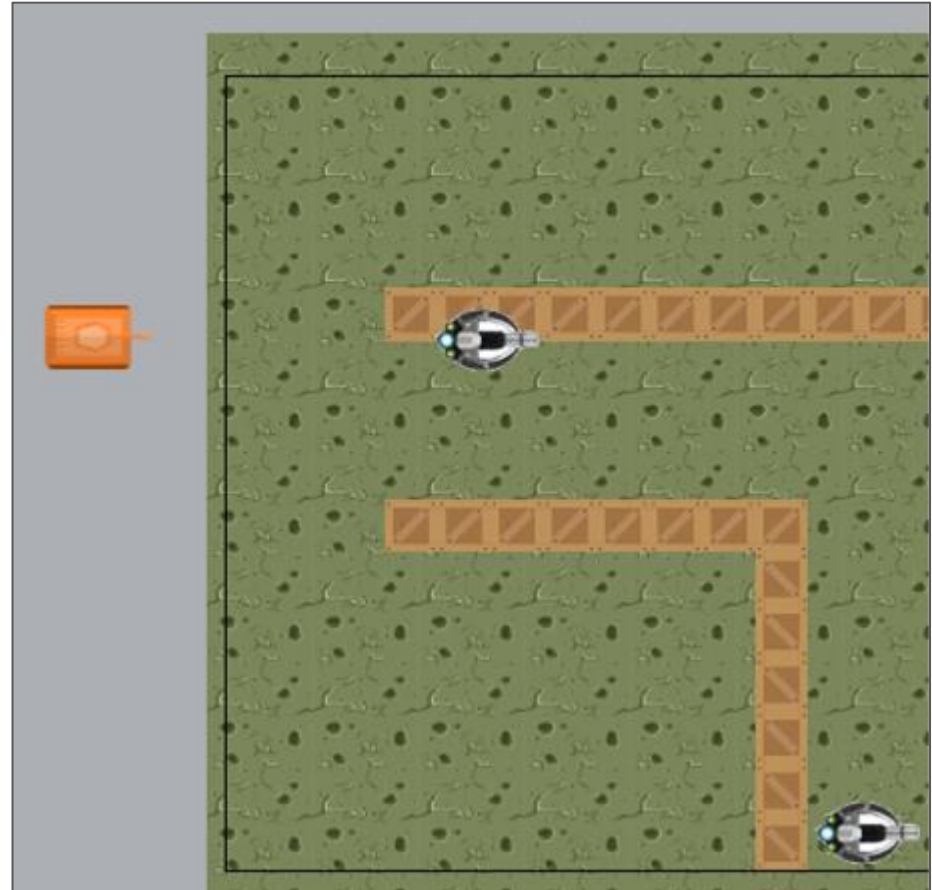
Walkthrough Video (WOW, it's good!)



<https://youtu.be/ff4xTiSZXQw>

Setup Layout & Sprites

- Layout size (854, 480)
- Create a tiledBackground
 - ground.png
- Create tiledBackground obstacles
 - brick.png or crate.png
- Create a sprite for tank (or bunny) & a turret (or bubble machine)
 - turret-02.png or other

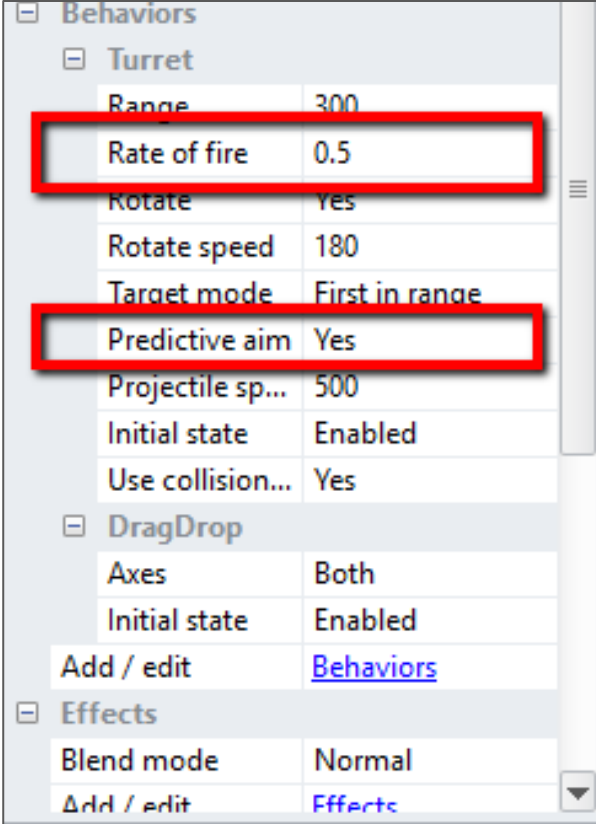


Behaviors

- Tank gets:
 - Name: tank
 - Behaviors: DestroyOutsideLayout, Pathfinding
- Turret gets
 - Name: turret
 - Behaviors: Turret, DragDrop
- Obstacles
 - Name: crate
 - Behaviors: Solid

Turret Properties

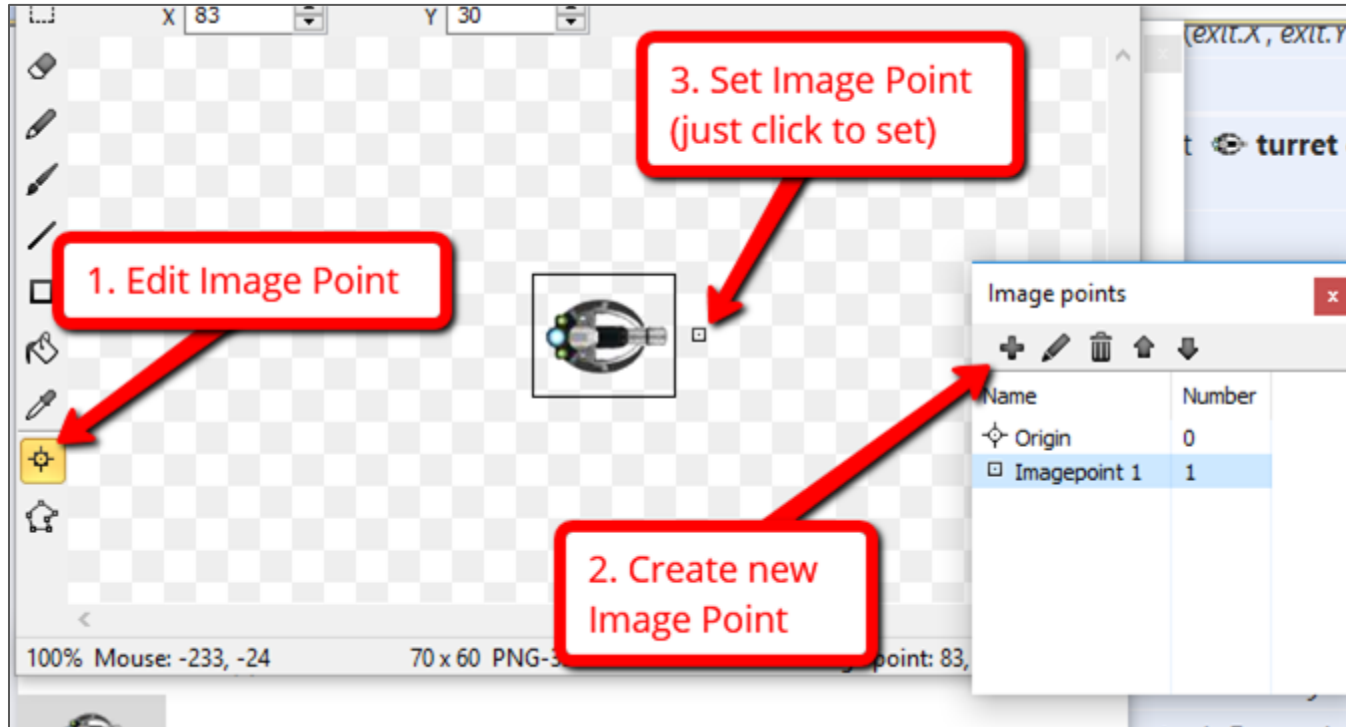
- Adjust the Turret's properties
 - Rate of fire is "0.5"
 - Predictive aim is "Yes"



Behaviors	
Turret	
Range	300
Rate of fire	0.5
Rotate	Yes
Rotate speed	180
Target mode	First in range
Predictive aim	Yes
Projectile sp...	500
Initial state	Enabled
Use collision...	Yes
DragDrop	
Axes	Both
Initial state	Enabled
Add / edit	Behaviors
Effects	
Blend mode	Normal
Add / edit	Effects

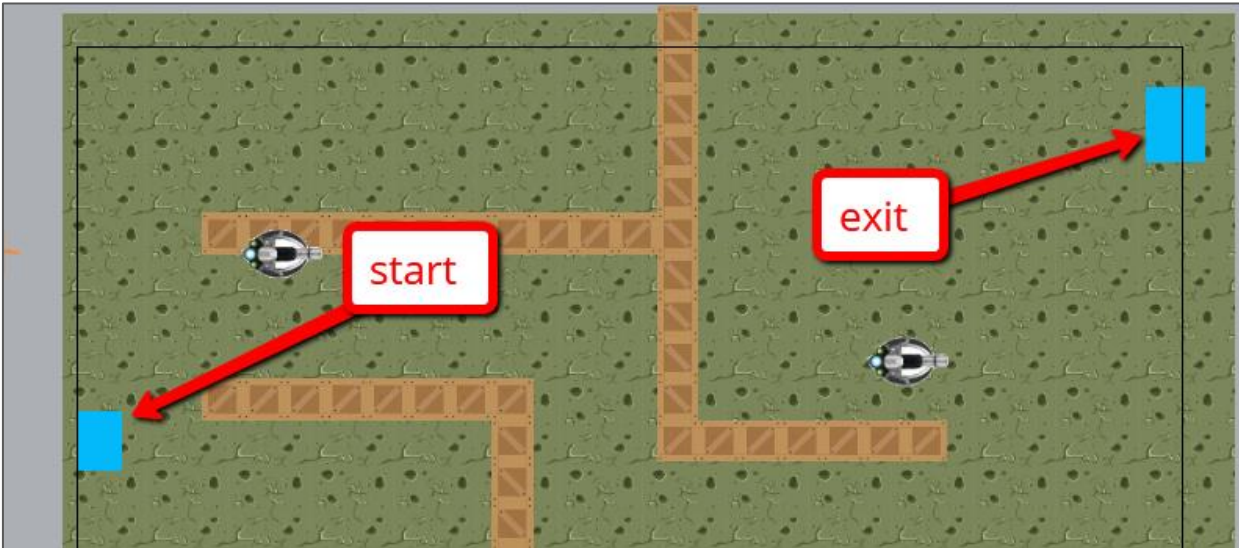
Adding Image Point

- Add image point for bullet to spawn properly



Add a “start” and “exit” spot

- Create two sprites, give them a solid color
- Name one start and the other exit
- Place accordingly
- Set “initial visibility” to invisible











Spawn Tanks & add paths

- Spawn a new tank every 5 seconds, send them on their way
- Upon arrival at “exit”, destroy the tank

1	 System	Every 5 seconds	 start	Spawn  tank on layer 0 (<i>image point 0</i>)
			 tank	Find path to (<i>exit.X, exit.Y</i>)
			Add action	
2	  tank	On  Pathfinding path found	 tank	Move along path
			Add action	
3	  tank	On  Pathfinding arrived	 tank	Destroy
			Add action	








Let's do it -- Firing Turrets

- Create a bullet sprite (simple circle or image)
 - Name: bullet
 - Behaviors: bullet
- Add the following events
 - **NOTE:** Use turret's image point 1 to spawn bullet

4	 System	On start of layout	 turret	Add  Turret target  tank
				Add action
5	 turret	On  Turret shoot	 turret	Spawn  bullet on layer 0 (<i>image point 1</i>)
				Add action

Add keyboard actions

- Add “keyboard” and “mouse” objects
- Add keys for:
 - “Space” to launch more tanks
 - “T” to create a new turret (where the mouse it)

6	 Keybo...	On Space pressed	 start	Spawn  tank on layer 0 (<i>image point 0</i>)
			 tank	Find path to (<i>exit.X, exit.Y</i>)
			Add action	
7	 Keybo...	On T pressed	 System	Create object  turret on layer 0 at (<i>Mouse.X, mouse.Y</i>)
			Add action	

Instance Variables

- Each instance has their own variable! Now we can track how many times a tank is hit.

The image shows a game engine interface with a left-hand panel containing a table of instance properties and a right-hand panel showing a game world with a tank instance. A red-bordered box highlights the 'Instance variables' section of the table, with a red arrow pointing to the 'Add / edit' link. Another red-bordered box highlights the 'Add' button in the instance editor, with a red arrow pointing to it. A third red-bordered box highlights the 'Name' field in the 'Edit instance variable' dialog, with a red arrow pointing to it. A fourth red-bordered box highlights the 'Initial value' field in the same dialog, with a red arrow pointing to it. A fifth red-bordered box highlights the 'Number of "hits"' text, with a red arrow pointing to the 'Initial value' field.

Property	Value
UID	1
Global	No
Com	
Layer	
Angle	
Opacity	100
Position	-77, 158
Size	65, 39
Instance variables	
hits	5
Add / edit	Instance variables
Behaviors	
DestroyOutside...	(no properties)
Pathfinding	
Cell size	30
Cell border	-1
Obstacles	Solids
Max speed	200
Acceleration	1000
Deceleration	2000

1. Click

2. Create

3. Add

4. Name







5. Number of "hits"

Instance variables table:

Name	Type	Initial value	Description (optional)
hits	Number	5	

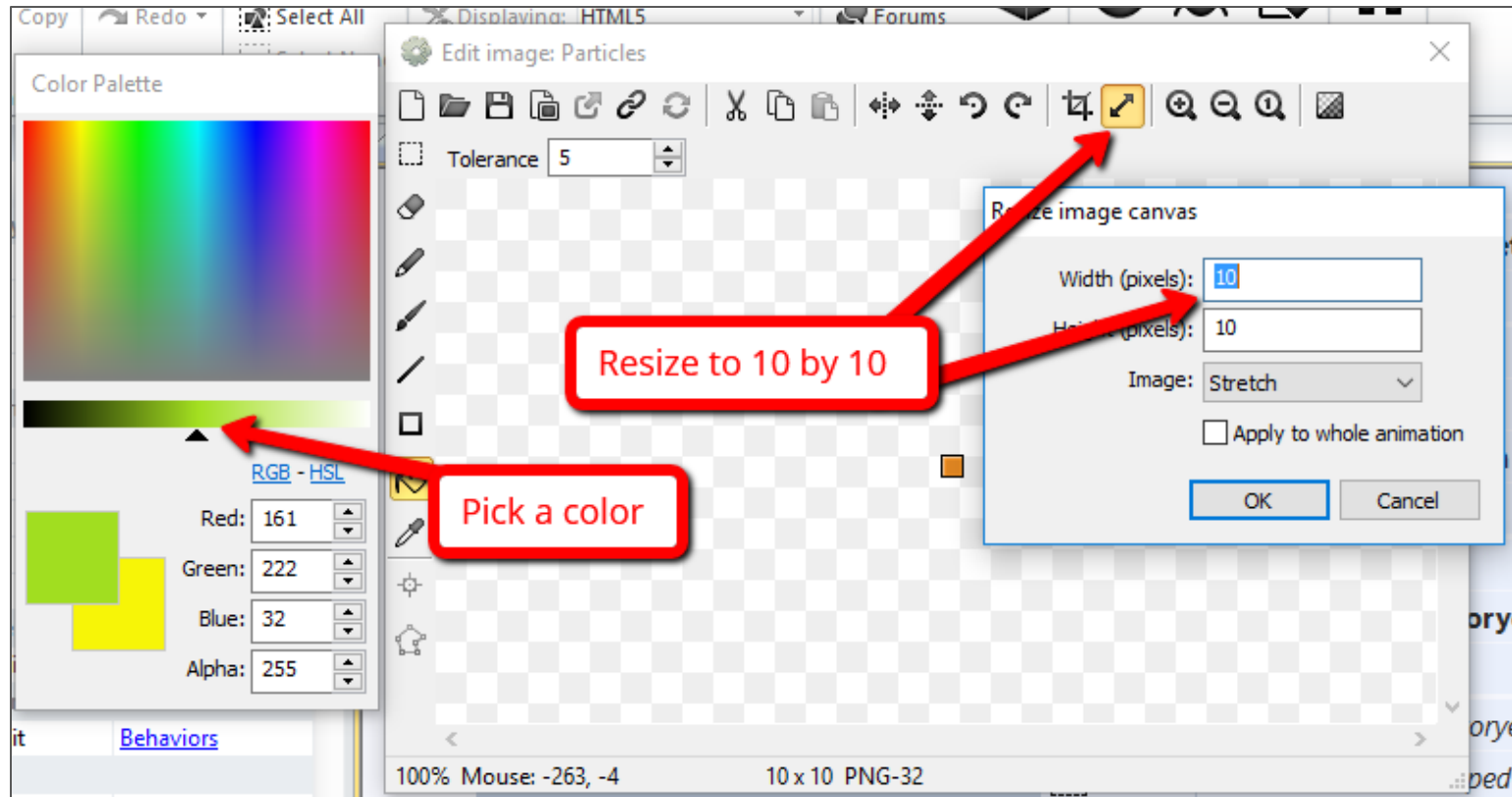
Destroying those tanks!

- When each tank's instance variable hits "0", destroy them.

8	 tank	On collision with  bullet	 tank	Subtract 1 from hits
			 bullet	Destroy
			Add action	
9	 tank	hits ≤ 0	 tank	Destroy
			Add action	

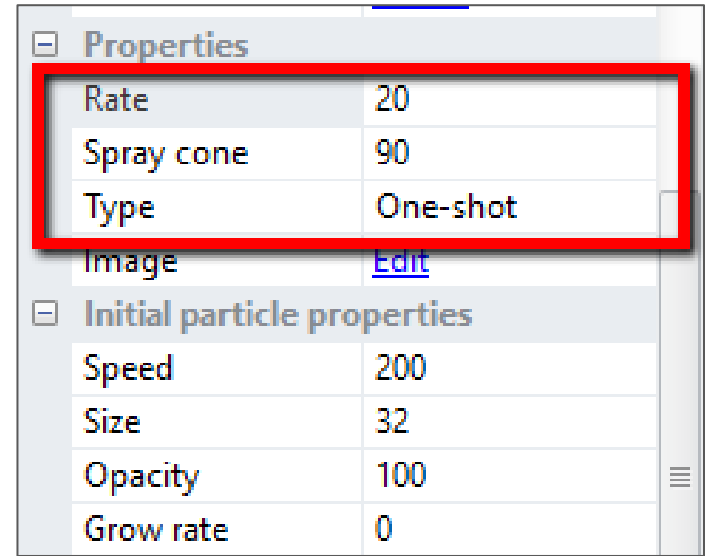
Add Some Particles

- Add particles (filled in sprite) when the tanks are hit

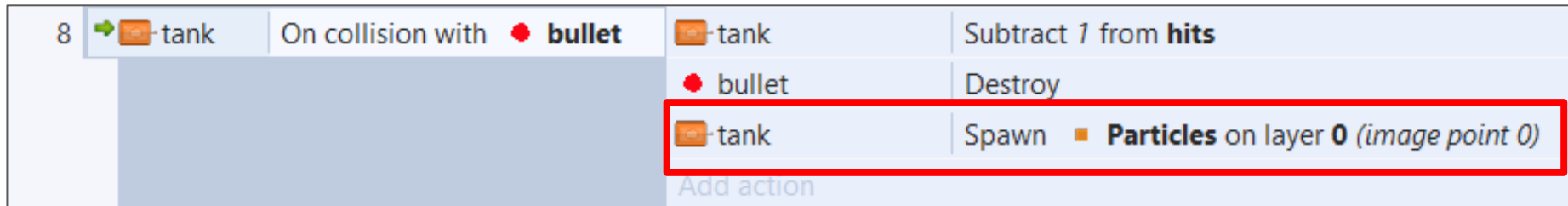


Add Some Particles

- Adjust Particles properties
 - Rate: 20
 - Spray cone: 90
 - Type: One-shot

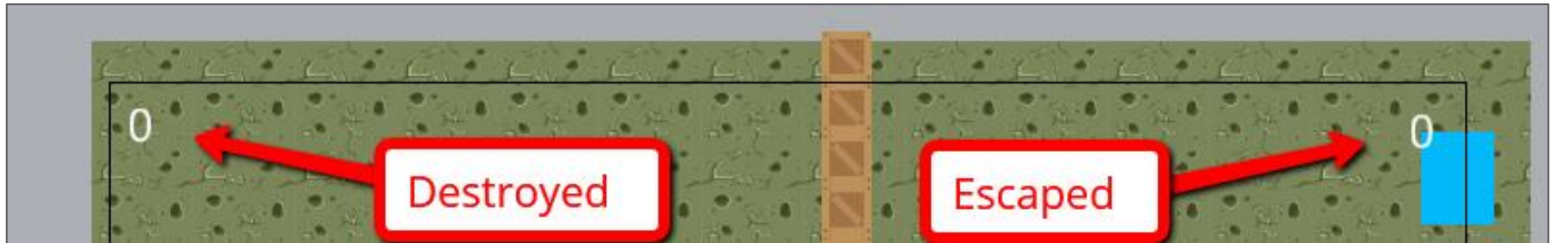


- Show explosions



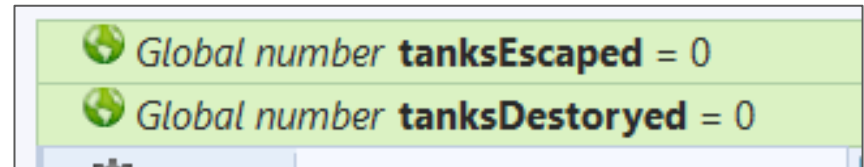
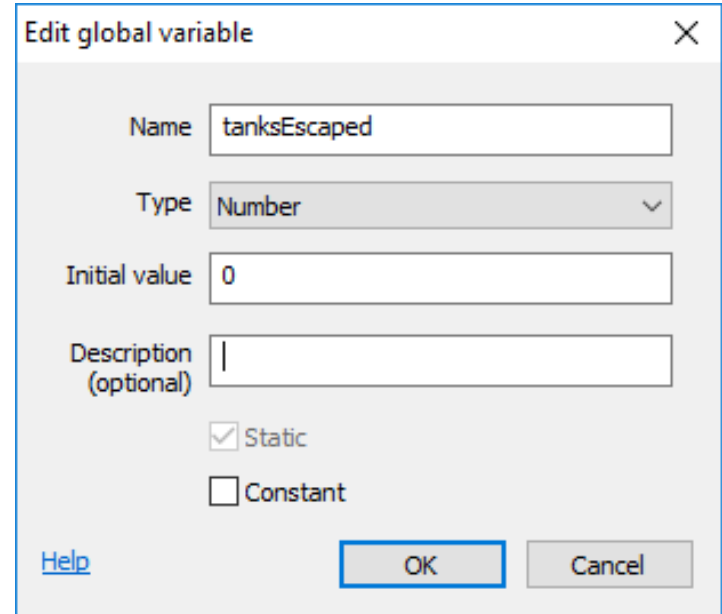
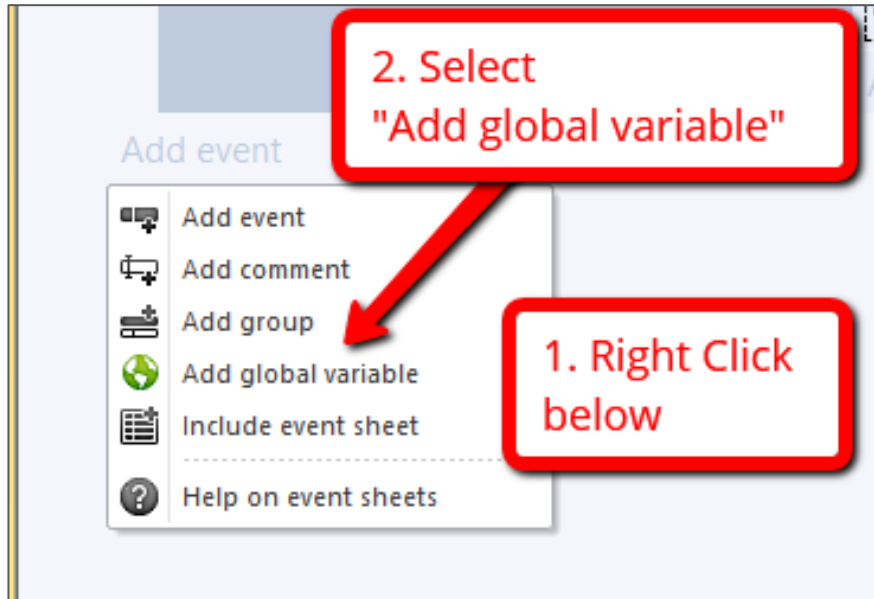
Tracking Scores

- Create two “Text” objects
 - Number of tanks destroyed: name **tanksDestroyed**
 - Number of tanks that escape: name **tanksEscaped**
 - Text: **0**
 - Font: **Arial (24)**
 - Color: **White**







Tracking Scores




- Add 2 Global Variables
 - tanksEscaped (number)
 - tanksDestroyed (number)



Tracking Score

- Track those that escaped (add to line 3)
- Track those that get destroyed (add to line 9)

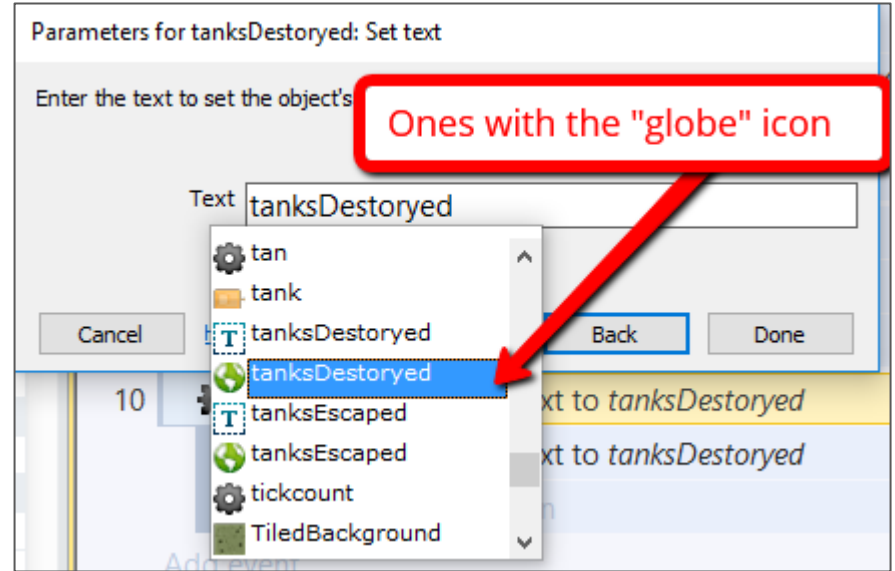
3	 tank	On  Pathfinding arrived	 tank	Destroy
			 System	Add 1 to tanksEscaped
Add action				

9	 tank	hits ≤ 0	 tank	Destroy
			 System	Add 1 to tanksDestroyed
Add action				

Tracking Scores

- Keep the scores updated, add this event

NOTE: No “double quotes” around the variable names.



10	System	Every tick	tanksDestroyed	Set text to <i>tanksDestroyed</i>
			tanksEscaped	Set text to <i>tanksEscaped</i>
			Add action	

Extra Stuff

- Add multiple types of tanks
- Add multiple types of turrets that cause different damage
- Automatically adjust the speed of the tanks over time
- Create a plane that flies by periodically
- Blow something up