# Rolling in the sheepe

## General

Each player is a **random shape**. You can only **roll** through a world full of obstacles.

The map flows to the left, building itself as you go along. (There might be split paths, ways to go down, direction reversals. But keep it simple at first.)

## Theme

During the game, you can *change* your shape. These upgrades make you look more and more like a *sheep*. (The round, bouncy form of sheep is the “ideal” shape for this game.)

You are all fleeing from a wolf. That’s why you’re running.

## Objective

Be the first to reach the finish line, with any of your parts.

## Control

* Button 1: roll right
* Button 2: roll left
* Both: jump
* (Nothing = well, nothing)

## Minor Rules

Catchup mechanics:

* Any player that’s too far behind (either in terms of rooms *or* concrete distance), is teleport to the next best player. But gets a time penalty.
* Any player that does nothing for 10 seconds, is teleported forward a single room. And gets a time penalty.
* (Any player not on a teleport yet, still goes with the group, but gets a time penalty.)

## Terrain types

### Essentials

* **Finish:** touch it to win
* **CoinLock** =>backdrop for coin lock
* **Teleporter** => backdrop for teleporter

### gravity

* **Reverse Gravity**
  + Use this more often on parts *going upwards*
* **No Gravity**
* **(Collision-normal-based-jumps?)**

### physics material

* **No Friction => Ice**
* **Bouncy**
* **Spiderman** => you cling (strongly) to all walls around you
  + Or make this the default and add sections where you *can’t* cling.

### speed

* **Speed Boost**
* **Speed Slowdown**
* **(Speed reset? Slowmo?)**

### Slicing/shapes

* **Spikes** => hitting anyone else will *slice* them **=> make functional**
* **Glue** => touching an old part of yours will glue it back to you **=> make functional**

### Misc

* **Reversed Controls**
* **Ghost =>** players can pass *through* each other (and obstacles within rooms

**IDEA:** Some terrain, or mode, or whatever that allows you to **destroy blocks** in the tilemap. (Maybe everyone becomes a bomb in that section.)

## Lock types

These should always be **modules.** Instead of putting them *inside the room script*, just spawn an extra node with its own script. Once fulfilled, it just sends a signal (to its parent room) that it should release its lock).

* **CoinLock:** Regularly spawns new coins. (Within min/max bounds.) When touched by player, its collected. Keeps counter in background. When counter above 10, the lock opens.
* **Teleporter.** Keeps a timer. When it runs out, *or all players have at least one body here*, it teleports you. (Old map is destroyed, new one started somewhere else.)

**IDEAS:**

* **Buttons.** Place buttons against the tilemap/edges, these must be pressed.
  + Variation => *they must be pressed simultaneously.* (Always at most (#players – 1) buttons then.)
  + Variation => *they must be pressed in order*
  + **What’s the bonus for being first?**
* **Fast gate.** Opens/closes at random intervals, very quickly. You can only pass through when it’s open, obviously. (These intervals *lower* over time, increasing the probability of getting through.)
* **The certain slice.** The first player to go through *will be sliced*. (So the question is: do I want that, or wait until someone else does it?)
* **Mass.** A certain amount of “mass” must be gathered, which means more players must arrive, or more pieces.
  + **What’s the bonus for being first?**
  + Variation => there are *shapes* and you must *fill them*. (By standing on top of them.)
  + Variation => these could also simply be *round holes*, as that’s easier to execute and to explain.
* **Shop.** If you have enough coins, you immediately buy your way through upon entering. (The number of coins to pay becomes lower with each subsequent player? Or is removed entirely after the first?) If not, you shall have to collect them.

The idea behind locks:

* Players that are further ahead must *wait* for the rest to catch up, bringing people together.
* The trailing players *don’t* have to do the minigame or challenge anymore; they can just power through.
* But it’s a fun minigame *and* it yields bonuses to be there first and play it.

Keep these ideas in mind on all locks!

**IDEA:** The first time a certain lock appears, place a tutorial in the background for it?

**IDEA:** Make the *coins* you collect in a lock *actually mean something*. (Maybe players with more coins can *do* something later, or *buy* something, or get a *time bonus*.)

## Powerups/Obstacles/Elements

These are all the same. Within any room, it can place *something*. This can be an obstacle to navigate around, something to grab, etc.

**IDEA:** The most basic obstacle is just *placing tiles in the center* if the room is large enough. (If one side is >= 3, we can do so.) This splits the path into two without issues, should look good as well.

**IDEA:** Sometimes it would be nice to place extra *edges* between rooms. These top players from “flying through” and can be a nice gate/obstacle/variation.

**IDEA:** There are obstacles that *glue* you to them.

**IDEA:** There are obstacles that simply hurt you (so you slow down/reset). But also ones that *split* your shape, like a spike shooting through you.

**IDEA:** Alaser might also just shoot through at certain moments, slicing *everyone* it hits.

**IDEA:** A powerup that makes you a ghost *for a certain period of time*.

**IDEA:** A powerup that instantly teleports you to the next room. (Or to the next best player. Or better yet, the leading player.)

**IDEA:** A powerup that makes you “more round”. When grabbed, it picks a random shape, then *pushes* its vertices to be more like a circle.

* Issue #1: it should pick the “worst” shape, right?
* Issue #2: how to prevent overlaps with other shapes? => Use the “matching triangle” algorithm. Any point that has a match is *not* moved. => In that case, I might just update *all shapes*, right?

**IDEA:** Of course, the *reverse* also exists. Just push all points in random directions to “un-round” a shape.

## Tutorial

Only the specific buttons are taught per player, with a prompt.

Everything else is shown as images in the background of the map. (Like a terrain paint.)

Something like this:

* Show prompt above players for “ROLL RIGHT”
* A bit later show “ROLL LEFT”
* Then, *in the background of the map itself*, show “press/release both at the same time to JUMP”
* When the first (coin) lock appears, show *in the background* “collect coins to unlock the next part”
* When the first teleporter appears, show *in the background* “once all players arrive, you *teleport* to a new part”

For this to work, we need to force a large room at those spots (so we have space for the image).

Anything else is taught in a campaign-based system. Each level has several images in the background explaining stuff. (**Could even be halfway!** Just “unlock” a terrain only after seeing the image.)

## Predefined shape list

* Circle
* Square
* Triangle
* Pentagon
* Hexagon
* Parallelogram
* “L”-shape
* StarPenta
* StarHexa
* Trapezium
* Crown
* Cross
* Heart
* Drop
* Arrow
* Diamond
* Crescent ( = half moon/crescent moon shape)
* Trefoil ( = “klavertjedrie”)
* Quatrefoil ( = “klavertjevier”)

## Collision layers

* 1 = all
* 2 = terrain
* 3 = players
* 4 = ??

## Rules for coding

Everything is done via **modules**. No script should do everything at once. Every functionality is a unique script, attached to a parent.

This also means that **when an object is passed around, it’s always the parent.** (Which usually does not have a script itself. But any modules can be accessed with a simple get\_node(<modulename>) call.)

## Painting the tilemap

To make this possible, we need two things:

1. A texture containing **the paint**
2. A texture containing **the tilemap** (the shapes of filled tiles)

**First one:**

* Create an Image
* Whenever a player hits something, paint a circle (of random size, in its own color) at the location of the hit, in this Image
* Every frame, convert the Image to an ImageTexture and hand it to a sprite
* Add a shader to the sprite.

**Second one:**

* A copy of the tilemap exists which is updated anytime the “real” tilemap is updated
* This is inside a *viewport*, which is the same size as the world/level/tilemap itself. (So it sees *all of it* at all times.
* The ViewportTexture (from this viewport) is sent to the shader on the sprite.
* The shader simply shows the paint but *masked* based on the tilemap shape. This way, it only shows up on actual tiles, not in empty space.

# To Do

## Gameplay

**Step 1:** I should use the fact that players can be **any shape** and that this can change more.

* Idea: Your **size** (or “mass”) plays a huge role. (You’re faster when you’re bigger?)
* Idea: Your **number of parts** plays a huge role. (Gates you can only pass through if you have *fewer than* or *more than* the indicated number of parts?)
* Idea: Maybe there are specific “gates” with weirdly shaped gaps. (Like that TV programme where you had to stand in a certain pose while a shape came towards you.) You will have to find one that *you* fit through.
* Idea: There are sections/powerups that *reset* you to a specific (predefined) shape. Or just your original shape.

**BUG:** Sometimes it counts collecting a coin as collecting *two coins*.

**BUG:** What if you get completely stuck? Should I add a *counter*, and if you stood still for 10+ seconds, you “explode” or “get a boost”?

## Gameplay (Essentials)

**Step 1:** Once *everyone* has finished, show an overview of the ranks + times on screen.

* Don’t go to a separate screen; just show in a neat widget to the side.
* Allow restarting. (Or going back.)

## Annoying situations

**Situation #0:** When backtracking, I have to allow more free placement. (Adjaceny/overlapping old rooms.) But … this leads to unclear routes, as there’s *no way* to know where you should be to count as “being in one of the front rooms”

Maybe I could add *edges* between the new rooms and the old ones? (These can separate rooms *without requiring much space*.

**IDEA:**

* Give the “previous room” to each rectangle
* Place edges along outline, but *not* when the previous room is on the other side
* Once this works, I can “scale it back” to only use when needed.

**Situation #0:** Don’t allow the **very last body** of a player to be removed. If this is about to happen, simply don’t allow their body to be *sliced* in the first place?

**Situation #1:** Two triangle slopes right after each other => often there’s no space to squeeze between there.

* If this happens … place a “cutter” before it? (So players have a *chance* to reduce their size?)

**Situation #2:** Growing a teleporter, and just plopping it down (+ erasing all around it) … looks ugly. Additionally, sometimes it happens *way too often* and *way too quickly.* How to ensure paths have a bigger chance of survival?

* Create *edges* on the outline. But this time, keep them open when there is *any* free tile on the other side. (Not just in the last room, but all rooms.)

## Movement Improvements

**Step 1:** Cap influence of air resistance. (Perhaps add a force that slows you down *when in the air*, towards a maximum velocity. So you can still go *really fast* if you gain speed, but moving in the air will always be limited.)

**Step 2:** Might need some extra *safeguards* to ensure you can always move somewhere successfully.

* Stronger jumping?
* Getting bitten by the wolf behind you, somehow *resets* you or gets you *unstuck*.

## Slicing improvements

**Step 1:** Be way more precise with intersect\_shape => create a *rectangle*, the length of the line segment, narrow width, rotated + positioned around angle + avg.

**Step 2:** The clinging force/jump force should be *proportional* to player size. (Otherwise small pieces get stuck, and large pieces cannot cling.)

# Done

## Basic Bodies

**Step 1:** Generate a random polygon

* <https://stackoverflow.com/questions/8997099/algorithm-to-generate-random-2d-polygon> => basically, create a circle, but allow each point to vary in radius/angle
* <https://stackoverflow.com/questions/59287928/algorithm-to-create-a-polygon-from-points> => draw a point cloud first, order by angle, then draw through it

**Step 2:** Calculate its centroid. Place a smiley face there. Then center the polygon around it.

**Step 3:** Turn it into a physics body + draw it each frame.

**Step 4:** When given input, roll in a certain direction. (Check if this actually works for movement.)

## Body slicing

**Step 1:** Write the slicing algorithm I scribbled on paper.

* <https://stackoverflow.com/questions/563198/how-do-you-detect-where-two-line-segments-intersect> => detect intersection point of two lines
* The rest of the algorithm is just:
  + Loop through shape.
  + Detect first intersection point. Add it to the shape. (Between the start/end vertices of the edge it intersects.)
  + Continue until second intersection point. Add it to the shape.
  + Now *extract* the part between the two points: shape 2. *Remove* the part you extracted from the original shape: shape 1.
  + Now recreate the *bodies* + *draw/move scripts* for each.

**Step 2:** Allow testing by drawing with the mouse. (Or clicking twice. Or pressing a key and testing a predefined line.)

**Step 3:** If successful, allow applying dynamically.

# Discarded

The old idea with “placing precreated rooms”

## Rooms & Routes

**Issue 1:** How do we allow *rotating* rooms?

* Translate everything to anchor center
* Rotate the thing
* Translate everything back => DOESN’T WORK, because the “position” property is still local, so translating back would just *follow the new orientation*
* Now recalculate opening values

**Issue 2:** What if a single side has *multiple* openings?

* We should be able to match any of them
* But *not* necessarily close the others when filling gaps

**Issue 3:** Now we have ugly *double walls* between rooms.