

# Portal 2 Level Analysis

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## What defines a puzzle game?

A puzzle game is a game built with a single solution. Puzzle games are meant to act as a mental challenge for the player, but importantly not one which is too difficult to figure out; It should make the player stop and think, but not force them into figuring out the solution through brute force trial-and-error. As such, they often need to subtly guide the player into finding the correct solution, without holding their hand. A puzzle game operates within a defined set of rules that govern how the player interacts with the game world, and new levels will often reveal a new rule about the game world, and challenge the player to master the new rule and how that rule interacts with the others.

## What makes Portal 2 unique?

Portal 2 is a puzzle game with a focus on physics, and how physics interact with the portals that the player can place down. The main gameplay mechanic of Portal is the ability for the player to shoot two different color portals out of their gun, which each allow instantaneous transport to the other. An important aspect to many of the game's puzzles is the fact that momentum is conserved when a moving object passes through a portal - this means that the player could, for example, jump into one portal from a high elevation, and come flying out of the exit portal because of all the momentum they gained when falling. Another important aspect of Portal 2 is simply its comedy elements - the game's main antagonists will constantly taunt the player with jokes made at their expense.

Many of Portal 2's puzzles involve figuring out how to get a cube to a certain location in order to place it on a button which will open a door to allow the player to exit the level. Portal 2's levels also do an excellent job of introducing a new game mechanic - such as turrets or faith plates - and teaching the player how to use them through slow and subtle guidance. For instance, they may force the player to touch a faith plate so that the player can discover how it will launch them into the air, before then having the player press a button that will drop a cube onto the faith plate, launching it onto a button. As a final challenge, the game may then have the player figure out how to get a cube onto another faith plate to launch it onto another button. For my own level, I will be introducing the "Hard Light" mechanic to the player, and once they are familiarized with how Hard Light functions, I will challenge the player to use Hard Light in conjunction with the game's physics to direct balls into turrets and get into important locations.

In addition to the primary portal mechanic, the following is a description of many of the games' other mechanics:

- **Emancipation Grid** - The emancipation grid is a wall that can be walked through, but which resets all portals shot by the player and destroys any test elements (Like cubes or turrets). Essentially, it keeps puzzle elements from one part of the puzzle from entering another part of the puzzle.
- **White and black walls/panels** - White walls/panels indicate locations where portals can be placed. Portals cannot be placed on black walls/panels.
- **Glass wall** - Lets the player see into another portion of the level, without being able to move through the glass wall or shoot portals through the glass wall.
- **Grates** - Grates act similarly to glass walls, with the added benefit that most game elements can in fact pass through them, including the player's portals. They simply stop the player, and other solid objects, from moving through them.
- **Faith Plates** - when the player stands on a faith plate, they are launched to another location on the map, which is set by the level's designer. The player is able to move a little while they are in the air after being launched from the faith plate, potentially changing their trajectory.
- **Turrets** - when the player moves in front of a turret, and the turret has an unobstructed line of sight to the player, the turret will open fire upon the player, hurting and potentially killing them.
- **Buttons** - In Portal, the player can use buttons of all sorts to trigger certain effects. These effects can include opening doors, flipping the colors of certain panels, creating ramps, moving a platform up and down, raising a staircase, and turning off a laser grid. Buttons include a timed button that the player can press to have activate an effect for a short period of time, or several kinds of pressure-plate buttons which activate their effect only when a weighty object is on top of them - this can include the player, cubes, or in some cases, spheres.
- **Cubes** - Players can use cubes in all sorts of ways, such as stepladders, blockers, and objects to hit turrets with. However, their primary use is that they can be picked up by the player, and placed onto a button, keeping that button activated.
- **Laser emitters and laser receptacles** - Laser emitters shoot a continuous laser beam, which can hurt the player if the player touches the laser. These lasers can be redirected by use of the player's portals, or by certain cubes that bounce the laser beam in another direction. Laser receptacles will activate an associated effect only when a laser is directed into the receptacle.
- **Hard Light Emitters** - Hard Light emitters shoot out a continuous plane of "hard light," which is a see-through substance that portals can be shot through, but which players and objects collide with. Hard light can be redirected through the use of portals, and they can be used for creating bridges or walls.
- **Gel** - Gel is a paint-like substance that comes out of emitters placed on the ceiling. When gel splatters against a surface, it leaves a unique effect on that surface. Gel comes in three forms:

- **Conversion Gel** - When conversion gel splatters against a surface, it leaves that surface colored white, and makes so that the player's portals can now be placed on the surface (Even when they could not be placed on that surface before).
- **Repulsion Gel** - When repulsion gel splatters against a surface, it leaves that surface colored blue, and makes it so that the player can jump extra far up off of that surface. It also makes it so that any solid object (including the player) landing on that surface now gets bounced back into the air.
- **Propulsion Gel** - When propulsion gel splatters against a surface, it leaves that surface colored orange, and makes it so that the player now runs extra quickly across that surface. It can also make other solid objects slide across the surface extra quickly.

# My Level

Level theme: Building Bridges

- There is a large causeway that extends from the start to the end. The causeway has become ruined over time, and the player must solve puzzles to repair it so they can cross.
- Causeway acts as a weenie, always orienting the player and acting as the primary point of interest. The player must continuously return to the weenie.

What player skill level am I targeting?

- The level is built for a player of a beginner-to-intermediate skill level, who has gone through at least a third of the game's main campaign.

How will I introduce a primary mechanic, teach the player how to use it, reinforce the player's knowledge, and then use the primary mechanic to introduce a secondary mechanic?

- This level will be introducing a primary mechanic of the game. The primary mechanic taught and used in this level is the Hard Light Emitter. It will first introduce the Hard Light Emitter, and then showcase to the player a couple of its uses and interactions with other game elements. It will introduce the Hard Light Emitter by having the player create portals to create a bridge out of Hard Light that takes them to a button on a high-up ledge. It will then show the player that they can use the Hard Light as a barrier, by having them use the Hard Light as a backboard to launch a sphere into multiple turrets, destroying them. Finally, the level will then show the player how Hard Light can be used as a surface for gels, by having the player create a Hard Light bridge underneath a bounce gel generator to be able to jump onto a platform.

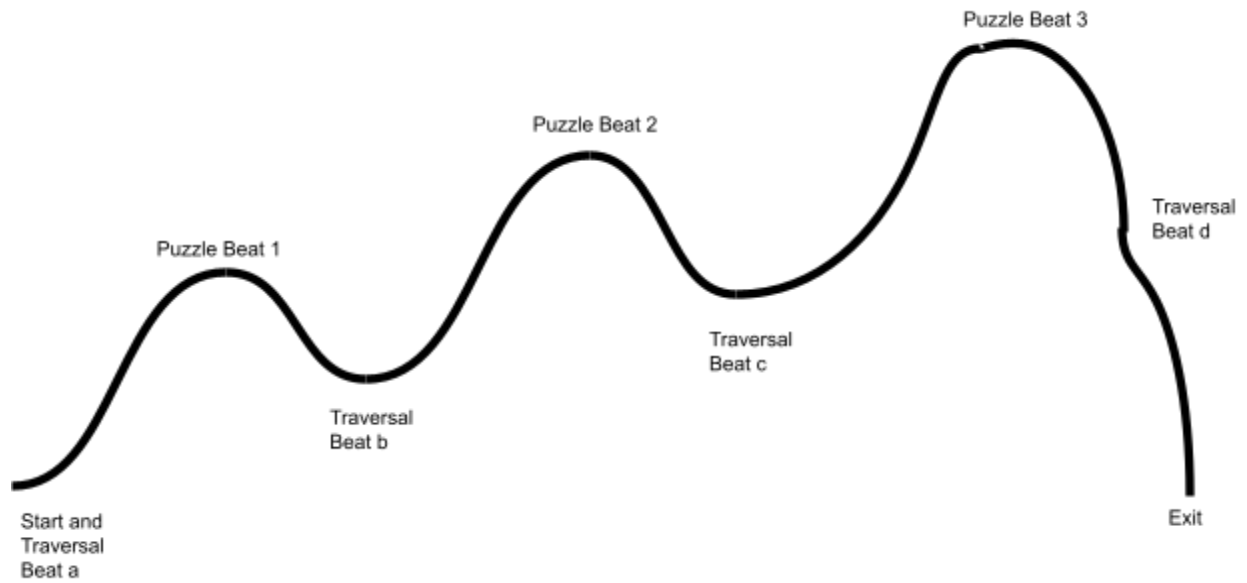
## Puzzle Beats

1. The first puzzle teaches them to use the hard light generator. It will teach the player how the hard light generator can be used to create bridges, and how they interact with portals by having the player create portals on certain portalable surfaces to have the player create a bridge that takes them to a button on a high-up ledge. Ends with the player pressing a button that will activate a permanent hard light bridge across the gap, allowing them to move across.
2. The second puzzle teaches the player to use hard light to direct a ball launched off of faith plates into turrets, destroying them. The player does this by using their portals on various portalable surfaces on the walls and series which will create hard light walls for the ball to hit and bounce off of. Ends with the player activating a button in the middle of the area full of turrets, activating a permanent hard light wall from the ceiling above the causeway, which blocks the player from going straight through the hole on the 3rd causeway platform.
3. The third puzzle teaches the player the interaction of gel with hard light surfaces. While hard light surfaces can be shot through with portals, gels collide with the surface and leave their gel type as long as the hard light surface maintains its position. In this puzzle, the player will need to use portals to position their hard light bridge underneath a bounce gel generator to be able to jump onto a platform; The player will then need to time the deactivation of two different hard light walls to let the gel get to a position on the elevated platform, allowing the player to reach a different platform with a button. Ends with the player activating the button which will remove a hard light bridge to let the gel fall onto the causeway, and make it possible to jump from the causeway to the exit.

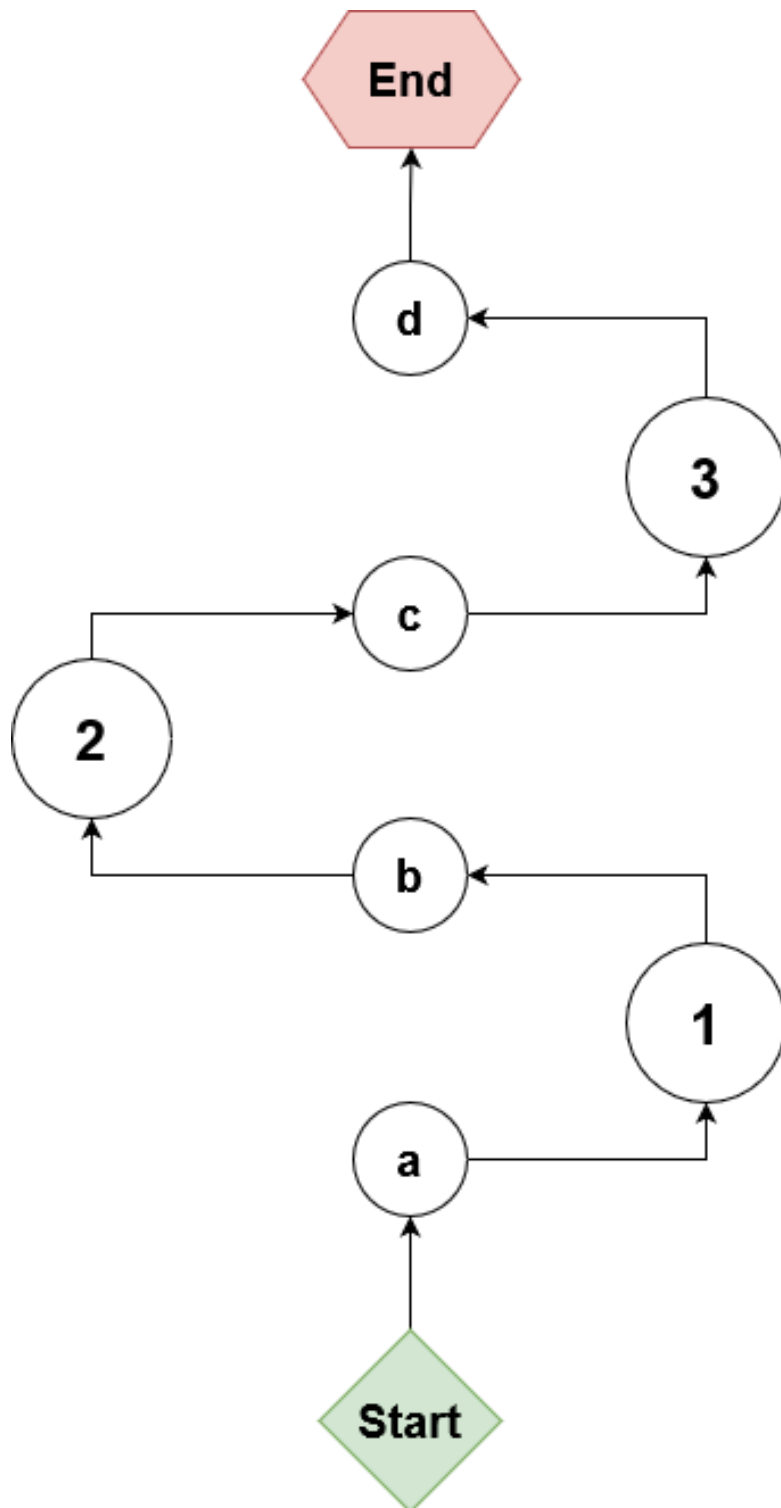
## Traversal Beats

- a. Start of map. Player is introduced to the causeway, and the first problem: There is a gap keeping them from continuing along. The player can return to the start of the causeway and cross an emancipation grid to enter the first puzzle.
- b. The player returns to the causeway, and can now jump onto a hard light bridge to get over the gap. But another gap now blocks their way. The gap can be crossed by a faith plate, but the faith plate launches the player straight into a hole. The same hard light bridge that they jumped over can now be crossed to the second puzzle.
- c. The player returns to the causeway, and can now jump onto the faith plate to launch themselves before getting blocked by the hard light bridge, which lands them onto the platform safely. Another faith plate launches the player into the third puzzle.
- d. The player returns to the causeway one final time, and can now use the gel on the ground to bounce onto the last part of the bridge, and cross into the exit.

# Engagement Curve



## Level Molecule



# Napkin Sketch

