

Puzzled Billiards

Game Design Document

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1. Overview

This project details a game concept which is a physics based puzzle game. The game requires the player to knock the first ball into a pocket by using a second ball. The game will set out similarly to a game of billiards as the player must use a second ball to collide with the first ball in order to knock the first ball into the pocket. For the sake of this document, the first ball which must make its way to the pocket will be referred to as the target ball, and the second ball which must be used to knock it in will be referred to as the ability ball. The target ball may only be hit one time by the player, at the beginning of the level. This is to establish the initial position of the target ball before it reaches its goal. The ability ball may be hit multiple times but within a limited number of attempts relative to the level the player is in the process of completing. The ability ball will have a set of abilities which the player must use to overcome the set of obstacles laid out before them in the level. Each level is a unique course with a different set of obstacles that form a puzzle which the player must solve using the ability ball's mechanics. The level will conclude once the player has successfully set up the ability ball and used it to knock in the target ball.

2. System of Mechanics

The primary gameplay loop will entail the player operating a controller which hits the objective and ability ball with an impulsive force. The player will control. The player will use this controller to initially position the target ball with a single hit. After the first hit, the player must hit the second ability ball to knock the target ball into the pocket within a limited number of attempts which would be specific to the implementation of each individual level.

In the current version of the concept the player views the entirety of the course from a top down camera perspective, but this may vary with the implementation of different levels of verticality.

Varying ability ball mechanics are intended to be implemented to work together with different physical forces and environmental objects in order to create obstacles which the player must overcome. These ability mechanics will include things like being able to travel through specific walls or being able to control certain collisions. Other mechanics may be implemented to work within the environment of different levels.

Ability ball Mechanics:

Figure 11 and figure 12 in the appendix show concept and technical art for the ability ball. The figures indicate design, aim indicator, and collision interaction.

Ideas regarding potential mechanics include;

- A ball that can be hit without any special mechanics (similarly to how the player hits the target ball in the initial stage of the game)
- Ball that sticks to the surface on first collision and allows the player to aim the angle of reflection.
- A ball which can phase through the first wall it collides with and bounces off every wall after that.
- Ball which the player may use to hit curve shots.
- Ball which is capable of destroying certain walls.

3. Communication Design

Varying platforms which have different physical properties should be obvious to the player in how they behave. For instance, if there is a bouncy surface for the balls to interact with or a gravitational field, this should also be indicated in some way, such as using colour, sprites or animation to represent the different reactions those platforms will emit once a ball collides with it.

The different abilities which the ability ball employs should be communicated to the player in as many different ways as possible. These mechanics should be indicated through color coordination as well as other potential visual cues which may indicate the outcome where possible. Since the player will be limited to how many times they may use each of the different abilities, some form of numerical indicator should be implemented to communicate this to the player. The feedback design should be explicit enough to ensure that the player is able to easily remember the response they get from applying any of the implemented ability mechanics after using each one.

Figure 13 and figure 14 in the appendix show concept art for the in-game UI overlay.

4. Data Design

The data design should aim to balance the game and give the developers control of the variables regarding the physical properties of the hit mechanics as well as the environmental objects. This should allow the tuning of the physical responses which the player will experience when exercising the system of mechanics. The tuning of said variables will be done iteratively through a series of playtesting in order to achieve an ideal game feel.

Types of data to have control over:

- Max power of ball hit.
- Friction value of ground and ball
- How many shots is the player allowed per level
- Bounciness of walls and ball
- Size of target pocket
- Size of balls
- Weight and feel of the balls

The game will keep a record of how many times the player has hit the ability ball during each individual stage. This data can be used to indicate to the player how efficiently they were able to

complete the stage. Each stage may also place limits on this data in order to create different levels of challenge.

5. Level Design

The ability mechanics which the ability ball employs should be specifically designed to work within the environments provided by the various stages. For instance, if the player is presented with the ability to travel through walls, they should be presented with the opportunity to do so in the given level. Some levels may put focus on individual ability mechanics in order to familiarize the player with how said mechanics function early on in the experience. Stages which attempt a higher level of difficulty should employ a combination of the different ability mechanics with an increasing number of moves required to solve the puzzle. Levels may differ in design but should all come back to the goal of having the player knock the first ball into a goal region with the second ball.

The order in which the player progresses through the various stages should be situated in such a way so that the game uses early levels to show the player how the basic mechanics work. Later stages would then use the principles which the player learnt earlier on to create more complex puzzles. The intention would be to create a difficulty curve which sees a gradual increase in complexity in puzzles.

Each level has a set of micro goals, the design of each level should fulfill these goals in order to ensure the macro level structure of the game is a well curated experience, that offers the player a fun experience with a good game flow and difficulty level. The first levels should be an introduction to the core system and gameplay loop, and offer a space for the player to explore and get a feel for the shooting mechanic and power levels. The use of many game objects will help increase the level of conceptual and complex difficulty. The concept sketches in the appendix theoretically achieve similar micro goals to each other.

Concept art regarding different elements of level design found in the Appendix showing concepts such as the Dead Zone and establishing the game pieces (Figures 1 - 3), ball abilities and emphasis on the movement of walls and balls (Figures 7 - 10), and interesting level designs incorporating puzzle elements and wall switches (Figures 4 - 6).

Environment Objects:

- Static wall
- Breakable wall
- Moving wall
- Pairs of Teleport pads
- Wall switches which open doors within the level
- Force fields
- Deadzone

6. Game Design Intent

The intent of the primary gameplay loop is to provide the player with a puzzle which they must solve by using the system of mechanics presented to them in order to complete each stage. Since the game is physics based, solving each puzzle will not only require the player to figure out the sequence of actions they must perform but also time their shots correctly and estimate the power and direction

necessary to achieve the desired outcome. Different mechanics and level designs intend to create a system where the player must use their understanding of the environment and their own capabilities to solve the level put before them. The top down perspective is intended to give the player a full view of the level which would allow them to plan out the sequence of moves required to solve the puzzle.

Appendix

Level Concept Variations

Designs and descriptions by Tenisha Moodley

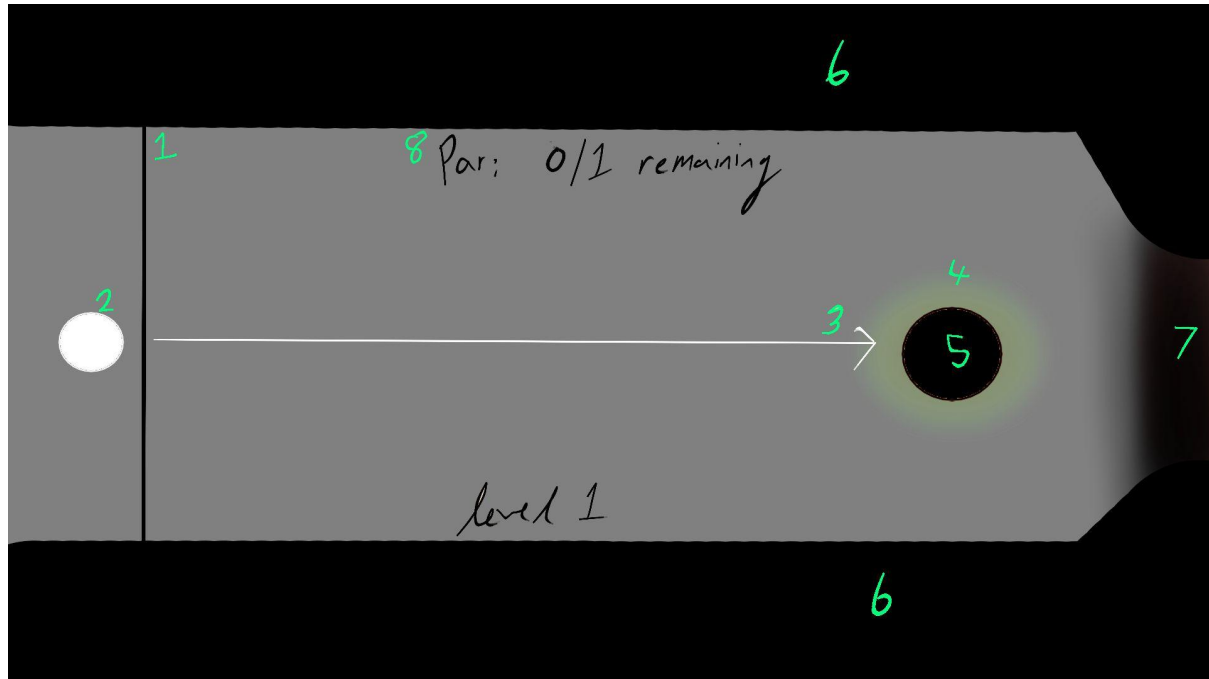


Figure 1 Image showing Concept Design for Level 1

- 1: The Startup line where the objective (white) ball and the ability ball start from on their first hit. In this level, the right side of the startup line is a solid wall that the balls cannot pass through.
- 2: The White Ball, like in Billiards and PuttPutt games, this ball is the 'main ball'. In this game, the white ball is the reverse of the white ball in a Billiards game, and therefore has the similar abilities to that of the ball in PuttPutt. The player has to sink the white ball into the hole at number 5.
- 3: The Action line representing the white ball's trajectory from how the player hit it.
- 4: The Pull Zone. This zone surrounds the sink hole and acts like an atmosphere to the hole, providing a weak gravitational pull towards the hole. It's not very strong, so the ball can bypass it if hit too hard.
- 5: The Goal Zone where the player is aiming to get the white ball.
- 6: The Walls. These walls are just solid walls that the ball bounces off, and provides constraints for the level.
- 7: The Dead Zone. A place where the ability balls can't go, but the white ball can. If the white ball enters this area then the level is lost automatically.
- 8: The Par score: This is the number of hits the player is allowed before they've failed the game. A hit refers to the successful drag and shoot motion of any of the balls found in that level. (Does this count the beginning two shots from the startup line?)

Intended player experience: This level is designed to introduce the main game pieces and mechanics to the player. It should be simple, quick and easy but still be descriptive enough to the player.

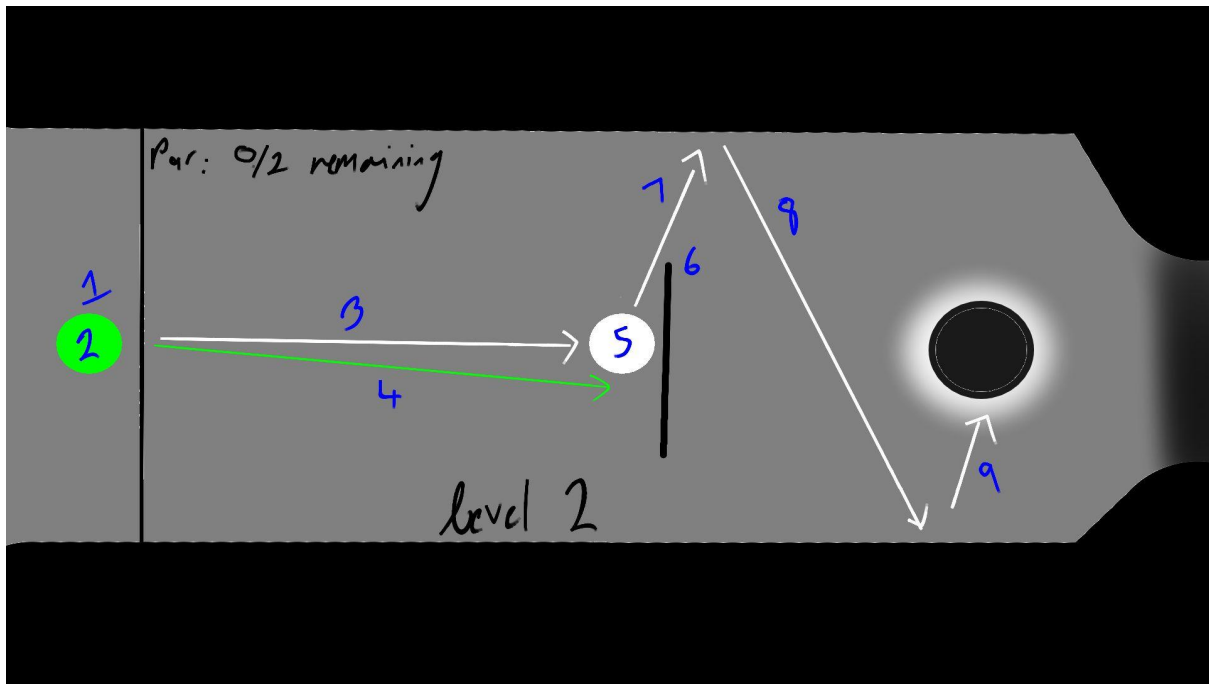


Figure 2 Image showing Concept Design for Level 2

- 1: The Objective Ball (white ball) and Ability Ball (different coloured ball) Startup Position. The Objective ball appears and the player is required to pull and shoot it. After it has been shot, the Ability ball appears in the same position but being whatever colour it is.
- 2: The Ability Ball. This Ball only has the ability of being a normal ball.
- 3: The Action line representing the trajectory of the Objective ball took on its first shot.
- 4: The Action line showing the ability balls trajectory line. The Ability ball only has one shot, so it would either disappear or become uninteractive after this shot.
- 5: The Objective ball once stopped moving after colliding with the solid wall at number 6.
- 6: The solid wall obstacle.
- 7,8 and 9: The Action lines representing the bounces that the Objective ball could possibly look like after being hit by the Ability ball at that angle, which don't count in the par.

Intended player experience: Another short and quick level that introduces the appearance of Ability balls, and obstacles. The player can use the Objective ball to get to the goal by just using the Objective ball if they are willing to get the par in 1 shot rather than two and therefore gain more points.

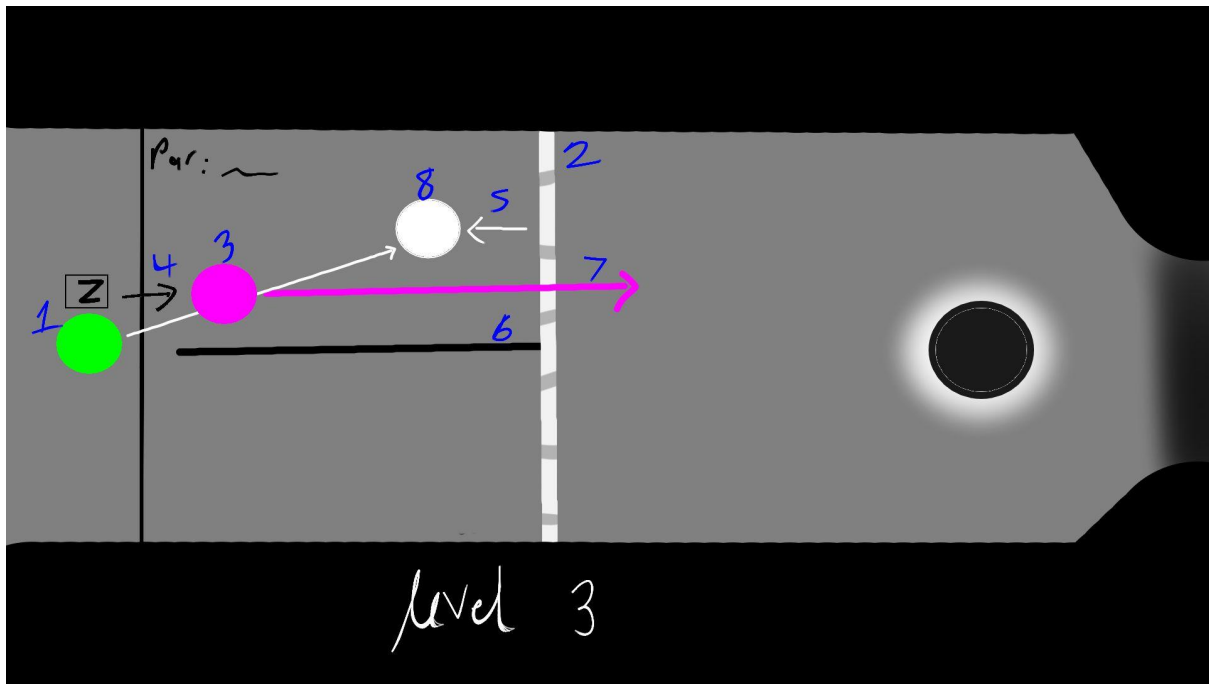


Figure 3 Image showing Concept Design for Level 3

- 1: Ability Ball 1 - The Normal Ability Ball
- 2: The Breakable Wall - Can only be broken by the Wall Breaking Ability Ball
- 3: The Wall Breaking ability ball, all ability ball mechanics can only be used once
- 4: The Action of pressing the Z Key in order to switch between Ability ball's abilities, since there is one Ability ball which has numerous abilities but only one ability can be used at a time.
- 5: The action line showing the Objective ball bouncing off the breakable wall
- 6: The solid wall is placed here to encourage the player to not only shoot forward
- 7: The action line showing the wall breaking ability ball being used to smash through the wall
- 8: The Objective ball

Intended player experience: This level introduces the multiple ability ball mechanics mechanic by not only allowing the player to now interact with the Ability ball more than just dragging and shooting it, but also by using a key to switch between the Ability ball mechanics. It also emphasizes the introduction of more Ability ball mechanics, by introducing a complimentary game obstacle which can only be bypassed by using the newly introduced Ability ball mechanic. Furthermore, it also introduces the increase of level difficulty through each level.

Level Concept Variations Volume 2

Designs and descriptions by Ashish Juggpall

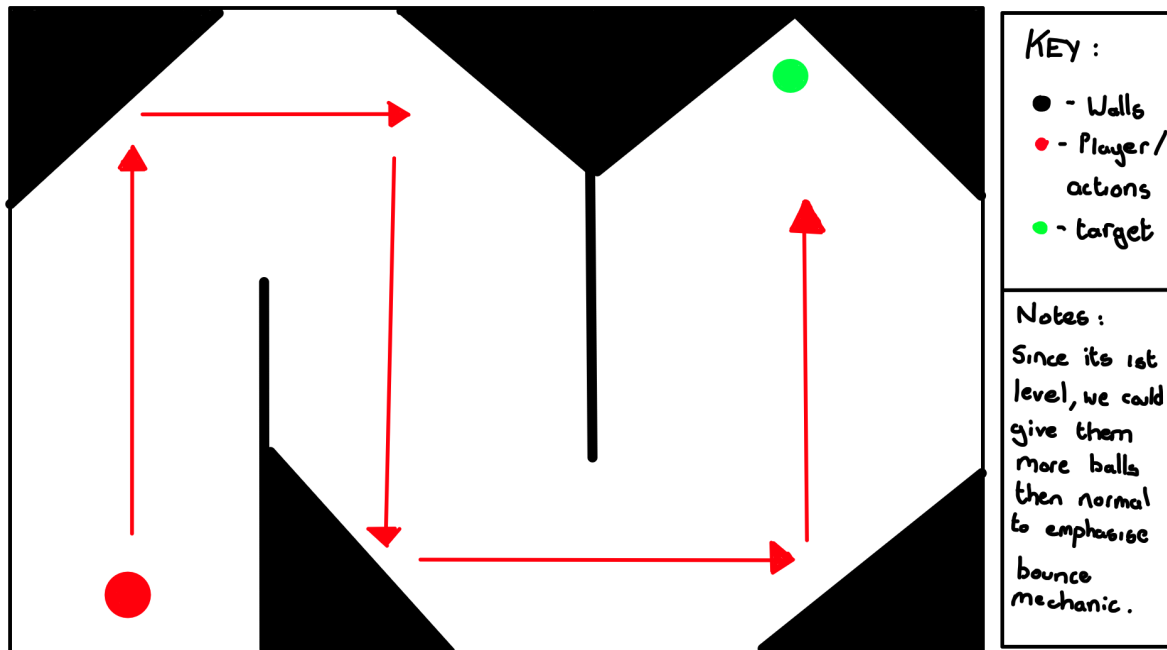


Figure 4 showing level design concepts for Level 1.

For the first level concept, the intent is for the player to identify the main ball mechanic as well as create an emphasis on the ball bouncing off walls, ricocheting towards the target. The limit of ball bounces are increased to allow the player a limited amount of freedom to learn the mechanics of the game.

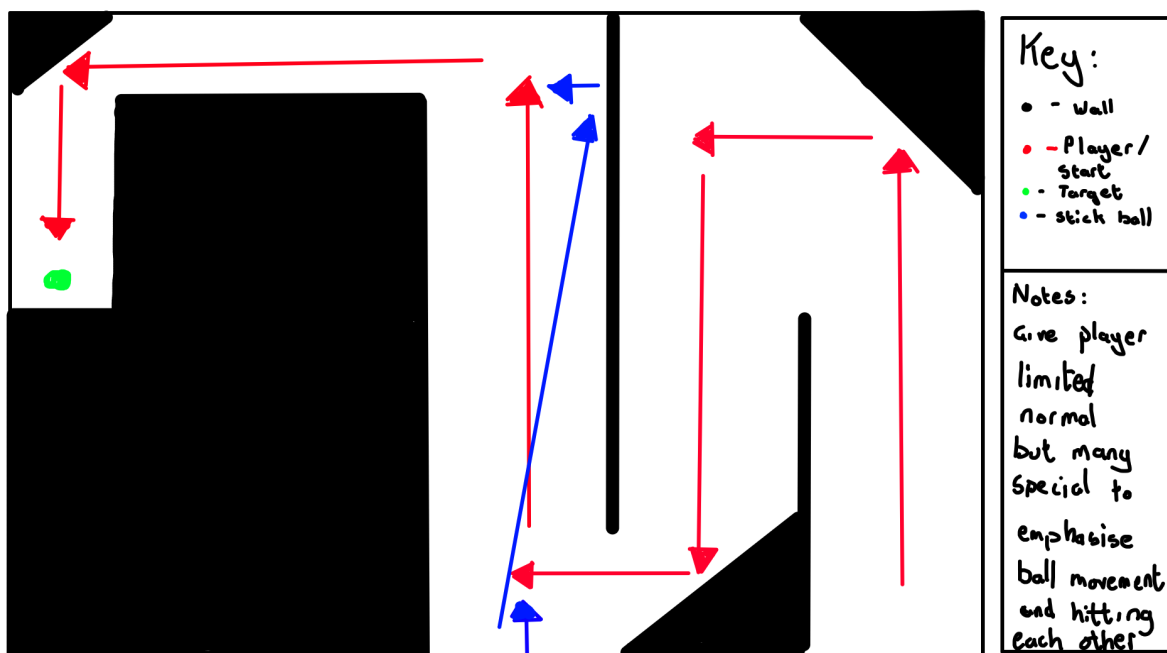


Figure 5 showing level design concepts for Level 2.

For the second level concept, there is also a new ability ball introduced, with the level designed to incorporate the new ball's abilities. There is still an emphasis on the ball bouncing off walls, however there is now a limit of how many bounces are allowed per ball type. This presents an increased

difficulty as well as allows players to strategically plan how to play the level, forcing players to use both ball variants to achieve the level objective.

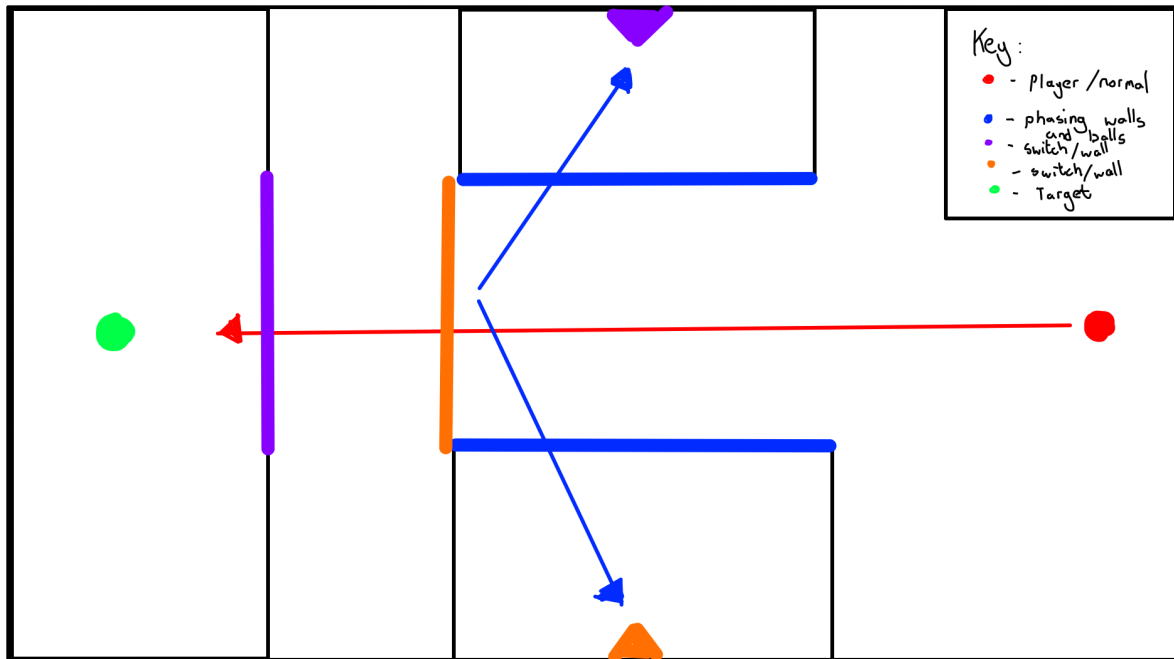


Figure 6 showing level design concepts for Level 3.

The third level concept's main intention was to create an emphasis on puzzle-based gameplay. The player must complete the series of puzzles in a specific order to complete the level. The player must use the ability ball with phasing abilities to phase through walls and deactivate the different colour-coded walls in a specific sequence in order to achieve the objective of the game.

Level Concept Variations Volume 3

Designs and descriptions by James Theron

Attempts Remaining - 3

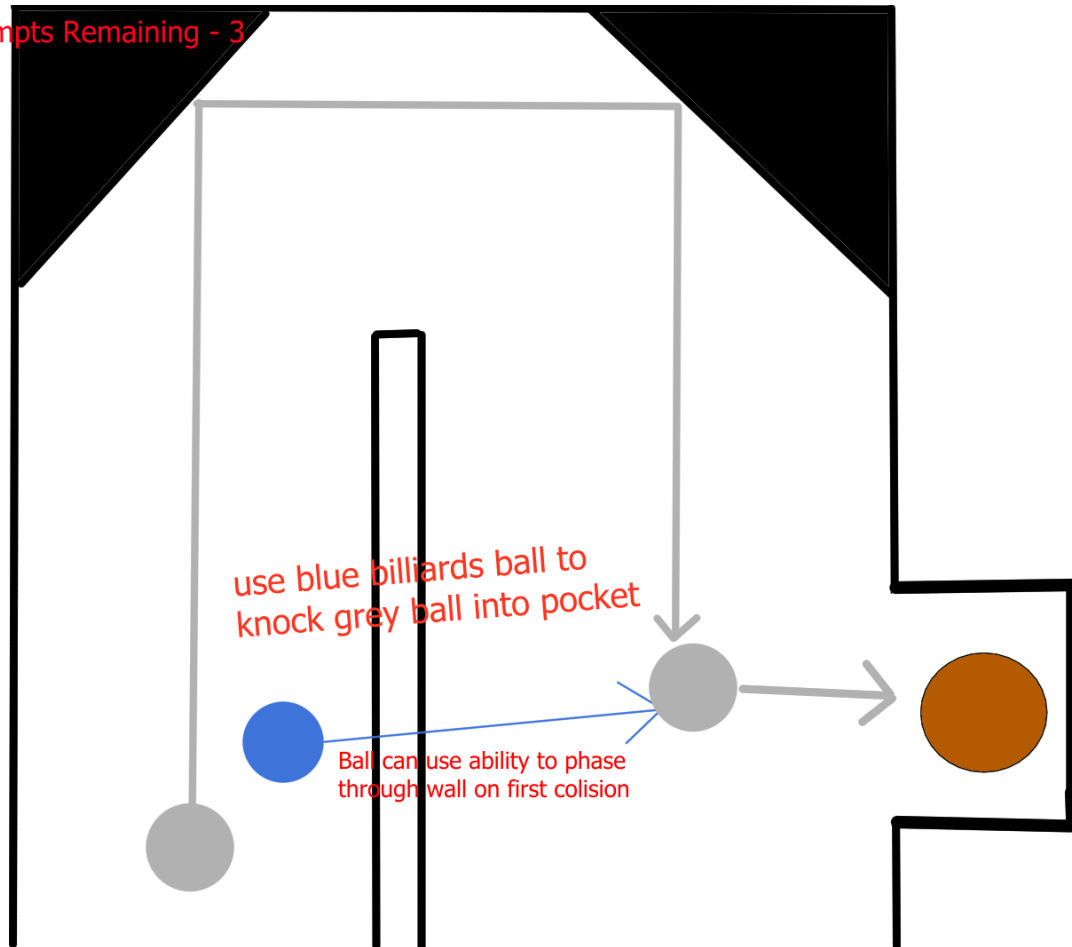


Figure 7: An early level depicting the phase ability

This initial level would be implemented for the sake of illustrating to the player the ability ball's ability to phase through certain walls. The grey circle represents the target ball, the blue circle represents the ability ball with the phase ability and the orange circle would be the pocket. The player must set up the target ball by hitting it in such a way that it reflects off of the angled surfaces and lands just in front of the pocket as illustrated by the grey arrows. The player must then use the ability ball to phase through the wall and knock in the target ball as shown by the blue arrows in the sketch. This particular course would likely give the player 3 opportunities to complete the stage.

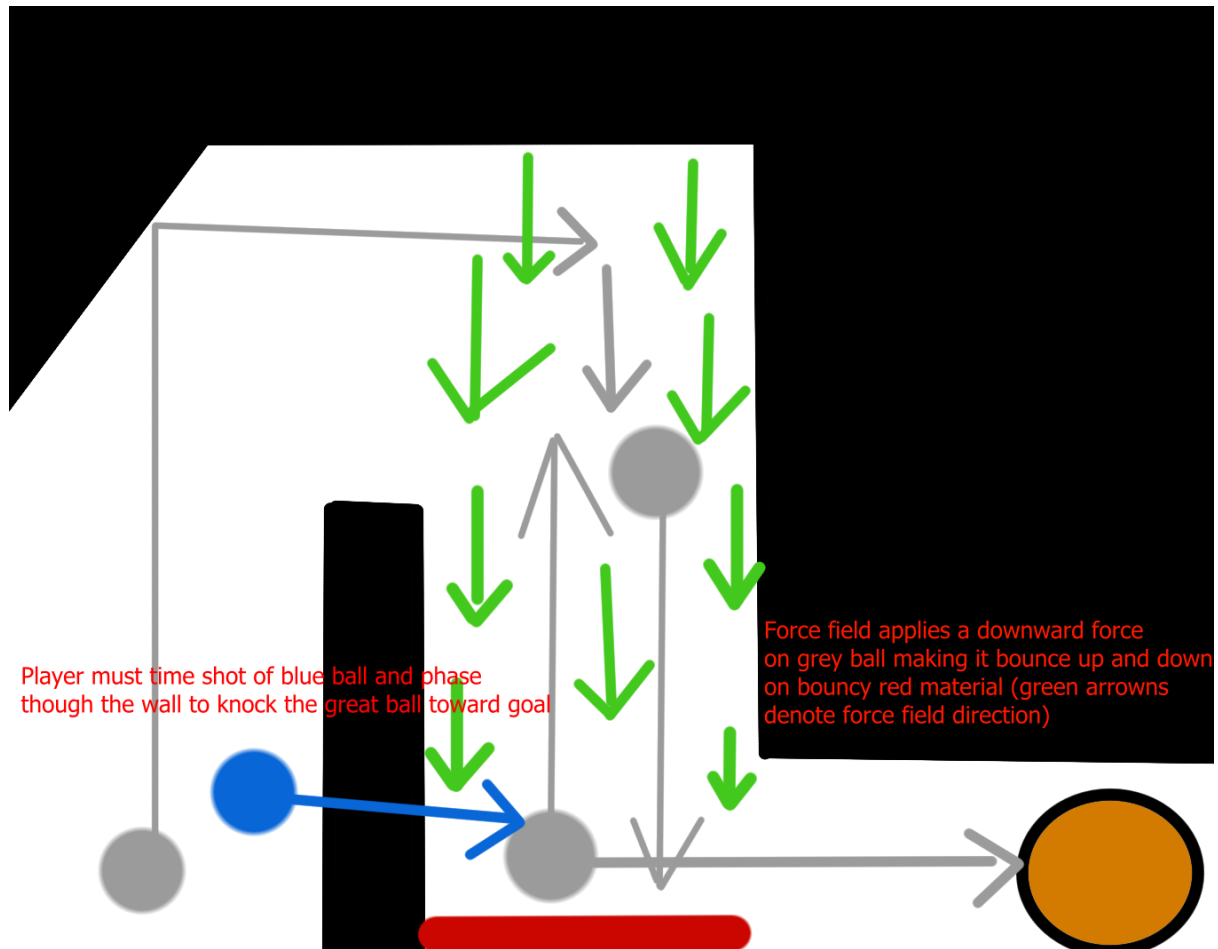


Figure 8: A level depicting the use of the phase ability and force field

Similar to the previous sketch, this course requires the player to use the phase ability of the ability ball to travel through a wall and knock the target ball into the pocket. In this instance, the green arrows show the presence of a force field which would pull the target ball in a downward direction. The force field coupled with the red bouncy material would initially cause the target ball to bounce up and down continually. The player must correctly time their shot with the ability ball in order to make the connection with the target ball and knock it in.

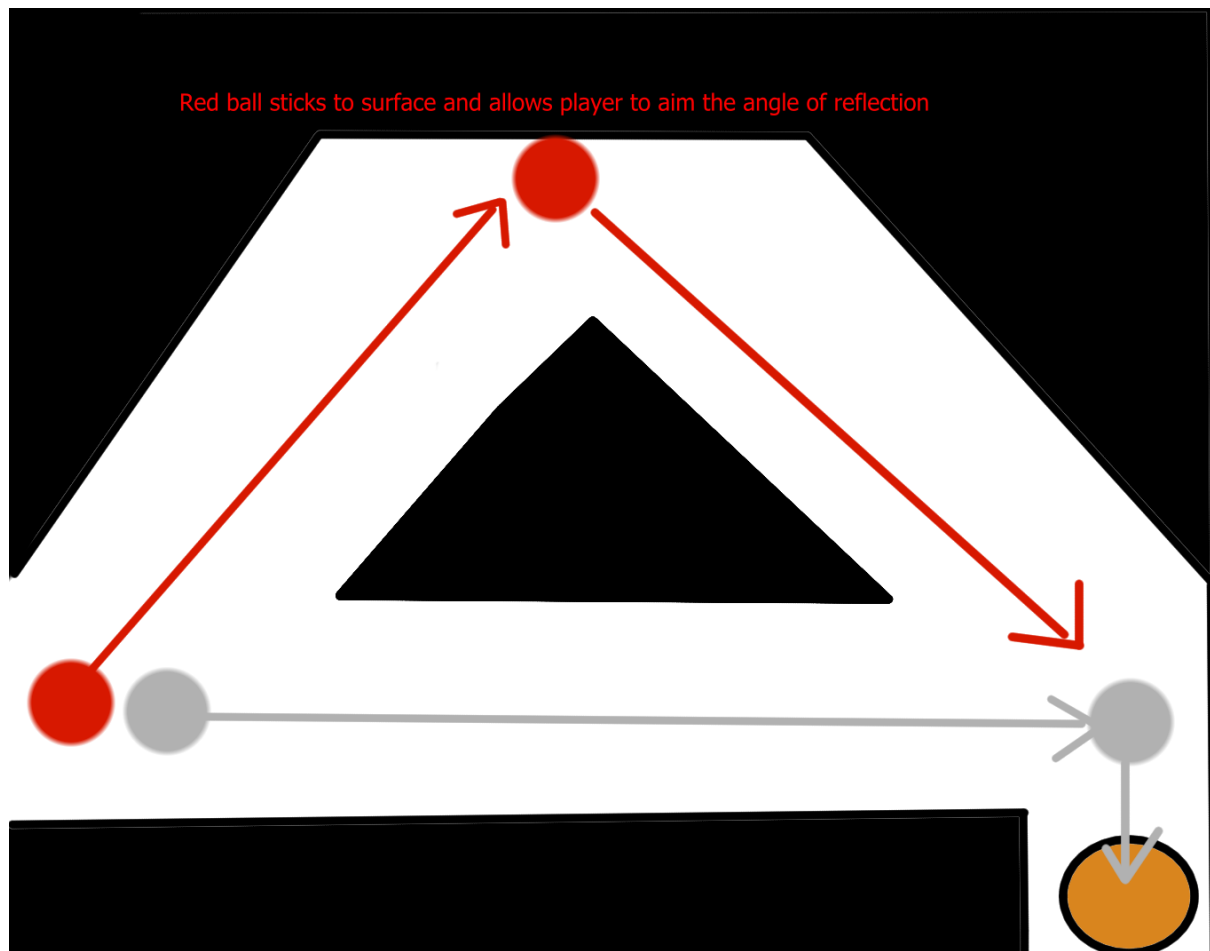


Figure 9: An early level depicting the sticky ability.

This stage is intended to illustrate to the player the ability ball's sticking ability. The player must first set the target ball by simply hitting it to line up with the pocket as shown by the first grey arrow. Since the player would potentially be limited to a single shot with the ability ball, they must use its ability to stick to the surface at the top of the level as shown in the sketch. This would allow the player to aim the angle of the reflection towards the target ball and knock it into the pocket in a single shot.

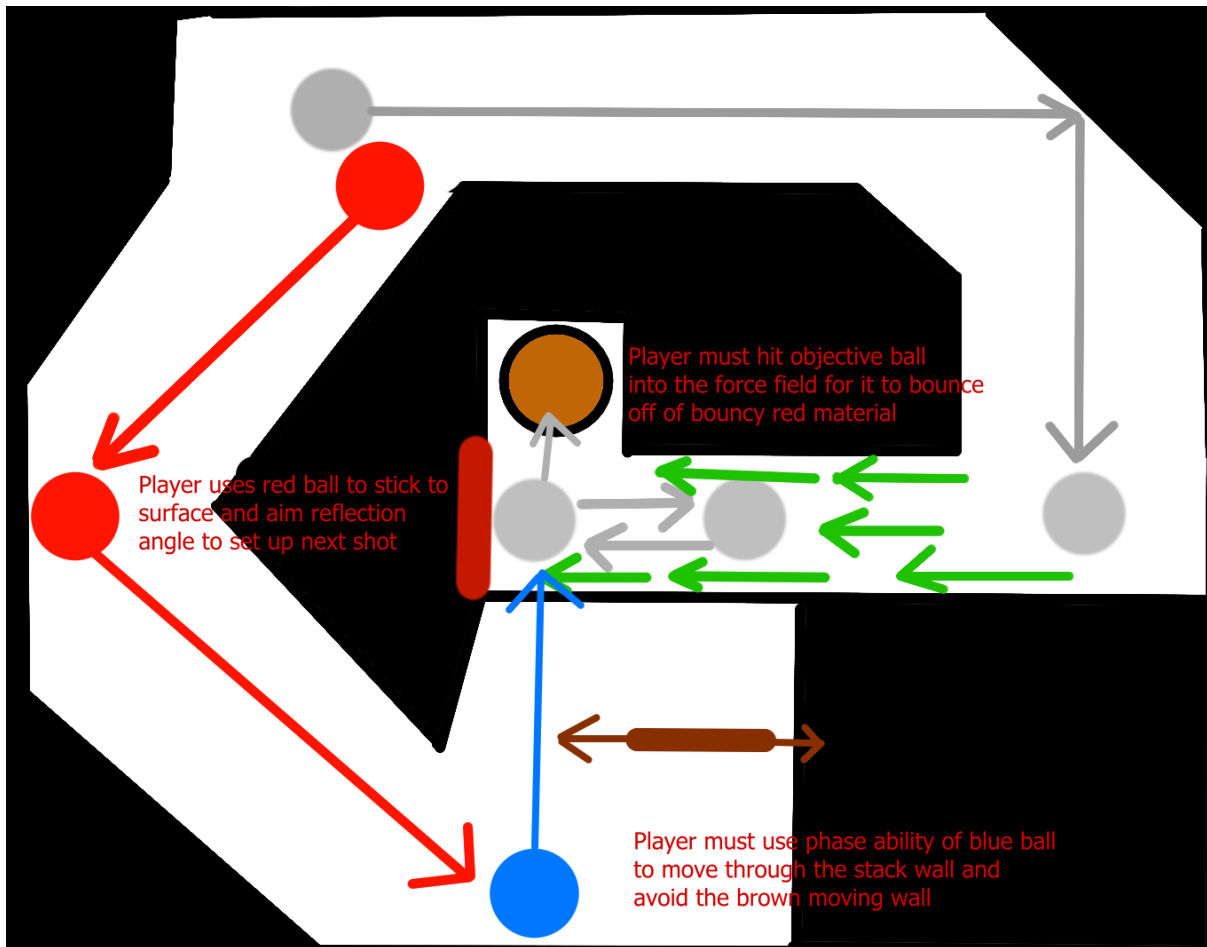


Figure 10: A more complex level requiring both the sticky ability and the phase ability

Figure 10 depicts a level of increased complexity which requires the player to use both the ability ball mechanics illustrated in earlier levels. Again, the player would hit the objective ball off of the reflective surface and into the force field causing it to bounce up and down off of the red bouncy material. The player would then proceed to use the sticky ability mechanic to position the ability ball as shown by the red arrows. The player would then have to use the phase ability to move through the static wall and knock in the objective ball into the pocket. The final shot needs to avoid the moving brown wall and be timed in such a way to hit the objective ball in the right moment during it's bouncing motion.

Game Object and User Interface Concept Variations

Designs and descriptions by Ashish Juggpall

Ability Ball Concepts

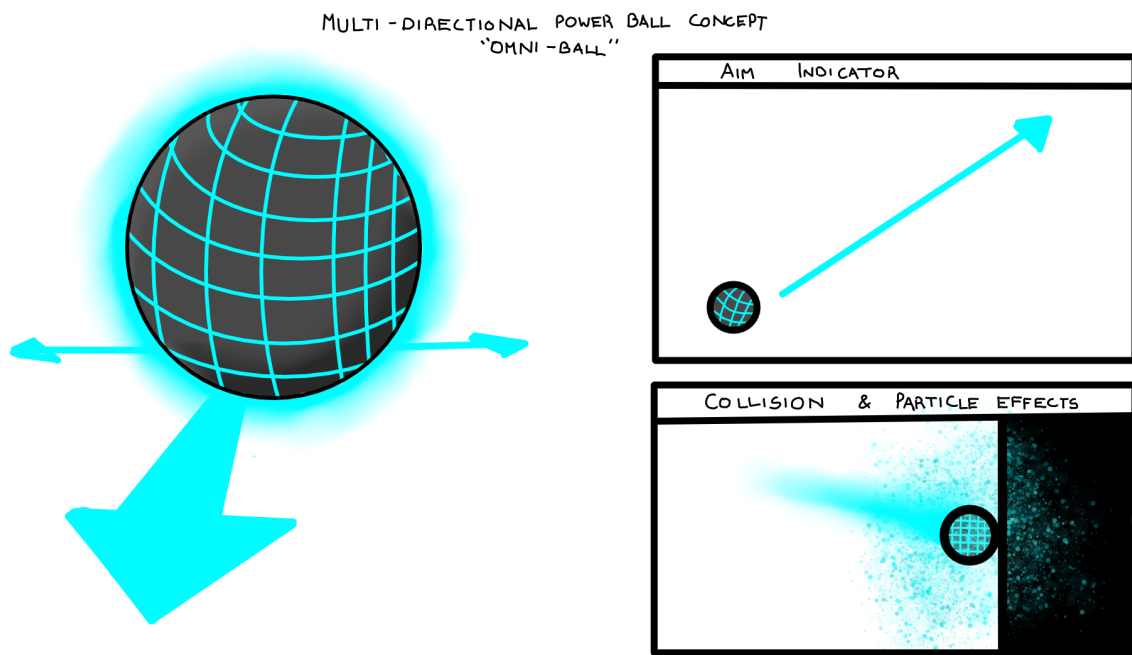


Figure 11 Image showing Omni-Ball Concept Art and ability

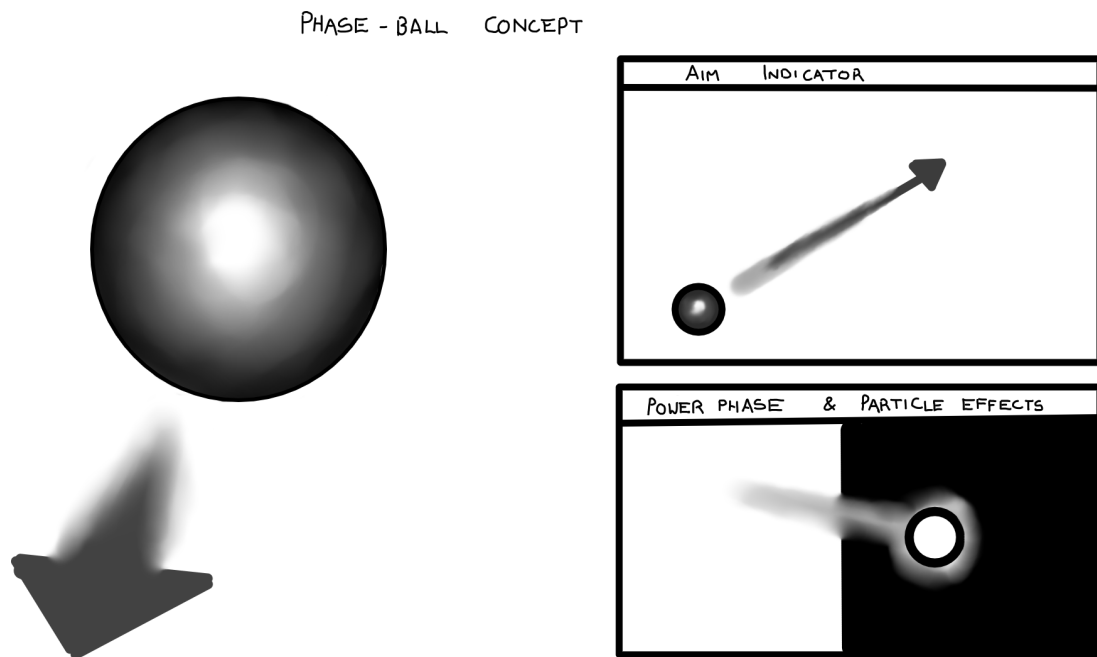


Figure 12 Image showing Phase Ball Concept Art and ability

User Interface Concepts

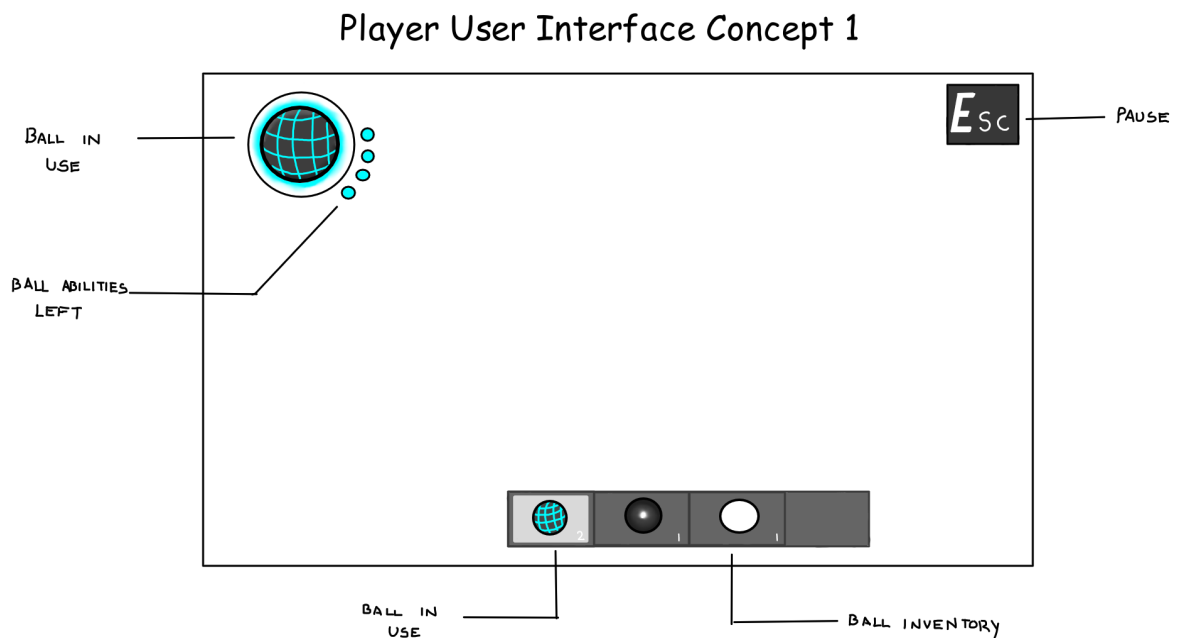


Figure 13 Image showing User Interface Concept Art that we most favour

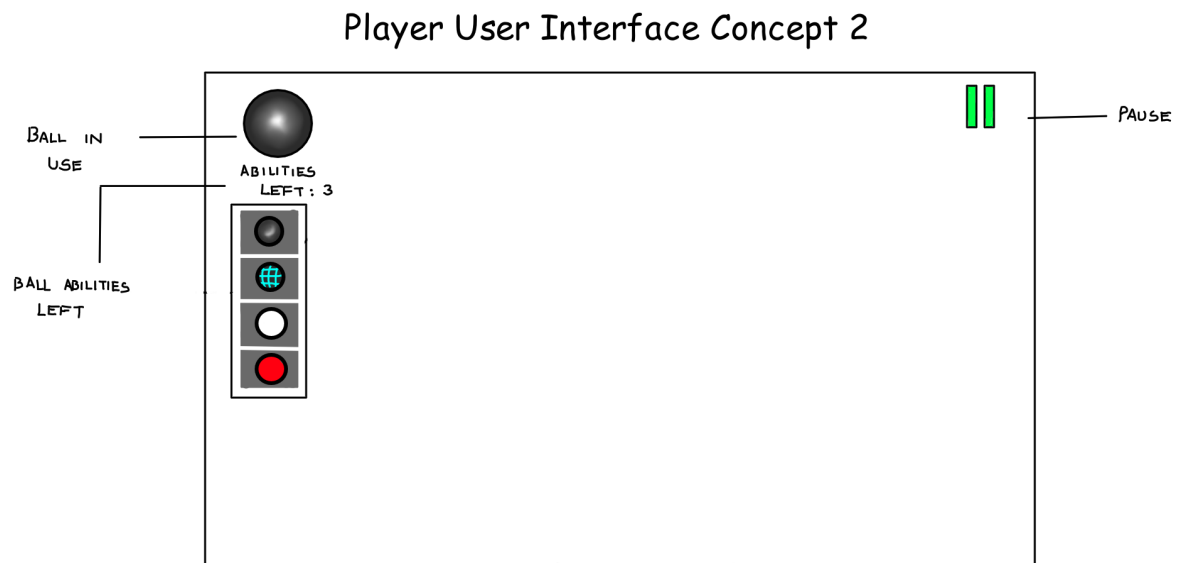


Figure 14 Image showing User Interface Concept Art that we least favoured but still acknowledge