

## Pong Game – design checkpoints

### Checkpoint 1:

*Players can control paddles; the ball starts in the middle, moves in a random direction, and bounces.*

#### Feature Idea # 1.1: The ball sprite

*Get a “ball” sprite and make it bounce freely. After pressing SPACE BAR the ball should start bouncing around the screen.*

#### Feature Idea # 1.2: The two paddles

*Add two paddles. This involves two steps.*

Step 1: *The paddles should move up-down only. The paddle on the left will move with the 'w' and 's' keys. The paddle on the right will move with the up and down arrow keys.*

Step 2: *Make the ball bounce off the paddles.*

#### Feature Idea # 1.3: Serve direction is picked randomly

*After pressing SPACE BAR the ball starts moving either right or left at random.*

### Checkpoint 2:

*The ball speeds up when it hits a paddle, and resets to the middle when it hits the left or right edge.*

#### Feature Idea # 2.1: Speed-up

*When the ball touches either of the paddles, it speeds up slightly. This will involve first, using a variable to control the speed, and then changing the variable when the ball touches a paddle.*

#### Feature Idea # 2.2: The Miss

*If the ball touches the left or right edge of the screen, it should be treated as a “miss”. The game should be paused for a new serve.*

#### Feature Idea # 2.3: Bouncing with random variation

*Add a small random variation to the bouncing of the ball off the paddles. You just need to add/subtract a small angle (whose value is random) to the bouncing angle of the ball.*

### Checkpoint 3:

*A point is scored when the ball hits the edge on the opponent's side of the field; the game ends when one player reaches five points; players can start a new game after the game ends.*

### **Feature Idea # 3.1: Keeping score**

*Add variables to keep score for each player.*

### **Feature Idea # 3.2: Declare game over**

*When one of the players reaches the winning score (5), stop the game and declare who won.*

### **Feature Idea # 3.3: The Start button**

*When the game is over, provide a Start button to begin play once again.*

## **Additional features (optional):**

### **Feature Idea # 1: Help screen**

Add a help screen before starting the game, telling the player which keys to use to move the paddles, about the direction of the serve, etc. All other sprites should hide when the Help screen is up. It should disappear when the game begins.

### **Feature Idea # 2: Avoid vertical drift**

There is a slight problem in our program. Sometimes the ball's direction becomes such that it starts moving more up-down than left-right. Provide a special key to fix this.

### **Feature Idea # 3: Bouncing correctly**

We have implemented the action of “bouncing” off the paddles with an arbitrary angle. Make it more realistic (using law of reflection). Here are the laws for the “direction” property of a sprite:

- When a sprite bounces off the left or right edge (of the screen), its direction changes only in sign. So, 30 becomes -30, -110 becomes 110, and so on.
- When a sprite with initial direction  $A$  bounces off the top or bottom edge, after bouncing its direction becomes  $180-A$ .

*Author: Abhay B. Joshi (abjosshi@yahoo.com)*

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