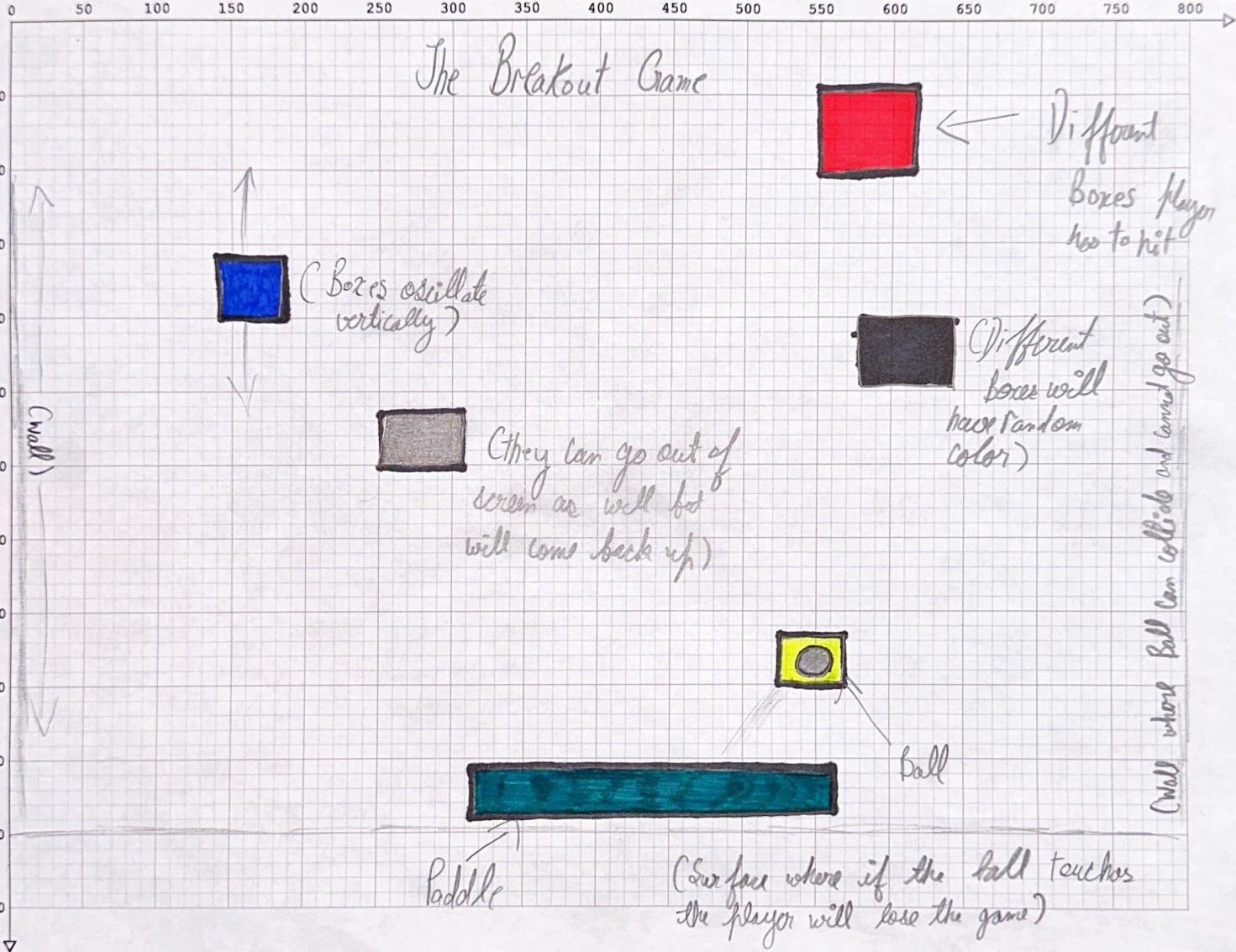
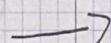


The Breakout Game



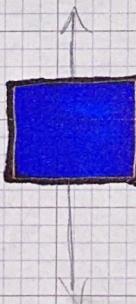
(Boxes)

Different boxes have different colors



Get them to oscillate vertically

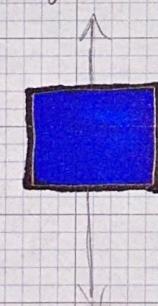
- ① Define Oscillation Phase first. (Vertically)
- ② Track the oscillation so it doesn't just stay either up or down.
- ③ Update the oscillation phase over time.



To create smooth movement: Use Math.Sin

Position.Y += (float) Math.Sin (Current Oscillation Phase)

* Vertical Oscillation Amplitude; Then integrate into update.



To track oscillation phase use:

float current oscillation phase = 0.0f

To update: current oscillation phase += Time.DeltaTime * oscillation frequency;

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800



→ Moved using Mouse

Only has collision with the ball and does not collide with the Boxes.

Paddle

Collision with the Ball:

- If the bottom of the ball



touches the top of the Paddle, the vertical velocity is reversed to make the ball bounce upwards. ($velocity.Y^* = -1$);

① Check if Box is a Paddle

- `isPaddle` is true

② Set Paddle position with Mouse Input

- `Position.X = Input.GetMouseX()`

- `(size.X / 2);`

C This will center the paddle with respect to mouse

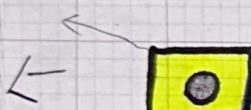
③ Set Paddle's Y Position

- `Position.Y = Window.Height - 60;`

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800

2 things to check, ball
collision with wall and
with paddle.

Collisions for Ball and Box



C Check if the ball
collides with the boundaries
of the screen)

For Paddle : we have
to check for 2 moving
objects, the paddle (controlled
by user) and the Ball.

Create a method isColliding with Box
Check and compare the positions
of the ball and box if they

overlap each other. →

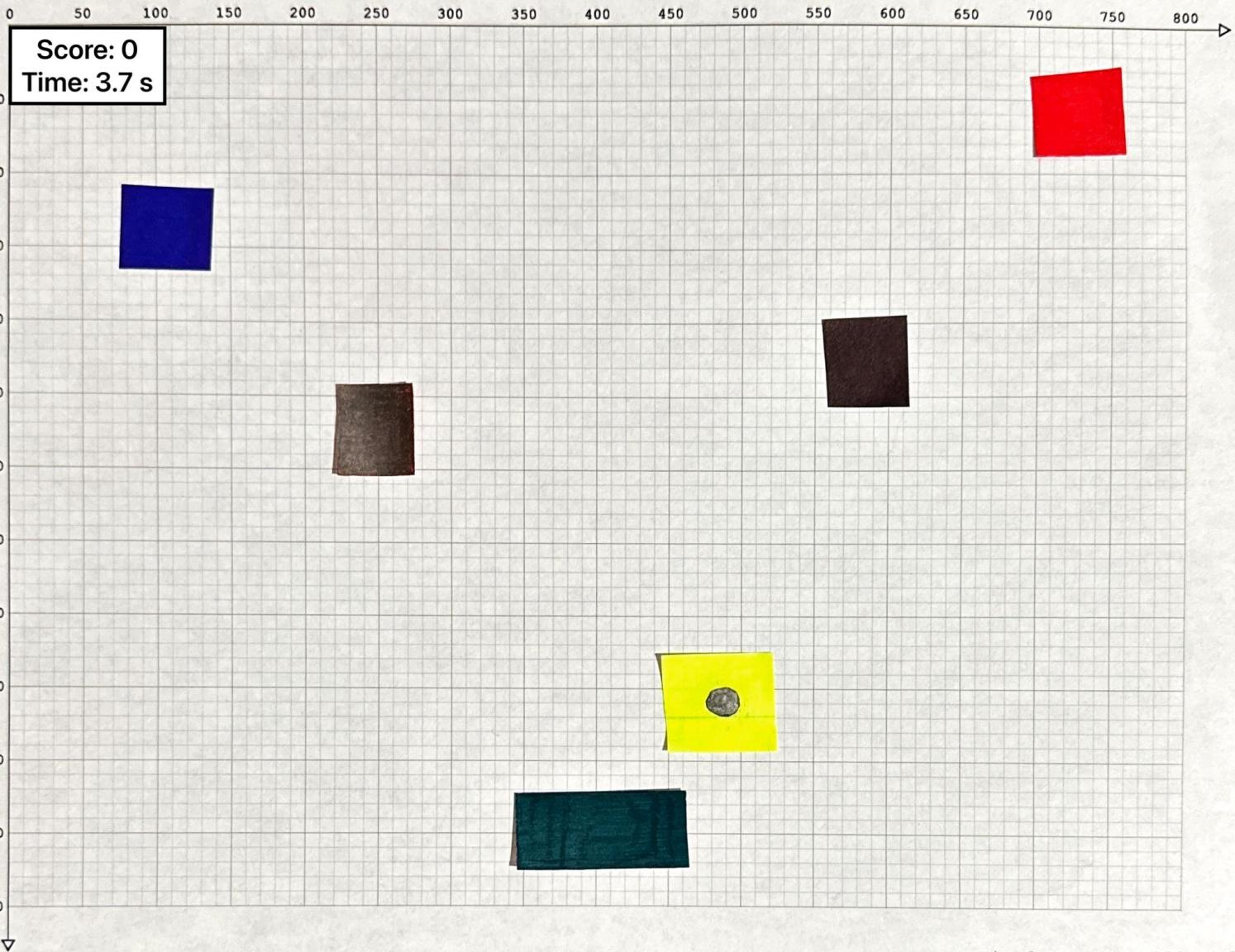


For Horizontal boundaries:
Use Position.X to see if
it exceeds left or right
edge of the well.

For Vertical : Use Position.Y
to check for top or bottom
edge of the well

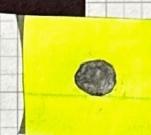
Use if Position.X or Y exceeds
Window. Width or Height, player
loses.

- ① Define Ball and Box's edges
- ② Check if there are any overlapping edges.
- ③ If conditions are true, there is a collision



0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800

Score: 0
Time: 7.3 s

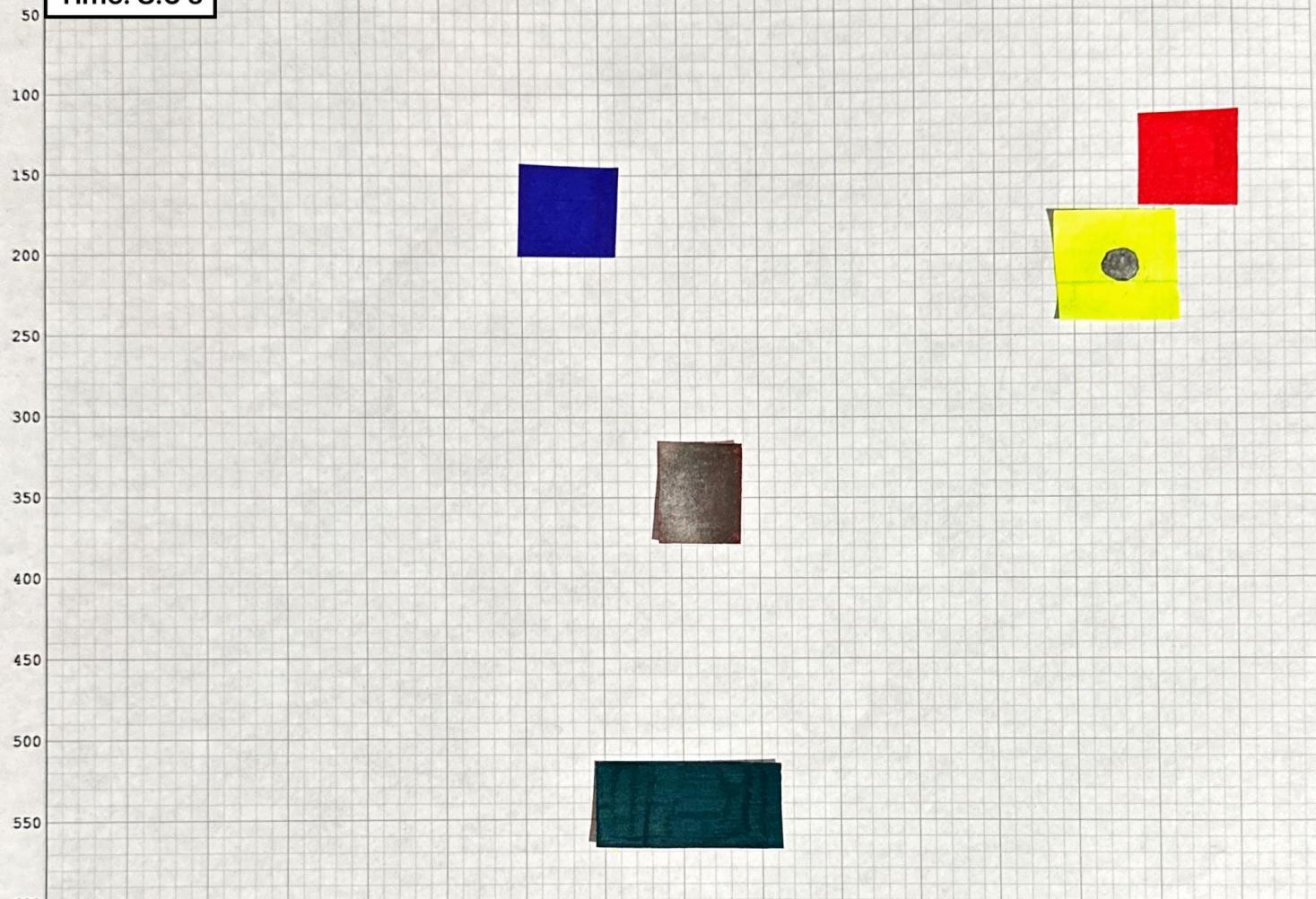


▼

Pixel Paper - 800 x 600
Graph Paper for Screen Coordinates

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800

Score: 1
Time: 8.6 s

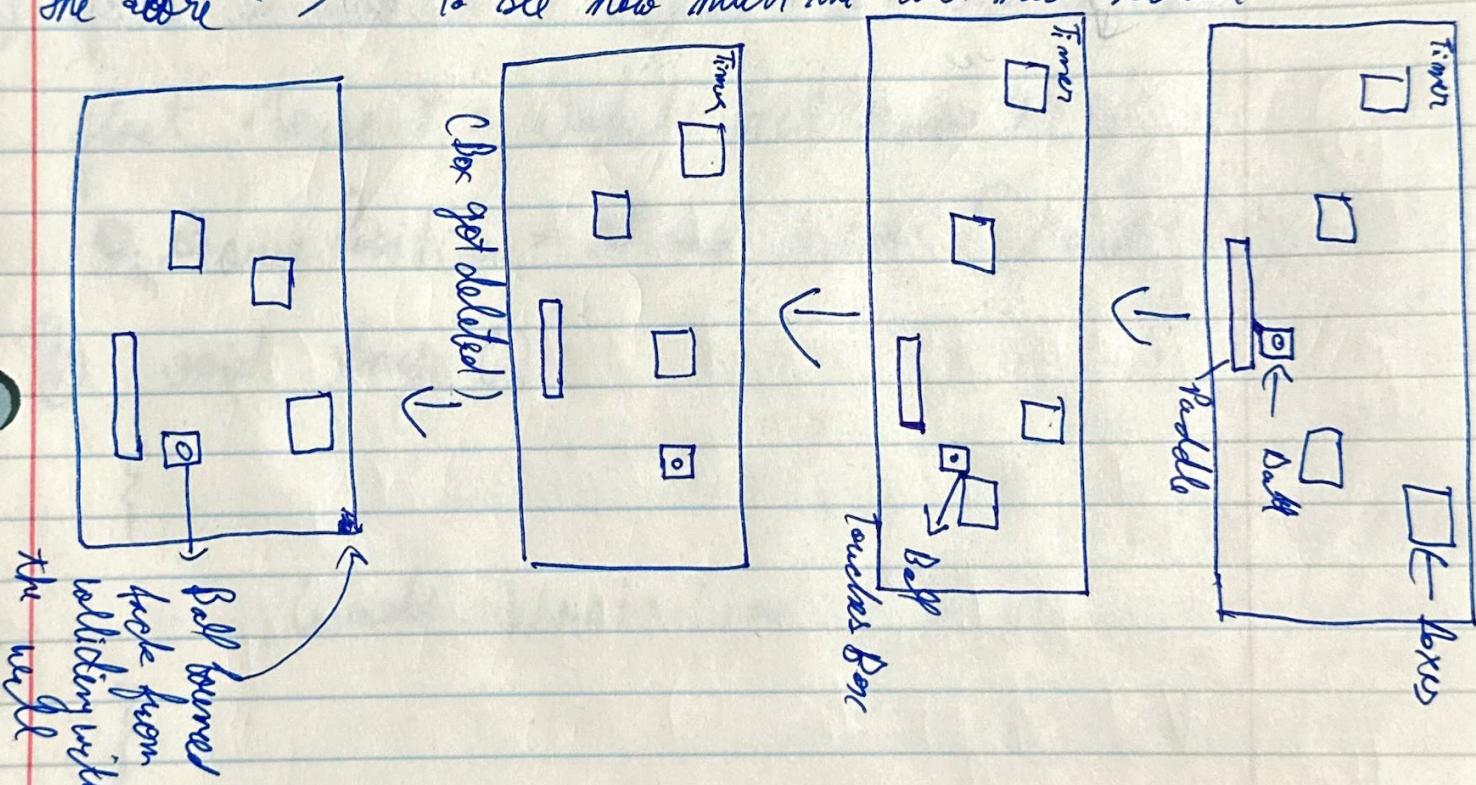


▼

The Breakout Game

Things to work out so:

- ① The Paddle → which is the base of the game
- ② The Ball → which is the main object
- ③ The Boxes → which is the main obstacle of the game.
- ④ The Timer → To see how much time a user took to win
- ⑤ The Score → To see how much the user has scored.



Controls: W A S D ⌘ and Mouse

To delete the boxes once the ball makes the contact with one of the box

(Box got deleted) → (Paddle)

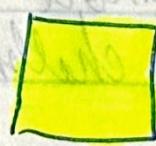
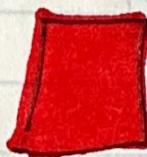
To control the paddle →

Collision: Make it so ① Ball bounces off the Paddle and ② the ~~box~~ boxes bounces off the ball as well.

Boxes are vertically oscillating randomly throughout the screen.

Timer is on the top left corner which could be used to see how much time the user took to win.

Make Boxes have different color each new game when started.



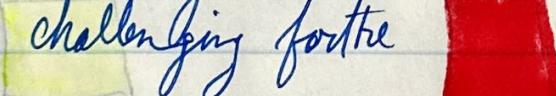
(Different colored Boxes each time)

3 Classes: Game, Box, Ball

Has all the components to run the game

Has all the components for the Boxes to function properly + the Paddle.

Has the components for the Ball.

- ① Use Random. Color for Random color of Boxes
Random. Float for random direction of the Boxes
- ② Have the Ball and Boxes' movement scaled by Time.Delta time which will give frame-rate independent
- ③ Have the speed of the ball and the Boxes be reduced a bit every collision ~~($f = 0.95$)~~
(movementSpeed * = 0.95 f)
- ④ Oscillation (Vertical) for the boxes so they are more dynamic and less predictable in turn more challenging for the user.


- ⑤ Game Win and lose screen for the user to know when they win or lose.
- ⑥ Score tracking and timer so user knows how much time they took for the score they have.