

## Sandbox | CMU CS Academy

```
1 #Pong
2 BigNumber=Label(5,200,200,opacity=50,fill='gray',size=60)
3 Player=Rect(0,175,5,50)
4 NonPlayer=Rect(395,175,5,50)
5 Ball=Circle(10,200,7)
6 Bounce1=Oval(10,200,10,19.6,visible=False)
7 Bounce2=Oval(10,200,12,16.3,visible=False)
8 Bounce3=Oval(10,200,13,15,visible=False)
9 Bounce4=Oval(10,200,16.3,12,visible=False)
10 Var=[4,randrange(45,135),0,200,0,0,6,0,255,0,0,-1]
11
12 #Var[BallSpeed, BallAngle, DistanceFromCenterOfPaddle, AITargetYValue,
13 #BallSlope, AIVariation, BeginningCountdown, onStepRestrict, redValue,
14 #greenValue, blueValue, animationStage]
15
16 Ball.dx=Var[0]*dsin(Var[1])
17 Ball.dy=Var[0]*dcos(Var[1])
18 Ball.visible=False
19 BigNumber.visible=False
20 ROF=Label('OFF',200,315,size=15)
21 Title=Group(
22     Rect(15,75,370,50,fill='mistyRose',border='red'),
23     Label("Rapid Ricochet",200,100,size=40),
24     Label('Use mouse to interact with buttons',200,360,opacity=70),
25     Label('Up and Down Arrow Keys control the left paddle',200,375,opacity=70)
26 )
27 Play=Group(
28     Oval(200,200,150,75,fill='honeydew',border='lime'),
29     Label('Play',200,200,size=20)
30 )
31 Rainbow=Group(
32     Oval(200,300,150,75,fill='aliceBlue',border='blue'),
33     Label('Rainbow Ball',200,295,size=20),
34     ROF
35 )
36 GameOver=Group(
37     Label('Game Over',200,150,size=40,opacity=70),
38     Label('Game Over',200,150,size=38,opacity=40),
39     Label('Game Over',200,150,size=36,opacity=30)
40 )
41 GameOver.visible=False
42 Win=Group(
43     Label('You Win!',200,250,size=40,opacity=70),
44     Label('You Win!',200,250,size=38,opacity=40),
45     Label('You Win!',200,250,size=36,opacity=30)
46 )
47 Win.visible=False
48 Lose=Group(
49     Label('You Lose!',200,250,size=40,opacity=70),
50     Label('You Lose!',200,250,size=38,opacity=40),
51     Label('You Lose!',200,250,size=36,opacity=30)
52 )
53 Lose.visible=False
54 Replay=Group(
55     Oval(100,320,150,75,fill='aliceBlue',border='blue'),
56     Label('Replay',100,320,size=20)
57 )
58 Replay.visible=False
59 MainMenu=Group(
60     Oval(300,320,150,75,fill='ghostWhite',border='purple'),
61     Label('Main Menu',300,320,size=20)
62 )
63 MainMenu.visible=False
64 def onMousePress(mouseX,mouseY):
65     if Play.hits(mouseX,mouseY) and Play.visible==True:
66         Title.visible=False
67         Play.visible=False
68         Rainbow.visible=False
69         Var[7]=1
70         Ball.visible=True
71         BigNumber.visible=True
72         app.stepsPerSecond=1.5
73         AResponse()
```

```

74     if Rainbow.hits(mouseX,mouseY) and Rainbow.visible==True:
75         if ROF.value=='OFF':
76             ROF.value='ON'
77             Ball.border='black'
78             Ball.borderWidth=1
79         else:
80             ROF.value='OFF'
81             Ball.border=None
82             Ball.fill='black'
83     if Replay.hits(mouseX,mouseY) and Replay.visible==True:
84         Replay.visible=False
85         MainMenu.visible=False
86         Ball.centerX=10
87         Ball.centerY=200
88         Var[0]=4
89         Var[1]=randrange(45,135)
90         Var[7]=1
91         Var[6]=6
92         app.stepsPerSecond=1.5
93         GameOver.visible=False
94         Lose.visible=False
95         Win.visible=False
96         Ball.dx=Var[0]*dsin(Var[1])
97         Ball.dy=Var[0]*dcos(Var[1])
98         Player.centerY=200
99         Aresponse()
100        BigNumber.value=5
101    if MainMenu.hits(mouseX,mouseY) and MainMenu.visible==True:
102        Replay.visible=False
103        MainMenu.visible=False
104        Ball.visible=False
105        Ball.centerX=10
106        Ball.centerY=200
107        Var[0]=4
108        Var[1]=randrange(45,135)
109        Var[7]=0
110        Var[6]=6
111        Title.visible=True
112        Play.visible=True
113        Rainbow.visible=True
114        GameOver.visible=False
115        Lose.visible=False
116        Win.visible=False
117        Ball.dx=Var[0]*dsin(Var[1])
118        Ball.dy=Var[0]*dcos(Var[1])
119        Player.centerY=200
120        BigNumber.value=5
121    def onKeyHold(keys):
122        if Var[7]==2:
123            if ('down' in keys) and (Player.bottom<400):
124                Player.centerY+=5
125            if ('up' in keys) and (Player.top>0):
126                Player.centerY-=5
127    def onStep():
128        if Var[7]==1:
129            if Var[6]!=0:
130                Var[6]-=1
131                BigNumber.value=Var[6]
132            else:
133                Var[7]=2
134                app.stepsPerSecond=30
135        if Var[7]==2:
136            Ball.centerX+=Ball.dx
137            Ball.centerY+=Ball.dy
138            if (Ball.bottom>=400) and GameOver.visible==False:
139                Ball.dy=-Ball.dy
140                Ball.bottom=400
141            if (Ball.top<=0) and GameOver.visible==False:
142                Ball.dy=-Ball.dy
143                Ball.top=0
144            if (Ball.hitsShape(Player)==True):
145                Bounce(1,Player.centerY)
146                Aresponse()
147            if (Ball.hitsShape(NonPlayer)==True):
148                Bounce(-1,NonPlayer.centerY)
149                Var[3]=200

```

```

150         Var[5]=-13
151     if (NonPlayer.centerY<Var[3]) and (abs(NonPlayer.centerY-Var[3])>
152     (15+Var[5])) and NonPlayer.bottom<400:
153         NonPlayer.centerY+=3
154     elif NonPlayer.centerY>Var[3] and (abs(NonPlayer.centerY-Var[3])>
155     (15+Var[5])) and NonPlayer.top>0:
156         NonPlayer.centerY-=3
157     Var[6]+=.05
158     Var[0]=8/(1+(2.71828**(-.05*(Var[6]-5))))
159     if ROF.value=='ON': #Rainbow Effects
160         if((Var[8]>0)and(Var[9]<255)and(Var[10]==0)):
161             Var[9]+=1
162         elif((Var[8]>0)and(Var[9]==255)and(Var[10]<255)):
163             Var[8]-=1
164             Var[10]+=1
165         elif((Var[8]==0)and(Var[9]>0)and(Var[10]==255)):
166             Var[9]-=1
167         elif((Var[8]<255)and(Var[9]==0)and(Var[10]==255)):
168             Var[8]+=1
169         elif((Var[8]==255)and(Var[9]==0)and(Var[10]>0)):
170             Var[10]-=1
171         Ball.fill=rgb(Var[8],Var[9],Var[10])
172     if abs(200-Ball.centerX)>210: #Game over detection and score analysis
173         Replay.visible=True
174         MainMenu.visible=True
175         GameOver.visible=True
176         if (BigNumber.value%2)==0:
177             Win.visible=True
178         else:
179             Lose.visible=True
180     if Var[11]!=-1:
181         Bounce(0,0)
182 def Bounce(dir,encounteredObject):
183     Var[2]=encounteredObject-Ball.centerY
184     if (abs(Var[2])>27) and abs(Ball.centerX-200)>196:
185         Ball.dy*=-1
186     elif Var[11]==-1 and not((abs(Var[2])>27) and abs(Ball.centerX-200)>196):
187         Var[1]=angleTo(Ball.centerX,Ball.centerY,Ball.centerX+Ball.dx,
188         Ball.centerY+Ball.dy)
189         Var[1]+=.8*Var[2]*dir
190         Ball.dx=-Var[0]*dsin(Var[1])
191         Ball.dy=-Var[0]*dcos(Var[1])
192         Ball.centerX+=2*dir
193         BigNumber.value+=1
194         Var[11]=9
195         Var[1]=dir
196     if Var[11]==0 or Var[11]==1:
197         Ball.visible=True
198         Bounce4.visible=False
199         Var[11]-=1
200     elif Var[11]==8 or Var[11]==9:
201         Ball.visible=False
202         Bounce1.visible=True
203         Bounce1.centerX=Ball.centerX-(Var[1]*3)
204         Bounce1.centerY=Ball.centerY
205         Bounce1.fill=Ball.fill
206         Bounce1.borderWidth=Ball.borderWidth
207         Bounce1.border=Ball.border
208         Var[11]-=1
209     elif Var[11]==6 or Var[11]==7:
210         Bounce1.visible=False
211         Bounce2.visible=True
212         Bounce2.centerX=Ball.centerX-(Var[1]*3)
213         Bounce2.centerY=Ball.centerY
214         Bounce2.fill=Ball.fill
215         Bounce2.borderWidth=Ball.borderWidth
216         Bounce2.border=Ball.border
217         Var[11]-=1
218     elif Var[11]==4 or Var[11]==5:
219         Bounce3.visible=True
220         Bounce2.visible=False
221         Bounce3.centerX=Ball.centerX-(Var[1]*2)
222         Bounce3.centerY=Ball.centerY
223         Bounce3.fill=Ball.fill
224         Bounce3.borderWidth=Ball.borderWidth
225         Bounce3.border=Ball.border

```

```

226     Var[11]-=1
227     elif Var[11]==2 or Var[11]==3:
228         Bounce3.visible=False
229         Bounce4.visible=True
230         Bounce4.centerX=Ball.centerX-(Var[1]*1)
231         Bounce4.centerY=Ball.centerY
232         Bounce4.fill=Ball.fill
233         Bounce4.borderWidth=Ball.borderWidth
234         Bounce4.border=Ball.border
235         Var[11]-=1
236     def AResponse():
237         Var[4]=Ball.dy/Ball.dx
238         if Var[4]<0:
239             Var[3]=abs(Var[4])*abs(abs(abs(abs(abs(393-((2000+Ball.centerY)/
240                 abs(Var[4])))-(400/abs(Var[4])))-(400/abs(Var[4])))-(400/abs(Var[4]))
241                 -(400/abs(Var[4])))-(400/abs(Var[4]))))
242         else:
243             Var[3]=Var[4]*abs(abs(abs(abs(abs(393-((2000-Ball.centerY)/
244                 Var[4])))-(400/Var[4])))-(400/Var[4]))-(400/Var[4]))-(400/Var[4]))
245             -(400/Var[4]))
246         Var[5]=randrange(-10,15)

```