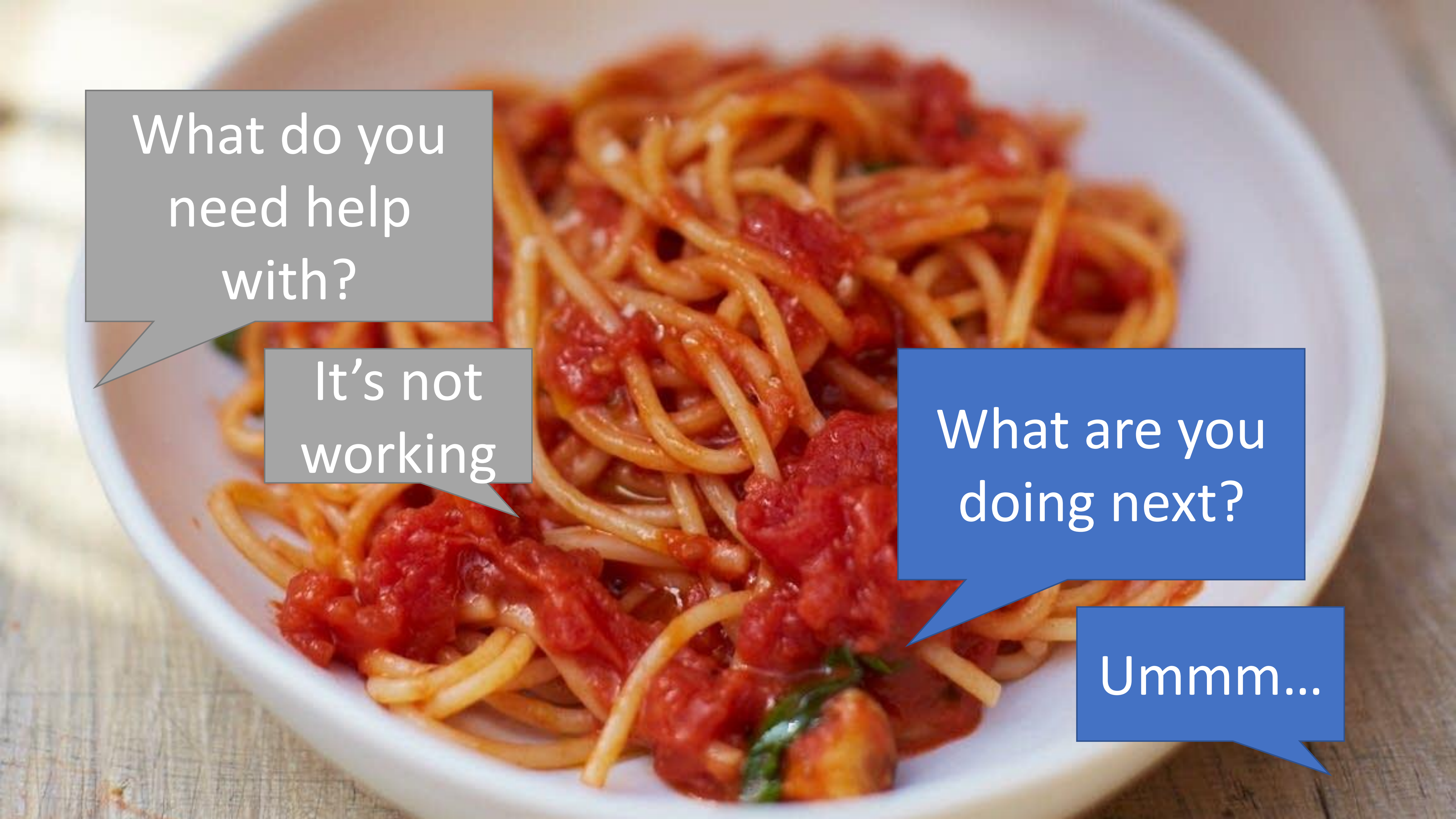
# Planning the Final Project

Sheets 3.10 (Indenting Code) and Sheet 3.11 (Patterns of Movement)

# Preventing Spaghetti Code



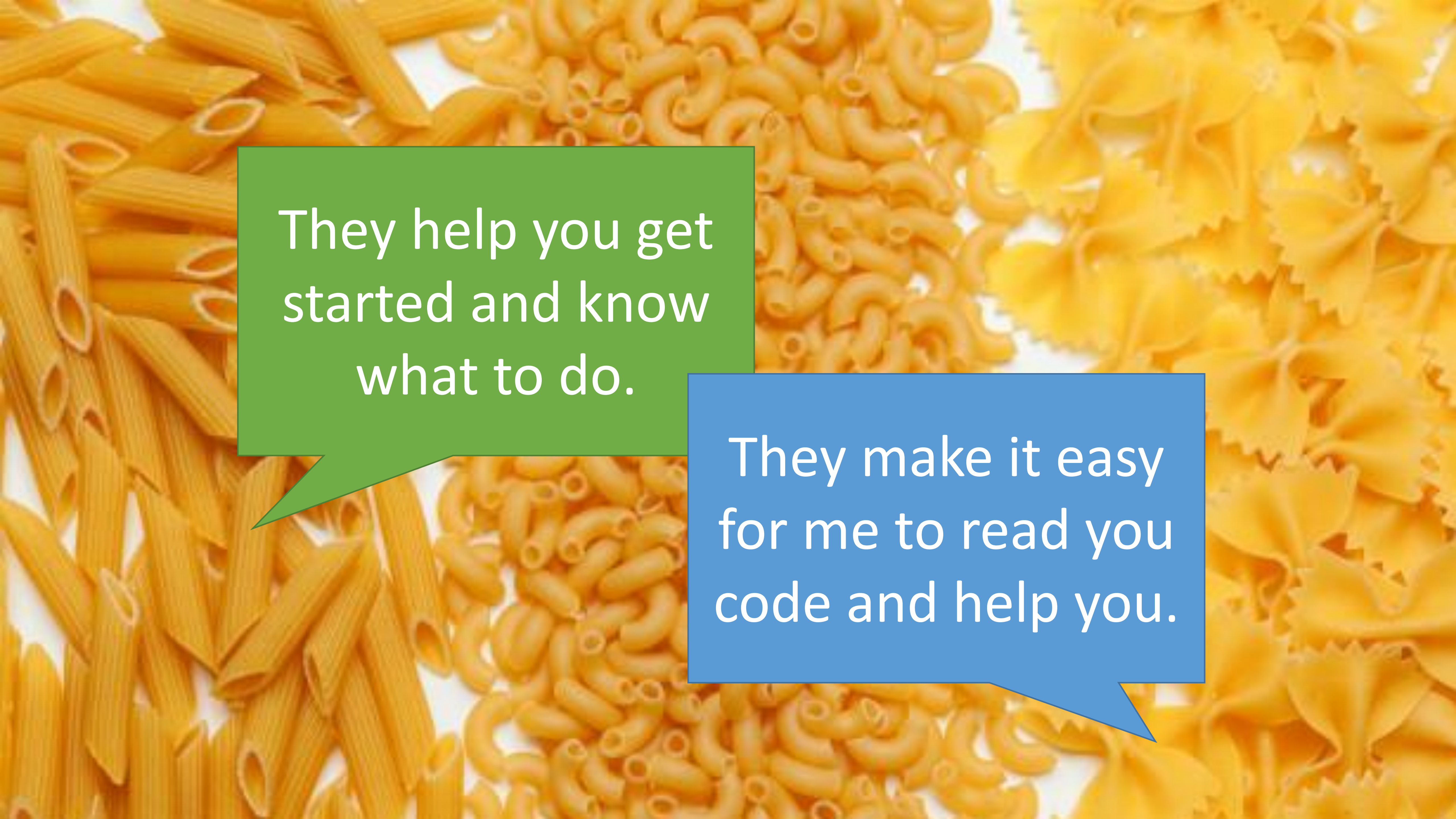
What do you need help with?

It's not working

What are you doing next?

Ummm…

Organization and Readability is our goal!

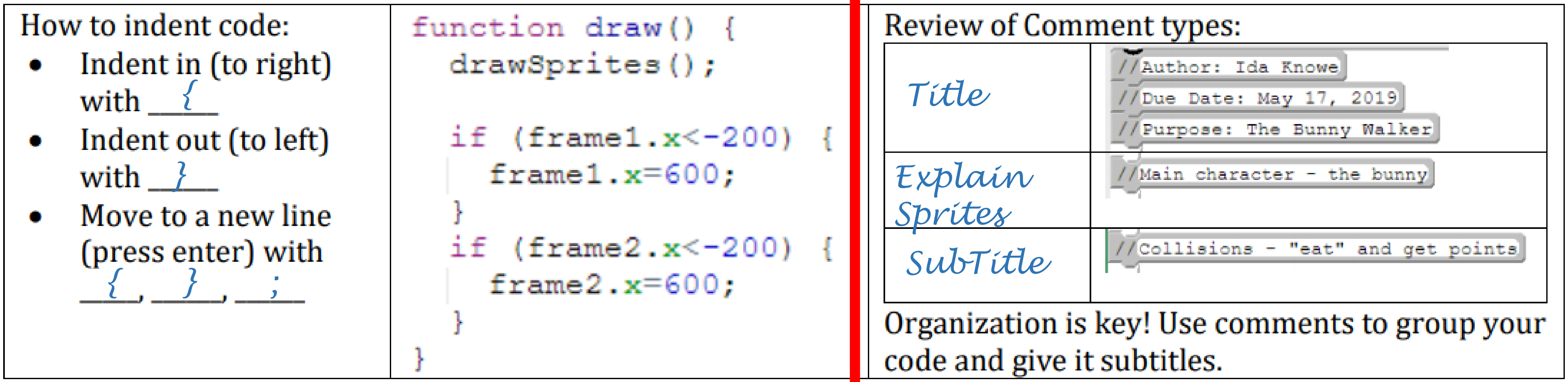


They help you get started and know what to do.

They make it easy for me to read you code and help you.

# Indenting Code

3.10 C



How to indent code:

- Indent in (to right) with {
- Indent out (to left) with }
- Move to a new line (press enter) with {, }, ;

```
function draw() {
  drawSprites();

  if (frame1.x<-200) {
    frame1.x=600;
  }
  if (frame2.x<-200) {
    frame2.x=600;
  }
}
```

Review of Comment types:

| | |
|---|---|
| Title | //Author: Ida Knowe<br>//Due Date: May 17, 2019<br>//Purpose: The Bunny Walker |
| Explain Sprites | //Main character - the bunny |
| SubTitle | //Collisions - "eat" and get points |

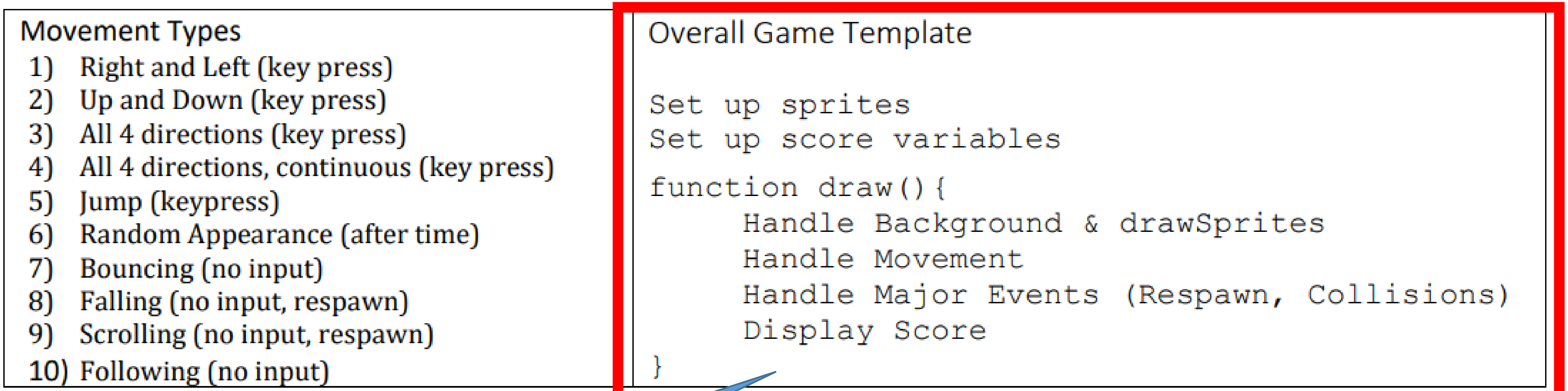
Organization is key! Use comments to group your code and give it subtitles.

Start your code with comments!

Fill in the code as you go.

# Patterns of Movement

3.11 T



Movement Types

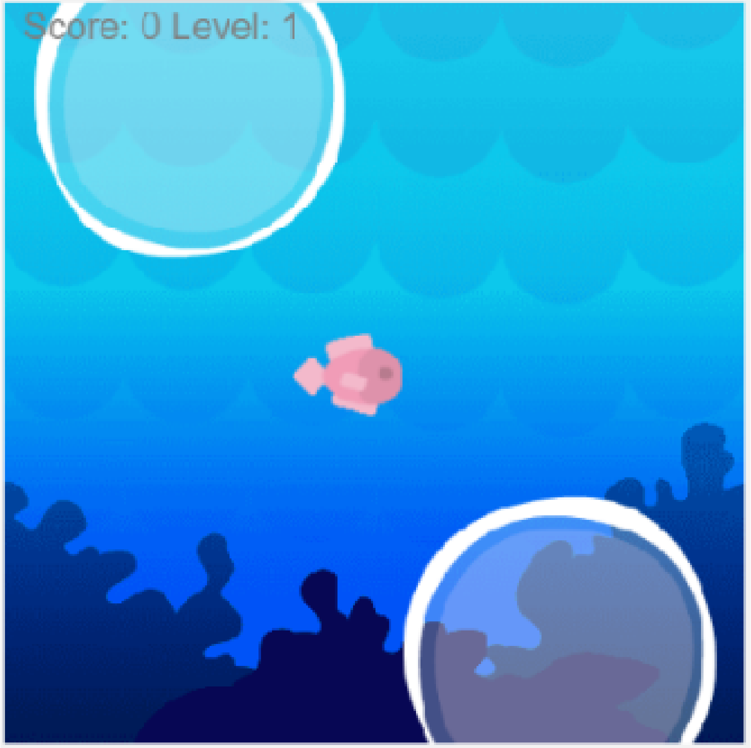
1) Right and Left (key press)
2) Up and Down (key press)
3) All 4 directions (key press)
4) All 4 directions, continuous (key press)
5) Jump (keypress)
6) Random Appearance (after time)
7) Bouncing (no input)
8) Falling (no input, respawn)
9) Scrolling (no input, respawn)
10) Following (no input)

Overall Game Template

```
Set up sprites
Set up score variables
function draw(){
     Handle Background & drawSprites
     Handle Movement
     Handle Major Events (Respawn, Collisions)
     Display Score
}
```

These are the comments to start with

Applying the Template to Level Up Swimmer

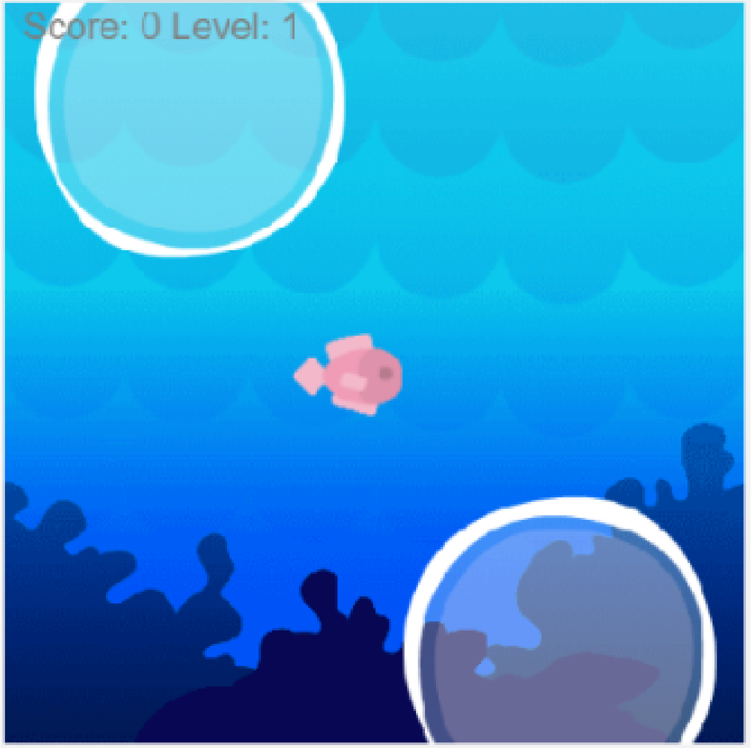


```
//Set up sprites
Background: ____________________
Hero: _______________________
Enemy: _______________________
//Set up score variables

__________________________


function draw(){
     Handle Background: ____________________
     drawSprites();
     //Handle Movement
     Hero Movement: _______________________
     Enemy Movement: ______________________
     //Handle Major Events
     Collisions: ____________
     Respawn: _______________
     Level Up: ______________
     //Display Score
}
```

The comments are also good for planning your program.

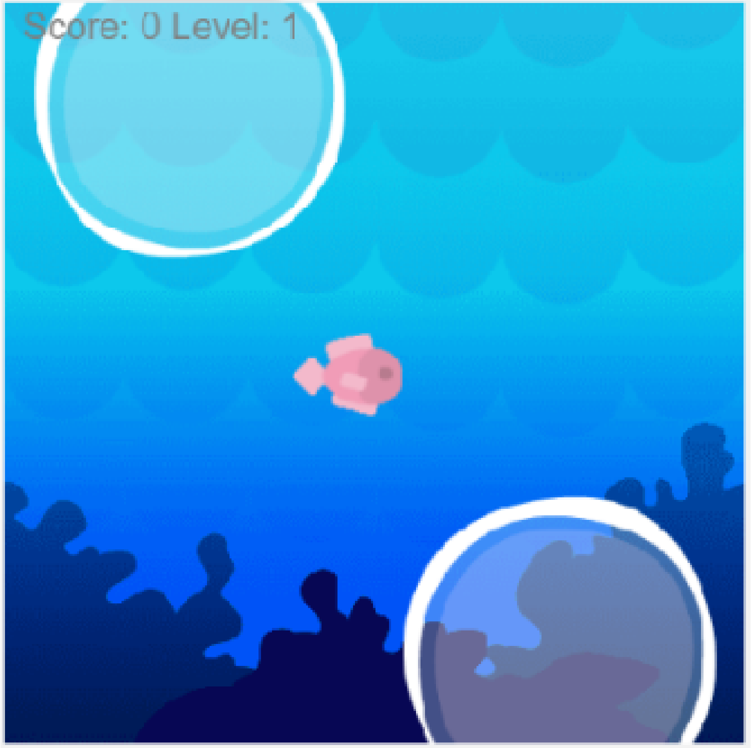
Let’s apply that now

Applying the Template to Level Up Swimmer



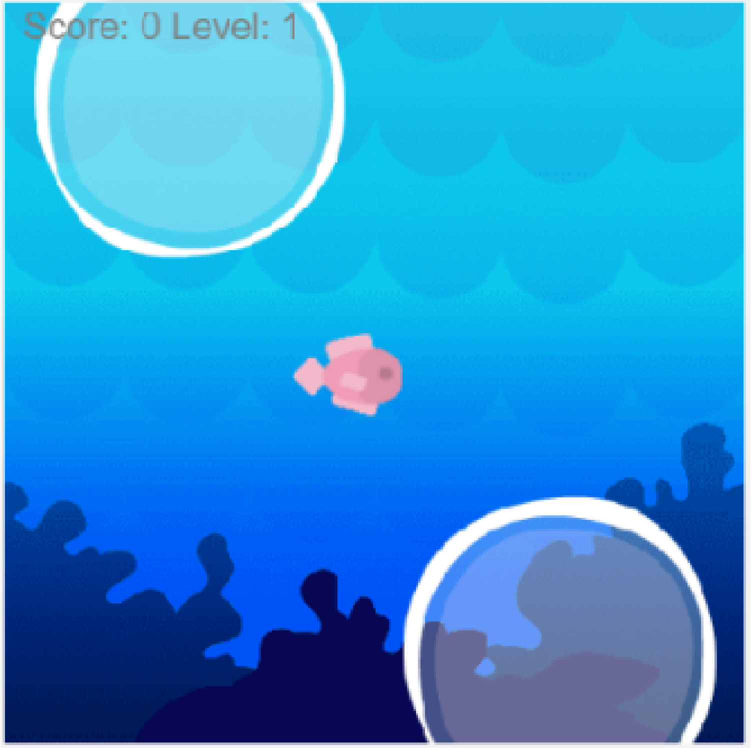
```
//Set up sprites
Background: ______________________
Hero: ______________________
Enemy: ______________________
//Set up score variables

_________________________


function draw(){
     Handle Background: ____________________
     drawSprites();
     //Handle Movement
     Hero Movement: ______________________
     Enemy Movement: _____________________
     //Handle Major Events
     Collisions: _________________________
     Respawn: ____________________________
     Level Up: ____________________________
     //Display Score
}
```

## Applying the Template to Level Up Swimmer



```
//Set up sprites
Background: _Underwater_____________
Hero: _____________________________
Enemy: _____________________________
//Set up score variables
____________________________


function draw(){
     Handle Background: _____________________
     drawSprites();
     //Handle Movement
     Hero Movement: _______________________
     Enemy Movement: ______________________
     //Handle Major Events
     Collisions: __________________________
     Respawn: _____________________________
     Level Up: _____________________________
     //Display Score
}
```

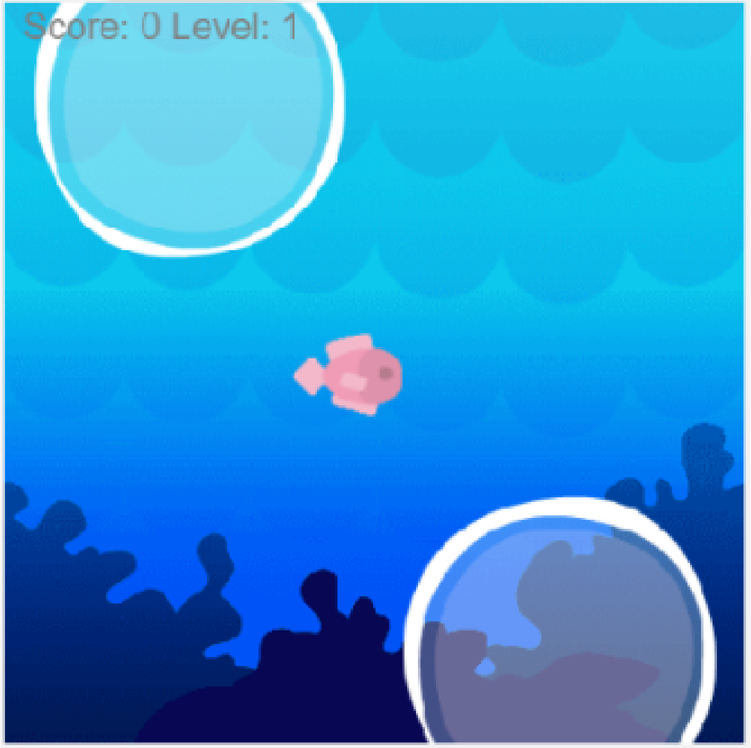
Applying the Template to Level Up Swimmer



Score: 0 Level: 1

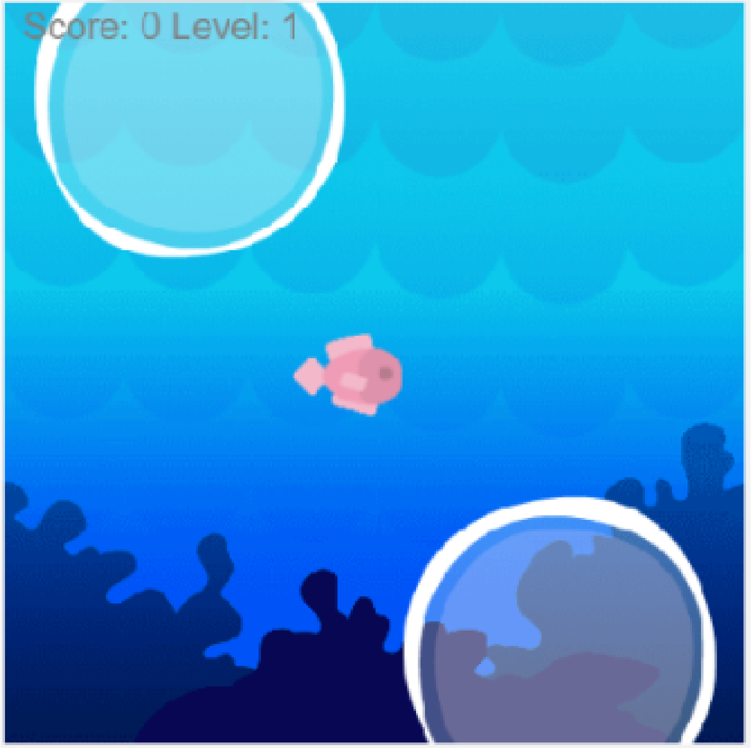
```
//Set up sprites
Background: Underwater____________
Hero: Pink Fish___________________
Enemy: ____________________________
//Set up score variables
___________________________________

function draw(){
      Handle Background: ___________________
      drawSprites();
      //Handle Movement
      Hero Movement: ______________________
      Enemy Movement: _____________________
      //Handle Major Events
      Collisions: _________________________
      Respawn: ____________________________
      Level Up: ___________________________
      //Display Score
}
```

Applying the Template to Level Up Swimmer



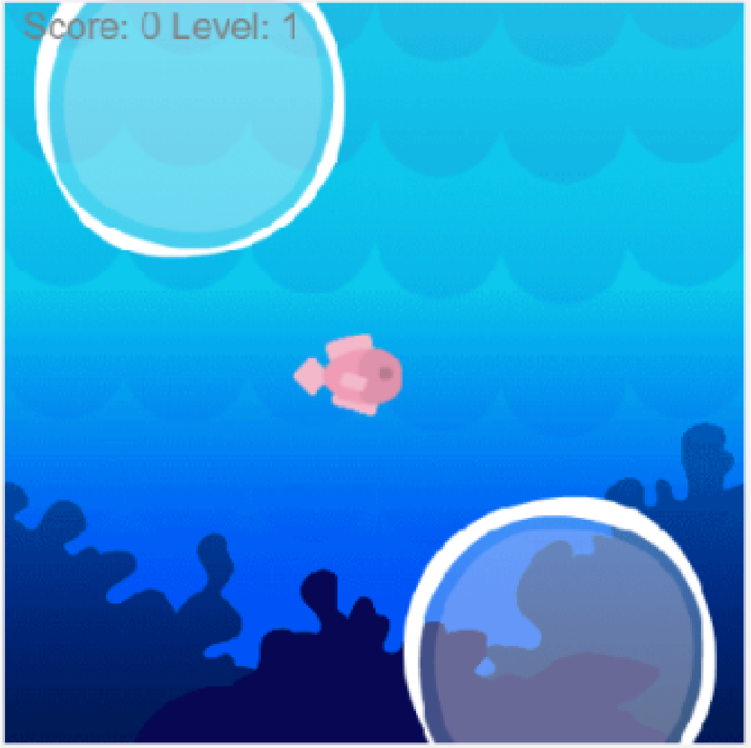
```
//Set up sprites
Background: __Underwater______________
Hero: __Pink Fish_____________
Enemy: __Bubble 1, Bubble 2____
//Set up score variables

______________________________


function draw(){
     Handle Background: _______________________
     drawSprites();
     //Handle Movement
     Hero Movement: ___________________________
     Enemy Movement: __________________________
     //Handle Major Events
     Collisions: ______________________________
     Respawn: _________________________________
     Level Up: _________________________________
     //Display Score
}
```

Applying the Template to Level Up Swimmer



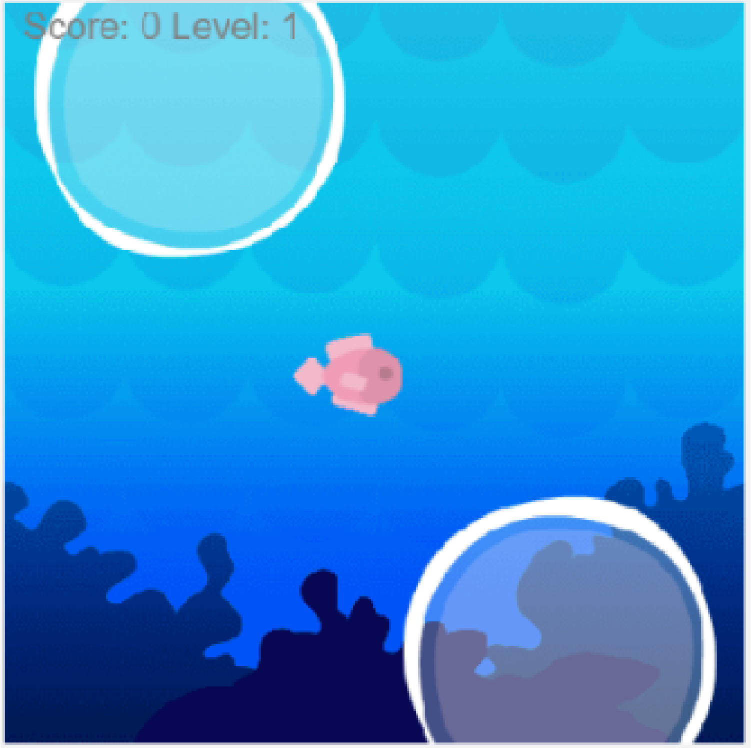
```
//Set up sprites
Background: _Underwater_________________
Hero: _Pink Fish_________________
Enemy: _Bubble 1, Bubble 2_____
//Set up score variables
_Score, Level_______________________

function draw(){
      Handle Background: ____________________
      drawSprites();
      //Handle Movement
      Hero Movement: ______________________
      Enemy Movement: _____________________
      //Handle Major Events
      Collisions: _________________________
      Respawn: ____________________________
      Level Up: ___________________________
      //Display Score
}
```

Applying the Template to Level Up Swimmer



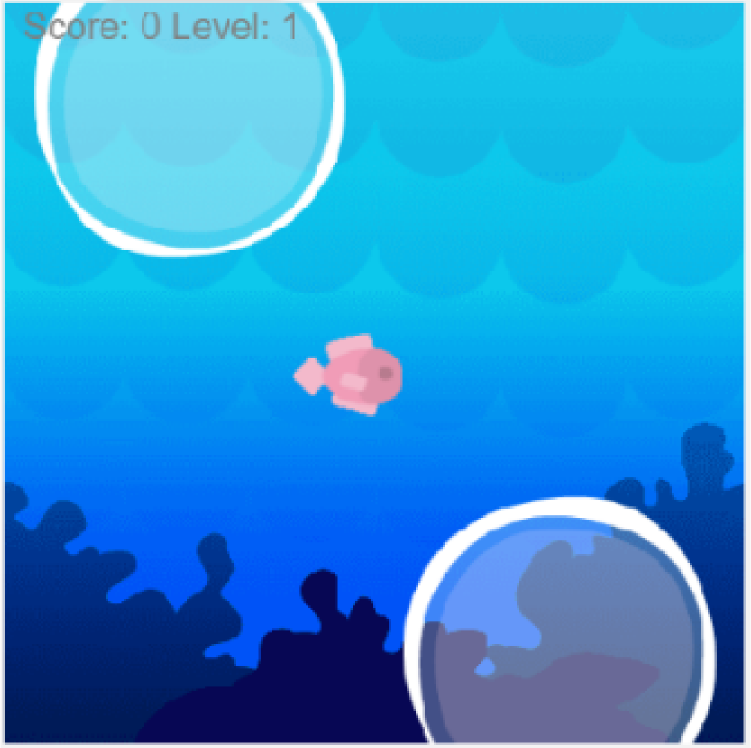
```
//Set up sprites
Background: Underwater
Hero: Pink Fish
Enemy: Bubble 1, Bubble 2
//Set up score variables
Score, Level

function draw(){
     Handle Background: None needed.
     drawSprites();
     //Handle Movement
     Hero Movement: ______________________
     Enemy Movement: _____________________
     //Handle Major Events
     Collisions: _________________________
     Respawn: ____________________________
     Level Up: ___________________________
     //Display Score
}
```

Applying the Template to Level Up Swimmer



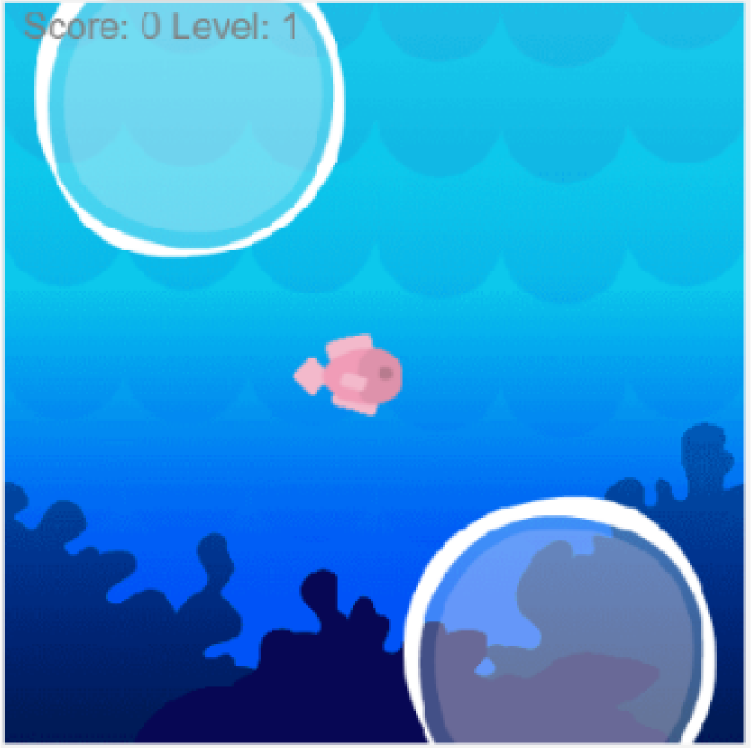
```
//Set up sprites
Background: ___Underwater____________
Hero: ___Pink Fish______________
Enemy: ___Bubble 1, Bubble 2_____
//Set up score variables
___Score, Level_____________

function draw(){
     Handle Background: ___None needed.___
     drawSprites();
     //Handle Movement
     Hero Movement: ___Right and Left___
     Enemy Movement: ____________________
     //Handle Major Events
     Collisions: ________________________
     Respawn: ___________________________
     Level Up: __________________________
     //Display Score
}
```

Applying the Template to Level Up Swimmer



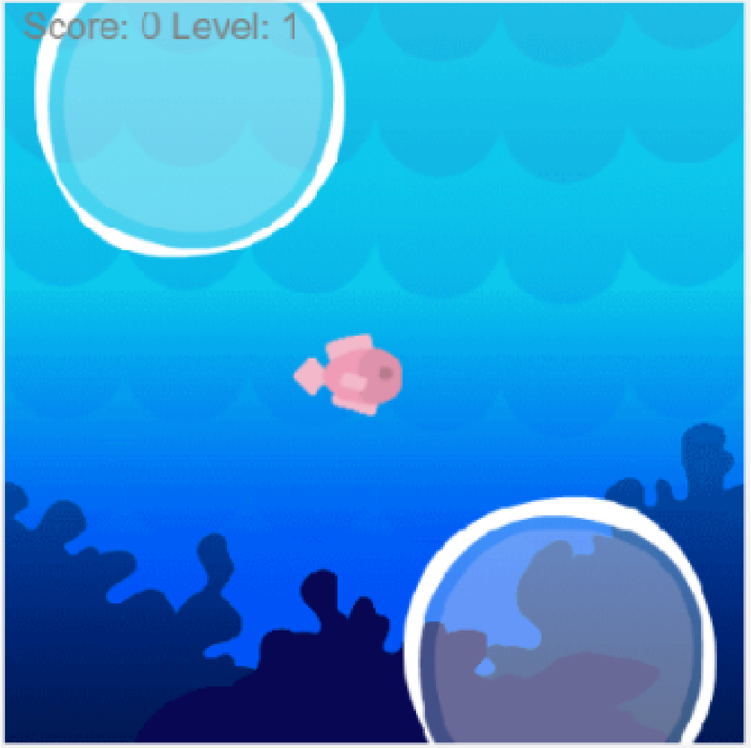
```
//Set up sprites
Background: Underwater
Hero: Pink Fish
Enemy: Bubble 1, Bubble 2
//Set up score variables
Score, Level

function draw(){
     Handle Background: None needed.
     drawSprites();
     //Handle Movement
     Hero Movement: Right and Left
     Enemy Movement: Down
     //Handle Major Events
     Collisions: ____________________
     Respawn: ____________________
     Level Up: ____________________
     //Display Score
}
```

## Applying the Template to Level Up Swimmer



```
//Set up sprites
Background: Underwater
Hero: Pink Fish
Enemy: Bubble 1, Bubble 2
//Set up score variables
Score, Level

function draw(){
     Handle Background: None needed.
     drawSprites();
     //Handle Movement
     Hero Movement: Right and Left
     Enemy Movement: Down
     //Handle Major Events
     Collisions: Bubble hits fish, game over
     Respawn: ____________________________
     Level Up: ___________________________
     //Display Score
}
```

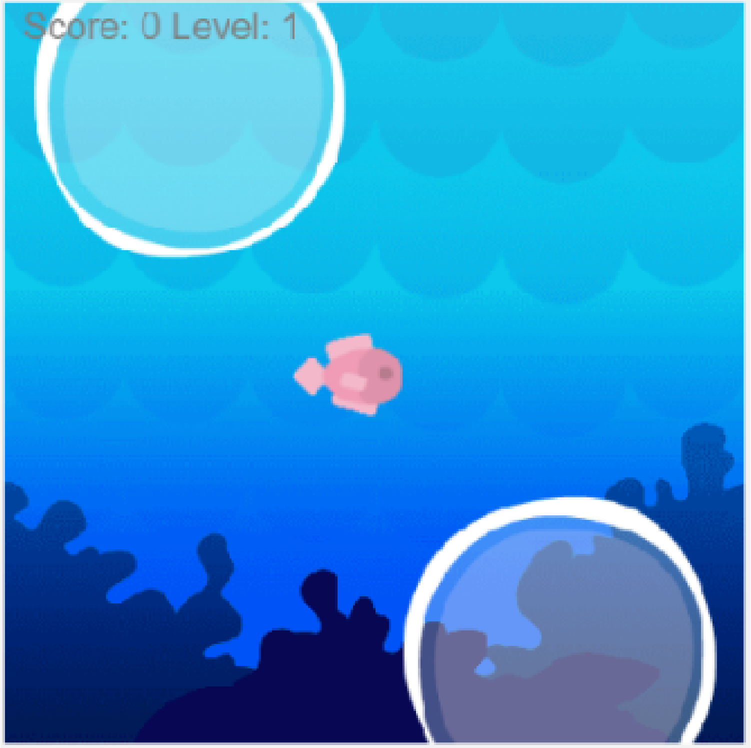
Applying the Template to Level Up Swimmer



Score: 0 Level: 1

```
//Set up sprites
Background: Underwater
Hero: Pink Fish
Enemy: Bubble 1, Bubble 2
//Set up score variables
Score, Level

function draw(){
      Handle Background: None needed.
      drawSprites();
      //Handle Movement
      Hero Movement: Right and Left
      Enemy Movement: Down
      //Handle Major Events
      Collisions: Bubble hits fish, game over
      Respawn: When Bubble at bottom, point too
      Level Up: ______________________________
      //Display Score
}
```

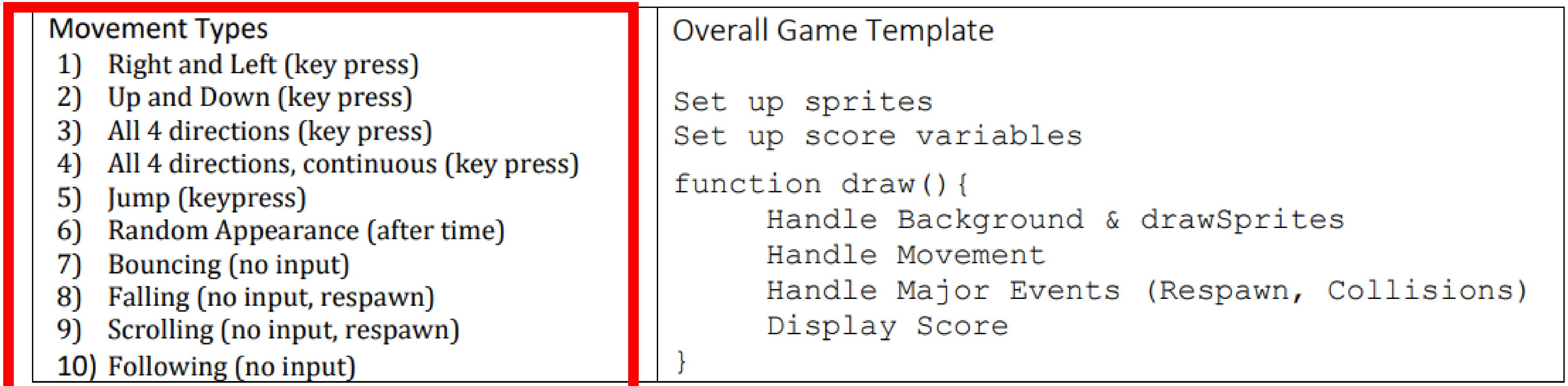
Applying the Template to Level Up Swimmer


Score: 0 Level: 1

```
//Set up sprites
Background: Underwater
Hero: Pink Fish
Enemy: Bubble 1, Bubble 2
//Set up score variables
Score, Level

function draw(){
      Handle Background: None needed.
      drawSprites();
      //Handle Movement
      Hero Movement: Right and Left
      Enemy Movement: Down
      //Handle Major Events
      Collisions: Bubble hits fish, game over
      Respawn: When Bubble at bottom, point too
      Level Up: On increments of 5
      //Display Score
}
```

# Patterns of Movement

3.11 T



Movement Types

1) Right and Left (key press)
2) Up and Down (key press)
3) All 4 directions (key press)
4) All 4 directions, continuous (key press)
5) Jump (keypress)
6) Random Appearance (after time)
7) Bouncing (no input)
8) Falling (no input, respawn)
9) Scrolling (no input, respawn)
10) Following (no input)

Overall Game Template

```
Set up sprites
Set up score variables
function draw(){
     Handle Background & drawSprites
     Handle Movement
     Handle Major Events (Respawn, Collisions)
     Display Score
}
```

Another problem is that students don’t know where to look to find things.

# Patterns of Movement

3.11 T

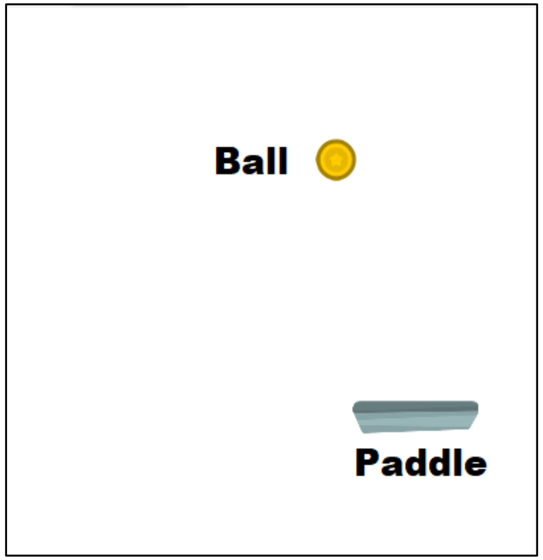
Movement Types

1) Right and Left (key press)
2) Up and Down (key press)
3) All 4 directions (key press)
4) All 4 directions, continuous (key press)
5) Jump (keypress)
6) Random Appearance (after time)
7) Bouncing (no input)
8) Falling (no input, respawn)
9) Scrolling (no input, respawn)
10) Following (no input)

Overall Game Template

```
Set up sprites
Set up score variables

function draw(){
     Handle Background & drawSprites
     Handle Movement
     Handle Major Events (Respawn, Collisions)
     Display Score
}
```

Pong:



Movement:
- Ball - bouncing
- Paddle - Right and Left

Collision = Ball bounces off paddle

Game Over = Ball under paddle

# Patterns of Movement

3.11 T

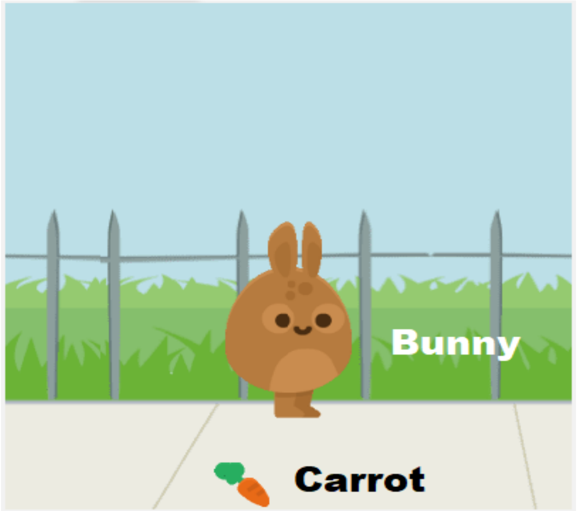
Movement Types

1) Right and Left (key press)
2) Up and Down (key press)
3) All 4 directions (key press)
4) All 4 directions, continuous (key press)
5) Jump (keypress)
6) Random Appearance (after time)
7) Bouncing (no input)
8) Falling (no input, respawn)
9) Scrolling (no input, respawn)
10) Following (no input)

Overall Game Template

```
Set up sprites
Set up score variables

function draw(){
     Handle Background & drawSprites
     Handle Movement
     Handle Major Events (Respawn, Collisions)
     Display Score
}
```

Bunny Walker:



Movement:
- Bunny - up and down
- Carrot - scrolling
- Background - scrolling

Collision = bunny eats carrot, respawn carrot
Respawn = carrot at edge

# Patterns of Movement

3.11 T

Movement Types

1) Right and Left (key press)
2) Up and Down (key press)
3) All 4 directions (key press)
4) All 4 directions, continuous (key press)
5) Jump (keypress)
6) Random Appearance (after time)
7) Bouncing (no input)
8) Falling (no input, respawn)
9) Scrolling (no input, respawn)
10) Following (no input)

Overall Game Template

```
Set up sprites
Set up score variables

function draw(){
     Handle Background & drawSprites
     Handle Movement
     Handle Major Events (Respawn, Collisions)
     Display Score
}
```

*Animated Walker:*

*Movement:*
*- Sprite - All 4 directions, continuous*

*Changes sprite animation based on direction.*

# Patterns of Movement

3.11 T

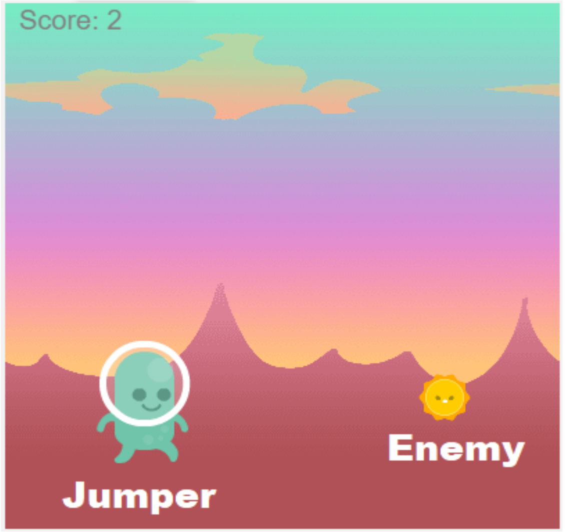
Movement Types

1) Right and Left (key press)
2) Up and Down (key press)
3) All 4 directions (key press)
4) All 4 directions, continuous (key press)
5) Jump (keypress)
6) Random Appearance (after time)
7) Bouncing (no input)
8) Falling (no input, respawn)
9) Scrolling (no input, respawn)
10) Following (no input)

Overall Game Template

```
Set up sprites
Set up score variables

function draw(){
     Handle Background & drawSprites
     Handle Movement
     Handle Major Events (Respawn, Collisions)
     Display Score
}
```

Jumper:



Movement:
- Jumper - jump
- Enemy - scrolling
- Background - scrolling

Collision = jumper/enemy, lose point,
respawn enemy
Respawn = enemy at edge, gain point

# Patterns of Movement

3.11 T

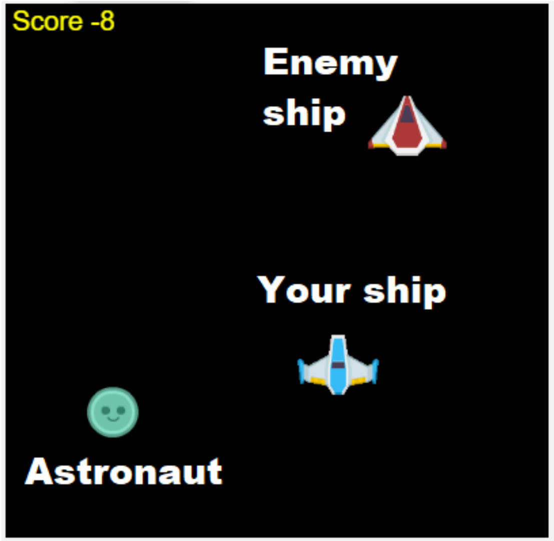
Movement Types

1) Right and Left (key press)
2) Up and Down (key press)
3) All 4 directions (key press)
4) All 4 directions, continuous (key press)
5) Jump (keypress)
6) Random Appearance (after time)
7) Bouncing (no input)
8) Falling (no input, respawn)
9) Scrolling (no input, respawn)
10) Following (no input)

Overall Game Template

```
Set up sprites
Set up score variables
function draw(){
     Handle Background & drawSprites
     Handle Movement
     Handle Major Events (Respawn, Collisions)
     Display Score
}
```

*Fly Away:*



*Movement:*
*- Your Ship - All 4 directions continuous*
*- Enemy - Following (no input)*
*- Astronaut - Random Appearance (after time)*

*Collision = ship/enemy, lose point,*
*respawn enemy*
*= ship/astronaut, gain point*
*move astronaut*
*Respawn = move astronaut after time*

# Patterns of Movement

3.11 T

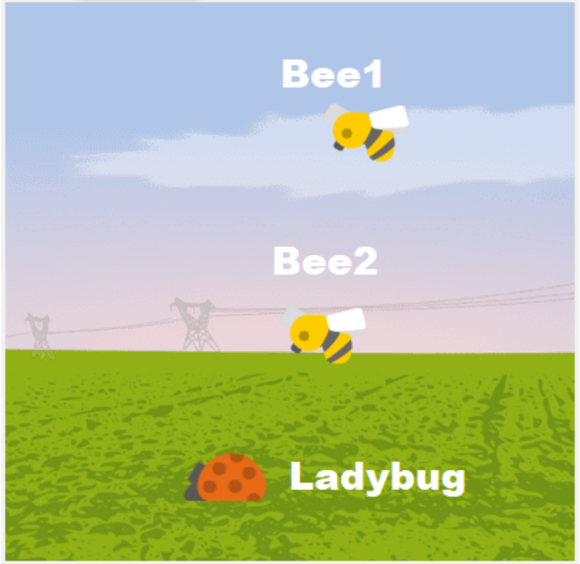
Movement Types

1) Right and Left (key press)
2) Up and Down (key press)
3) All 4 directions (key press)
4) All 4 directions, continuous (key press)
5) Jump (keypress)
6) Random Appearance (after time)
7) Bouncing (no input)
8) Falling (no input, respawn)
9) Scrolling (no input, respawn)
10) Following (no input)

Overall Game Template

```
Set up sprites
Set up score variables

function draw(){
     Handle Background & drawSprites
     Handle Movement
     Handle Major Events (Respawn, Collisions)
     Display Score
}
```

*Avoid the Bees*

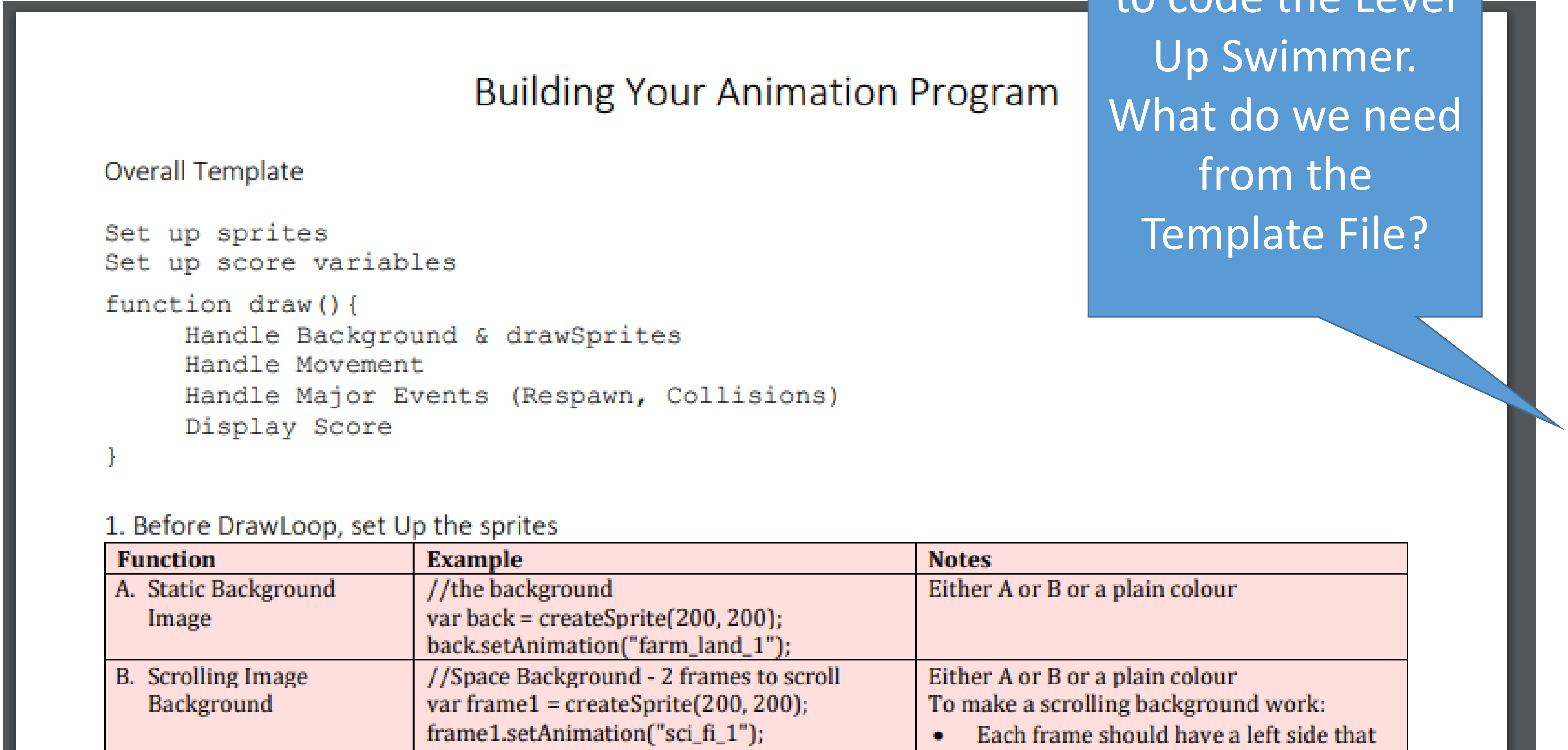


*Movement:*
*- Ladybug - Right and Left (key press)*
*- Bees - Bouncing (no input)*

*Collision = bug/bee, game over*

*Shows how to make intro*
*and instruction screen.*

Let’s say we want to code the Level Up Swimmer. What do we need from the Template File?



## Building Your Animation Program

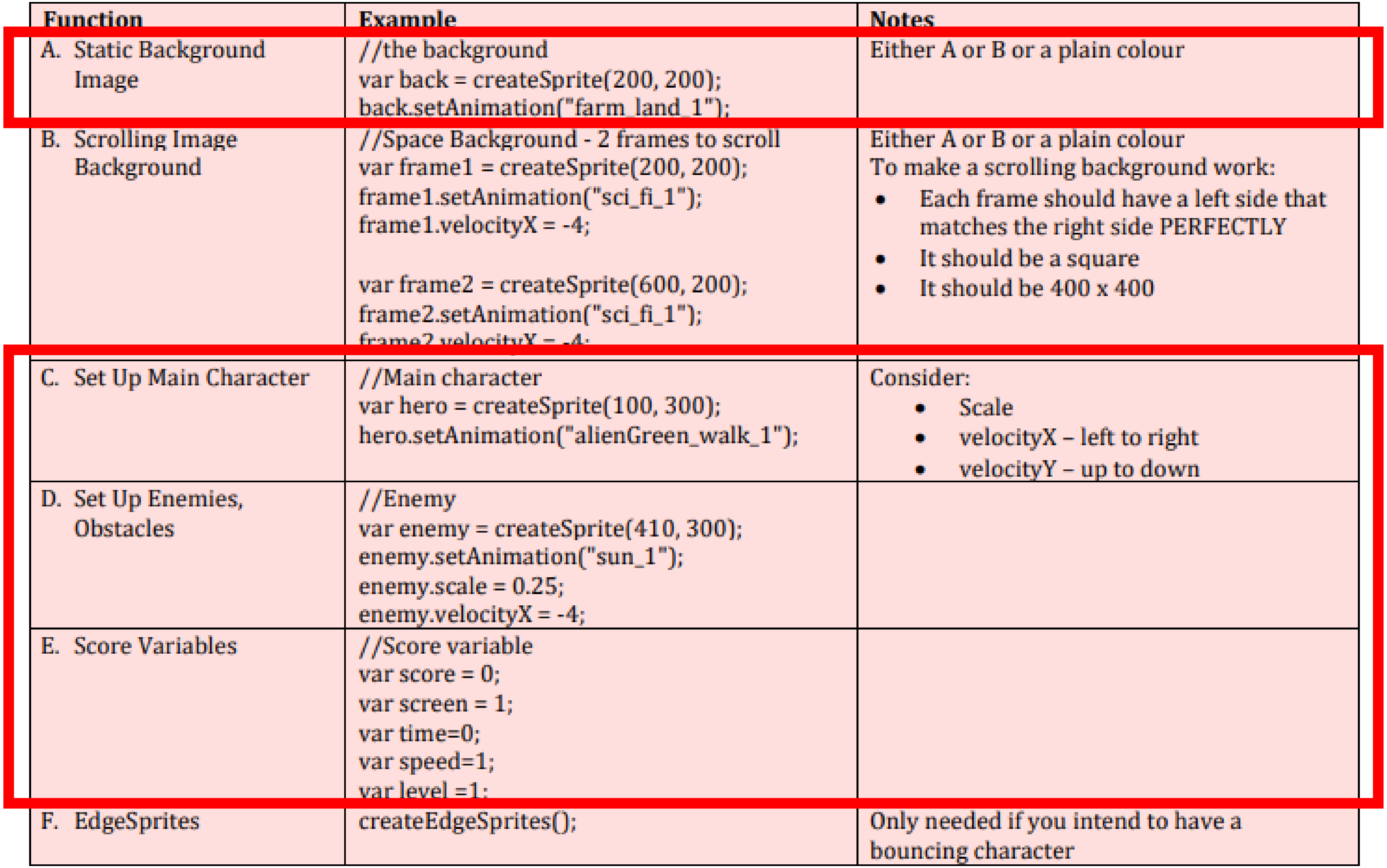
Overall Template

```
Set up sprites
Set up score variables
function draw(){
      Handle Background & drawSprites
      Handle Movement
      Handle Major Events (Respawn, Collisions)
      Display Score
}
```

1. Before DrawLoop, set Up the sprites

| **Function** | **Example** | **Notes** |
|---|---|---|
| A. Static Background Image | //the background<br>var back = createSprite(200, 200);<br>back.setAnimation("farm_land_1"); | Either A or B or a plain colour |
| B. Scrolling Image Background | //Space Background - 2 frames to scroll<br>var frame1 = createSprite(200, 200);<br>frame1.setAnimation("sci_fi_1"); | Either A or B or a plain colour<br>To make a scrolling background work:<br>• Each frame should have a left side that |

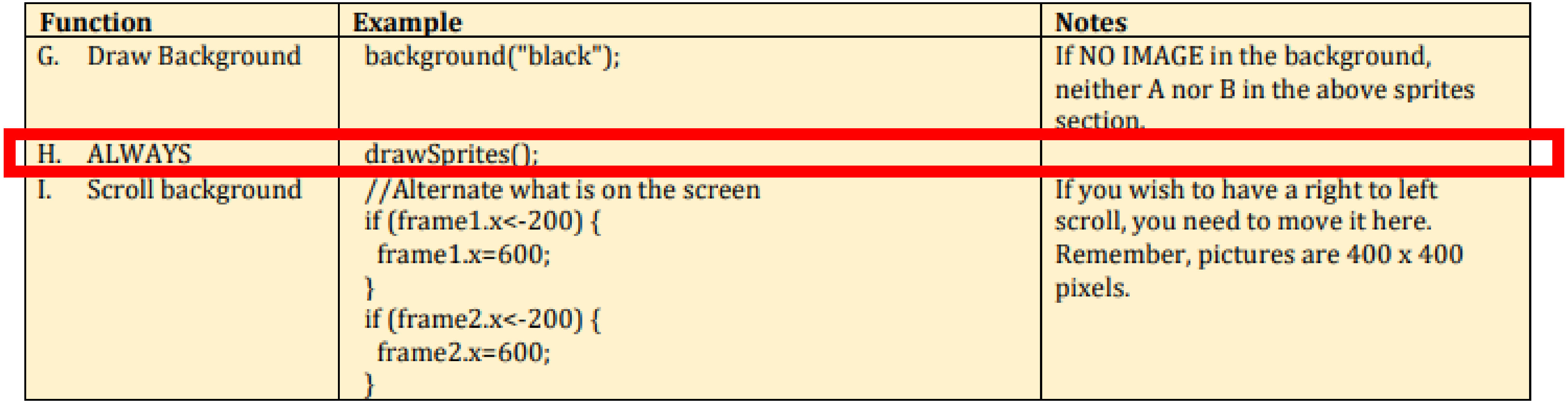
1. Before DrawLoop, set Up the sprites



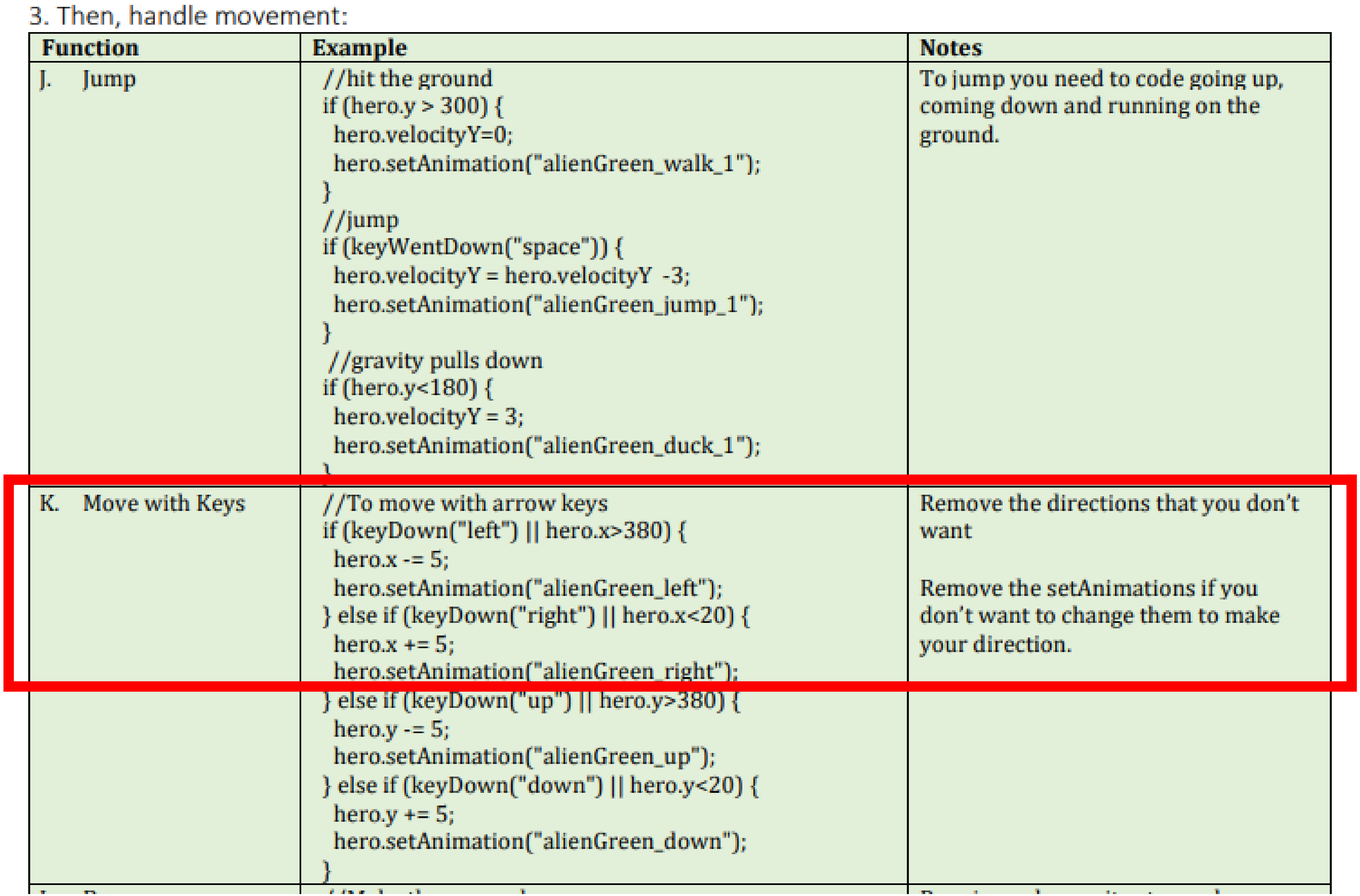
| Function | Example | Notes |
|---|---|---|
| A. Static Background Image | //the background<br>var back = createSprite(200, 200);<br>back.setAnimation("farm_land_1"); | Either A or B or a plain colour |
| B. Scrolling Image Background | //Space Background - 2 frames to scroll<br>var frame1 = createSprite(200, 200);<br>frame1.setAnimation("sci_fi_1");<br>frame1.velocityX = -4;<br><br>var frame2 = createSprite(600, 200);<br>frame2.setAnimation("sci_fi_1");<br>frame2.velocityX = -4; | Either A or B or a plain colour<br>To make a scrolling background work:<br>• Each frame should have a left side that matches the right side PERFECTLY<br>• It should be a square<br>• It should be 400 x 400 |
| C. Set Up Main Character | //Main character<br>var hero = createSprite(100, 300);<br>hero.setAnimation("alienGreen_walk_1"); | Consider:<br>• Scale<br>• velocityX – left to right<br>• velocityY – up to down |
| D. Set Up Enemies, Obstacles | //Enemy<br>var enemy = createSprite(410, 300);<br>enemy.setAnimation("sun_1");<br>enemy.scale = 0.25;<br>enemy.velocityX = -4; | |
| E. Score Variables | //Score variable<br>var score = 0;<br>var screen = 1;<br>var time=0;<br>var speed=1;<br>var level =1; | |
| F. EdgeSprites | createEdgeSprites(); | Only needed if you intend to have a bouncing character |

2. After function draw() {

Handle background and the drawSprites.

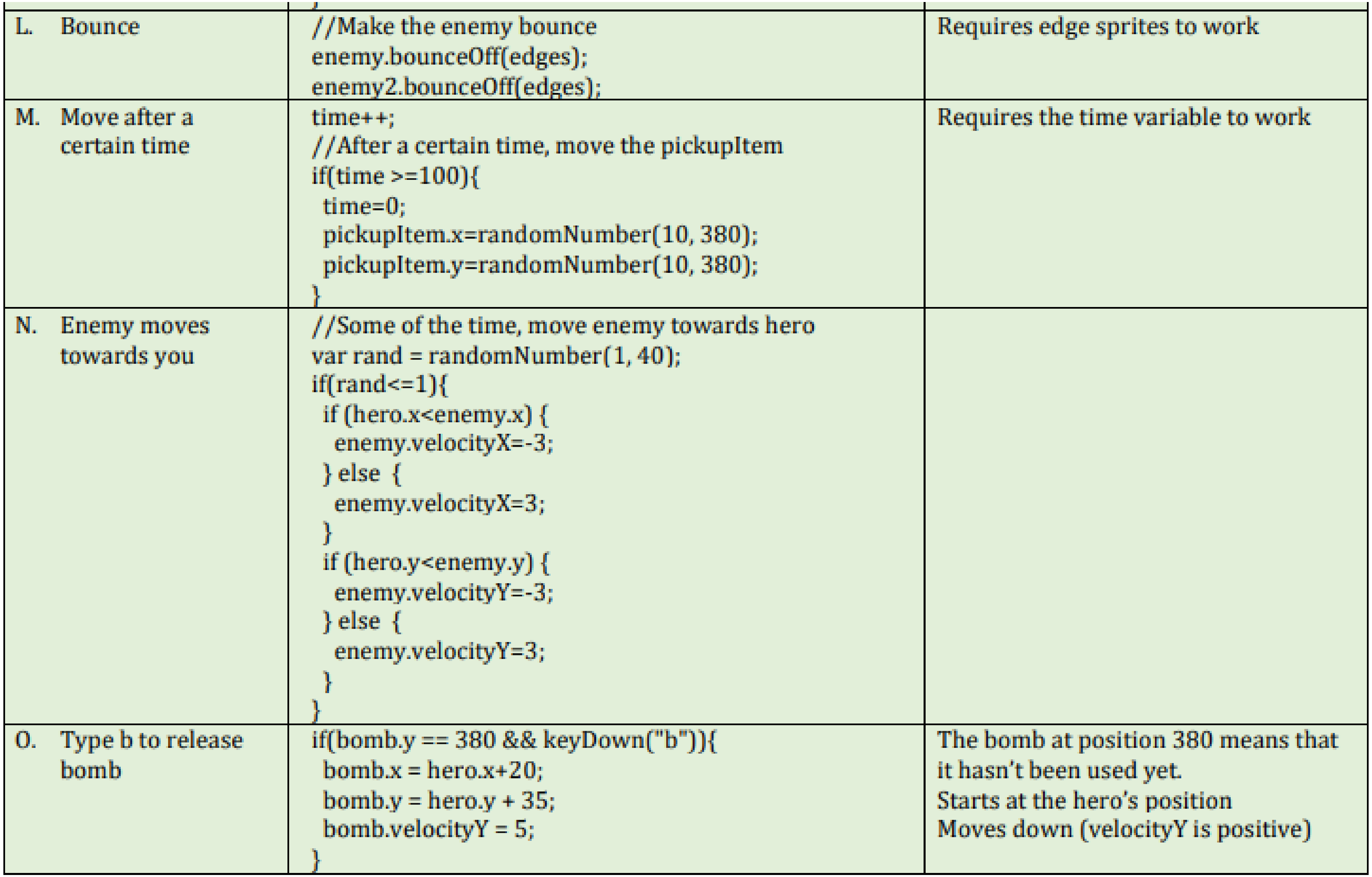


| Function | Example | Notes |
|---|---|---|
| G. Draw Background | background("black"); | If NO IMAGE in the background, neither A nor B in the above sprites section. |
| H. ALWAYS | drawSprites(); | |
| I. Scroll background | //Alternate what is on the screen<br>if (frame1.x<-200) {<br>frame1.x=600;<br>}<br>if (frame2.x<-200) {<br>frame2.x=600;<br>} | If you wish to have a right to left scroll, you need to move it here. Remember, pictures are 400 x 400 pixels. |



3. Then, handle movement:

<table>
<tr><th>Function</th><th>Example</th><th>Notes</th></tr>
<tr><td>J. Jump</td><td>//hit the ground<br>if (hero.y > 300) {<br>hero.velocityY=0;<br>hero.setAnimation("alienGreen_walk_1");<br>}<br>//jump<br>if (keyWentDown("space")) {<br>hero.velocityY = hero.velocityY -3;<br>hero.setAnimation("alienGreen_jump_1");<br>}<br>//gravity pulls down<br>if (hero.y<180) {<br>hero.velocityY = 3;<br>hero.setAnimation("alienGreen_duck_1");<br>}</td><td>To jump you need to code going up, coming down and running on the ground.</td></tr>
<tr><td>K. Move with Keys</td><td>//To move with arrow keys<br>if (keyDown("left") || hero.x>380) {<br>hero.x -= 5;<br>hero.setAnimation("alienGreen_left");<br>} else if (keyDown("right") || hero.x<20) {<br>hero.x += 5;<br>hero.setAnimation("alienGreen_right");<br>} else if (keyDown("up") || hero.y>380) {<br>hero.y -= 5;<br>hero.setAnimation("alienGreen_up");<br>} else if (keyDown("down") || hero.y<20) {<br>hero.y += 5;<br>hero.setAnimation("alienGreen_down");<br>}</td><td>Remove the directions that you don't want<br>Remove the setAnimations if you don't want to change them to make your direction.</td></tr>
</table>



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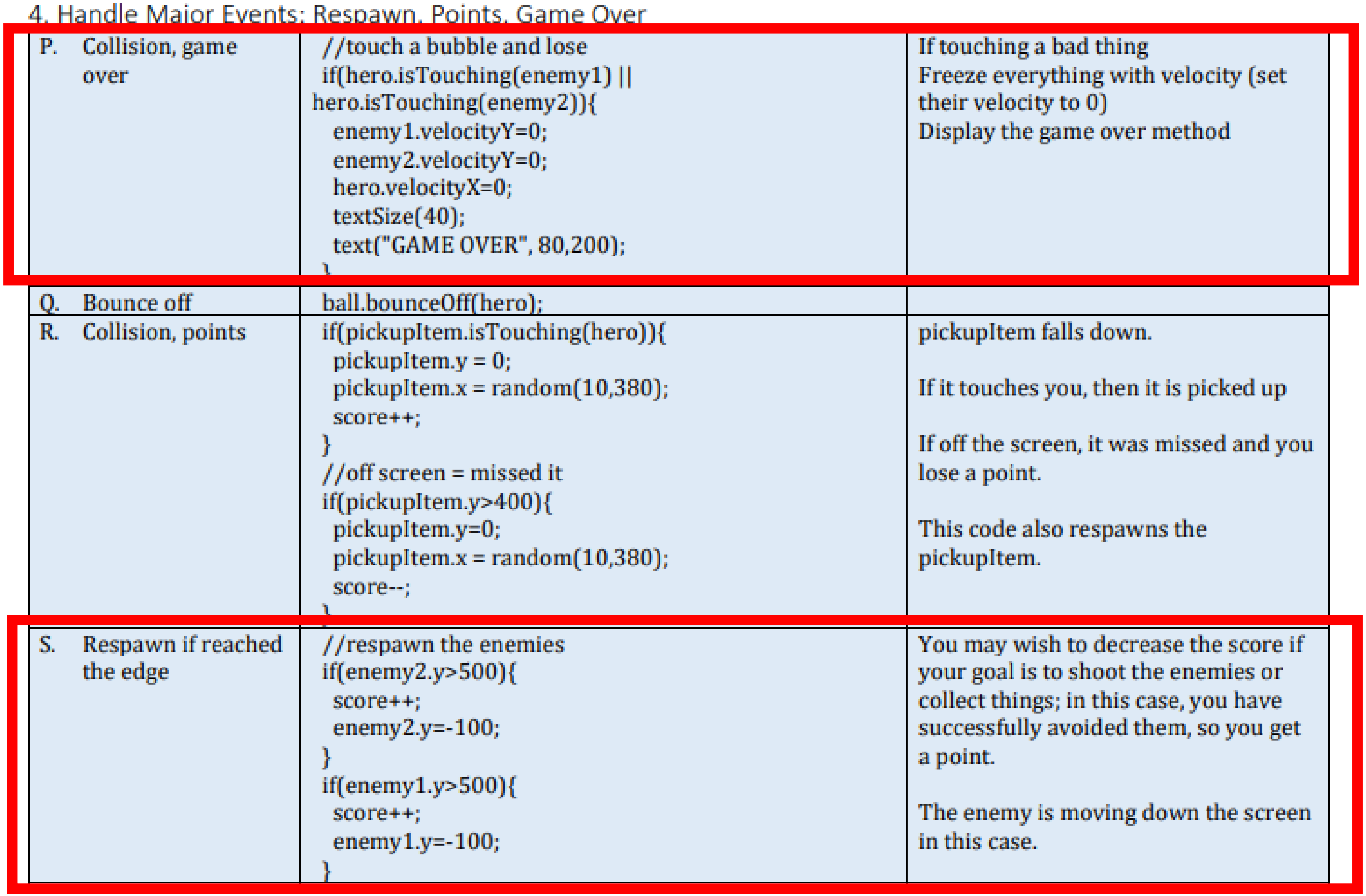
| | } | |
| L. Bounce | //Make the enemy bounce<br>enemy.bounceOff(edges);<br>enemy2.bounceOff(edges); | Requires edge sprites to work |
| M. Move after a certain time | time++;<br>//After a certain time, move the pickupItem<br>if(time >=100){<br>  time=0;<br>  pickupItem.x=randomNumber(10, 380);<br>  pickupItem.y=randomNumber(10, 380);<br>} | Requires the time variable to work |
| N. Enemy moves towards you | //Some of the time, move enemy towards hero<br>var rand = randomNumber(1, 40);<br>if(rand<=1){<br>  if (hero.x<enemy.x) {<br>    enemy.velocityX=-3;<br>  } else  {<br>    enemy.velocityX=3;<br>  }<br>  if (hero.y<enemy.y) {<br>    enemy.velocityY=-3;<br>  } else  {<br>    enemy.velocityY=3;<br>  }<br>} | |
| O. Type b to release bomb | if(bomb.y == 380 && keyDown("b")){<br>  bomb.x = hero.x+20;<br>  bomb.y = hero.y + 35;<br>  bomb.velocityY = 5;<br>} | The bomb at position 380 means that it hasn't been used yet.<br>Starts at the hero's position<br>Moves down (velocityY is positive) |



## 4. Handle Major Events: Respawn, Points, Game Over

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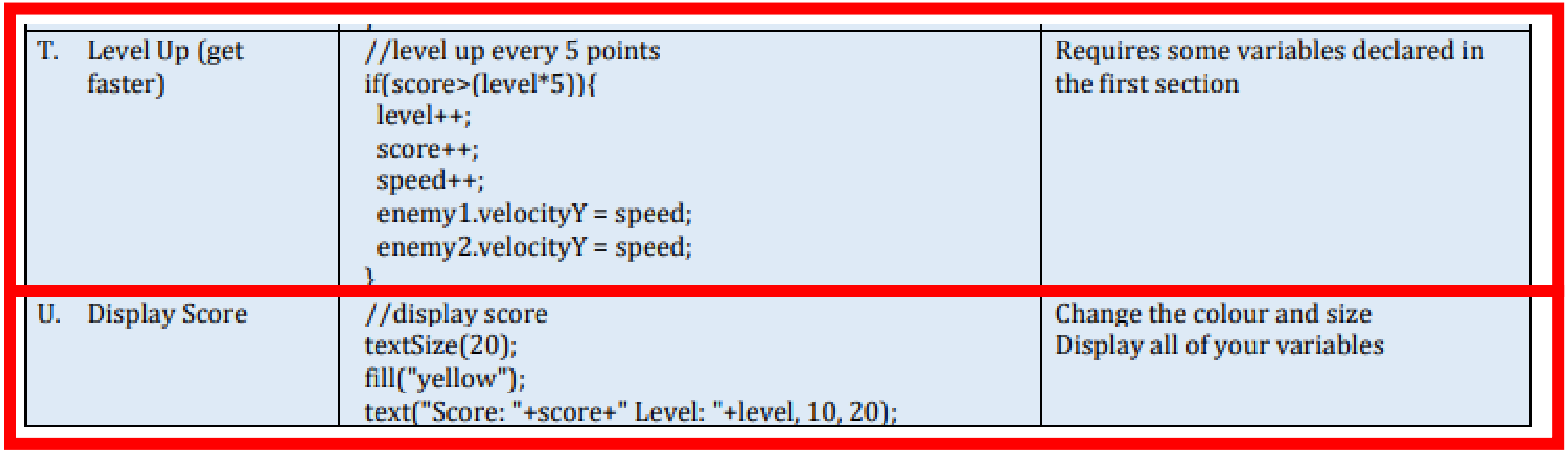
| P. | Collision, game over | //touch a bubble and lose<br>if(hero.isTouching(enemy1) \|\|<br>hero.isTouching(enemy2)){<br>enemy1.velocityY=0;<br>enemy2.velocityY=0;<br>hero.velocityX=0;<br>textSize(40);<br>text("GAME OVER", 80,200);<br>} | If touching a bad thing<br>Freeze everything with velocity (set their velocity to 0)<br>Display the game over method |
| Q. | Bounce off | ball.bounceOff(hero); | |
| R. | Collision, points | if(pickupItem.isTouching(hero)){<br>pickupItem.y = 0;<br>pickupItem.x = random(10,380);<br>score++;<br>}<br>//off screen = missed it<br>if(pickupItem.y>400){<br>pickupItem.y=0;<br>pickupItem.x = random(10,380);<br>score--;<br>} | pickupItem falls down.<br>If it touches you, then it is picked up<br>If off the screen, it was missed and you lose a point.<br>This code also respawns the pickupItem. |
| S. | Respawn if reached the edge | //respawn the enemies<br>if(enemy2.y>500){<br>score++;<br>enemy2.y=-100;<br>}<br>if(enemy1.y>500){<br>score++;<br>enemy1.y=-100;<br>} | You may wish to decrease the score if your goal is to shoot the enemies or collect things; in this case, you have successfully avoided them, so you get a point.<br>The enemy is moving down the screen in this case. |



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|---|---|---|---|
| T. | Level Up (get faster) | //level up every 5 points<br>if(score>(level*5)){<br>  level++;<br>  score++;<br>  speed++;<br>  enemy1.velocityY = speed;<br>  enemy2.velocityY = speed;<br>} | Requires some variables declared in the first section |
| U. | Display Score | //display score<br>textSize(20);<br>fill("yellow");<br>text("Score: "+score+" Level: "+level, 10, 20); | Change the colour and size<br>Display all of your variables |