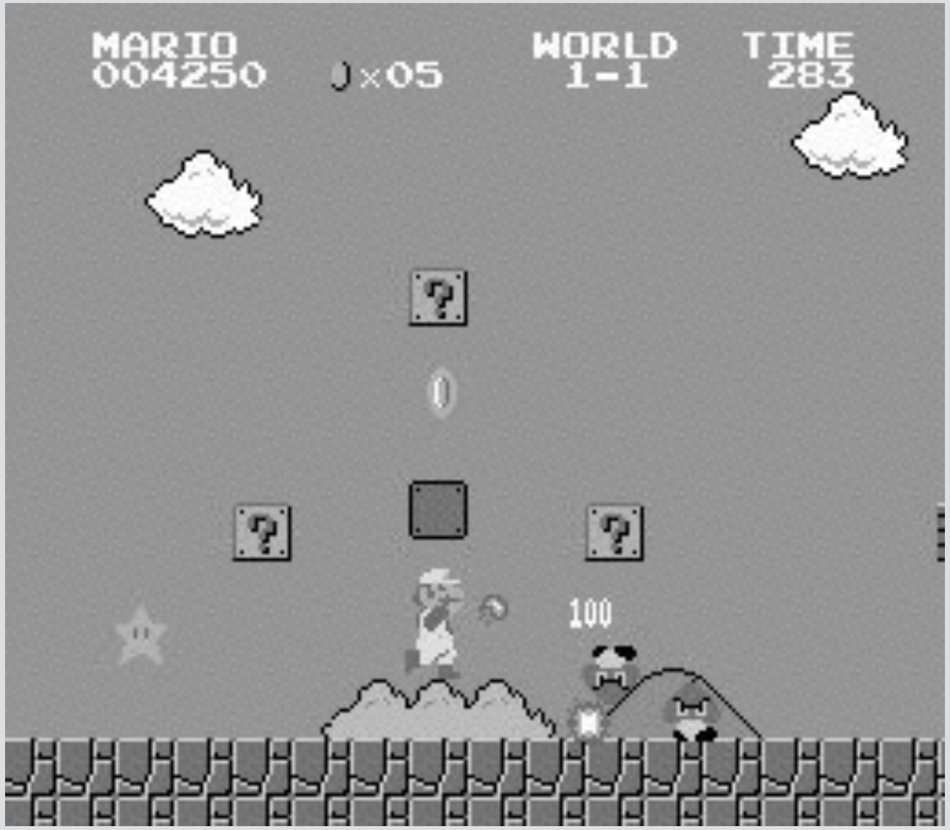
Platformer games.



Revisiting **entities**

```
class Entity {
    public:

        void Draw(ShaderProgram *program);

        float x;
        float y;
        float rotation;

        int textureID;


        float width;
        float height;

        float speed;
        float direction_x;
        float direction_y;
};
```

Entities are a useful way for us to think about **objects** in the game.

```
class Entity {
  public:

  Entity();

  void Update(float elapsed);
  void Render(ShaderProgram *program);
  bool collidesWith(Entity *entity);

  SheetSprite sprite;

  float x;
  float y;

  float width;
  float height;

  float velocity_x;
  float velocity_y;

  float acceleration_x;
  float acceleration_y;
};
```

Updating the **Entity** class.

Dynamic and **static** entities.

```
class Entity {
  public:

  Entity();

  void Update(float elapsed);
  void Render(ShaderProgram *program);
  bool collidesWith(Entity *entity);

  SheetSprite sprite;

  float x;
  float y;

  float width;
  float height;

  float velocity_x;
  float velocity_y;

  float acceleration_x;
  float acceleration_y;

  bool isStatic;
};
```

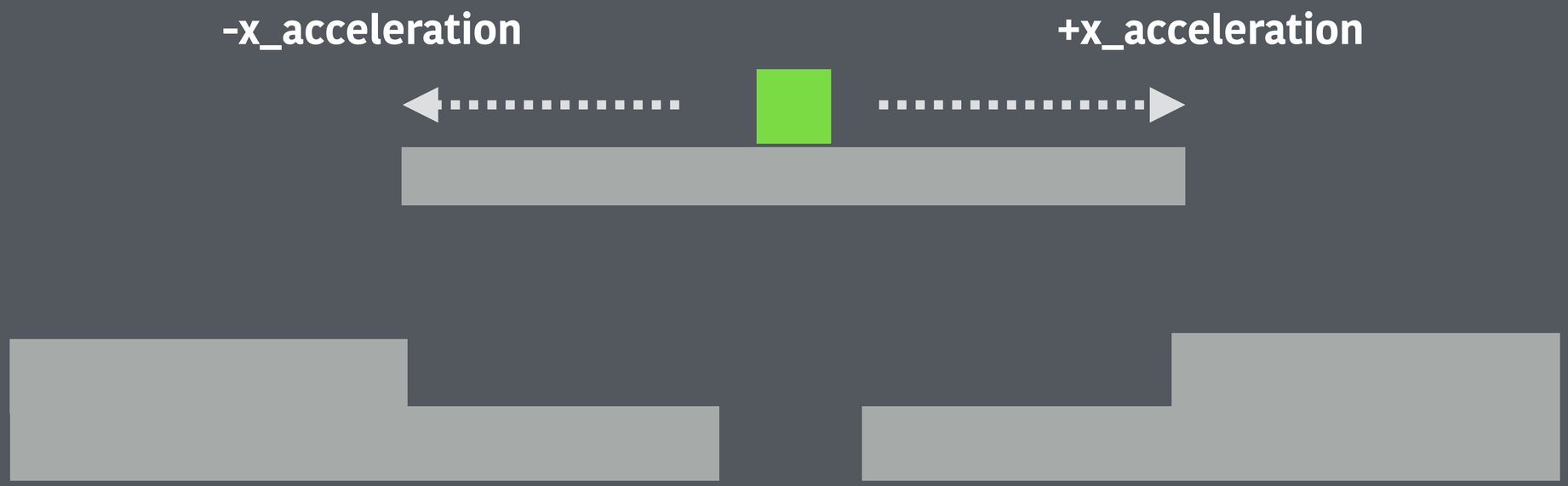
Adding a **static** flag.

Dynamic: gravity applied and checking collisions with other entities.

Static: No gravity, no movement, no collision checking!

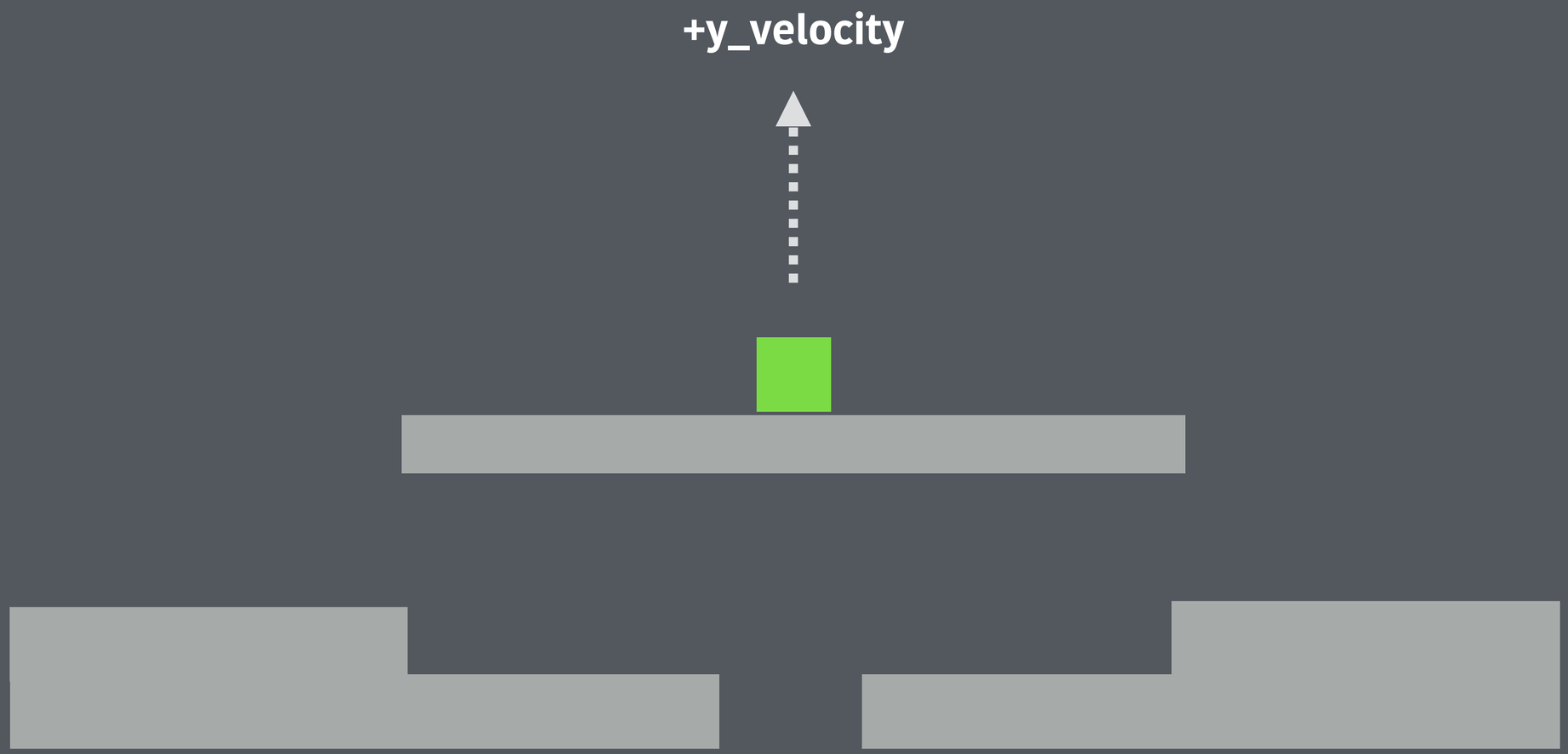
Movement

Set **X acceleration** to **positive** or **negative** to **move** and to **0** to **stop**.



Jumping

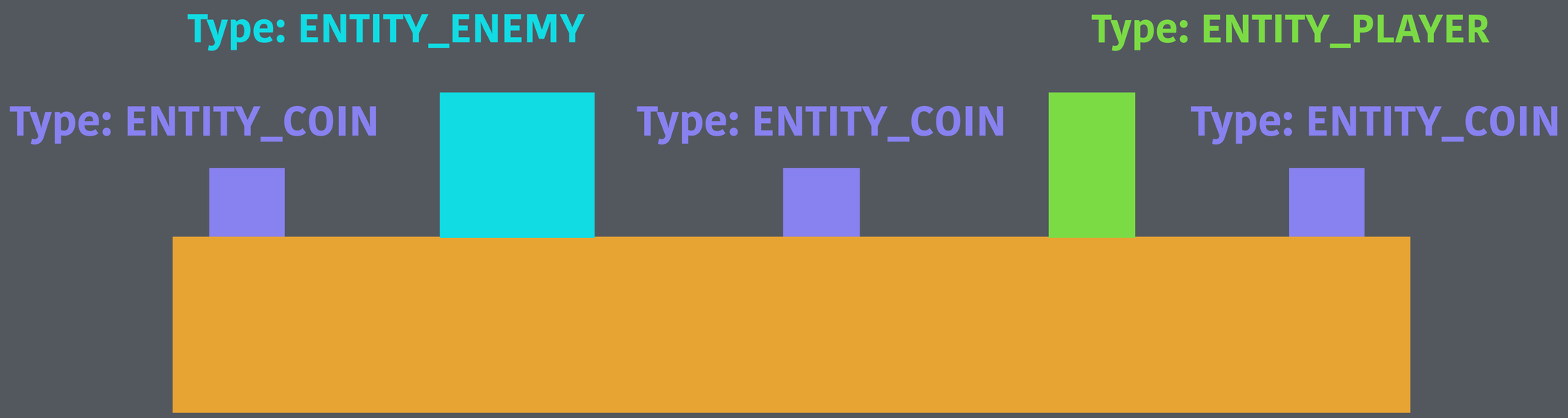
Set **Y velocity** directly to **jump**.



Entity **types**

```
enum EntityType {ENTITY_PLAYER, ENTITY_ENEMY,
ENTITY_COIN};

class Entity {
  public:

  Entity();

  void Update(float elapsed);
  void Render(ShaderProgram *program);
  bool collidesWith(Entity *entity);

  SheetSprite sprite;

  float x;
  float y;
  float width;
  float height;
  float velocity_x;
  float velocity_y;
  float acceleration_x;
  float acceleration_y;

  bool isStatic;
  EntityType entityType;
};
```

Adding an **entity type**.


Type: ENTITY_ENEMY
Type: ENTITY_PLAYER
Type: ENTITY_COIN
Type: ENTITY_COIN
Type: ENTITY_COIN

Check collision between all **dynamic entities**
and **do something** based on their **types**.

Platformer game breakdown.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26
000240740
203


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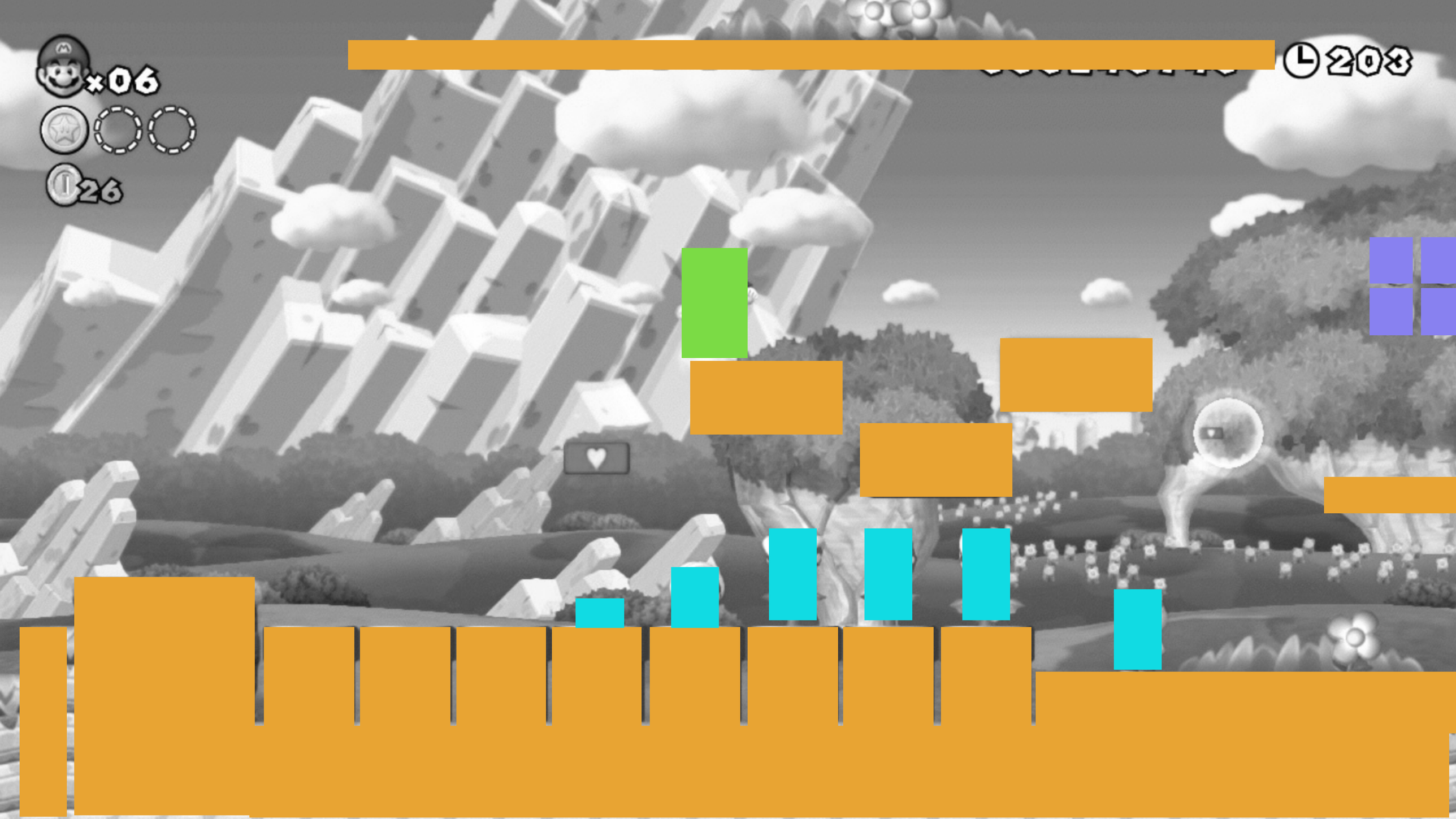
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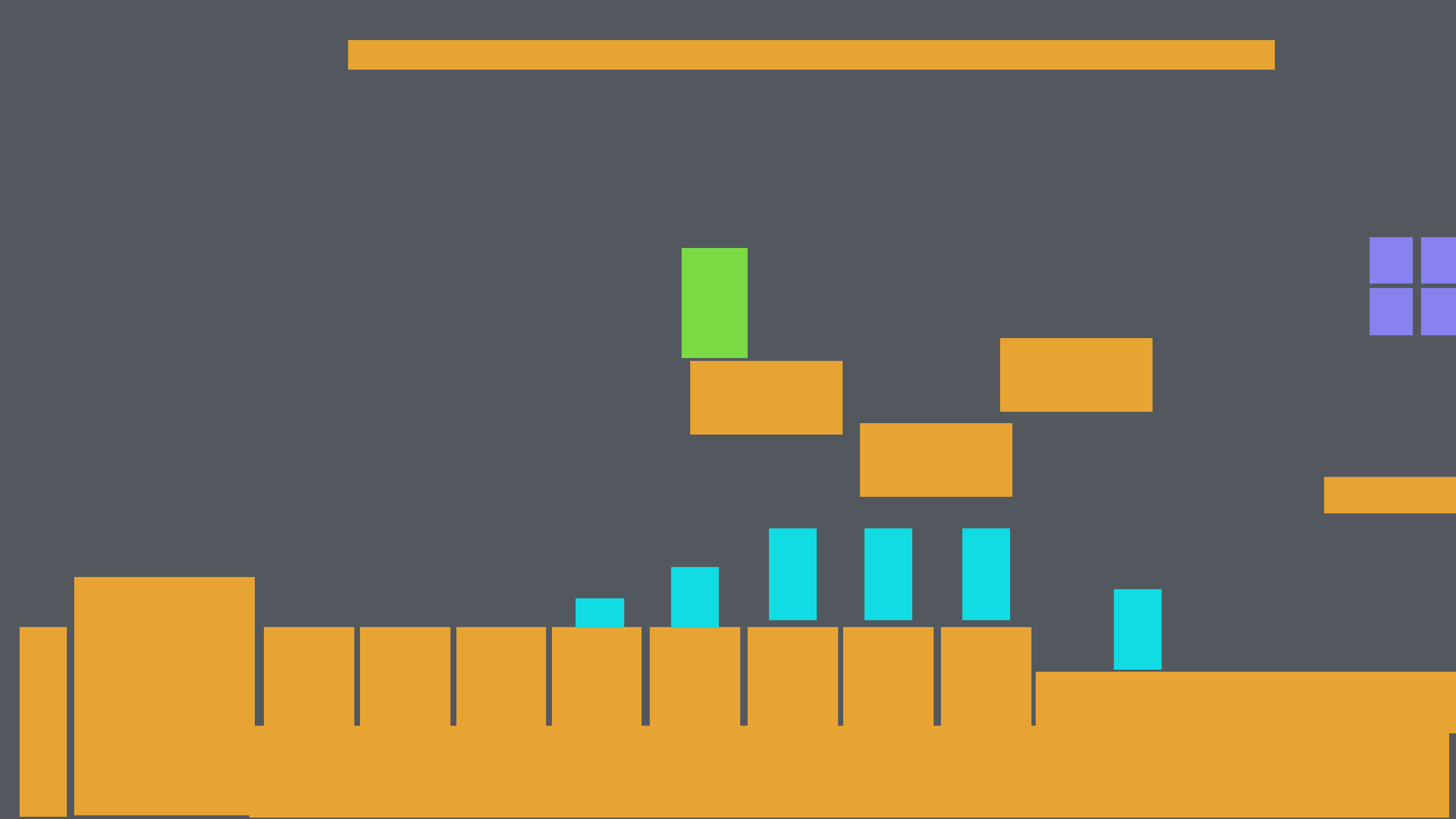
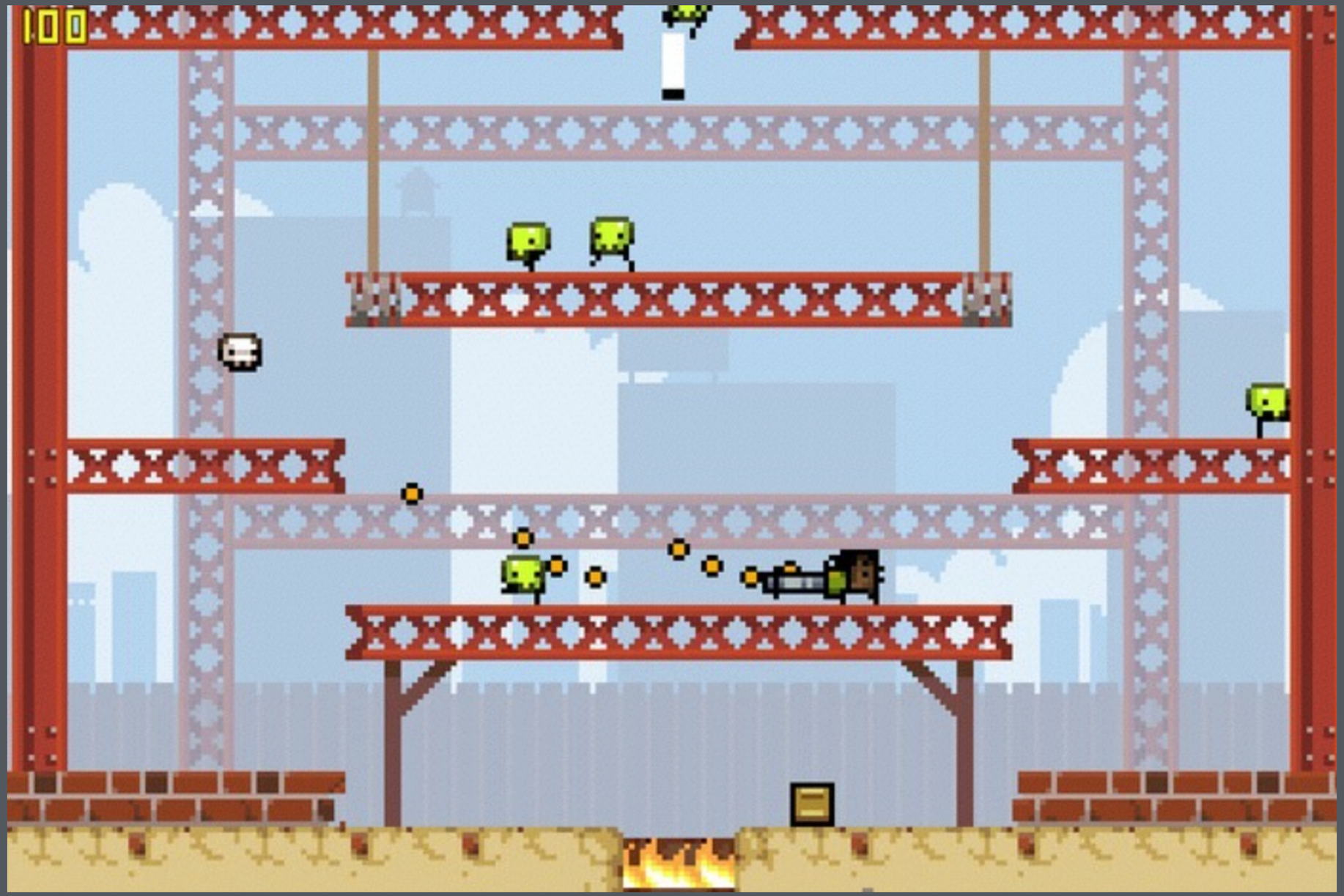
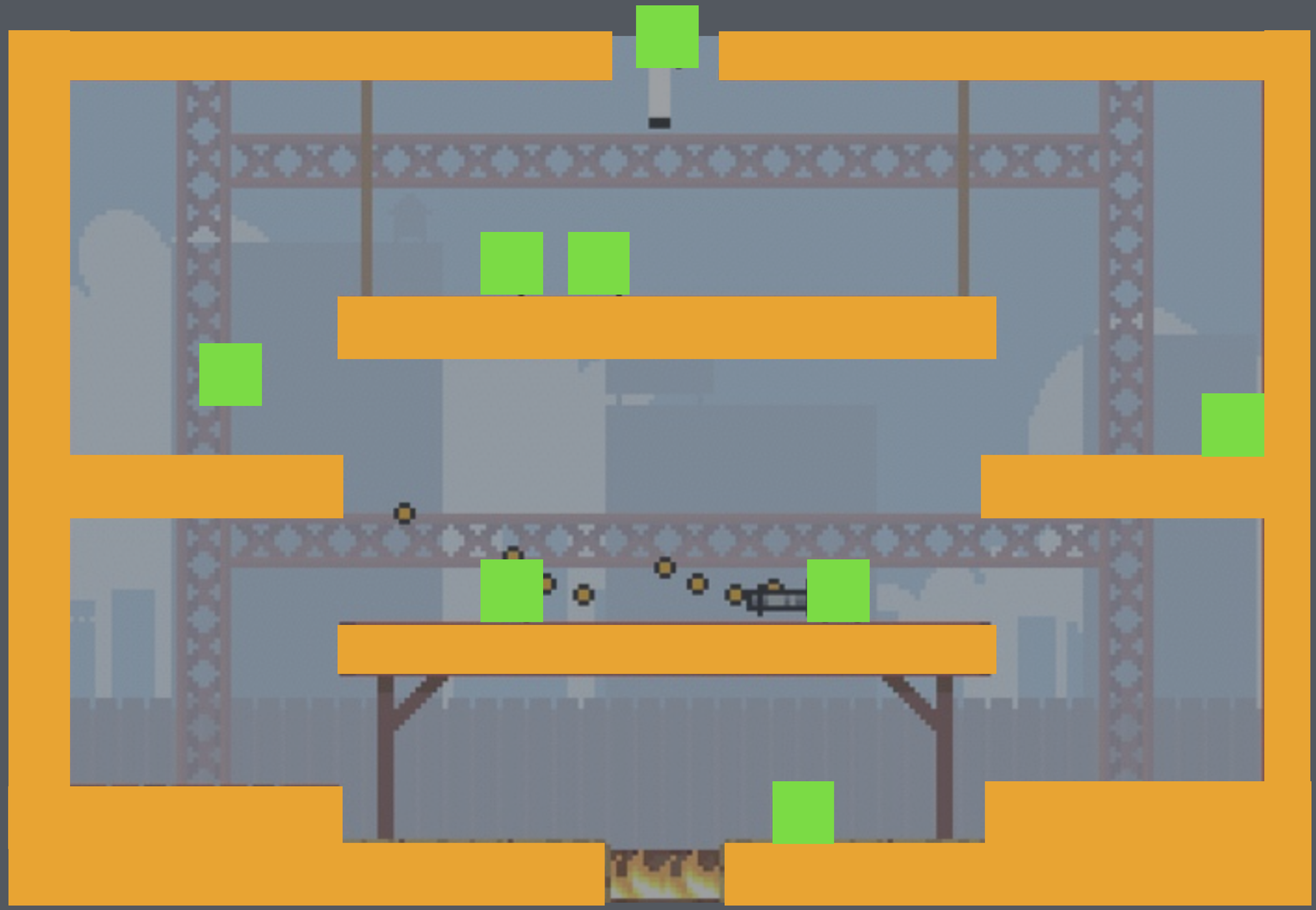
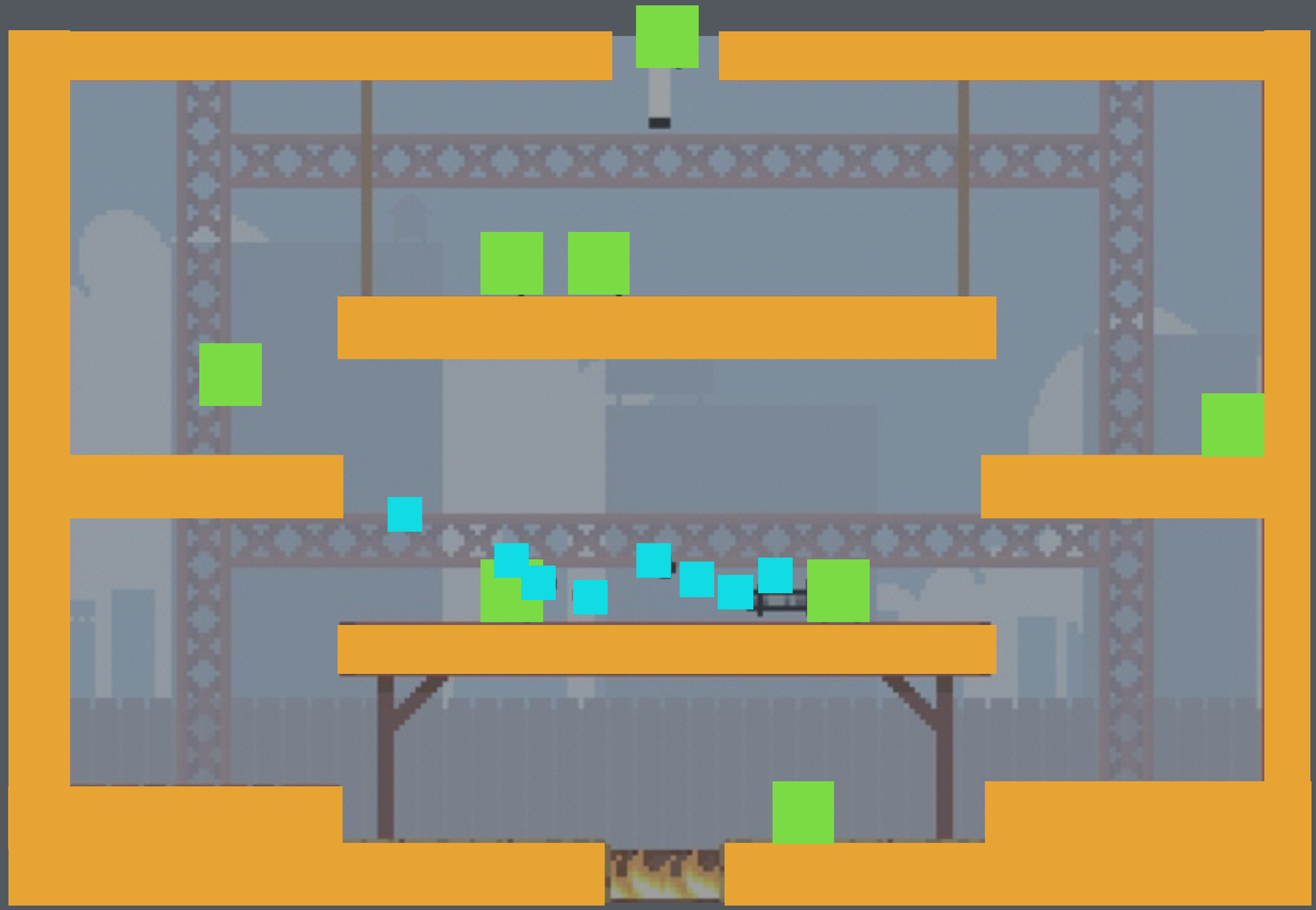
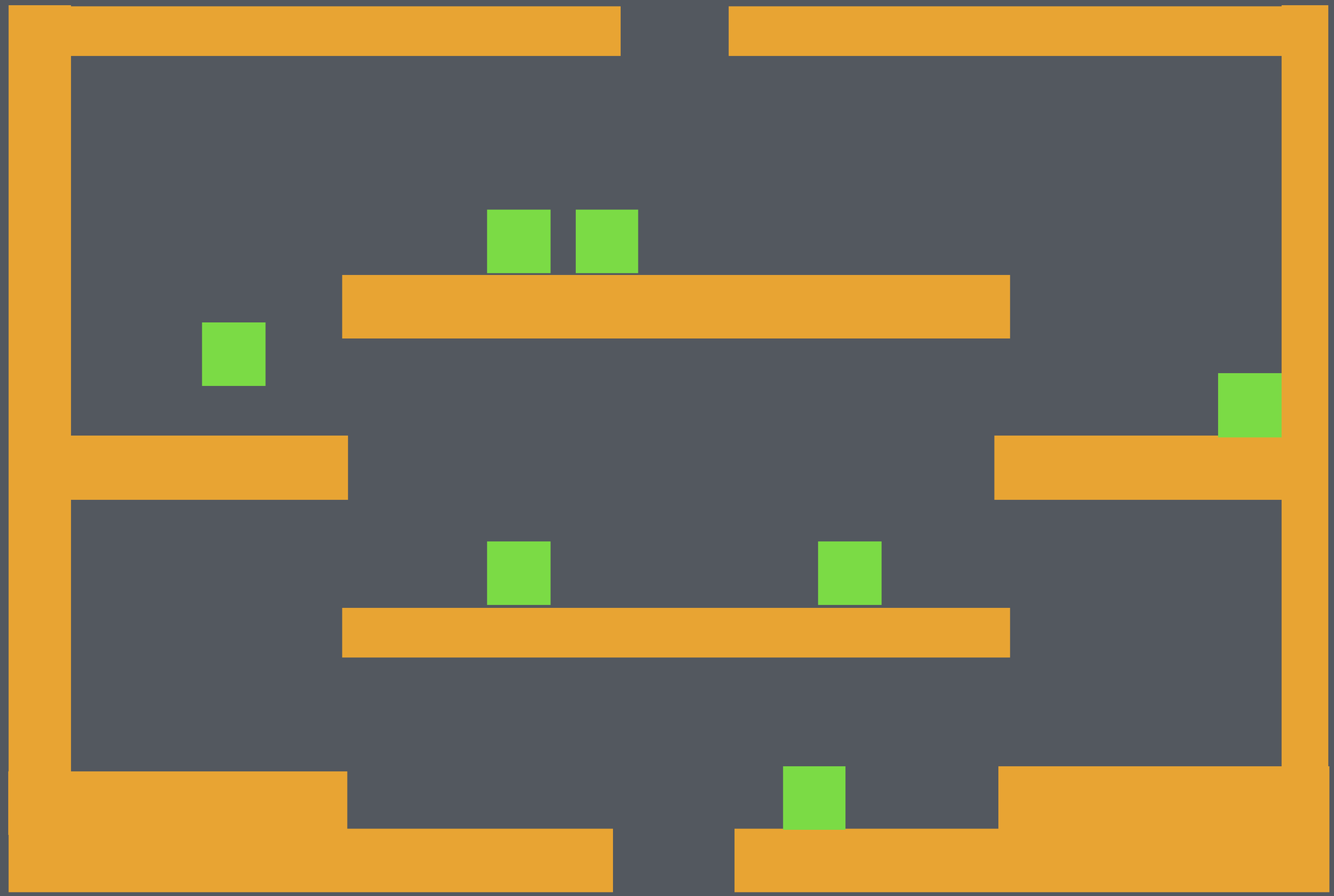


Building a **single screen platformer**.



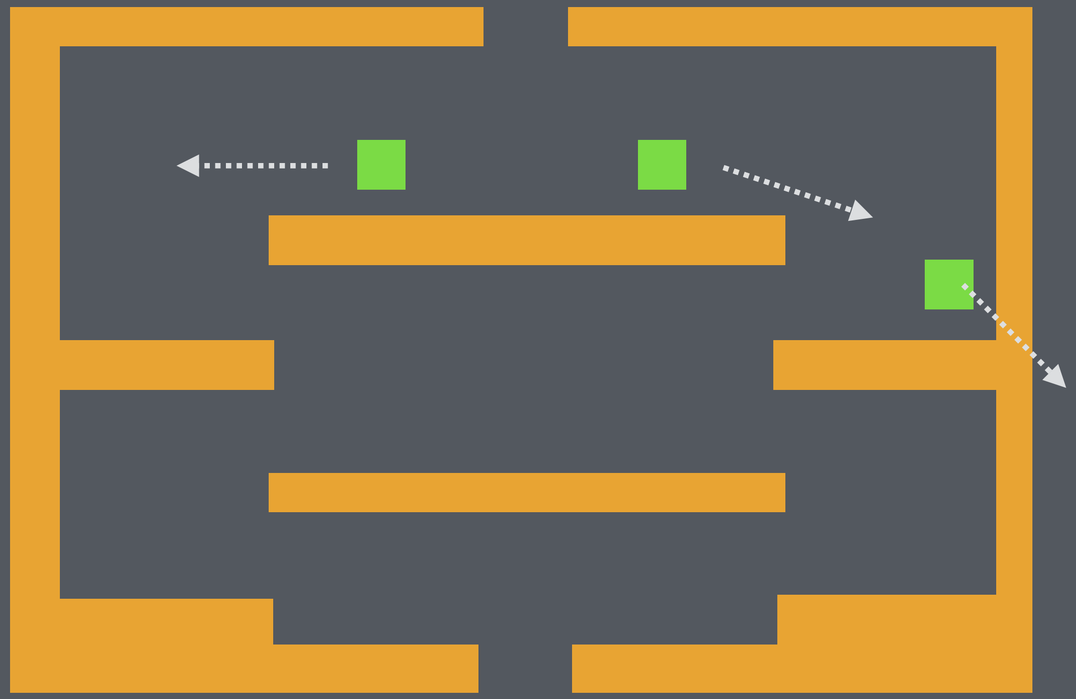


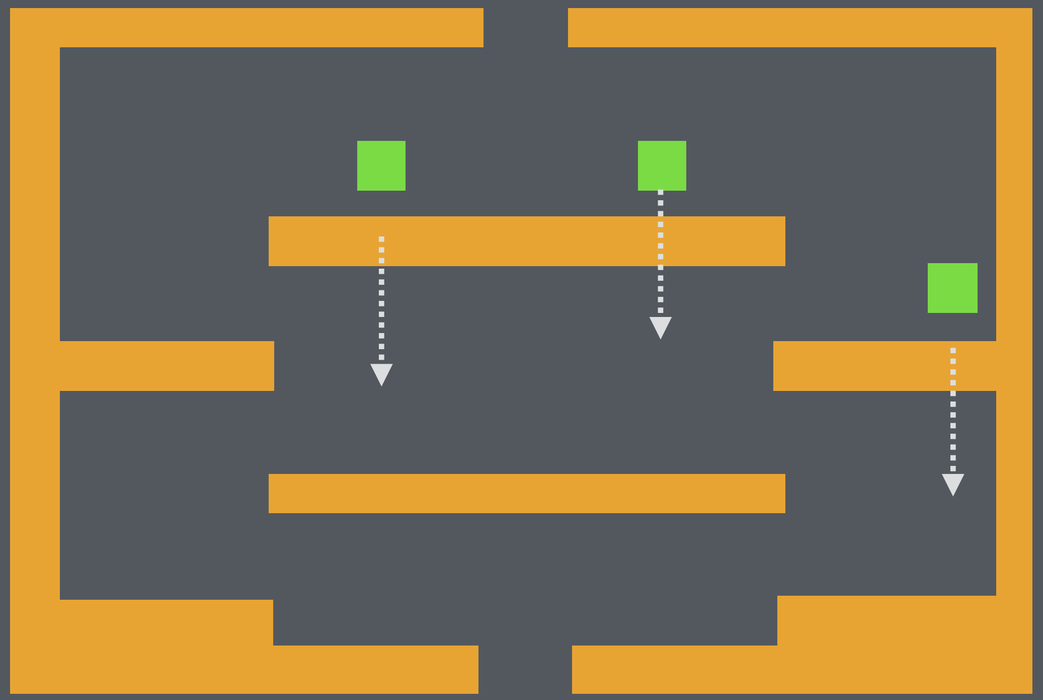




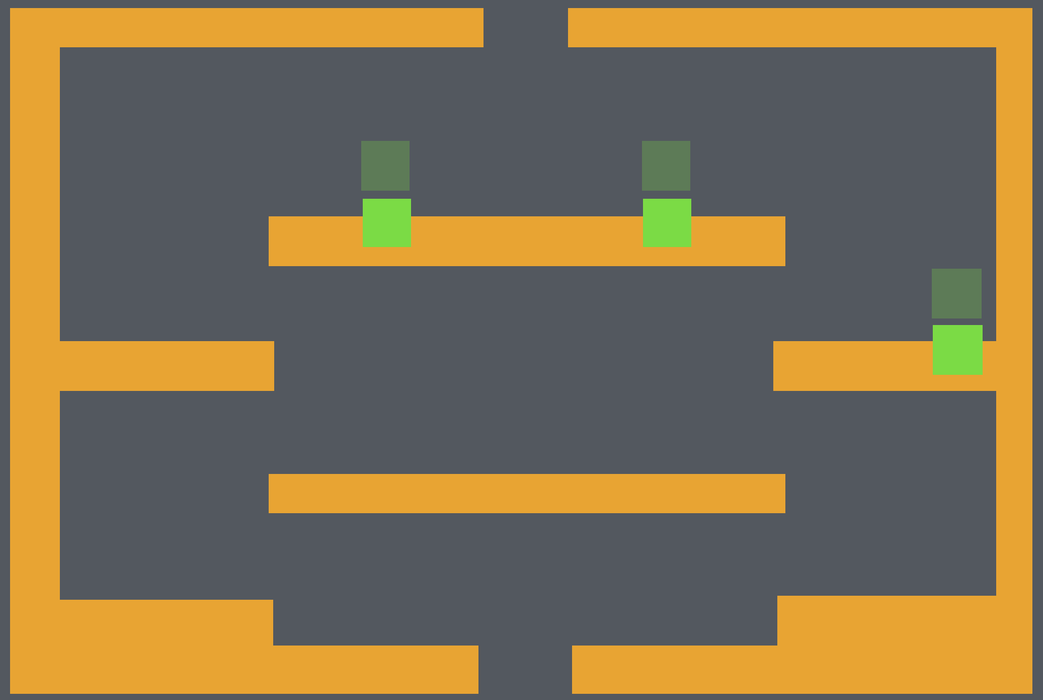
Putting it all together.

1. Apply **acceleration** and **friction** to velocity of **dynamic** entities.

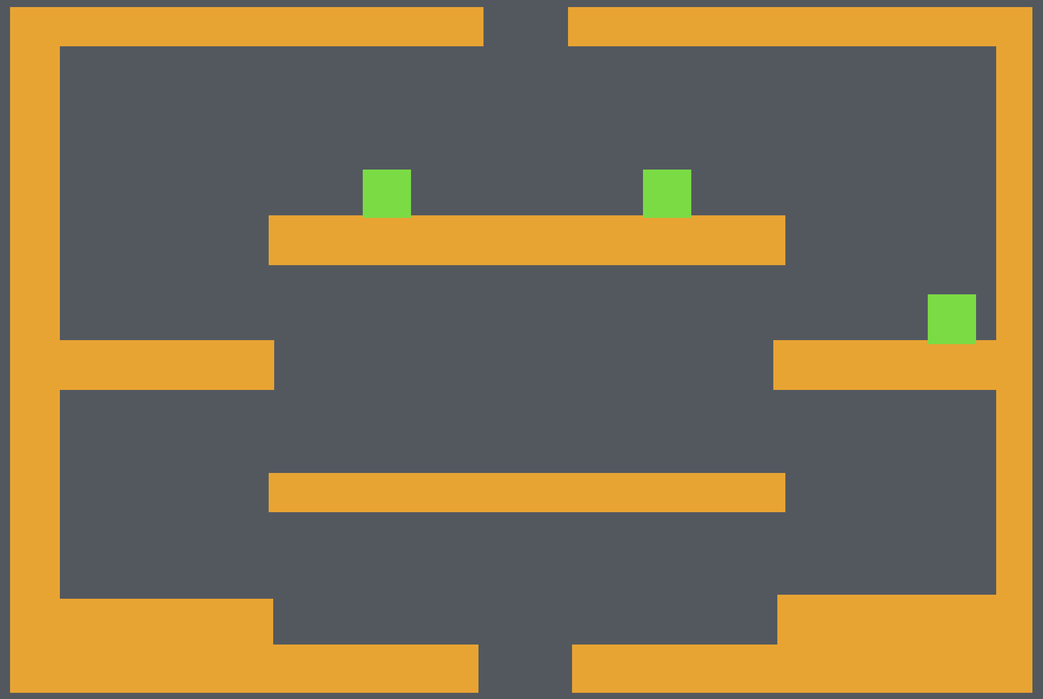




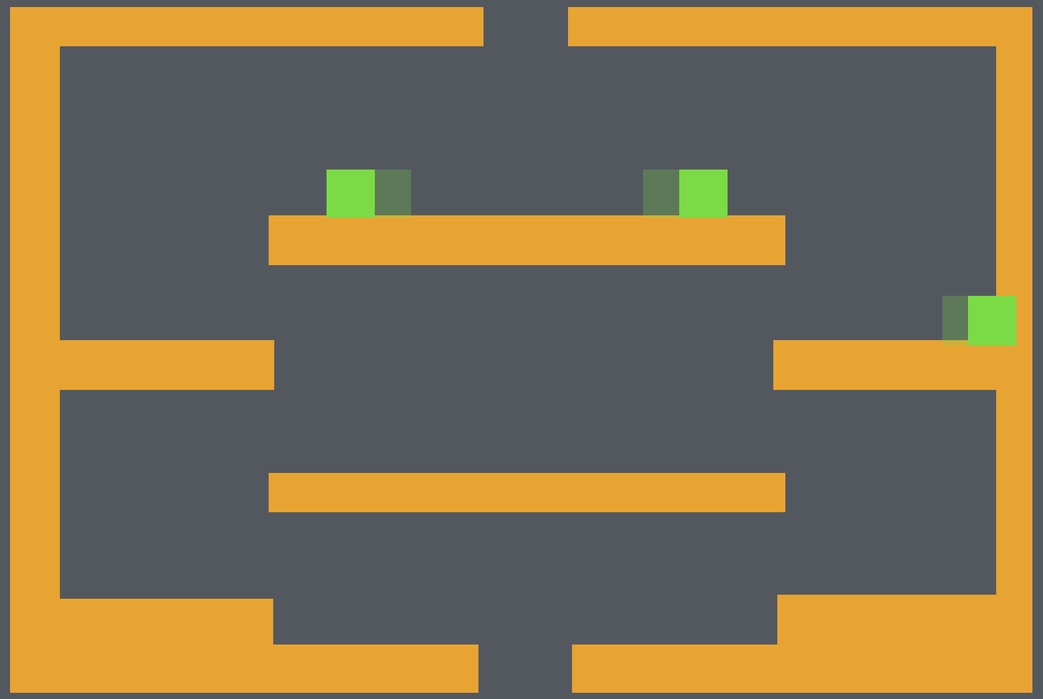
1. Apply **acceleration** and **friction** to velocity of **dynamic** entities.
2. Apply **gravity** to velocity of **dynamic** entities.



1. Apply **acceleration** and **friction** to velocity of **dynamic** entities.
2. Apply **gravity** to velocity of **dynamic** entities.
3. Apply **ONLY Y-axis velocity** to **dynamic entity** positions.



1. Apply **acceleration** and **friction** to velocity of **dynamic** entities.
2. Apply **gravity** to velocity of **dynamic** entities.
3. Apply **ONLY Y-axis velocity** to **dynamic entity** positions.
4. For each **dynamic entity**, check collisions with **static entities** and adjust **Y-position** based on **penetration**. If **collided,** set **y-velocity** to **0.**



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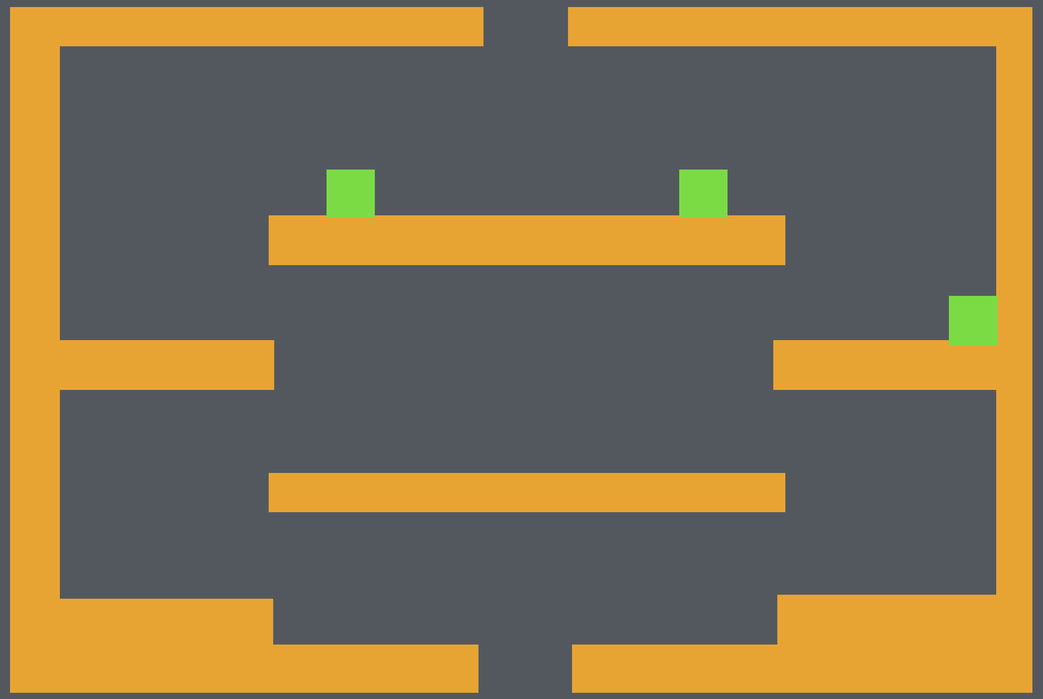
5. Apply **ONLY X-axis velocity** to **dynamic entity** positions.



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5. Apply **ONLY X-axis velocity** to **dynamic entity** positions.
6. For each **dynamic entity**, check collisions with **static entities** and adjust **X-position** based on **penetration**. If **collided,** set **x-velocity** to **0.**

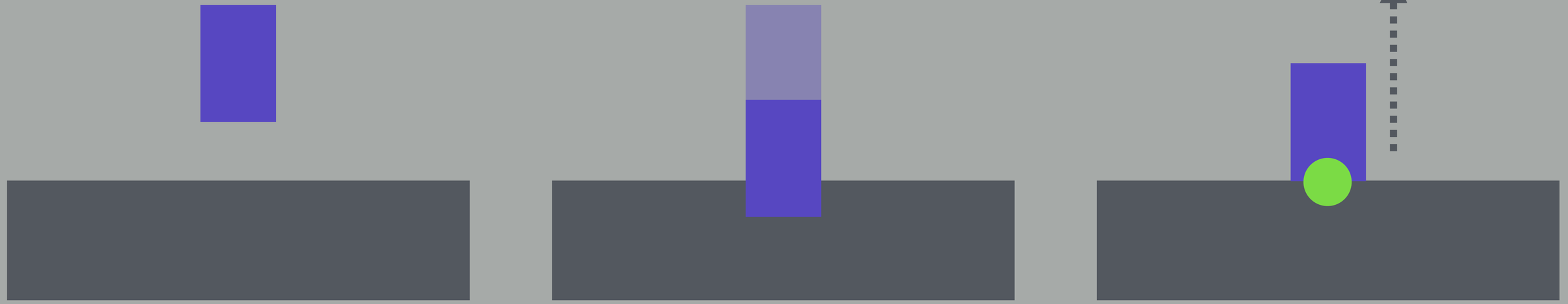
Contact flags

4 **boolean** flags, one for each side.

```
bool collidedTop;
bool collidedBottom;
bool collidedLeft;
bool collidedRight;
```

```
collidedTop = false;
collidedBottom = false;
collidedLeft = false;
collidedRight = false;
```

Set to **false** on **every frame.**



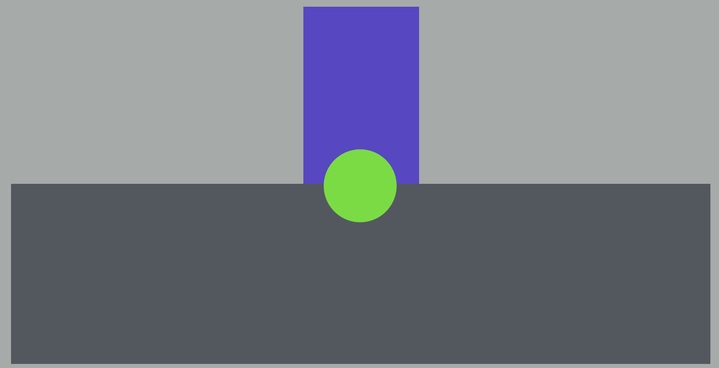
```
collidedBottom = true;
```

Set **flag** based on **collision direction**.

Using **contact flags**

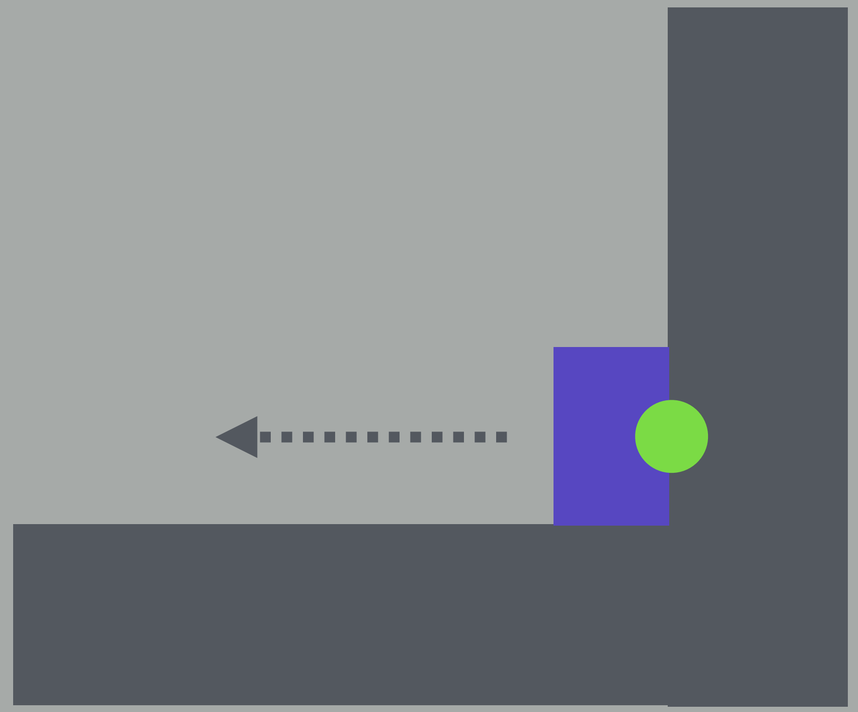
Detecting if you are standing on the **ground**.

(**Jump** only when **bottom contact** flag is **true**)



Turning **NPC entities** around when they hit a **wall**.

(When **left or right contact** flag is **true,** reverse **x_acceleration)**



```
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ENTITY_COIN};

class Entity {
  public:

   Entity();

  void Update(float elapsed);
  void Render(ShaderProgram *program);
  bool collidesWith(Entity *entity);

  SheetSprite sprite;

  float x;
  float y;
  float width;
  float height;
  float velocity_x;
  float velocity_y;
  float acceleration_x;
  float acceleration_y;

  bool isStatic;
  EntityType entityType;

  collidedTop = false;
  collidedBottom = false;
  collidedLeft = false;
  collidedRight = false;
};
```

Final **entity** properties.