

## Class Game

```
java.lang.Object  
    greenfoot.World  
        Game
```

---

```
public class Game  
extends greenfoot.World
```

World where the game takes place Credits for assets:

**Sounds** <https://www.youtube.com/watch?v=HoiU2vfJxhA>

- 0.06: upgrade
- 0:23: place tower
- 0.24: arrowhit
- 0:32: barbarian deploy
- 0:37 melee attack
- 1:08: upgrade
- 1:10: button click
- 1:11: cannon
- 1:16-19: collect gold
- 1:27: pekka
- 1:39 explosion
- 1:43 freeze spell
- 1:48 tower powerup
- 2:11 healer attack
- 2:30 mage attack
- 2:34 mage deploy
- 2:37 mortar attack
- 2:52 golem
- 2:57-2:59 zap/tesla
- 3:01 spring trap
- 3:16 wall place
- 3:29 complete level

### Music

- <https://www.youtube.com/watch?v=thbts1Vf948>
- <https://www.youtube.com/watch?v=72PhV7wQr5Y>
- <https://www.youtube.com/watch?v=CRIk6Z0IJhE>
- <https://www.youtube.com/watch?v=f04N04uFyIM>
- <https://www.youtube.com/watch?v=ZBFw6kkh4-M>
- <https://www.youtube.com/watch?v=0ELE9Jv-4p4>
- <https://www.youtube.com/watch?v=VWBF0Zonqck>
- <https://www.youtube.com/watch?v=ptrUUOxTF8c>

### Images/Sprites

#### Towers + Tower Units

- Barracks [https://za.pinterest.com/pin/822329213183384106/?amp\\_client\\_id=CLIENT\\_ID\(\\_\)&mweb\\_unauth\\_id=&simplified=true](https://za.pinterest.com/pin/822329213183384106/?amp_client_id=CLIENT_ID(_)&mweb_unauth_id=&simplified=true)
- Gold Mines <https://heavy.com/games/2014/11/clash-of-clans-cheats-top-tips-for-gold-mines/2/>
- Projectiles
- Fireballs [https://www.123rf.com/photo\\_110800607\\_stock-vector-fire-ball-animated-flaming-fireball-hot-flying-flame-and-warm-fireballs-2d-animation-frames-for-game.html](https://www.123rf.com/photo_110800607_stock-vector-fire-ball-animated-flaming-fireball-hot-flying-flame-and-warm-fireballs-2d-animation-frames-for-game.html)
- Cartoon Arrow <https://www.istockphoto.com/vector/cartoon-shooting-arrow-gm518203581-49578308>
- Iceball [https://www.nicepng.com/ourpic/u2q8i1w7e6t4y3a9\\_iceball-ice-mario/](https://www.nicepng.com/ourpic/u2q8i1w7e6t4y3a9_iceball-ice-mario/)
- Cannonball/ Mortar shells <https://www.subpng.com/png-ns2qkl/>
- Explosion <https://opengameart.org/content/pixel-art-explosion-animation>

#### Shop

- BarbarianHutCard [https://clashroyale.fandom.com/wiki/Cards CutScenes + Backgrounds](https://clashroyale.fandom.com/wiki/Cards_CutScenes_%2B_Backgrounds)
- Player/Bennet, Iroh/Albedo, Koyen/Childe, Council/Sucrose, YajYaj/ Kaeya <https://genshin.mihoyo.com/en/character/mondstadt?char=2>
- dark and light castle <https://wallpaperaccess.com/anime-castle>
- inside castle <https://cutewallpaper.org/21/anime-castle-background/view-page-21.html>
- war ground <https://www.wallpaperflare.com/search?wallpaper=war+zone>  
*Background*
- Grass <https://webstockreview.net/images/daisies-clipart-grass-prairie-16.png>
- Sand <https://thumbs.dreamstime.com/b/sand-texture-11053497.jpg>  
*Other*
- greenfoot logo (info screen) [https://upload.wikimedia.org/wikipedia/commons/4/43/Greenfoot\\_Logo.jpg](https://upload.wikimedia.org/wikipedia/commons/4/43/Greenfoot_Logo.jpg)
- Jay Jay [https://www.youtube.com/watch?v=-51AfMqnpl&ab\\_channel=JayJaytheJetPlane-OfficialChannel](https://www.youtube.com/watch?v=-51AfMqnpl&ab_channel=JayJaytheJetPlane-OfficialChannel)

**Version:**

2021-01-26

**Author:**

Ryan Lin, Young Chen

## Field Summary

### Fields

Modifier and Type	Field	Description
static int	<code>canvasHeight</code>	
static int	<code>canvasWidth</code>	
static int	<code>worldHeight</code>	
static int	<code>worldWidth</code>	

## Constructor Summary

### Constructors

Constructor	Description
<code>Game()</code>	Creates a default game
<code>Game(boolean autoLoad, boolean isCampaign)</code>	Creates a game with options to load from autosave.owo and whether or not story mode has been selected
<code>Game(boolean autoload, boolean isCampaign, boolean editor)</code>	Creates a game with options to load from autosave.owo, whether or not story mode has been selected, and whether or not the world is a map editor

## Method Summary

[All Methods](#)   [Instance Methods](#)   [Concrete Methods](#)

Modifier and Type	Method	Description
void	<code>act()</code>	Actor act method
void	<code>init()</code>	Initialises UI
boolean	<code>isCampaign()</code>	Whether or not game is in story mode
boolean	<code>isEditor()</code>	Whether or not world is an editor
void	<code>playMusic()</code>	Plays music
void	<code>stopMusic()</code>	Stops music
void	<code>updateMask(Tower tower)</code>	Updates tower mask

### Methods inherited from class greenfoot.World

`addObject`, `getBackground`, `getCellSize`, `getColorAt`, `getHeight`, `getObjects`, `getObjectsAt`, `getWidth`, `numberOfObjects`, `removeObject`, `removeObjects`, `repaint`, `setActOrder`, `setBackground`, `setBackground`, `setPaintOrder`, `showText`, `started`, `stopped`

### Methods inherited from class java.lang.Object

`clone`, `equals`, `getClass`, `hashCode`, `notify`, `notifyAll`, `toString`, `wait`, `wait`, `wait`

### Field Detail

#### canvasWidth

`public static final int canvasWidth`

#### See Also:

[Constant Field Values](#)

#### canvasHeight

`public static final int canvasHeight`

**See Also:**

[Constant Field Values](#)

### worldWidth

```
public static final int worldWidth
```

**See Also:**

[Constant Field Values](#)

### worldHeight

```
public static final int worldHeight
```

**See Also:**

[Constant Field Values](#)

## ***Constructor Detail***

### Game

```
public Game()
```

Creates a default game

### Game

```
public Game(boolean autoLoad,  
           boolean isCampaign)
```

Creates a game with options to load from autosave.owo and whether or not story mode has been selected

**Parameters:**

autoLoad - whether or not to load from previous session  
isCampaign - whether or not story mode is selected

## Game

```
public Game(boolean autoload,  
           boolean isCampaign,  
           boolean editor)
```

Creates a game with options to load from autosave.owo, whether or not story mode has been selected, and whether or not the world is a map editor

### Parameters:

- autoload - whether or not to load from previous session
- isCampaign - whether or not story mode is selected
- editor - whether or not the world is an editor

## *Method Detail*

### init

```
public void init()
```

Initialises UI

### act

```
public void act()
```

Actor act method

### Overrides:

act in class greenfoot.World

### playMusic

```
public void playMusic()
```

Plays music

### stopMusic

```
public void stopMusic()
```

Stops music

### isCampaign

```
public boolean isCampaign()
```

Whether or not game is in story mode

#### Returns:

Whether or not game is in story mode

### isEditor

```
public boolean isEditor()
```

Whether or not world is an editor

#### Returns:

Whether or not world is an editor

### updateMask

```
public void updateMask(Tower tower)
```

Updates tower mask

#### Parameters:

tower - target tower

## Class ArcherTower

```
java.lang.Object
    Updated
        Sprite
            Tower
                CombatTower
                    ArcherTower
```

---

```
public class ArcherTower
extends CombatTower
```

Shoots arrows at enemies.

**Version:**

2021

**Author:**

Ryan Lin

### *Field Summary*

#### Fields inherited from class Tower

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>ArcherTower(int x, int y, int ix, int iy)</code>	Creates a basic ArcherTower.
<code>ArcherTower(int x, int y, int ix, int iy, int level)</code>	Creates an ArcherTower with a custom level.

protected void	<b>attack(Enemy e)</b>	Attack enemies
float	<b>getCost()</b>	Get the cost of an ArcherTower
<b>String</b>	<b>toString()</b>	Returns the string representation of ArcherTower

### Methods inherited from class CombatTower

`_update, getNextEnemy`

### Methods inherited from class Tower

`canAct, destroy, getCooldown, getIX, getIY, getLevel, getRange, isSelectedTower, levelup, resetCooldown`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait`

### **Constructor Detail**

```
    int y,  
    int ix,  
    int iy)
```

Creates a basic ArcherTower.

**Parameters:**

`x` - the x coordinate of the Archer Tower  
`y` - the y coordinate of the Archer Tower  
`ix` - the x index of the tower in the global grid  
`iy` - the y index of the tower in the global grid

## ArcherTower

```
public ArcherTower(int x,  
                  int y,  
                  int ix,  
                  int iy,  
                  int level)
```

Creates an ArcherTower with a custom level.

**Parameters:**

`x` - the x coordinate of the tower  
`y` - the y coordinate of the tower  
`ix` - the x index of the tower in the global grid  
`iy` - the y index of the tower in the global grid  
`level` - the level of the Tower

## Method Detail

### attack

```
protected void attack(Enemy e)
```

**toString**

```
public String toString()
```

Returns the string representation of ArcherTower

**Overrides:**

[toString](#) in class [Object](#)

**Returns:**

name of ArcherTower

**getCost**

```
public float getCost()
```

Get the cost of an ArcherTower

**Specified by:**

[getCost](#) in class [Tower](#)

**Returns:**

the cost of an ArcherTower

## Class Arrow

```
java.lang.Object
    Updated
        Sprite
            Projectile
                Arrow
```

---

```
public class Arrow
extends Projectile
```

A arrow that hits a single target

**Version:**

2021

**Author:**

Lucy Zhao

### ***Field Summary***

#### **Fields inherited from class Projectile**

```
damage, isMagic, MAX_LEVEL, speed, target
```

### ***Constructor Summary***

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>Arrow(double x, double y, Enemy target)</code>	Constructor for Arrow class
<code>Arrow(double x, double y, Enemy target, int level)</code>	Constructor for Arrow class

### ***Method Summary***

## Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

## Methods inherited from class Updated

```
_receiveBroadcast
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Arrow

```
public Arrow(double x,  
            double y,  
            Enemy target)
```

Constructor for Arrow class

#### Parameters:

x - the starting x coordinate

y - the starting y coordinate

target - the reference enemy target

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD  
~~enemy target,~~  
int level)

Constructor for Arrow class

**Parameters:**

x - the starting x coordinate  
y - the starting y coordinate  
target - the reference enemy target  
level - the level of the projectile

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

## Class Artillery

```
java.lang.Object
    Updated
        Sprite
            Tower
                CombatTower
                    Artillery
```

---

```
public class Artillery
extends CombatTower
```

Shoots cannonballs at enemies.

**Version:**

2021

**Author:**

Ryan Lin

### *Field Summary*

#### Fields inherited from class Tower

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>Artillery(int x, int y, int ix, int iy)</code>	Creates a basic Artillery.
<code>Artillery(int x, int y, int ix, int iy, int level)</code>	Creates an Artillery with a custom level.

protected void	<b>attack(Enemy e)</b>	Attack enemies
float	<b>getCost()</b>	Gets the cost of an Artillery
<b>String</b>	<b>toString()</b>	Returns the string representation of Artillery

### Methods inherited from class CombatTower

\_update, getNextEnemy

### Methods inherited from class Tower

canAct, destroy, getCooldown, getIX, getIY, getLevel, getRange, isSelectedTower, levelup, resetCooldown

### Methods inherited from class Sprite

animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards

### Methods inherited from class Updated

\_receiveBroadcast

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait

### Constructor Detail

```
    int y,  
    int ix,  
    int iy)
```

Creates a basic Artillery.

**Parameters:**

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iy - the y index of the tower in the global grid

**Artillery**

```
public Artillery(int x,  
                int y,  
                int ix,  
                int iy,  
                int level)
```

Creates an Artillery with a custom level.

**Parameters:**

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iy - the y index of the tower in the global grid

level - the level of the tower

**Method Detail****attack**

```
protected void attack(Enemy e)
```

**toString**

```
public String toString()
```

Returns the string representation of Artillery

**Overrides:**

`toString` in class `Object`

**Returns:**

name of Artillery

**getCost**

```
public float getCost()
```

Gets the cost of an Artillery

**Specified by:**

`getCost` in class `Tower`

**Returns:**

the cost of an Artillery

## Class BabyPekka

```
java.lang.Object
    Updated
        Sprite
            Enemy
                BabyPekka
```

```
public class BabyPekka
extends Enemy
```

The Baby Pekka is a small unit that has above average health and damage and is very speedy.

**Version:**

2021-01-26

**Author:**

Rachel Tong, Young Chen

### **Field Summary**

#### **Fields inherited from class Enemy**

```
angle, coolDown, coolDownTime, DEFAULT_HP, DEFAULT_RANGE, hpOffset, range,
rangeSquared, velX, velY
```

### **Constructor Summary**

#### **Constructors**

Constructor	Description
<code>BabyPekka(double x, double y)</code>	Creates a baby pekka at the indicated location

### **Method Summary**

### Methods inherited from class Enemy

```
_receiveBroadcast, checkCanAttack, damage, die, getNodeIndex, heal,  
moveTowards, translate, updateHP
```

### Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### BabyPekka

```
public BabyPekka(double x,  
                  double y)
```

Creates a baby pekka at the indicated location

#### Parameters:

x - the x coordinate of BabyPekka

y - the y coordinate of BabyPekka

**\_update**

```
public void _update(float delta)
```

Update method

**Overrides:**

[\\_update](#) in class [Enemy](#)

**Parameters:**

`delta` - Change in time since last update

**attack**

```
public void attack()
```

Attack to damage JayJay the Dragon

**Overrides:**

[attack](#) in class [Enemy](#)

## Class Background

java.lang.Object  
  Updated  
    Sprite  
      Background

---

```
public class Background
extends Sprite
```

Background image

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>Background(int width, int height)</code>	Creates the object for the background image

### Method Summary

#### Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,
setY, setZ, turnTowards
```

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

***Constructor Detail*****Background**

```
public Background(int width,  
                  int height)
```

Creates the object for the background image

## Class Bar

```
java.lang.Object
    greenfoot.Actor
        Bar
```

```
public class Bar
extends greenfoot.Actor
```

A progress bar.

**Version:**

2021

**Author:**

Ryan Lin

### Constructor Summary

#### Constructors

**Constructor**

<code>Bar(int width, int height, int maxValue)</code>	<b>Description</b>
<code>Bar(int width, int height, int maxValue, boolean displayText)</code>	Constructor for class Bar.
<code>Bar(int width, int height, int startValue, int maxValue, greenfoot.Color fillColor, greenfoot.Color bgColor, boolean displayText)</code>	Constructor for class Bar that displays numerical text showing the progress.
	Constructor for class Bar that is color-customizable.

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

**Modifier and Type**

**Method**

**Description**

void

`addedToWorld  
(greenfoot.World world)`

Called when the Bar is added to the World.

## Methods inherited from class greenfoot.Actor

```
act, getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset,  
getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset,  
getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge,  
isTouching, move, removeTouching, setImage, setImage, setLocation,  
setRotation, turn, turnTowards
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Bar

```
public Bar(int width,  
          int height,  
          int maxValue)
```

Constructor for class Bar.

**Parameters:**

`width` - The width of the bar.

`height` - The height of the bar.

`maxValue` - The maximum value of the bar.

### Bar

```
public Bar(int width,  
          int height,  
          int maxValue,  
          boolean displayText)
```

Constructor for class Bar that displays numerical text showing the progress.

`displayText` - If the bar will display the numerical text.

## Bar

```
public Bar(int width,  
          int height,  
          int startValue,  
          int maxValue,  
          greenfoot.Color fillColor,  
          greenfoot.Color bgColor,  
          boolean displayText)
```

Constructor for class Bar that is color-customizable.

**Parameters:**

`width` - The width of the bar.

`height` - The height of the bar.

`maxValue` - The maximum value of the bar.

`fillColor` - The color of progress.

`bgColor` - The background color of the bar.

`displayText` - If the bar will display the numerical text.

## Method Detail

### addedToWorld

```
public void addedToWorld(greenfoot.World world)
```

Called when the Bar is added to the World.

**Overrides:**

`addedToWorld` in class `greenfoot.Actor`

**Parameters:**

`value` - The value to set the progress bar to.

**drawImage**

```
public void drawImage()
```

Draw the progress bar image.

## Class Barracks

```
java.lang.Object
    Updated
        Sprite
            Tower
                Barracks
```

```
public class Barracks
extends Tower
```

Spawns NPCs to fight enemies on the path near the tower.

**Version:**

2021

**Author:**

Young Chen

### Field Summary

#### Fields

Modifier and Type	Field	Description
static int	<a href="#">MINIONS_PER_BARRACK</a>	

### Fields inherited from class Tower

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">Barracks(int x, int y, int ix, int iy)</a>	Creates a basic Barracks.

## Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Update the Barracks
protected void	<code>attack()</code>	Spawn Minion
void	<code>destroy()</code>	Destroys the barracks
float	<code>getCost()</code>	Get the cost of a Barracks
<code>String</code>	<code>toString()</code>	Returns the string representation of Barracks

### Methods inherited from class Tower

`canAct, getCooldown, getIX, getIY, getLevel, getRange, isSelectedTower, levelup, resetCooldown`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait`

**MINIONS\_PER\_BARRACK**

```
public static final int MINIONS_PER_BARRACK
```

**See Also:**

Constant Field Values

***Constructor Detail*****Barracks**

```
public Barracks(int x,  
                int y,  
                int ix,  
                int iy)
```

Creates a basic Barracks.

**Parameters:**

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iy - the y index of the tower in the global grid

**Barracks**

```
public Barracks(int x,  
                int y,  
                int ix,  
                int iy,  
                int level)
```

Creates a Barracks with a custom level.

**Parameters:**

x - the x coordinate of the tower

### **Method Detail**

#### **attack**

```
protected void attack()
```

Spawn Minion

#### **\_update**

```
public void _update(float delta)
```

Update the Barracks

**Overrides:**

[\\_update](#) in class [Updated](#)

**Parameters:**

delta - Change in time since last update

#### **destroy**

```
public void destroy()
```

Destroys the barracks

**Overrides:**

[destroy](#) in class [Tower](#)

#### **toString**

```
public String toString()
```

name of Barracks

### getCost

public float getCost()

Get the cost of a Barracks

**Specified by:**

`getCost` in class `Tower`

**Returns:**

the cost of a Barracks

## Class Boulder

```
java.lang.Object
    Updated
        Sprite
            Projectile
                EnemyProjectile
                    Boulder
```

---

```
public class Boulder
extends EnemyProjectile
```

An enemy's boulder used to hurt Jay Jay

**Version:**

2021

**Author:**

Young Chen

### *Field Summary*

#### Fields inherited from class Projectile

```
damage, isMagic, MAX_LEVEL, speed, target
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>Boulder(double x, double y, double angle)</code>	Constructor for objects of class Boulder

### *Method Summary*

[All Methods](#)

[Instance Methods](#)

[Concrete Methods](#)

## Methods inherited from class EnemyProjectile

checkCollision, damageEnemy

## Methods inherited from class Projectile

checkWorldBounds, destroy

## Methods inherited from class Sprite

animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards

## Methods inherited from class Updated

\_receiveBroadcast

## Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

## Constructor Detail

### Boulder

```
public Boulder(double x,  
             double y,  
             double angle)
```

**Method Detail****\_update**

```
public void _update(float delta)
```

Update method of Boulder class

**Overrides:**

[\\_update](#) in class [Projectile](#)

**Parameters:**

`delta` - Change in time since last update

## Class BuildCursor

```
java.lang.Object
  greenfoot.Actor
    BuildCursor
```

```
public class BuildCursor
extends greenfoot.Actor
```

Object to build towers with

**Version:**

2021-01-26

**Author:**

Young Chen

### Method Summary

All Methods	Static Methods	Instance Methods	Concrete Methods
Modifier and Type	Method	Description	
void	<a href="#">act()</a>	Actor act method	
static void	<a href="#">init()</a>	Initialises the build cursor	
static void	<a href="#">setState(int ID)</a>	Sets the state of the build cursor	

### Methods inherited from class greenfoot.Actor

```
addedToWorld, getImage, getIntersectingObjects, getNeighbours,
getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject,
getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY,
intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage,
 setLocation, setRotation, turn, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,
```

**init**

```
public static void init()
```

Initialises the build cursor

**setState**

```
public static void setState(int ID)
```

Sets the state of the build cursor

**Parameters:**

ID - magic number of state

**act**

```
public void act()
```

Actor act method

**Overrides:**

act in class greenfoot.Actor

## Class Button

```
java.lang.Object
    greenfoot.Actor
        Button
```

**Direct Known Subclasses:**

[ImageButton](#), [TowerButton](#)

---

```
public abstract class Button
extends greenfoot.Actor
```

Write a description of class Button here.

**Version:**

2021

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">Button()</a>	

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Abstract Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<a href="#">act()</a>	Check for mouse clicks and act accordingly.
protected abstract void	<a href="#">onPress()</a>	Action when the Button is pressed.

### Methods inherited from class greenfoot.Actor

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Constructor Detail****Button**

```
public Button()
```

**Method Detail****act**

```
public void act()
```

Check for mouse clicks and act accordingly.

**Overrides:**

act in class greenfoot.Actor

**onPress**

```
protected abstract void onPress()
```

Action when the Button is pressed.

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class ButtonGrid

java.lang.Object  
    greenfoot.Actor  
        ButtonGrid

---

```
public class ButtonGrid
extends greenfoot.Actor
```

Flowing grid for buttons

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>ButtonGrid()</code>	

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<code>set(Button[] buttons, int width, int height, int gap)</code>	Adds the buttons to world in the grid
void	<code>set(Button[] buttons, int width, int height, int gapX, int gapY)</code>	Adds the buttons to world in the grid

### Methods inherited from class greenfoot.Actor

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Constructor Detail****ButtonGrid**

```
public ButtonGrid()
```

**Method Detail****set**

```
public void set(Button[] buttons, int width, int height, int gap)
```

Adds the buttons to world in the grid

**Parameters:**

buttons - Array of buttons

width - buttons per row

height - buttons per column

gap - gap between buttons

**set**

```
public void set(Button[] buttons, int width, int height, int gapX, int gapY)
```

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

height - buttons per column

gapX - horizontal gap between buttons

gapY - vertical gap between buttons

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

## Class Cannonball

```
java.lang.Object
    Updated
        Sprite
            Projectile
                Cannonball
```

---

```
public class Cannonball
extends Projectile
```

A Cannonball that hits a single target

**Version:**

2021

**Author:**

Lucy Zhao

### ***Field Summary***

#### **Fields inherited from class Projectile**

```
damage, isMagic, MAX_LEVEL, speed, target
```

### ***Constructor Summary***

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>Cannonball(double x, double y, <b>Enemy</b> target)</code>	Constructor for Cannonball class
<code>Cannonball(double x, double y, <b>Enemy</b> target, int level)</code>	Constructor for Cannonball class

### ***Method Summary***

## Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

## Methods inherited from class Updated

```
_receiveBroadcast
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Cannonball

```
public Cannonball(double x,  
                  double y,  
                  Enemy target)
```

Constructor for Cannonball class

#### Parameters:

x - the starting x coordinate

y - the starting y coordinate

target - the reference enemy target

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
        double y,  
        Enemy target,  
        int level)
```

Constructor for Cannonball class

**Parameters:**

- x - the starting x coordinate
- y - the starting y coordinate
- target - the reference enemy target
- level - the level of the projectile

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

## Class Canvas

```
java.lang.Object
  greenfoot.Actor
    Canvas
```

```
public class Canvas
extends greenfoot.Actor
```

Sprite renderer class that draws sprites from lowest y position (closest to top of the screen) to highest y position (closest to bottom of the screen). Also draws onto a volatile image, which can lead to better performance in certain cases compared to using greenfoot's actor class directly

**Version:**

2021-01-15

**Author:**

Young Chen

### **Constructor Summary**

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code><b>Canvas</b>(int zWidth, int width, int height)</code>	Creates a canvas

### **Method Summary**

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

<b>Modifier and Type</b>	<b>Method</b>	<b>Description</b>
void	<code><b>act()</b></code>	Canvas act method to draw sprites
void	<code><b>addSprite(Sprite s, int layer)</b></code>	Adds a sprite to the canvas
void	<code><b>draw()</b></code>	Draws all the sprites currently contained in the canvas from back to front, with the order being determined by the y-location of the sprite

```
(Sprite >,
int layer)
```

### Methods inherited from class greenfoot.Actor

```
addedToWorld, getImage, getIntersectingObjects, getNeighbours,
getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject,
getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY,
intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage,
setLocation, setRotation, turn, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,
```

### Constructor Detail

#### Canvas

```
public Canvas(int zWidth,
              int width,
              int height)
```

Creates a canvas

##### Parameters:

`zWidth` - Y axis divisions to divide sprites into

`width` - width of canvas

`height` - height of canvas

### Method Detail

determined by the y-location of the sprite

### getGreenfootImage

```
public greenfoot.GreenfootImage getGreenfootImage()
```

Gets the greenfootimage of the canvas

**Returns:**

greenfoot image

### getBufferedImage

```
public BufferedImage getBufferedImage()
```

Gets the bufferedimage of the canvas

**Returns:**

image

### addSprite

```
public void addSprite(Sprite s, int layer)
```

Adds a sprite to the canvas

**Parameters:**

s - sprite

layer - draw layer of sprite. Must be a positive or zero integer. Sprites are drawn from lowest draw layer to highest draw layer

### removeSprite

```
public void removeSprite(Sprite s, int layer)
```

Removes a sprite from the canvas

**act**

**public void act()**

Canvas act method to draw sprites

**Overrides:**

act in class greenfoot.Actor

## Class Character

```
java.lang.Object
  greenfoot.Actor
    Character
```

---

```
public class Character
extends greenfoot.Actor
```

The Character class holds an image that can be changed Rachel Tong

**Version:**

Jan 2020

### Constructor Summary

#### Constructors

Constructor	Description
<code>Character()</code>	Constructor for Character class
<code>Character(greenfoot.GreenfootImage image)</code>	Constructor for Character class

### Method Summary

#### All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>finish()</code>	Removes Character from the world
void	<code>updateImage(greenfoot.GreenfootImage display)</code>	Changes the displayed image

### Methods inherited from class greenfoot.Actor

```
act, addedToWorld, getImage, getIntersectingObjects, getNeighbours,
getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject,
```

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Constructor Detail****Character**

```
public Character()
```

Constructor for Character class

**Character**

```
public Character(greenfoot.GreenfootImage image)
```

Constructor for Character class

**Parameters:**

image - displayed image

**Method Detail****updateImage**

```
public void updateImage(greenfoot.GreenfootImage display)
```

Changes the displayed image

**Parameters:**

display - new displayed image

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

Removes Character from the world

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class CircleMask

java.lang.Object  
    Updated  
        Sprite  
            CircleMask

---

```
public class CircleMask
extends Sprite
```

A mask used to display the radius around a tower.

**Version:**

2021-01-25

**Author:**

Ryan Lin

### Constructor Summary

#### Constructors

Constructor	Description
<code>CircleMask()</code>	Creates a Circular Mask

### Method Summary

All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Update the Circular Mask
void	<code>hide()</code>	Make the Circular Mask Disappear
boolean	<code>isVisible()</code>	Checks if the mask is visible
void	<code>show(Tower selected)</code>	Make the Circular Mask appear for a tower

### Methods inherited from class Sprite

SUMMARY: NESTED | FIELD | CONSTR | METHOD DETAIL: FIELD | CONSTR | METHOD

```
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,
setY, setZ, turnTowards
```

### Methods inherited from class Updated

```
_receiveBroadcast
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,
wait
```

### Constructor Detail

#### CircleMask

```
public CircleMask()
```

Creates a Circular Mask

##### Parameters:

x - The x-coordinate of the tower

y - The y-coordinate of the tower

radius - The radius of the tower

### Method Detail

#### \_update

```
public void _update(float delta)
```

delta - The time, in seconds, that elapsed since the last update

**hide**

```
public void hide()
```

Make the Circular Mask Disappear

**show**

```
public void show(Tower selected)
```

Make the Circular Mask appear for a tower

**Parameters:**

selected - The tower whose range is to be displayed

**isVisible**

```
public boolean isVisible()
```

Checks if the mask is visible

**Returns:**

visible True if the mask is visible, otherwise False

## Class CombatTower

```
java.lang.Object
    Updated
        Sprite
            Tower
                CombatTower
```

**Direct Known Subclasses:**

[ArcherTower](#), [Artillery](#), [FireballTower](#), [IceballTower](#), [LazerTower](#), [Pillbox](#)

---

```
public abstract class CombatTower
extends Tower
```

A tower that shoots projectiles.

**Version:**

2021

**Author:**

Ryan Lin, Young Chen

### *Field Summary*

#### Fields inherited from class Tower

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>CombatTower(greenfoot.GreenfootImage[][][] image, float[] range, float[] cooldown, boolean rotate, int x, int y, int ix, int iy, int level)</code>	Constructor for objects of class CombatTower with a custom level

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Update the CombatTower
protected abstract void	<code>attack(Enemy e)</code>	Attack enemies
protected Enemy	<code>getNextEnemy()</code>	Get the next enemy targeted by this tower

### Methods inherited from class Tower

`canAct, destroy, getCooldown, getCost, getIX, getIY, getLevel, getRange, isSelectedTower, levelup, resetCooldown`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getCount, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`

### Constructor Detail

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

~~↳ rotate, cooldown,~~

boolean rotate,

int x,

int y,

int ix,

int iy,

int level)

Constructor for objects of class CombatTower with a custom level

**Parameters:****image** - a 2D array of sprite images**range** - the range of the tower**cooldown** - the cooldown of the tower**rotate** - is the tower able to rotate to face the enemy**x** - the x coordinate of the tower**y** - the y coordinate of the tower**ix** - the x index of the tower in the global grid**iy** - the y index of the tower in the global grid**level** - the level of the tower**Method Detail****\_update****public void \_update(float delta)**

Update the CombatTower

**Overrides:****\_update** in class **Updated****Parameters:****delta** - Change in time since last update

**Returns:**

Enemy the next enemy targeted by this tower, null if no enemies exist

**attack**

```
protected abstract void attack(Enemy e)
```

Attack enemies

## Class Cutscene

```
java.lang.Object
    greenfoot.World
        Cutscene
```

---

```
public class Cutscene
extends greenfoot.World
```

This world displays cutscenes. When the world is created, it takes a scene number and then calls the method to display the corresponding scene. The textbox along with its corresponding image will appear with a new background. The scenes are used to tell a story or display any text written by using the addText method in the Textbox class. The user can read it visual novel style by pressing the enter key.

**Version:**

Jan 2020

**Author:**

Rachel Tong

### **Field Summary**

**Fields**

Modifier and Type	Field	Description
static int	<b>LEVELS_PER_CUTSCENE</b>	
int	<b>sceneNum</b>	
static int	<b>TOTAL_CUTSCENES</b>	

### **Constructor Summary**

**Constructors**

Constructor	Description
<b>Cutscene</b> (int sceneNum)	Constructor for world.

**Type**

void	<a href="#">act()</a>	Act method to update what the textbox is displaying when the user presses the enter key
void	<a href="#">scene1()</a>	Create scene 1
void	<a href="#">scene2()</a>	Create scene 2
void	<a href="#">scene3()</a>	Create scene 3
void	<a href="#">scene4()</a>	Create scene 4
void	<a href="#">scene5()</a>	Create scene 5
void	<a href="#">scene6()</a>	Create scene 6
void	<a href="#">scene7()</a>	Create scene 7
void	<a href="#">scene8()</a>	Create scene 8
static void	<a href="#">stopMusic()</a>	Stops any cutscene music

**Methods inherited from class greenfoot.World**

addObject, getBackground, getCellSize, getColorAt, getHeight, getObjects, getObjectsAt, getWidth, numberOfObjects, removeObject, removeObjects, repaint, setActOrder, setBackground, setBackground, setPaintOrder, showText, started, stopped

**Methods inherited from class java.lang.Object**

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait

**Field Detail**

**LEVELS\_PER\_CUTSCENE**

**TOTAL\_CUTSCENES**

```
public static final int TOTAL_CUTSCENES
```

**See Also:**

Constant Field Values

**sceneNum**

```
public int sceneNum
```

***Constructor Detail*****Cutscene**

```
public Cutscene(int sceneNum)
```

Constructor for world. Creates an AbilityButton to demonstrate how it works.

**Parameters:**

sceneNum - number to determine what scene is being displayed

***Method Detail*****act**

```
public void act()
```

Act method to update what the textbox is displaying when the user presses the enter key

**stopMusic**

```
public static void stopMusic()
```

Stops any cutscene music

**scene1**

```
public void scene1()
```

Create scene 1

**scene2**

```
public void scene2()
```

Create scene 2

**scene3**

```
public void scene3()
```

Create scene 3

**scene4**

```
public void scene4()
```

Create scene 4

**scene5**

```
public void scene5()
```

Create scene 5

Create scene 6

```
scene7
```

```
public void scene7()
```

Create scene 7

```
scene8
```

```
public void scene8()
```

Create scene 8

## Class Death

java.lang.Object  
  greenfoot.World  
    Death

---

```
public class Death
extends greenfoot.World
```

Death screen

**Version:**

2021-01-26

**Author:**

Lucy Zhao

### Constructor Summary

#### Constructors

Constructor	Description
<code>Death()</code>	Creates the Death screen

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
<code>void</code>	<code>act()</code>	Actor act method

### Methods inherited from class greenfoot.World

`addObject`, `getBackground`, `getCellSize`, `getColorAt`, `getHeight`, `getObjects`,  
`getObjectsAt`, `getWidth`, `numberOfObjects`, `removeObject`, `removeObjects`, `repaint`,  
`setActOrder`, `setBackground`, `setBackground`, `setPaintOrder`, `showText`, `started`,  
`stopped`

## ***Constructor Detail***

### **Death**

```
public Death()
```

Creates the Death screen

## ***Method Detail***

### **act**

```
public void act()
```

Actor act method

**Overrides:**

act in class greenfoot.World

## Class DissapearingText

```
java.lang.Object
  greenfoot.Actor
    Label
      DissapearingText
```

---

```
public class DissapearingText
extends Label
```

Text that disappears after a while

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>DissapearingText(String text, int x, int y)</code>	Creates a disappearing text

### Method Summary

All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>act()</code>	Actor act method

### Methods inherited from class Label

`setFillColor, setLineColor, setValue, setValue`

### Methods inherited from class greenfoot.Actor

## Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`

## Constructor Detail

### DissapearingText

```
public DissapearingText(String text,  
                        int x,  
                        int y)
```

Creates a disappearing text

**Parameters:**

`text` - text string

`x` - x location

`y` - y location

## Method Detail

### act

```
public void act()
```

Actor act method

**Overrides:**

`act` in class `greenfoot.Actor`

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class DummySpawner

```
java.lang.Object
    Updated
        Spawner
            DummySpawner
```

---

```
public class DummySpawner
extends Spawner
```

Spawner that spawns nothing for the map editor

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>DummySpawner(ObjectManager manager)</code>	Creates a dummyspawner

### Method Summary

All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Overridden update method
void	<code>nextLevel()</code>	Overridden next level method
void	<code>spawnLevel(int level)</code>	Overriden spawn level method

### Methods inherited from class Spawner

`getLevel, hasCutscene`

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### DummySpawner

```
public DummySpawner(ObjectManager manager)
```

Creates a dummyspawner

**Parameters:**

manager - Object manager

## Method Detail

### \_update

```
public void _update(float delta)
```

Overridden update method

**Overrides:**

`_update` in class `Spawner`

**Parameters:**

delta - Change in time since last update

### nextLevel

### spawnLevel

```
public void spawnLevel(int level)
```

Overridden spawn level method

**Overrides:**

[spawnLevel](#) in class [Spawner](#)

**Parameters:**

`level` - level

## Class Effect

```
java.lang.Object
    Updated
        Sprite
            Effect
```

---

```
public class Effect
extends Sprite
```

Write a description of class Effect here.

**Version:**

2021-01-23

**Author:**

Lucy Zhao

### Constructor Summary

#### Constructors

Constructor	Description
<code>Effect(double x, double y, greenfoot.GreenfootImage image, Animation animation)</code>	Constructor for objects of class Effect
<code>Effect(double x, double y, greenfoot.GreenfootImage image, Animation animation, float fadeDuration)</code>	Constructor for objects of class Effect
<code>Effect(double x, double y, greenfoot.GreenfootImage image, Animation animation, float fadeDuration, float animDuration)</code>	Constructor for objects of class Effect

### Method Summary

#### All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
-------------------	--------	-------------

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,
setY, setZ, turnTowards
```

### Methods inherited from class Updated

```
_receiveBroadcast
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,
wait
```

## Constructor Detail

### Effect

```
public Effect(double x,
              double y,
              greenfoot.GreenfootImage image,
              Animation animation)
```

Constructor for objects of class Effect

#### Parameters:

x - the starting x coordinate

y - the starting y coordinate

image - the starting sprite

animation - the animation to be played

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
greenfoot.GreenfootImage image,
Animation animation,
float fadeDuration)
```

Constructor for objects of class Effect

**Parameters:**

x - the starting x coordinate

y - the starting y coordinate

image - the starting sprite

animation - the animation to be played

fadeDuration - how often to update fade

**Effect**

```
public Effect(double x,
              double y,
              greenfoot.GreenfootImage image,
              Animation animation,
              float fadeDuration,
              float animDuration)
```

Constructor for objects of class Effect

**Parameters:**

x - the starting x coordinate

y - the starting y coordinate

image - the starting sprite

animation - the animation to be played

fadeDuration - how often to update fade

animDuration - how often to update animation

**Method Detail**

**Overrides:**

[\\_update](#) in class [Updated](#)

**Parameters:**

`delta` - Change in time since last update

## Class Enemy

```
java.lang.Object
    Updated
        Sprite
            Enemy
```

**Direct Known Subclasses:**

BabyPekka, Golem, Maniac, Pekka, Troll, Warlock

```
public class Enemy
extends Sprite
```

Enemies make their way to Jay Jay the Dragon by following the path in the attempt to defeat/kill it. They are attacked by the towers that are guarding the path. If their health bar reaches 0, the enemy dies. Each different enemy has different stats and attacks. If they are successful in defeating Jay Jay, the level ends.

**Version:**

2021-01-26

**Author:**

Rachel Tong, Young Chen

### Field Summary

#### Fields

Modifier and Type	Field	Description
protected double	angle	
protected float	coolDown	
protected float	coolDownTime	
static float	DEFAULT_HP	
static float	DEFAULT_RANGE	
protected double	hpOffset	
protected float	range	
protected float	rangeSquared	
protected double	velX	
protected double	velY	

**Constructors**

Constructor	Description
<code>Enemy(double x, double y, greenfoot.GreenfootImage image)</code>	Constructor for enemy
<code>Enemy(double x, double y, greenfoot.GreenfootImage image, float hp, float range, float coolDown, float speed, boolean magRes, boolean phyRes)</code>	Constructor for enemy

**Method Summary**[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<code>_receiveBroadcast(int id)</code>	Receive broadcast from object manager
void	<code>_update(float delta)</code>	Enemy update method
void	<code>attack()</code>	
protected	<code>checkCanAttack(float delta)</code>	Whether or not the enemy can attack
void		
void	<code>damage(float damage, boolean typeMag, boolean typePhy)</code>	Damage done to enemies to reduce hp
void	<code>die()</code>	Called when enemy hp hits 0.
int	<code>getNodeIndex()</code>	Get current node index in path
void	<code>heal(float amount)</code>	Heals enemy by a certain amount
void	<code>moveTowards(double x, double y, float magnitude)</code>	Move towards location
void	<code>translate(double x, double y)</code>	Move
protected	<code>updateHP()</code>	Updates the health bar to represent the current hp
void		

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

## Field Detail

### DEFAULT\_HP

```
public static final float DEFAULT_HP
```

#### See Also:

Constant Field Values

### DEFAULT\_RANGE

```
public static final float DEFAULT_RANGE
```

#### See Also:

Constant Field Values

### range

```
protected float range
```

**coolDown**

```
protected float coolDown
```

**coolDownTime**

```
protected float coolDownTime
```

**hpOffset**

```
protected double hpOffset
```

**velX**

```
protected double velX
```

**velY**

```
protected double velY
```

**angle**

```
protected double angle
```

***Constructor Detail***

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
    double y,  
    greenfoot.GreenfootImage image)
```

Constructor for enemy

**Parameters:**

x - the x coordinate of the enemy  
y - the y coordinate of the enemy  
image - image representing the enemy

**Enemy**

```
public Enemy(double x,  
            double y,  
            greenfoot.GreenfootImage image,  
            float hp,  
            float range,  
            float coolDown,  
            float speed,  
            boolean magRes,  
            boolean phyRes)
```

Constructor for enemy

**Parameters:**

x - the x coordinate of the enemy  
y - the y coordinate of the enemy  
image - image representing the enemy  
hp - amount of health the enemy has  
range - the range of the enemy attack  
coolDown - time it takes in between enemy attacks  
speed - movement speed of the enemy  
magRes - true if the enemy has resistance to magical damage  
phyRes - true if the enemy has resistance to physical damage

```
public void damage(float damage, boolean typeMag, boolean typePhy)
```

Damage done to enemies to reduce hp

**Parameters:**

damage - the amount of damage being dealt

typeMag - true if the type of damage being dealt is magical

typePhy - true if the type of damage being dealt is physical

**heal**

```
public void heal(float amount)
```

Heals enemy by a certain amount

**Parameters:**

amount - the amount of hp the enemy is healed

**attack**

```
public void attack()
```

**updateHP**

```
protected void updateHP()
```

Updates the health bar to represent the current hp

**\_update**

```
public void _update(float delta)
```

Enemy update method

**Overrides:**

**\_receiveBroadcast**

```
public void _receiveBroadcast(int id)
```

Receive broadcast from object manager

**Overrides:**

[\\_receiveBroadcast](#) in class [Updated](#)

**Parameters:**

`id` - broadcast magic number

**checkCanAttack**

```
protected void checkCanAttack(float delta)
```

Whether or not the enemy can attack

**Parameters:**

`delta` - change in time since last update

**translate**

```
public void translate(double x, double y)
```

Move

**Parameters:**

`x` - distance in x axis

`y` - distance in y axis

**moveTowards**

```
public void moveTowards(double x, double y, float magnitude)
```

Move towards location

**die**

```
public void die()
```

Called when enemy hp hits 0. Removes the enemy and hp bar from the game.

**getNodeIndex**

```
public int getNodeIndex()
```

Get current node index in path

**Returns:**

node index

## Class EnemyProjectile

```
java.lang.Object
    Updated
        Sprite
            Projectile
                EnemyProjectile
```

### Direct Known Subclasses:

[Boulder](#)

---

```
public class EnemyProjectile
extends Projectile
```

Write a description of class EnemyProjectile here.

### Version:

2021

### Author:

Young Chen

### *Field Summary*

#### Fields inherited from class Projectile

```
damage, isMagic, MAX_LEVEL, speed, target
```

### *Constructor Summary*

#### Constructors

##### Constructor

```
EnemyProjectile(double x, double y,
greenfoot.GreenfootImage image, double angle, int id,
float damage, float speed)
```

##### Description

Constructor for  
EnemyProjectile  
class

```
protected void checkCollision() Checks if EnemyProjectile has reached an enemy
protected void damageEnemy() Does nothing
```

### Methods inherited from class Projectile

`_update, checkWorldBounds, destroy`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`

### Constructor Detail

#### EnemyProjectile

```
public EnemyProjectile(double x,
                      double y,
                      greenfoot.GreenfootImage image,
```

SUMMARY: NESTED | FIELD | CONSTR | METHOD  
Constructor for EnemyProjectile class

DETAIL: FIELD | CONSTR | METHOD

**Parameters:**

x - the starting x coordinate  
y - the starting y coordinate  
image - the sprite of the projectile  
angle - angle of projectile  
id - the id of the projectile for sounds

**Method Detail****damageEnemy**

```
protected void damageEnemy()
```

Does nothing

**Overrides:**

damageEnemy in class [Projectile](#)

**checkCollision**

```
protected void checkCollision()
```

Checks if EnemyProjectile has reached an enemy

**Overrides:**

checkCollision in class [Projectile](#)

## Class Explosion

java.lang.Object  
  Updated  
    Sprite  
      Explosion

---

```
public class Explosion
extends Sprite
```

Explosion effect

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>Explosion(double x, double y)</code>	Creates an explosion effect

### Method Summary

#### All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Updates explosion animation

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,`

**Methods inherited from class Updated**`_receiveBroadcast`**Methods inherited from class java.lang.Object**`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`**Constructor Detail****Explosion**

```
public Explosion(double x,  
                double y)
```

Creates an explosion effect

**Parameters:**

`x` - x location

`y` - y location

**Method Detail****\_update**

```
public void _update(float delta)
```

Updates explosion animation

**Overrides:**

`_update` in class `Updated`

**Parameters:**

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class FastForwardButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
        FastForwardButton
```

---

```
public class FastForwardButton
extends ImageButton
```

Allows the user to fast forward through cutscenes.

**Version:**

2021

**Author:**

Young Chen

### **Constructor Summary**

#### **Constructors**

Constructor	Description
<b>FastForwardButton()</b>	Constructor for class FastForwardButton.

### **Method Summary**

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<b>onPress()</b>	Fast forward through cutscenes.

### **Methods inherited from class Button**

**act**

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage, setLocation, setRotation, turn, turnTowards

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

## ***Constructor Detail***

### FastForwardButton

`public FastForwardButton()`

Constructor for class FastForwardButton.

## ***Method Detail***

### onPress

`public void onPress()`

Fast forward through cutscenes.

**Specified by:**

`onPress` in class `Button`

## Class Fireball

```
java.lang.Object
    Updated
        Sprite
            Projectile
                Splash
                    Fireball
```

---

```
public class Fireball
extends Splash
```

A magical fireball that deals AOE damage

**Version:**

2021

**Author:**

Lucy Zhao

### *Field Summary*

#### Fields inherited from class Splash

```
exploding, hasExplosion, onHit, radius
```

#### Fields inherited from class Projectile

```
damage, isMagic, MAX_LEVEL, speed, target
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>Fireball(double x, double y, Enemy target)</code>	Constructor for Fireball class
<code>Fireball(double x, double y, Enemy target, int level)</code>	Constructor for Fireball class

**Methods inherited from class Splash**

```
_update, checkCollision, damageEnemy, destroy, explode
```

**Methods inherited from class Projectile**

```
checkWorldBounds
```

**Methods inherited from class Sprite**

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

**Methods inherited from class Updated**

```
_receiveBroadcast
```

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Constructor Detail****Fireball**

```
public Fireball(double x,  
               double y,
```

SUMMARY: NESTED | FIELD | CONSTR | METHOD  
x - the starting x coordinate

DETAIL: FIELD | CONSTR | METHOD

y - the starting y coordinate

target - the reference enemy target

## Fireball

```
public Fireball(double x,  
               double y,  
               Enemy target,  
               int level)
```

Constructor for Fireball class

**Parameters:**

x - the starting x coordinate

y - the starting y coordinate

target - the reference enemy target

level - the level of the projectile

## Class FireballTower

```
java.lang.Object
    Updated
        Sprite
            Tower
                CombatTower
                    FireballTower
```

---

```
public class FireballTower
extends CombatTower
```

Shoots fireballs at enemies.

**Version:**

2021

**Author:**

Ryan Lin

### *Field Summary*

#### Fields inherited from class Tower

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>FireballTower(int x, int y, int ix, int iy)</code>	Creates a basic FireballTower.
<code>FireballTower(int x, int y, int ix, int iy, int level)</code>	Creates a FireballTower with a custom level.

protected void	<b>attack(Enemy e)</b>	Attack enemies
float	<b>getCost()</b>	Get the cost of a FireballTower
<b>String</b>	<b>toString()</b>	Returns the string representation of FireballTower

### Methods inherited from class CombatTower

`_update, getNextEnemy`

### Methods inherited from class Tower

`canAct, destroy, getCooldown, getIX, getIY, getLevel, getRange, isSelectedTower, levelup, resetCooldown`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait`

### **Constructor Detail**

```
    int y,  
    int ix,  
    int iy)
```

Creates a basic FireballTower.

**Parameters:**

`x` - the x coordinate of the tower

`y` - the y coordinate of the tower

`ix` - the x index of the tower in the global grid

`iy` - the y index of the tower in the global grid

### FireballTower

```
public FireballTower(int x,  
                     int y,  
                     int ix,  
                     int iy,  
                     int level)
```

Creates a FireballTower with a custom level.

**Parameters:**

`x` - the x coordinate of the tower

`y` - the y coordinate of the tower

`ix` - the x index of the tower in the global grid

`iy` - the y index of the tower in the global grid

`level` - the level of the tower

### Method Detail

#### attack

```
protected void attack(Enemy e)
```

**toString**

```
public String toString()
```

Returns the string representation of FireballTower

**Overrides:**

[toString](#) in class [Object](#)

**Returns:**

name of FireballTower

**getCost**

```
public float getCost()
```

Get the cost of a FireballTower

**Specified by:**

[getCost](#) in class [Tower](#)

**Returns:**

the cost of a FireballTower

## Class Global

java.lang.Object  
Global

---

```
public class Global
extends Object
```

Class for global variables

**Version:**

2021-01-26

**Author:**

Young Chen

### **Field Summary**

#### Fields

Modifier and Type	Field	Description
static ObjectManager	manager	
static int	SLOT_SIZE	
static Game	world	

### **Constructor Summary**

#### Constructors

Constructor	Description
Global()	

### **Method Summary**

[All Methods](#)    [Static Methods](#)    [Concrete Methods](#)

static void	<b>setWorld(Game world)</b>	Set the global world
-------------	-----------------------------	----------------------

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`

### ***Field Detail***

#### **world**

`public static Game world`

#### **manager**

`public static ObjectManager manager`

#### **SLOT\_SIZE**

`public static final int SLOT_SIZE`

**See Also:**

[Constant Field Values](#)

### ***Constructor Detail***

#### **Global**

**Method Detail****setWorld**

```
public static void setWorld(Game world)
```

Set the global world

**Parameters:**

world - World to set

**getWorld**

```
public static Game getWorld()
```

Get the global world

**Returns:**

global world

**getManager**

```
public static ObjectManager getManager()
```

Get the global object manager

**Returns:**

global object manager

## Class Golem

```
java.lang.Object
    Updated
        Sprite
            Enemy
                Golem
```

---

```
public class Golem
extends Enemy
```

The Golem is a tank unit with lots of health

**Version:**

2021-01-26

**Author:**

Rachel Tong, Young Chen

### ***Field Summary***

#### **Fields inherited from class Enemy**

```
angle, coolDown, coolDownTime, DEFAULT_HP, DEFAULT_RANGE, hpOffset, range,
rangeSquared, velX, velY
```

### ***Constructor Summary***

#### **Constructors**

Constructor	Description
<code>Golem(double x, double y)</code>	Creates a golem

### ***Method Summary***

### Methods inherited from class Enemy

```
_receiveBroadcast, checkCanAttack, damage, die, getNodeIndex, heal,  
moveTowards, translate, updateHP
```

### Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Golem

```
public Golem(double x,  
            double y)
```

Creates a golem

#### Parameters:

x - the x coordinate of Golem

y - the y coordinate of Golem

**\_update**

```
public void _update(float delta)
```

Golem update method

**Overrides:**

[\\_update](#) in class [Enemy](#)

**Parameters:**

delta - Change in time since last update

**attack**

```
public void attack()
```

Attack to damage JayJay the Dragon

**Overrides:**

[attack](#) in class [Enemy](#)

## Class HomeButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
        HomeButton
```

---

```
public class HomeButton
extends ImageButton
```

A button that takes the user back to the starting screen.

**Version:**

2021

**Author:**

Young Chen

### **Constructor Summary**

#### **Constructors**

Constructor	Description
<a href="#">HomeButton()</a>	Constructor for class HomeButton.

### **Method Summary**

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<a href="#">onPress()</a>	Return the user to the home screen.

### **Methods inherited from class Button**

[act](#)

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage, setLocation, setRotation, turn, turnTowards

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

## ***Constructor Detail***

### HomeButton

```
public HomeButton()
```

Constructor for class HomeButton.

## ***Method Detail***

### onPress

```
public void onPress()
```

Return the user to the home screen.

**Specified by:**

[onPress](#) in class [Button](#)

## Class HPBar

```
java.lang.Object
    Updated
        Sprite
            HPBar
```

---

```
public class HPBar
extends Sprite
```

Health bar

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>HPBar(double x, double y, int width, int height, float full, Color background, Color foreground)</code>	Creates a health bar

### Method Summary

#### All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>remove()</code>	Removes healthbar from canvas
void	<code>setHP(float hp)</code>	Set hitpoints

### Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,
```

`setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast, _update`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`

## ***Constructor Detail***

### HPBar

```
public HPBar(double x,  
           double y,  
           int width,  
           int height,  
           float full,  
           Color background,  
           Color foreground)
```

Creates a health bar

**Parameters:**

`x` - x location

`y` - y location

`width` - width

`height` - height

`full` - full hitpoint value

`background` - background colour

`foreground` - foreground colour

**setHP**

```
public void setHP(float hp)
```

Set hitpoints

**Parameters:**

hp - new hitpoint value

**remove**

```
public void remove()
```

Removes healthbar from canvas

## Class Iceball

```
java.lang.Object
    Updated
        Sprite
            Projectile
                Splash
                    Iceball
```

---

```
public class Iceball
extends Splash
```

A magical iceball that deals AOE damage

**Version:**

2021

**Author:**

Lucy Zhao

### *Field Summary*

#### Fields inherited from class Splash

```
exploding, hasExplosion, onHit, radius
```

#### Fields inherited from class Projectile

```
damage, isMagic, MAX_LEVEL, speed, target
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>Iceball(double x, double y, Enemy target)</code>	Constructor for Iceball class
<code>Iceball(double x, double y, Enemy target, int level)</code>	Constructor for Iceball class

**Methods inherited from class Splash**

```
_update, checkCollision, damageEnemy, destroy, explode
```

**Methods inherited from class Projectile**

```
checkWorldBounds
```

**Methods inherited from class Sprite**

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

**Methods inherited from class Updated**

```
_receiveBroadcast
```

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Constructor Detail****Iceball**

```
public Iceball(double x,  
              double y,
```

SUMMARY: NESTED | FIELD | CONSTR | METHOD  
x - the starting x coordinate

DETAIL: FIELD | CONSTR | METHOD

y - the starting y coordinate

target - the reference enemy target

level - the level of the projectile

**Iceball**

```
public Iceball(double x,  
              double y,  
              Enemy target,  
              int level)
```

Constructor for Iceball class

**Parameters:**

x - the starting x coordinate

y - the starting y coordinate

target - the reference enemy target

level - the level of the projectile

## Class IceballTower

```
java.lang.Object
    Updated
        Sprite
            Tower
                CombatTower
                    IceballTower
```

---

```
public class IceballTower
extends CombatTower
```

Shoots Iceballs at enemies.

**Version:**

2021

**Author:**

Ryan Lin

### *Field Summary*

#### Fields inherited from class Tower

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>IceballTower(int x, int y, int ix, int iy)</code>	Creates a basic IceballTower.
<code>IceballTower(int x, int y, int ix, int iy, int level)</code>	Creates an IceballTower with a custom level.

protected void	<b>attack(Enemy e)</b>	Attack enemies
float	<b>getCost()</b>	Get the cost of the tower
<b>String</b>	<b>toString()</b>	Returns the string representation of IceballTower

### Methods inherited from class CombatTower

`_update, getNextEnemy`

### Methods inherited from class Tower

`canAct, destroy, getCooldown, getIX, getIY, getLevel, getRange,  
isSelectedTower, levelup, resetCooldown`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait`

### **Constructor Detail**

```
    int y,  
    int ix,  
    int iy)
```

Creates a basic IceballTower.

**Parameters:**

`x` - the x coordinate of the tower

`y` - the y coordinate of the tower

`ix` - the x index of the tower in the global grid

`iy` - the y index of the tower in the global grid

### **IceballTower**

```
public IceballTower(int x,  
                    int y,  
                    int ix,  
                    int iy,  
                    int level)
```

Creates an IceballTower with a custom level.

**Parameters:**

`x` - the x coordinate of the tower

`y` - the y coordinate of the tower

`ix` - the x index of the tower in the global grid

`iy` - the y index of the tower in the global grid

`level` - the level of the tower

### **Method Detail**

#### **attack**

```
protected void attack(Enemy e)
```

**toString**

```
public String toString()
```

Returns the string representation of IceballTower

**Overrides:**

[toString](#) in class [Object](#)

**Returns:**

name of IceballTower

**getCost**

```
public float getCost()
```

**Description copied from class: [Tower](#)**

Get the cost of the tower

**Specified by:**

[getCost](#) in class [Tower](#)

**Returns:**

the cost of the tower

## Class ImageButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
```

**Direct Known Subclasses:**

[FastForwardButton](#), [HomeButton](#), [MapButton](#), [ReadButton](#), [SaveButton](#), [TowerActionButton](#)

---

```
public abstract class ImageButton
extends Button
```

A button that displays an image.

**Version:**

2021

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">ImageButton (greenfoot.GreenfootImage image)</a>	Simple constructor for ImageButton class
<a href="#">ImageButton (greenfoot.GreenfootImage image, boolean autoscale)</a>	Constructor with option for no automatic scaling for ImageButton class

### Method Summary

#### Methods inherited from class Button

[act](#), [onPress](#)

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage, setLocation, setRotation, turn, turnTowards

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

## Constructor Detail

### ImageButton

```
public ImageButton(greenfoot.GreenfootImage image)
```

Simple constructor for ImageButton class

### ImageButton

```
public ImageButton(greenfoot.GreenfootImage image,  
                   boolean autoscale)
```

Constructor with option for no automatic scaling for ImageButton class

#### Parameters:

image - The image to be displayed by the button.

autoscale - Is the image going to be autoscaled to the default size

## Class Info

java.lang.Object  
  greenfoot.World  
    Info

---

```
public class Info
extends greenfoot.World
```

Instructions and general info about enemies and towers

**Version:**

2021-01-26

**Author:**

Lucy Zhao

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">Info()</a>	Creates information world

### Method Summary

[All Methods](#)   [Instance Methods](#)   [Concrete Methods](#)

Modifier and Type	Method	Description
void	<a href="#">act()</a>	Actor act method

### Methods inherited from class greenfoot.World

[addObject](#), [getBackground](#), [getCellSize](#), [getColorAt](#), [getHeight](#), [getObjects](#), [getObjectsAt](#), [getWidth](#), [numberOfObjects](#), [removeObject](#), [removeObjects](#), [repaint](#), [setActOrder](#), [setBackground](#), [setBackground](#), [setPaintOrder](#), [showText](#), [started](#), [stopped](#)

## ***Constructor Detail***

### **Info**

```
public Info()
```

Creates information world

## ***Method Detail***

### **act**

```
public void act()
```

Actor act method

**Overrides:**

act in class greenfoot.World

## Class JayJay

```
java.lang.Object
    Updated
        Sprite
            JayJay
```

---

```
public class JayJay
extends Sprite
```

Being that the player defends.

**Version:**

2021-01-26

**Author:**

Lucy Zhao, Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>JayJay(double x, double y)</code>	Creates a jay jay

### Method Summary

All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Animates jay jay
void	<code>damage(float damage)</code>	Deals damage to it
void	<code>destroy()</code>	Removes jay jay

### Methods inherited from class Sprite

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

### Methods inherited from class Updated

```
_receiveBroadcast
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

### *Constructor Detail*

#### JayJay

```
public JayJay(double x,  
             double y)
```

Creates a jay jay

**Parameters:**

x - x location

y - y location

### *Method Detail*

#### damage

```
public void damage(float damage)
```

Deals damage to it

**\_update**

```
public void _update(float delta)
```

Animates jay jay

**Overrides:**

[\\_update](#) in class [Updated](#)

**Parameters:**

delta - Change in time since last update

**destroy**

```
public void destroy()
```

Removes jay jay

## Class Label

```
java.lang.Object
  greenfoot.Actor
    Label
```

**Direct Known Subclasses:**

[DissapearingText](#), [TextField](#), [TowerLabel](#)

```
public class Label
extends greenfoot.Actor
```

A Label class that allows you to display a textual value on screen. The Label is an actor, so you will need to create it, and then add it to the world in Greenfoot. If you keep a reference to the Label then you can change the text it displays.

**Version:**

1.1

**Author:**

Amjad Altadmri

### Constructor Summary

#### Constructors

Constructor	Description
<code>Label(int value, int fontSize)</code>	Create a new label, initialise it with the float value to be shown and the font size
<code>Label(String value, int fontSize)</code>	Create a new label, initialise it with the needed text and the font size

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<code>setFillColor(greenfoot.Color fillColor)</code>	Sets the fill color of the text

### Methods inherited from class greenfoot.Actor

```
act, addedToWorld, getImage, getIntersectingObjects, getNeighbours,  
getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject,  
getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY,  
intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage,  
setLocation, setRotation, turn, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Label

```
public Label(int value,  
            int fontSize)
```

Create a new label, initialise it with the float value to be shown and the font size

### Label

```
public Label(String value,  
            int fontSize)
```

Create a new label, initialise it with the needed text and the font size

## Method Detail

**Parameters:**

value - the text to be show

**setValue**

```
public void setValue(int value)
```

Sets the value as float

**Parameters:**

value - the value to be show

**setLineColor**

```
public void setLineColor(greenfoot.Color lineColor)
```

Sets the line color of the text

**Parameters:**

lineColor - the line color of the text

**setFillColor**

```
public void setFillColor(greenfoot.Color fillColor)
```

Sets the fill color of the text

**Parameters:**

fillColor - the fill color of the text

## Class LazerTower

```
java.lang.Object
    Updated
        Sprite
            Tower
                CombatTower
                    LazerTower
```

---

```
public class LazerTower
extends CombatTower
```

Shoots Lasers at enemies.

**Version:**

2021

**Author:**

Ryan Lin

### *Field Summary*

#### Fields inherited from class Tower

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>LazerTower(int x, int y, int ix, int iy)</code>	Creates a basic LazerTower
<code>LazerTower(int x, int y, int ix, int iy, int level)</code>	Creates a LazerTower with a custom level.

protected void	<b>attack(Enemy e)</b>	Attack enemies
float	<b>getCost()</b>	Get the cost of LazerTower
<b>String</b>	<b>toString()</b>	Return the string representation of LazerTower

### Methods inherited from class CombatTower

`_update, getNextEnemy`

### Methods inherited from class Tower

`canAct, destroy, getCooldown, getIX, getIY, getLevel, getRange, isSelectedTower, levelup, resetCooldown`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait`

### **Constructor Detail**

```
    int y,  
    int ix,  
    int iy)
```

Creates a basic LazerTower

**Parameters:**

`x` - the x coordinate of the tower

`y` - the y coordinate of the tower

`ix` - the x index of the tower in the global grid

`iy` - the y index of the tower in the global grid

### LazerTower

```
public LazerTower(int x,  
                  int y,  
                  int ix,  
                  int iy,  
                  int level)
```

Creates a LazerTower with a custom level.

**Parameters:**

`x` - the x coordinate of the tower

`y` - the y coordinate of the tower

`ix` - the x index of the tower in the global grid

`iy` - the y index of the tower in the global grid

`level` - the level of the tower

### Method Detail

#### attack

```
protected void attack(Enemy e)
```

**toString**

```
public String toString()
```

Return the string representation of LazerTower

**Overrides:**

[toString](#) in class [Object](#)

**Returns:**

name of LazerTower

**getCost**

```
public float getCost()
```

Get the cost of LazerTower

**Specified by:**

[getCost](#) in class [Tower](#)

**Returns:**

the cost of LazerTower

## Class LevelText

```
java.lang.Object
  greenfoot.Actor
    Label
      TextField
        LevelText
```

---

```
public class LevelText
extends TextField
```

Displays the level of the game.

**Version:**

2021

**Author:**

Young Chen

### **Constructor Summary**

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>LevelText(int x, int y)</code>	Constructor for class LevelText.

### **Method Summary**

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

<b>Modifier and Type</b>	<b>Method</b>	<b>Description</b>
<code>protected float</code>	<code>getValue()</code>	Gets the level of the game.

### Methods inherited from class `TextField`

`act, updateLoc`

### Methods inherited from class greenfoot.Actor

```
addedToWorld, getImage, getIntersectingObjects, getNeighbours,  
getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject,  
getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY,  
intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage,  
setLocation, setRotation, turn, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### LevelText

```
public LevelText(int x,  
                 int y)
```

Constructor for class LevelText.

#### Parameters:

x - The x coordinate of the label.

y - The y coordinate of the label.

## Method Detail

### getValue

```
protected float getValue()
```

Gets the level of the game.

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class Load

```
java.lang.Object
  greenfoot.World
    Load
```

```
public class Load
extends greenfoot.World
```

World to load previous game or to create a new game

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>Load(boolean isStory, greenfoot.GreenfootSound music)</code>	Creates load screen

### Method Summary

All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>act()</code>	Actor act method

### Methods inherited from class greenfoot.World

```
addObject, getBackground, getCellSize, getColorAt, getHeight, getObjects,
getObjectsAt, getWidth, numberOfObjects, removeObject, removeObjects, repaint,
setActOrder, setBackground, setBackground, setPaintOrder, showText, started,
stopped
```

## Constructor Detail

### Load

```
public Load(boolean isStory,
           greenfoot.GreenfootSound music)
```

Creates load screen

**Parameters:**

isStory - whether or not game is in story mode

## Method Detail

### act

```
public void act()
```

Actor act method

**Overrides:**

act in class greenfoot.World

## Class Maniac

```
java.lang.Object
    Updated
        Sprite
            Enemy
                Maniac
```

---

```
public class Maniac
extends Enemy
```

The Maniac is a basic unit that represents the average stats for enemy.

**Version:**

2021-01-26

**Author:**

Rachel Tong, Young Chen

### ***Field Summary***

#### **Fields inherited from class Enemy**

```
angle, coolDown, coolDownTime, DEFAULT_HP, DEFAULT_RANGE, hpOffset, range,
rangeSquared, velX, velY
```

### ***Constructor Summary***

#### **Constructors**

Constructor	Description
<code>Maniac(double x, double y)</code>	Creates a maniac

### ***Method Summary***

### Methods inherited from class Enemy

```
_receiveBroadcast, checkCanAttack, damage, die, getNodeIndex, heal,  
moveTowards, translate, updateHP
```

### Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Maniac

```
public Maniac(double x,  
             double y)
```

Creates a maniac

#### Parameters:

x - the x coordinate of Maniac

y - the y coordinate of Maniac

**\_update**

```
public void _update(float delta)
```

Maniac update method

**Overrides:**

[\\_update](#) in class [Enemy](#)

**Parameters:**

delta - Change in time since last update

**attack**

```
public void attack()
```

Attack to damage JayJay the Dragon

**Overrides:**

[attack](#) in class [Enemy](#)

## Class MapButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
        MapButton
```

```
public class MapButton
extends ImageButton
```

Write a description of class MapButton here.

**Version:**

2021

**Author:**

Young Chen

### Constructor Summary

**Constructors**

Constructor	Description
<code>MapButton(String file, String image, String name)</code>	Constructor for MapButton class.

### Method Summary

**All Methods    Instance Methods    Concrete Methods**

Modifier and Type	Method	Description
void	<code>addedToWorld(greenfoot.World w)</code>	Add label displaying name.
void	<code>onPress()</code>	Select and read map.

### Methods inherited from class Button

`act`

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage, setLocation, setRotation, turn, turnTowards

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

### Constructor Detail

#### MapButton

```
public MapButton(String file,  
                 String image,  
                 String name)
```

Constructor for MapButton class.

##### Parameters:

file - The path to the Map file.

image - The path to the image for the map.

name - The name of the map.

### Method Detail

#### addedToWorld

```
public void addedToWorld(greenfoot.World w)
```

Add label displaying name.

##### Overrides:

addedToWorld in class greenfoot.Actor

```
public void onPress()
```

Select and read map.

**Specified by:**

[onPress](#) in class [Button](#)

## Class Math2D

java.lang.Object  
Math2D

```
public class Math2D
extends Object
```

### Field Summary

#### Fields

Modifier and Type	Field	Description
static float	PI	

### Constructor Summary

#### Constructors

Constructor	Description
Math2D()	

### Method Summary

[All Methods](#)    [Static Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
static double	angleTo(double fromX, double toX, double fromY, double toY)	Calculates the distance of two locations.
static float	angleTo(float fromX, float toX, float fromY, float toY)	Calculates the distance of two locations.
static float	clamp(float value, float min, float max)	Clamps a number between two values

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

static float	<b>distance</b> (float ax, float bx, float ay, float by)	Calculates the distance of two locations.
static float	<b>distance</b> (int ax, int bx, int ay, int by)	Calculates the distance of two locations.
static double	<b>distanceSquared</b> (double ax, double bx, double ay, double by)	Calculates the distance of two locations and squares it.
static float	<b>distanceSquared</b> (float ax, float bx, float ay, float by)	Calculates the distance of two locations and squares it.
static float	<b>distanceSquared</b> (int ax, int bx, int ay, int by)	Calculates the distance of two locations and squares it.

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

### Field Detail

#### PI

public static float PI

### Constructor Detail

#### Math2D

public Math2D()

**distance**

```
public static float distance(float ax, float bx, float ay, float by)
```

Calculates the distance of two locations.

**Parameters:**

ax - the first x location

bx - the second x location

ay - the first y location

by - the second y location

**Returns:**

int the distance

**distanceSquared**

```
public static float distanceSquared(float ax, float bx, float ay, float by)
```

Calculates the distance of two locations and squares it.

**Parameters:**

ax - the first x location

bx - the second x location

ay - the first y location

by - the second y location

**Returns:**

int the distance

**distance**

```
public static float distance(int ax, int bx, int ay, int by)
```

Calculates the distance of two locations.

**Parameters:**

ax - the first x location

returns:

int the distance

**distance**

```
public static double distance(double ax, double bx, double ay, double by)
```

Calculates the distance of two locations.

**Parameters:**

ax - the first x location

bx - the second x location

ay - the first y location

by - the second y location

**Returns:**

int the distance

**distanceSquared**

```
public static double distanceSquared(double ax, double bx, double ay,  
double by)
```

Calculates the distance of two locations and squares it.

**Parameters:**

ax - the first x location

bx - the second x location

ay - the first y location

by - the second y location

**Returns:**

int the distance

**distanceSquared**

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

~~ax - the first x location~~

bx - the second x location

ay - the first y location

by - the second y location

**Returns:**

int the distance

**angleTo**

```
public static float angleTo(float fromX, float toX, float fromY, float toY)
```

Calculates the distance of two locations.

**Parameters:**

fromX - the x location to calculate from

toX - the x location to calculate the angle to

fromY - the y location to calculate from

toY - the y location to calculate the angle to

**Returns:**

float the angle in radians

**angleTo**

```
public static double angleTo(double fromX, double toX, double fromY,
double toY)
```

Calculates the distance of two locations.

**Parameters:**

fromX - the x location to calculate from

toX - the x location to calculate the angle to

fromY - the y location to calculate from

toY - the y location to calculate the angle to

**Returns:**

float the angle in radians

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
public static int clamp(int value, int min, int max)
```

Clamps a number between two values

**Parameters:**

**value** - Number to clamp

**min** - Minimum value

**max** - Maximum value

**Returns:**

Clamped value

**clamp**

```
public static float clamp(float value, float min, float max)
```

Clamps a number between two values

**Parameters:**

**value** - Number to clamp

**min** - Minimum value

**max** - Maximum value

**Returns:**

Clamped value

## Class Mines

```
java.lang.Object
    Updated
        Sprite
            Tower
                Mines
```

---

```
public class Mines
extends Tower
```

Generates gold currency for the player.

**Version:**

2021

**Author:**

Ryan Lin

### ***Field Summary***

#### **Fields inherited from class Tower**

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### ***Constructor Summary***

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>Mines(int x, int y, int ix, int iy)</code>	Creates a basic gold mine.
<code>Mines(int x, int y, int ix, int iy, int level)</code>	Creates a gold mine with a custom level.

### ***Method Summary***

float	<b>getCost()</b>	Get the cost of the tower
void	<b>levelup()</b>	Level up the tower
<b>String</b>	<b>toString()</b>	Returns the string representation of Mine

### Methods inherited from class Tower

`canAct, destroy, getCooldown, getIX, getIY, getLevel, getRange,  
isSelectedTower, resetCooldown`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getCount, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait`

## Constructor Detail

Mines

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

Creates a basic gold mine.

**Parameters:**

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iY - the y index of the tower in the global grid

**Mines**

```
public Mines(int x,  
            int y,  
            int ix,  
            int iy,  
            int level)
```

Creates a gold mine with a custom level.

**Parameters:**

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iY - the y index of the tower in the global grid

**Method Detail****levelup**

```
public void levelup()
```

**Description copied from class: Tower**

Level up the tower

**Overrides:**

levelup in class Tower

Attack enemies

**Overrides:**

[\\_update](#) in class Updated

**Parameters:**

delta - Change in time since last update

### toString

`public String toString()`

Returns the string representation of Mine

**Overrides:**

[toString](#) in class Object

**Returns:**

name of Mine

### getCost

`public float getCost()`

**Description copied from class: Tower**

Get the cost of the tower

**Specified by:**

[getCost](#) in class Tower

**Returns:**

the cost of the tower

## Class Minion

```
java.lang.Object
    Updated
        Sprite
            Minion
```

---

```
public class Minion
extends Sprite
```

Minion that attacks enemies

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>Minion(double x, double y)</code>	Creates a minion

### Method Summary

[All Methods](#)    [Static Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Minion update method
void	<code>destroy()</code>	Removes the minion
static int	<code>getNumberOfMinions()</code>	Get number of minions

### Methods inherited from class Sprite

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

### Methods inherited from class Updated

```
_receiveBroadcast
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## *Constructor Detail*

### Minion

```
public Minion(double x,  
             double y)
```

Creates a minion

**Parameters:**

x - x location

y - y location

## *Method Detail*

### \_update

```
public void _update(float delta)
```

Minion update method

**destroy**

```
public void destroy()
```

Removes the minion

**getNumberOfMinions**

```
public static int getNumberOfMinions()
```

Get number of minions

**Returns:**

number of minions

## Class MoneyText

```
java.lang.Object
  greenfoot.Actor
    Label
      TextField
        MoneyText
```

---

```
public class MoneyText
extends TextField
```

Displays the amount of money the player has.

**Version:**

2021

**Author:**

Young Chen

### **Constructor Summary**

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>MoneyText(int x, int y)</code>	Constructor for class MoneyText.

### **Method Summary**

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

<b>Modifier and Type</b>	<b>Method</b>	<b>Description</b>
<code>protected float</code>	<code>getValue()</code>	Gets the amount of money.

### Methods inherited from class `TextField`

`act, updateLoc`

### Methods inherited from class greenfoot.Actor

```
addedToWorld, getImage, getIntersectingObjects, getNeighbours,  
getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject,  
getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY,  
intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage,  
setLocation, setRotation, turn, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### MoneyText

```
public MoneyText(int x,  
                 int y)
```

Constructor for class MoneyText.

#### Parameters:

x - The x coordinate of the label.

y - The y coordinate of the label.

## Method Detail

### getValue

```
protected float getValue()
```

Gets the amount of money.

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class Mouse

java.lang.Object  
Mouse

---

```
public class Mouse
extends Object
```

MouseInfo wrapper class

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">Mouse()</a>	

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
int	<a href="#">getMouseX()</a>	Get x location of mouse
int	<a href="#">getMouseY()</a>	Get y location of mouse
boolean	<a href="#">isDown()</a>	Get whether or not the mouse is down
void	<a href="#">update()</a>	Update the mouse information

### Methods inherited from class java.lang.Object

## ***Constructor Detail***

### **Mouse**

```
public Mouse()
```

## ***Method Detail***

### **update**

```
public void update()
```

Update the mouse information

### **getMouseX**

```
public int getMouseX()
```

Get x location of mouse

**Returns:**

x location

### **getMouseY**

```
public int getMouseY()
```

Get y location of mouse

**Returns:**

y location

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

**Returns:**

Whether or not the mouse is down

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class Pathfinding

`java.lang.Object`  
**Pathfinding**

---

```
public class Pathfinding
extends Object
```

Class to carry out pathfinding using the A\* algorithm  
 Pathfinding algorithm based off of <https://www.youtube.com/watch?v=AKKpPmxx07w>

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>Pathfinding(Grid grid, Node start, Node end)</code>	Creates a pathfinding instance

### Method Summary

#### All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>findPath()</code>	Create the nearest path
Node[ ]	<code>getPath()</code>	Get created path
void	<code>setStartNode(Node n)</code>	Sets the start node
void	<code>setTargetNode(Node n)</code>	Sets the end node

### Methods inherited from class `java.lang.Object`

## ***Constructor Detail***

### **Pathfinding**

```
public Pathfinding(Grid grid,
                  Node start,
                  Node end)
```

Creates a pathfinding instance

**Parameters:**

grid - Node grid

start - start node

end - end node

## ***Method Detail***

### **setStartNode**

```
public void setStartNode(Node n)
```

Sets the start node

**Parameters:**

n - start node

### **setTargetNode**

```
public void setTargetNode(Node n)
```

Sets the end node

**Parameters:**

n - end node

Create the nearest path

**getPath**

`public Node[] getPath()`

Get created path

**Returns:**

path

## Class Pekka

```
java.lang.Object
    Updated
        Sprite
            Enemy
                Pekka
```

---

```
public class Pekka
extends Enemy
```

The Pekka is a large unit that has a large amount of health, large damage, and very slow.

**Version:**

2021-01-26

**Author:**

Rachel Tong, Young Chen

### ***Field Summary***

#### **Fields inherited from class Enemy**

```
angle, coolDown, coolDownTime, DEFAULT_HP, DEFAULT_RANGE, hpOffset, range,
rangeSquared, velX, velY
```

### ***Constructor Summary***

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>Pekka(double x, double y)</code>	Creates a pekka

### ***Method Summary***

### Methods inherited from class Enemy

```
_receiveBroadcast, checkCanAttack, damage, die, getNodeIndex, heal,  
moveTowards, translate, updateHP
```

### Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Pekka

```
public Pekka(double x,  
            double y)
```

Creates a pekka

#### Parameters:

x - the x coordinate of Pekka

y - the y coordinate of Pekka

**\_update**

```
public void _update(float delta)
```

Pekka update method

**Overrides:**

[\\_update](#) in class [Enemy](#)

**Parameters:**

delta - Change in time since last update

**attack**

```
public void attack()
```

Attack to damage JayJay the Dragon

**Overrides:**

[attack](#) in class [Enemy](#)

## Class Pillbox

```
java.lang.Object
    Updated
        Sprite
            Tower
                CombatTower
                    Pillbox
```

---

```
public class Pillbox
extends CombatTower
```

Write a description of class Pillbox here.

**Version:**

2021

**Author:**

Ryan Lin

### *Field Summary*

#### Fields inherited from class Tower

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>Pillbox(int x, int y, int ix, int iy)</code>	Creates a basic Pillbox.
<code>Pillbox(int x, int y, int ix, int iy, int level)</code>	Creates a Pillbox with a custom level.

protected void	<b>attack(Enemy e)</b>	Attack enemies
float	<b>getCost()</b>	Get the cost of Pillbox
String	<b>toString()</b>	Returns the string representation of Pillbox

### Methods inherited from class CombatTower

`_update, getNextEnemy`

### Methods inherited from class Tower

`canAct, destroy, getCooldown, getIX, getIY, getLevel, getRange,  
isSelectedTower, levelup, resetCooldown`

### Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards`

### Methods inherited from class Updated

`_receiveBroadcast`

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait`

### **Constructor Detail**

```
    int y,  
    int ix,  
    int iy)
```

Creates a basic Pillbox.

**Parameters:**

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iy - the y index of the tower in the global grid

### Pillbox

```
public Pillbox(int x,  
              int y,  
              int ix,  
              int iy,  
              int level)
```

Creates a Pillbox with a custom level.

**Parameters:**

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iy - the y index of the tower in the global grid

level - the level of the tower

### Method Detail

#### attack

```
protected void attack(Enemy e)
```

**toString**

```
public String toString()
```

Returns the string representation of Pillbox

**Overrides:**

`toString` in class `Object`

**Returns:**

name of Pillbox

**getCost**

```
public float getCost()
```

Get the cost of Pillbox

**Specified by:**

`getCost` in class `Tower`

**Returns:**

the cost of the tower

## Class Point

java.lang.Object  
Point

---

```
public class Point
extends Object
```

Class to represent a point in two dimensional space

**Version:**

2021-01-26

**Author:**

Young Chen

### **Field Summary**

#### Fields

Modifier and Type	Field	Description
float	x	
float	y	

### **Constructor Summary**

#### Constructors

Constructor	Description
<code>Point(float x, float y)</code>	Creates a point
<code>Point(int x, int y)</code>	Creates a point

### **Method Summary**

[All Methods](#)    [Static Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

float	<b>distanceSquared(Point b)</b>	Squared distance from other point
static float	<b>distanceSquared(Point a, Point b)</b>	Square of the distance from other point
void	<b>rotate(Point point, float radians)</b>	Rotate point around another point
void	<b>scale(Point point, float scale)</b>	Scale point relative to another point
void	<b>translate(float x, float y)</b>	Translates the point

### Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`

### Field Detail

x

`public float x`

y

`public float y`

### Constructor Detail

Point

x - Location in x-axis

y - Location in y-axis

## Point

```
public Point(int x,  
            int y)
```

Creates a point

**Parameters:**

x - Location in x-axis

y - Location in y-axis

## *Method Detail*

### translate

```
public void translate(float x, float y)
```

Translates the point

**Parameters:**

x - X-axis translation

y - Y-axis translation

### rotate

```
public void rotate(Point point, float radians)
```

Rotate point around another point

**Parameters:**

point - Point to rotate around

**scale**

```
public void scale(Point point, float scale)
```

Scale point relative to another point

**Parameters:**

**point** - Relative point to scale from

**scale** - Amount to scale by

**distance**

```
public float distance(Point b)
```

Distance from other point

**Parameters:**

**b** - Other point

**Returns:**

Distance

**distanceSquared**

```
public float distanceSquared(Point b)
```

Squared distance from other point

**Parameters:**

**b** - Other point

**Returns:**

Squared distance

**distance**

```
public static float distance(Point a, Point b)
```

Distance from other point

## Distance

**distanceSquared**

```
public static float distanceSquared(Point a, Point b)
```

Square of the distance from other point

**Parameters:**

a - Point a

b - Point b

**Returns:**

Squared distance

## Class Projectile

```
java.lang.Object
    Updated
        Sprite
            Projectile
```

**Direct Known Subclasses:**

[Arrow](#), [Cannonball](#), [EnemyProjectile](#), [Splash](#), [Zap](#)

```
public abstract class Projectile
extends Sprite
```

A projectile that hits enemies

**Version:**

2021

**Author:**

Lucy Zhao

### Field Summary

#### Fields

Modifier and Type	Field	Description
protected float	<a href="#">damage</a>	
protected boolean	<a href="#">isMagic</a>	
protected static int	<a href="#">MAX_LEVEL</a>	
protected float	<a href="#">speed</a>	
protected <a href="#">Enemy</a>	<a href="#">target</a>	

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">Projectile(double x, double y,</a>	Constructor for

## Method Summary

[All Methods](#)   [Instance Methods](#)   [Concrete Methods](#)

Modifier and Type	Method	Description
void	<a href="#"><u>update</u></a> (float delta)	Update method
protected	<a href="#"><u>checkCollision()</u></a> void	Checks if projectile has reached an enemy
protected	<a href="#"><u>checkWorldBounds()</u></a> void	Check if the projectile has reached the edge of the world Might have to change this if we have a moving camera.
protected	<a href="#"><u>damageEnemy()</u></a> void	Damages the enemy
protected	<a href="#"><u>destroy()</u></a> void	Destroys the projectile

## Methods inherited from class Sprite

animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards

## Methods inherited from class Updated

[\\_receiveBroadcast](#)

## Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

**MAX\_LEVEL**

```
protected static final int MAX_LEVEL
```

**See Also:**[Constant Field Values](#)**damage**

```
protected float damage
```

**speed**

```
protected float speed
```

**target**

```
protected Enemy target
```

**isMagic**

```
protected boolean isMagic
```

**Constructor Detail****Projectile**

Constructor for Projectile class

**Parameters:**

`x` - the starting x coordinate  
`y` - the starting y coordinate  
`image` - the sprite of the projectile  
`target` - the reference enemy target  
`id` - the id of the projectile for sounds

### Projectile

```
public Projectile(double x,  
                 double y,  
                 greenfoot.GreenfootImage image,  
                 double angle,  
                 int id)
```

Constructor for Projectile class

**Parameters:**

`x` - the starting x coordinate  
`y` - the starting y coordinate  
`image` - the sprite of the projectile  
`angle` - angle of projectile  
`id` - the id of the projectile for sounds

### Method Detail

#### \_update

```
public void _update(float delta)
```

Update method

**checkCollision**

```
protected void checkCollision()
```

Checks if projectile has reached an enemy

**checkWorldBounds**

```
protected void checkWorldBounds()
```

Check if the projectile has reached the edge of the world Might have to change this if we have a moving camera.

**damageEnemy**

```
protected void damageEnemy()
```

Damages the enemy

**destroy**

```
protected void destroy()
```

Destroys the projectile

## Class ReadButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
        ReadButton
```

---

```
public class ReadButton
extends ImageButton
```

Write a description of class ReadButton here.

**Version:**

2021

**Author:**

Young Chen

### **Constructor Summary**

#### **Constructors**

Constructor	Description
<code>ReadButton()</code>	Constructor for ReadButton class

### **Method Summary**

[All Methods](#)    [Static Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
static <code>File</code>	<code>chooseFile(File start)</code>	Asks User for a File and returns the File
<code>void</code>	<code>onPress()</code>	Action when button is pressed.
<code>static void</code>	<code>read()</code>	Reads a file
<code>static void</code>	<code>read(String dir)</code>	Reads a file

### Methods inherited from class greenfoot.Actor

```
addedToWorld, getImage, getIntersectingObjects, getNeighbours,  
getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject,  
getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY,  
intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage,  
setLocation, setRotation, turn, turnTowards
```

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## ***Constructor Detail***

### ReadButton

```
public ReadButton()
```

Constructor for ReadButton class

## ***Method Detail***

### onPress

```
public void onPress()
```

Action when button is pressed.

**Specified by:**

onPress in class Button

**read**

```
public static void read(String dir)
```

Reads a file

**Parameters:**

`dir` - the path to the directory

**chooseFile**

```
public static File chooseFile(File start)
```

Asks User for a File and returns the File

**Returns:**

the user-selected file

## Class RemoveTowerButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
        TowerActionButton
          RemoveTowerButton
```

---

```
public class RemoveTowerButton
extends TowerActionButton
```

A button that removes the linked tower.

**Version:**

2021

**Author:**

Ryan Lin

### *Field Summary*

#### Fields inherited from class TowerActionButton

tower

### *Constructor Summary*

#### Constructors

Constructor	Description
<a href="#">RemoveTowerButton()</a>	Constructor for RemoveTowerButton class.

### *Method Summary*

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

## Methods inherited from class TowerActionButton

`act, setTower, unlinkTower`

## Methods inherited from class greenfoot.Actor

`addedToWorld, getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge, isTouching, move, removeTouching, setImage, setLocation, setRotation, turn, turnTowards`

## Methods inherited from class java.lang.Object

`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`

## Constructor Detail

### RemoveTowerButton

`public RemoveTowerButton()`

Constructor for RemoveTowerButton class.

## Method Detail

### onPress

`public void onPress()`

Action when the button is pressed.

Specified by:

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class RPG

```
java.lang.Object
    Updated
        Sprite
            Projectile
                Splash
                    RPG
```

---

```
public class RPG
extends Splash
```

A RPG that deals AOE damage

**Version:**

2021

**Author:**

Young Chen

### *Field Summary*

#### Fields inherited from class Splash

```
exploding, hasExplosion, onHit, radius
```

#### Fields inherited from class Projectile

```
damage, isMagic, MAX_LEVEL, speed, target
```

### *Constructor Summary*

#### Constructors

Constructor	Description
<code>RPG(double x, double y, Enemy target)</code>	Constructor for RPG class
<code>RPG(double x, double y, Enemy target, int level)</code>	Constructor for RPG class

**Methods inherited from class Splash**

```
_update, checkCollision, damageEnemy, destroy, explode
```

**Methods inherited from class Projectile**

```
checkWorldBounds
```

**Methods inherited from class Sprite**

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

**Methods inherited from class Updated**

```
_receiveBroadcast
```

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Constructor Detail****RPG**

```
public RPG(double x,  
          double y,
```

SUMMARY: NESTED | FIELD | CONSTR | METHOD  
x - the starting x coordinate

DETAIL: FIELD | CONSTR | METHOD

y - the starting y coordinate

target - the reference enemy target

## RPG

```
public RPG(double x,  
          double y,  
          Enemy target,  
          int level)
```

Constructor for RPG class

**Parameters:**

x - the starting x coordinate

y - the starting y coordinate

target - the reference enemy target

level - the level of the projectile

## Class SaveButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
        SaveButton
```

---

```
public class SaveButton
extends ImageButton
```

Saves the current game.

**Version:**

2021

**Author:**

Young Chen

### ***Field Summary***

#### **Fields**

Modifier and Type	Field	Description
static String	EXT	
static String	SAVE_DIR	

### ***Constructor Summary***

#### **Constructors**

Constructor	Description
SaveButton()	Constructor for SaveButton class.

### ***Method Summary***

static void	<b>save()</b>	Saves the current game.
-------------	---------------	-------------------------

## Methods inherited from class Button

act

## Methods inherited from class greenfoot.Actor

addedToWorld, getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge, isTouching, move, removeTouching, setImage, setLocation, setRotation, turn, turnTowards

## Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

## Field Detail

### SAVE\_DIR

public static final String SAVE\_DIR

**See Also:**

Constant Field Values

### EXT

public static final String EXT

**See Also:**

Constant Field Values

**SaveButton**

```
public SaveButton()
```

Constructor for SaveButton class.

***Method Detail*****onPress**

```
public void onPress()
```

Action when the button is pressed.

**Specified by:**

[onPress](#) in class [Button](#)

**save**

```
public static void save()
```

Saves the current game.

**getTime**

```
public static String getTime()
```

Get the current time in a String format.

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

## Class SavedInstance

java.lang.Object  
SavedInstance

---

```
public class SavedInstance
extends Object
```

Class to save the world as a file

**Version:**

2021-01-26

**Author:**

Young Chen

### ***Field Summary***

#### **Fields**

Modifier and Type	Field	Description
static String	ARCHER	
static String	AUTO_SAVE_PATH	
static String	BARRACKS	
static String	CANNON	
static String	EMPTY	
static String	END	
static String	FIELD_LEVEL	
static String	FIELD_LOC	
static String	FIELD_MONEY	
static String	FIELD_SEP	
static String	FIELD_TOWER	
static String	FIREBALL	
static String	ICEBALL	
static String	LASER	

SUMMARY: NESTED | FIELD | CONSTR | METHOD DETAILED: FIELD | CONSTR | METHOD

<code>static String</code>	<code>PILLBOX</code>
<code>static String</code>	<code>SEP</code>
<code>static String</code>	<code>START</code>
<code>static String</code>	<code>TOWER_SEP</code>
<code>static String</code>	<code>WALL</code>

## Constructor Summary

### Constructors

Constructor	Description
<code>SavedInstance(ObjectManager m)</code>	Takes a snapshot of the current object manager variables

## Method Summary

**All Methods**    **Static Methods**    **Instance Methods**    **Concrete Methods**

Modifier and Type	Method	Description
<code>static Tower</code>	<code>getTowerAtIndex (ArrayList&lt;Tower&gt; towers, int x, int y)</code>	Gets a tower at the indicated index
<code>static void</code>	<code>read(String file)</code>	Reads a saved world file and adds the objects to the object manager
<code>void</code>	<code>save(String file)</code>	Saves the object manager snapshot

## Methods inherited from class `java.lang.Object`

`clone`, `equals`, `getClass`, `hashCode`, `notify`, `notifyAll`, `toString`, `wait`, `wait`

## Field Detail

**See Also:**

Constant Field Values

**FIELD\_MONEY**

```
public static final String FIELD_MONEY
```

**See Also:**

Constant Field Values

**FIELD\_TOWER**

```
public static final String FIELD_TOWER
```

**See Also:**

Constant Field Values

**FIELD\_LOC**

```
public static final String FIELD_LOC
```

**See Also:**

Constant Field Values

**START**

```
public static final String START
```

**See Also:**

Constant Field Values

**END**

**SEP**

```
public static final String SEP
```

**See Also:**

Constant Field Values

**LOC\_SEP**

```
public static final String LOC_SEP
```

**See Also:**

Constant Field Values

**TOWER\_SEP**

```
public static final String TOWER_SEP
```

**See Also:**

Constant Field Values

**FIELD\_SEP**

```
public static final String FIELD_SEP
```

**See Also:**

Constant Field Values

**ARCHER**

```
public static final String ARCHER
```

**CANNON**

```
public static final String CANNON
```

**See Also:**

[Constant Field Values](#)

**BARRACKS**

```
public static final String BARRACKS
```

**See Also:**

[Constant Field Values](#)

**FIREBALL**

```
public static final String FIREBALL
```

**See Also:**

[Constant Field Values](#)

**ICEBALL**

```
public static final String ICEBALL
```

**See Also:**

[Constant Field Values](#)

**LASER**

```
public static final String LASER
```

**See Also:**

[Constant Field Values](#)

**See Also:**[Constant Field Values](#)**PILLBOX**

```
public static final String PILLBOX
```

**See Also:**[Constant Field Values](#)**WALL**

```
public static final String WALL
```

**See Also:**[Constant Field Values](#)**EMPTY**

```
public static final String EMPTY
```

**See Also:**[Constant Field Values](#)**AUTO\_SAVE\_PATH**

```
public static final String AUTO_SAVE_PATH
```

**MAP\_PATH**

```
public static final String MAP_PATH
```

**SavedInstance**

```
public SavedInstance(ObjectManager m)
```

Takes a snapshot of the current object manager variables

**Parameters:**

m - Object manager

***Method Detail*****save**

```
public void save(String file) throws IOException
```

Saves the object manager snapshot

**Parameters:**

file - file name

**Throws:**

IOException

**read**

```
public static void read(String file) throws IOException
```

Reads a saved world file and adds the objects to the object manager

**Parameters:**

file - file name

**Throws:**

IOException

**Parameters:**

`towers` - ArrayList of towers

`x` - Tower x index

`y` - Tower y index

**Returns:**

tower, or null if no tower found

## Class Select

java.lang.Object  
  greenfoot.World  
    Select

---

```
public class Select
extends greenfoot.World
```

Map selection world

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>Select(boolean isStory)</code>	Creates the map selection screen

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
boolean	<code>isStory()</code>	Whether or not game is in story mode

### Methods inherited from class greenfoot.World

act, addObject, getBackground, getCellSize, getColorAt, getHeight, getObjects, getObjectsAt, getWidth, numberOfObjects, removeObject, removeObjects, repaint, setActOrder, setBackground, setBackground, setPaintOrder, showText, started, stopped

## ***Constructor Detail***

### **Select**

```
public Select(boolean isStory)
```

Creates the map selection screen

**Parameters:**

isStory - whether or not game is in story mode

## ***Method Detail***

### **isStory**

```
public boolean isStory()
```

Whether or not game is in story mode

**Returns:**

whether or not game is in story mode

## Class Slot

```
java.lang.Object
    Updated
        Sprite
            Slot
```

```
public class Slot
extends Sprite
```

Pathfinding node location, as well as a location to place towers on

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>Slot(int x, int y, int ix, int iy, boolean isBlocked)</code>	Creates a slot
<code>Slot(int x, int y, int ix, int iy, boolean isBlocked, greenfoot.GreenfootImage image)</code>	Creates a slot

### Method Summary

All Methods    Static Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Sets selected slot
Index2D	<code>getIndex()</code>	Gets the index in the array
Point	<code>getLoc()</code>	Gets the slot's location

## Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

## Methods inherited from class Updated

```
_receiveBroadcast
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Slot

```
public Slot(int x,  
           int y,  
           int ix,  
           int iy,  
           boolean isBlocked)
```

Creates a slot

#### Parameters:

x - x location

y - y location

**Slot**

```
public Slot(int x,  
           int y,  
           int ix,  
           int iy,  
           boolean isBlocked,  
           greenfoot.GreenfootImage image)
```

Creates a slot

**Parameters:**

x - x location

y - y location

ix - x index in array

iy - y index in array

isBlocked - whether or not its blocked

image - image of slot

***Method Detail*****setBlocked**

```
public boolean setBlocked(boolean blocked)
```

Sets whether or not this node should block the path

**Returns:**

Whether or not the requested change is valid. (If it will make the path impossible)

**getLoc**

```
public Point getLoc()
```

**getNode**

```
public Node getNode()
```

Gets the node on the slot

**Returns:**

node

**getSelected**

```
public static Slot getSelected()
```

Gets the currently selected slot

**Returns:**

selected slot

**getIndex**

```
public Index2D getIndex()
```

Gets the index in the array

**Returns:**

index

**\_update**

```
public void _update(float delta)
```

Sets selected slot

**Overrides:**

[\\_update](#) in class [Updated](#)

**Parameters:**

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class SoundManager

java.lang.Object  
SoundManager

---

```
public class SoundManager
extends Object
```

Play sounds and music for the game.

**Version:**

(a version number or a date)

**Author:**

Lucy Zhao

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">SoundManager()</a>	

### Method Summary

[All Methods](#)    [Static Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
static void	<a href="#">adjustVolume()</a>	Method to adjust all volumes of sound (sound be called once at the beginning)
static void	<a href="#">enemySounds(int id)</a>	Plays enemy sounds
static void	<a href="#">playSound(greenfoot.GreenfootSound sound)</a>	Actually plays the sound
static void	<a href="#">projectileSounds(int id)</a>	Plays projectile sounds

```
static    uiSounds(int id)
void
```

Plays ui/general sounds

### Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,
wait
```

### Constructor Detail

#### SoundManager

```
public SoundManager()
```

### Method Detail

#### adjustVolume

```
public static void adjustVolume()
```

Method to adjust all volumes of sound (sound be called once at the beginning)

#### projectileSounds

```
public static void projectileSounds(int id)
```

Plays projectile sounds

#### enemySounds

**towerSounds**

```
public static void towerSounds(int id)
```

Plays tower sounds

**uiSounds**

```
public static void uiSounds(int id)
```

Plays ui/general sounds

**playSound**

```
public static void playSound(greenfoot.GreenfootSound sound)
```

Actually plays the sound

**stopSound**

```
public static void stopSound(greenfoot.GreenfootSound sound)
```

Stops a specified sound (mostly for music)

## Class Spawner

`java.lang.Object`

  Updated

    Spawner

**Direct Known Subclasses:**

`DummySpawner`

```
public class Spawner
extends Updated
```

Class that spawns enemies

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>Spawner(ObjectManager manager)</code>	Creates a spawner that will spawn enemies into the indicated object manager
<code>Spawner(ObjectManager manager, int level)</code>	Creates a spawner that will spawn enemies into the indicated object manager

### Method Summary

All Methods	Static Methods	Instance Methods	Concrete Methods
-------------	----------------	------------------	------------------

Modifier and Type	Method	Description
void	<code>_update(float delta)</code>	Spawner update method
int	<code>getLevel()</code>	Get level of world

**Methods inherited from class Updated**`_receiveBroadcast`**Methods inherited from class java.lang.Object**`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`**Constructor Detail****Spawner**`public Spawner(ObjectManager manager)`

Creates a spawner that will spawn enemies into the indicated object manager

**Parameters:**

`manager` - object manager

**Spawner**`public Spawner(ObjectManager manager,  
 int level)`

Creates a spawner that will spawn enemies into the indicated object manager

**Parameters:**

`manager` - object manager

`level` - level of spawner

**Method Detail**

Spawner update method

**Overrides:**

`_update` in class `Updated`

**Parameters:**

`delta` - Change in time since last update

**hasCutscene**

```
public static boolean hasCutscene(int level)
```

Whether or not theres a cutscene

**Parameters:**

`level` - level to check

**Returns:**

whether or not theres a cutscene

**nextLevel**

```
public void nextLevel()
```

Spawns next level

**spawnLevel**

```
public void spawnLevel(int level)
```

Spawns level

**Parameters:**

`level` - level

**getLevel**

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

level

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

## Class Splash

```
java.lang.Object
    Updated
        Sprite
            Projectile
                Splash
```

**Direct Known Subclasses:**

[Fireball](#), [Iceball](#), [RPG](#)

```
public class Splash
extends Projectile
```

Projectiles that can deal area of effect damage

**Version:**

2021

**Author:**

Lucy Zhao

### Field Summary

#### Fields

Modifier and Type	Field	Description
protected greenfoot.GreenfootImage	<a href="#">explode</a>	
protected boolean	<a href="#">exploding</a>	
protected Animation	<a href="#">explosion</a>	
protected boolean	<a href="#">hasExplosion</a>	
protected <a href="#">Effect</a>	<a href="#">onHit</a>	
protected double	<a href="#">radius</a>	

### Fields inherited from class Projectile

[damage](#), [isMagic](#), [MAX\\_LEVEL](#), [speed](#), [target](#)

Constructor	Description
<code>Splash(double x, double y, greenfoot.GreenfootImage image, Enemy target, int id)</code>	Constructor for Splash class
<code>Splash(double x, double y, greenfoot.GreenfootImage image, Enemy target, Animation explosion, greenfoot.GreenfootImage explode, int id)</code>	Constructor for Splash class

## Method Summary

All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>_update (float delta)</code>	Update method
protected void	<code>checkCollision()</code>	Overridden from the Projectile superclass.
protected void	<code>damageEnemy()</code>	Overridden from the Projectile superclass.
protected void	<code>destroy()</code>	Destroys the projectile
protected void	<code>explode()</code>	Play an animation when the splash projectile hits a target

## Methods inherited from class Projectile

`checkWorldBounds`

## Methods inherited from class Sprite

`animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,`

**Methods inherited from class Updated**

```
_receiveBroadcast
```

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Field Detail****radius**

```
protected double radius
```

**explosion**

```
protected Animation explosion
```

**exploding**

```
protected boolean exploding
```

**onHit**

```
protected Effect onHit
```

**explode**

**hasExplosion**

```
protected boolean hasExplosion
```

## **Constructor Detail**

**Splash**

```
public Splash(double x,  
             double y,  
             greenfoot.GreenfootImage image,  
             Enemy target,  
             int id)
```

Constructor for Splash class

**Parameters:**

x - the starting x coordinate  
y - the starting y coordinate  
image - the sprite of the projectile  
target - the reference enemy target  
id - the id of the projectile for sounds

**Splash**

```
public Splash(double x,  
             double y,  
             greenfoot.GreenfootImage image,  
             Enemy target,  
             Animation explosion,  
             greenfoot.GreenfootImage explode,  
             int id)
```

Constructor for Splash class

**Parameters:**

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

target - the reference enemy target**explosion** - animation when splash hits an enemy**explode** - animation when splash hits an enemy**id** - the id of the projectile for sounds

## Method Detail

### update

```
public void _update(float delta)
```

Update method

**Overrides:**

[\\_update](#) in class [Projectile](#)

**Parameters:**

**delta** - Change in time since last update

### checkCollision

```
protected void checkCollision()
```

Overridden from the Projectile superclass. Finds multiple enemies

**Overrides:**

[checkCollision](#) in class [Projectile](#)

### damageEnemy

```
protected void damageEnemy()
```

Overridden from the Projectile superclass. Hurts multiple enemies

**Overrides:**

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD  
**expioae**

```
protected void explode()
```

Play an animation when the splash projectile hits a target

**destroy**

```
protected void destroy()
```

Destroys the projectile

**Overrides:**

[destroy](#) in class [Projectile](#)

## Class Sprite

```
java.lang.Object
    Updated
        Sprite
```

**Direct Known Subclasses:**

Background, CircleMask, Effect, Enemy, Explosion, HPBar, JayJay, Minion, Projectile, Slot, Tower

```
public abstract class Sprite
extends Updated
```

Sprites that will be rendered to the canvas

**Version:**

2021-01-26

**Author:**

Young Chen, Lucy Zhao

### Constructor Summary

#### Constructors

Constructor	Description
<code>Sprite(double x, double y, greenfoot.GreenfootImage image)</code>	Creates a sprite
<code>Sprite(double x, double y, greenfoot.GreenfootImage image, int layer)</code>	Creates a sprite
<code>Sprite(double x, double y, greenfoot.GreenfootImage image, int width, int height)</code>	Creates a sprite
<code>Sprite(double x, double y, greenfoot.GreenfootImage image, int width, int height, int layer)</code>	Creates a sprite
<code>Sprite(double x, double y, <b>BufferedImage</b> image, int layer)</code>	Creates a sprite
<code>Sprite(double x, double y, <b>BufferedImage</b> image, int width, int height)</code>	Creates a sprite
<code>Sprite(double x, double y, <b>BufferedImage</b> image, int width, int height, int layer)</code>	Creates a sprite
<code>Sprite(Canvas c, double x, double y,</code>	

<code>Sprite(Canvas c, double x, double y, greenfoot.GreenfootImage image, int width, int height)</code>	Creates a sprite in a certain canvas
<code>Sprite(Canvas c, double x, double y, greenfoot.GreenfootImage image, int width, int height, int layer)</code>	Creates a sprite in a certain canvas
<code>Sprite(Canvas c, double x, double y, BufferedImage image)</code>	Creates a sprite in a certain canvas
<code>Sprite(Canvas c, double x, double y, BufferedImage image, int layer)</code>	Creates a sprite in a certain canvas
<code>Sprite(Canvas c, double x, double y, BufferedImage image, int width, int height)</code>	Creates a sprite in a certain canvas
<code>Sprite(Canvas c, double x, double y, BufferedImage image, int width, int height, int layer)</code>	Creates a sprite in a certain canvas

## Method Summary

All Methods	Instance Methods	Concrete Methods
Modifier and Type	Method	Description
void	<code>animate(float delta)</code>	Animates the sprite
void	<code>changeHeight(int delta)</code>	Change height
void	<code>changeWidth(int delta)</code>	Change width
int	<code>getFrameCount()</code>	Get total number of frames
int	<code>getFrameIndex()</code>	Get the current frame's index
int	<code>getHeight()</code>	Get height of sprite
<code>BufferedImage getImage()</code>		Get the image of the sprite
int	<code>getImageHeight()</code>	Get height of image
int	<code>getImageWidth()</code>	Get width of image
int	<code>getIntX()</code>	Get x location as an integer

double	<b>getScaleY()</b>	Get sprite vertical image scale
double	<b>getTransparency()</b>	Gets the sprite's alpha
int	<b>getWidth()</b>	Get width of sprite
double	<b>getX()</b>	Get x location
double	<b>getY()</b>	Get y location
int	<b>getZ()</b>	Get the z index
boolean	<b>isInsideImage(int x, int y)</b>	Gets whether or not a point is inside the sprite
boolean	<b>isRemoved()</b>	Whether or not the sprite has been removed
void	<b>move(double dist)</b>	Move in direction of rotation
void	<b>move(double dist, double angle)</b>	Move forward
void	<b>moveTowards(double x, double y, double step)</b>	Move towards a point
void	<b>nextFrame()</b>	Change to next frame
void	<b>nextFrameLooped()</b>	Change to next frame and loop back to first frame when it has reached the last frame
void	<b>removeSprite()</b>	Removes the sprite from the canvas
void	<b>scale(int width, int height)</b>	Set the dimensions of the sprite For compatability with the Greenfoot Actor class
void	<b>setAnimation (Animation animation)</b>	Sets the sprite's animation
void	<b>setAnimation (Animation animation, float time)</b>	Sets the sprite's animation
void	<b>setAnimationFrameTime (float time)</b>	Sets the time between animation frames
void	<b>setDimensions(int width, int height)</b>	Set the dimensions of the sprite

SUMMARY: NESTED | FIELD | CONSTR | METHOD DETAIL: FIELD | CONSTR | METHOD  
(greenfoot.GreenfootImage image)

void	<b>setImage</b> (greenfoot.GreenfootImage image, boolean keepPreviousState)	Sets the sprite's image
void	<b>setImage(BufferedImage</b> image)	Set the sprite's image
void	<b>setImage(BufferedImage</b> image, boolean keepPreviousState)	Sets the sprite's image
void	<b>setLocation</b> (double x, double y)	Sets the sprite's location
void	<b>setRotation</b> (double rot)	Sets the rotation
void	<b>setScale</b> (double scale)	Set the scale of the sprite
void	<b>setTransparency</b> (double alpha)	Set the sprite's alpha
void	<b>setWidth</b> (int width)	Set the width of the sprite
void	<b>setX</b> (double x)	Sets the sprite's x location
void	<b>setY</b> (double y)	Sets the sprite's y location
void	<b>setZ</b> (int z)	Stores the z index value of the sprite.
void	<b>turnTowards</b> (double x, double y)	Turn towards a point

**Methods inherited from class Updated**`_receiveBroadcast, _update`**Methods inherited from class java.lang.Object**`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait`**Constructor Detail****Sprite**

**Parameters:**

x - x location

y - y location

image - image

**Sprite**

```
public Sprite(double x,  
            double y,  
            greenfoot.GreenfootImage image,  
            int layer)
```

Creates a sprite

**Parameters:**

x - x location

y - y location

image - image

layer - draw layer; must be positive or zero integer

**Sprite**

```
public Sprite(Canvas c,  
            double x,  
            double y,  
            greenfoot.GreenfootImage image)
```

Creates a sprite in a certain canvas

**Parameters:**

c - canvas

x - x location

y - y location

image - image

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
        double y,  
        greenfoot.GreenfootImage image,  
        int layer)
```

Creates a sprite in a certain canvas

**Parameters:**

c - canvas  
x - x location  
y - y location  
image - image  
layer - draw layer

**Sprite**

```
public Sprite(Canvas c,  
            double x,  
            double y,  
            greenfoot.GreenfootImage image,  
            int width,  
            int height)
```

Creates a sprite in a certain canvas

**Parameters:**

c - canvas  
x - x location  
y - y location  
image - image  
height - height  
width - width

**Sprite**

```
public Sprite(Canvas c,  
            double x,  
            double y,
```

Creates a sprite in a certain canvas

**Parameters:**

c - canvas

x - x location

y - y location

image - image

height - height

width - width

layer - draw layer

**Sprite**

```
public Sprite(double x,
             double y,
             greenfoot.GreenfootImage image,
             int width,
             int height)
```

Creates a sprite

**Parameters:**

x - x location

y - y location

image - image

height - height

width - width

**Sprite**

```
public Sprite(double x,
             double y,
             greenfoot.GreenfootImage image,
             int width,
             int height,
             int layer)
```

**image** - image

**height** - height

**width** - width

**layer** - draw layer

## Sprite

```
public Sprite(double x,  
            double y,  
            BufferedImage image,  
            int layer)
```

Creates a sprite

**Parameters:**

**x** - x location

**y** - y location

**image** - image

**layer** - draw layer

## Sprite

```
public Sprite(Canvas c,  
            double x,  
            double y,  
            BufferedImage image)
```

Creates a sprite in a certain canvas

**Parameters:**

**c** - canvas

**x** - x location

**y** - y location

**image** - image

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
        double x,
        double y,
        BufferedImage image,
        int layer)
```

Creates a sprite in a certain canvas

**Parameters:**

c - canvas

x - x location

y - y location

image - image

layer - draw layer

**Sprite**

```
public Sprite(Canvas c,
        double x,
        double y,
        BufferedImage image,
        int width,
        int height)
```

Creates a sprite in a certain canvas

**Parameters:**

c - canvas

x - x location

y - y location

image - image

height - height

width - width

**Sprite**

```
public Sprite(Canvas c,
        double x,
```

Creates a sprite in a certain canvas

**Parameters:**

c - canvas

x - x location

y - y location

image - image

height - height

width - width

layer - draw layer

**Sprite**

```
public Sprite(double x,
             double y,
             BufferedImage image,
             int width,
             int height)
```

Creates a sprite

**Parameters:**

x - x location

y - y location

image - image

height - height

width - width

**Sprite**

```
public Sprite(double x,
             double y,
             BufferedImage image,
             int width,
```

x - x location

y - y location

image - image

height - height

width - width

layer - draw layer

## ***Method Detail***

### **setLocation**

```
public void setLocation(double x, double y)
```

Sets the sprite's location

**Parameters:**

x - x location

y - y location

### **setX**

```
public void setX(double x)
```

Sets the sprite's x location

**Parameters:**

x - x location

### **setY**

```
public void setY(double y)
```

**move**

```
public void move(double dist)
```

Move in direction of rotation

**Parameters:**

dist - distance

**move**

```
public void move(double dist, double angle)
```

Move forward

**Parameters:**

dist - distance

angle - angle

**getX**

```
public double getX()
```

Get x location

**Returns:**

x location

**getY**

```
public double getY()
```

Get y location

**Returns:**

y location

```
public int getIntX()
```

Get x location as an integer

**Returns:**

x location

**getIntY**

```
public int getIntY()
```

Get y location as an integer

**Returns:**

y location

**getImage**

```
public BufferedImage getImage()
```

Get the image of the sprite

**Returns:**

image

**setZ**

```
public void setZ(int z)
```

Stores the z index value of the sprite. Does not change the layer or order it is drawn in.

**Parameters:**

z - z index

**getZ**

**setRotation**

```
public void setRotation(double rot)
```

Sets the rotation

**Parameters:**

rot - angle

**getRotation**

```
public double getRotation()
```

Gets the rotation

**Returns:**

angle

**turnTowards**

```
public void turnTowards(double x, double y)
```

Turn towards a point

**Parameters:**

x - x location of point

y - y location of point

**moveTowards**

```
public void moveTowards(double x, double y, double step)
```

Move towards a point

**Parameters:**

**getWidth**

```
public int getWidth()
```

Get width of sprite

**Returns:**

width

**getHeight**

```
public int getHeight()
```

Get height of sprite

**Returns:**

height of sprite

**setScale**

```
public void setScale(double scale)
```

Set the scale of the sprite

**Parameters:**

scale - scale

**setWidth**

```
public void setWidth(int width)
```

Set the width of the sprite

**Parameters:**

width - width

Set the height of the sprite

**Parameters:**

height - height

**isInsideImage**

```
public boolean isInsideImage(int x, int y)
```

Gets whether or not a point is inside the sprite

**Parameters:**

x - x location of point

y - y location of point

**Returns:**

whether or not the point intersects

**setDimensions**

```
public void setDimensions(int width, int height)
```

Set the dimensions of the sprite

**Parameters:**

width - width of sprite

height - height of sprite

**scale**

```
public void scale(int width, int height)
```

Set the dimensions of the sprite For compatibility with the Greenfoot Actor class

**Parameters:**

width - width of sprite

height - height of sprite

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

```
public void setImage(greenfoot.GreenfootImage image)
```

Sets the sprite's image

**Parameters:**

image - new image

**setImage**

```
public void setImage(greenfoot.GreenfootImage image,  
boolean keepPreviousState)
```

Sets the sprite's image

**Parameters:**

image - new image

keepPreviousState - whether to keep previous dimensions

**setImage**

```
public void setImage(BufferedImage image)
```

Set the sprite's image

**Parameters:**

image - new image

**setImage**

```
public void setImage(BufferedImage image, boolean keepPreviousState)
```

Sets the sprite's image

**Parameters:**

image - new image

keepPreviousState - whether to keep previous dimensions

Change width

**Parameters:**

delta - amount to change by

### changeHeight

```
public void changeHeight(int delta)
```

Change height

**Parameters:**

delta - amount to change by

### getImageWidth

```
public int getImageWidth()
```

Get width of image

**Returns:**

width

### getImageHeight

```
public int getImageHeight()
```

Get height of image

**Returns:**

height

### getScaleX

```
public double getScaleX()
```

**getScaleY**

```
public double getScaleY()
```

Get sprite vertical image scale

**Returns:**

scale

**setTransparency**

```
public void setTransparency(double alpha)
```

Set the sprite's alpha

**Parameters:**

alpha - new alpha

**getTransparency**

```
public double getTransparency()
```

Gets the sprite's alpha

**Returns:**

alpha

**removeSprite**

```
public void removeSprite()
```

Removes the sprite from the canvas

**isRemoved**

**setAnimation**

```
public void setAnimation(Animation animation)
```

Sets the sprite's animation

**Parameters:**

animation - animation

**setAnimation**

```
public void setAnimation(Animation animation, float time)
```

Sets the sprite's animation

**Parameters:**

animation - animation

time - time between frames

**setAnimationFrameTime**

```
public void setAnimationFrameTime(float time)
```

Sets the time between animation frames

**Parameters:**

time - time between frames

**animate**

```
public void animate(float delta)
```

Animates the sprite

**Parameters:**

**setFrameIndex**

```
public void setFrameIndex(int frame)
```

Set the current frame's index

**Parameters:**

frame - index

**getFrameIndex**

```
public int getFrameIndex()
```

Get the current frame's index

**Returns:**

index

**getFrameCount**

```
public int getFrameCount()
```

Get total number of frames

**Returns:**

number of frames

**nextFrame**

```
public void nextFrame()
```

Change to next frame

**nextFrameLooped**

```
public void nextFrameLooped()
```

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

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SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

## Class Start

java.lang.Object  
 greenfoot.World  
 Start

```
public class Start
extends greenfoot.World
```

Start screen

**Version:**

2021-01-26

**Author:**

Lucy Zhao, Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<b>Start()</b>	Creates the start screen

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<b>act()</b>	Actor act method
void	<b>started()</b>	Make music equal to null in order to prevent javazoom error
void	<b>stopped()</b>	Stop music

### Methods inherited from class greenfoot.World

`addObject, getBackground, getCellSize, getColorAt, getHeight, getObjects, getObjectsAt, getWidth, numberOfObjects, removeObject, removeObjects, repaint,`

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

### ***Constructor Detail***

#### **Start**

```
public Start()
```

Creates the start screen

### ***Method Detail***

#### **started**

```
public void started()
```

Make music equal to null in order to prevent javazoom error

**Overrides:**

started in class greenfoot.World

#### **stopped**

```
public void stopped()
```

Stop music

**Overrides:**

stopped in class greenfoot.World

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

**Overrides:**

act in class greenfoot.World

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

## Class Textbox

```
java.lang.Object
  greenfoot.Actor
    Textbox
```

---

```
public class Textbox
extends greenfoot.Actor
```

The textbox is used to display text and an image. Text is added by the user along with a corresponding image of who/what the text belongs to. This textbox may have customized colors and able to change the border color. The width and height can be changed to customize the size. The border size can be changed. String can be written on the button, the String, font, and size of the String may be customized.

**Version:**

Jan 2020

**Author:**

Rachel Tong

### Constructor Summary

#### Constructors

Constructor	Description
<code>Textbox(String text, String fontName, int textSize, int width, int height, int borderThickness, greenfoot.Color boxColor, greenfoot.Color borderColor, greenfoot.GreenfootImage image)</code>	Constructor for Textbox.

### Method Summary

All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>act()</code>	The purpose of the act method is to make sure the current text and image is displayed
protected	<code>addedToWorld</code>	Method called when the Textbox is added to the world
void	<code>(greenfoot.World world)</code>	

**void updateText()**

Update current displayed String and corresponding image

### Methods inherited from class greenfoot.Actor

getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset,  
getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset,  
getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge,  
isTouching, move, removeTouching, setImage, setImage, setLocation,  
setRotation, turn, turnTowards

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait

### Constructor Detail

#### Textbox

```
public Textbox(String text,
               String fontName,
               int textSize,
               int width,
               int height,
               int borderThickness,
               greenfoot.Color boxColor,
               greenfoot.Color borderColor,
               greenfoot.GreenfootImage image)
```

Constructor for Textbox. Specify a String to be displayed, text font, text size, width and height of textbox, and border thickness. Ability to change color of textbox and border. Ability to set the corresponding image to be displayed along with the textbox.

#### Parameters:

**text** - String to be displayed

**fontName** - the font of the displayed String

SUMMARY: NESTED | FIELD | CONSTR | METHOD    DETAIL: FIELD | CONSTR | METHOD

~~borderThickness - the thickness of the border. This value should be at least 1.~~**startingColor** - the color of the textbox**borderColor** - the color of the border**image** - corresponding character image for the textbox to display who/what the text of the textbox belongs to

## Method Detail

### addedToWorld

```
protected void addedToWorld(greenfoot.World world)
```

Method called when the Textbox is added to the world

**Overrides:**

addedToWorld in class greenfoot.Actor

### act

```
public void act()
```

The purpose of the act method is to make sure the current text and image is displayed

**Overrides:**

act in class greenfoot.Actor

### addText

```
public void addText(String newText, greenfoot.GreenfootImage image)
```

Adds text and corresponding image to the end of the arraylist to later be displayed

**Parameters:**

**newText** - new text to be displayed

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD  
**updateText**

```
public void updateText()
```

Update current displayed String and corresponding image

#### **updateBoxColor**

```
public void updateBoxColor(greenfoot.Color newBoxColor)
```

Update current color of textbox

**Parameters:**

newBoxColor - replaces textbox color

## Class TextButton

```
java.lang.Object
  greenfoot.Actor
    TextButton
```

---

```
public class TextButton
extends greenfoot.Actor
```

A Generic Button to display text that is clickable. Owned by a World, which controls click capturing.

**Version:**

2020-12-16

**Author:**

Jordan Cohen, Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>TextButton(String text)</code>	Construct a TextButton with a given String at the default size
<code>TextButton(String text, int textSize)</code>	Construct a TextButton with a given String and a specified size

### Method Summary

All Methods    Instance Methods    Concrete Methods

Modifier and Type	Method	Description
void	<code>update(greenfoot.Color fill)</code>	Change the background colour
void	<code>update(String text)</code>	Change the text displayed on this Button

### Methods inherited from class greenfoot.Actor

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Constructor Detail****TextButton**

```
public TextButton(String text)
```

Construct a TextButton with a given String at the default size

**Parameters:**

`text` - String value to display

**TextButton**

```
public TextButton(String text,  
                  int textSize)
```

Construct a TextButton with a given String and a specified size

**Parameters:**

`text` - String value to display

`textSize` - size of text, as an integer

**Method Detail****update**

### update

```
public void update(greenfoot.Color fill)
```

Change the background colour

**Parameters:**

fill - New colour

## Class TextField

```
java.lang.Object
  greenfoot.Actor
    Label
      TextField
```

**Direct Known Subclasses:**

[LevelText](#), [MoneyText](#)

```
public class TextField
extends Label
```

A label that displays text and has a value that can be updated.

**Version:**

2021

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<code>TextField(int x, int y, String prefix)</code>	Constructor for class TextField.

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<code>act()</code>	Act - do whatever the MoneyText wants to do.
protected float	<code>getValue()</code>	Gets the value that needs to be displayed.
protected void	<code>updateLoc()</code>	Keeps actor to the right of coordinates passed through constructor

## Methods inherited from class greenfoot.Actor

```
addedToWorld, getImage, getIntersectingObjects, getNeighbours,  
getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject,  
getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY,  
intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage,  
setLocation, setRotation, turn, turnTowards
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### TextField

```
public TextField(int x,  
                int y,  
                String prefix)
```

Constructor for class TextField.

#### Parameters:

x - The x coordinate of the TextField.

y - The y coordinate of the TextField.

prefix - The text to be displayed before the value.

## Method Detail

### act

act in class greenfoot.Actor

**updateLoc**

```
protected void updateLoc()
```

Keeps actor to the right of coordinates passed through constructor

**getValue**

```
protected float getValue()
```

Gets the value that needs to be displayed.

## Class Tower

```
java.lang.Object
    Updated
        Sprite
            Tower
```

**Direct Known Subclasses:**

[Barracks](#), [CombatTower](#), [Mines](#), [Wall](#)

```
public abstract class Tower
extends Sprite
```

A structure that shoots projectiles at enemies.

**Version:**

2021

**Author:**

Ryan Lin

### **Field Summary**

#### Fields

Modifier and Type	Field	Description
protected float[]	<a href="#">cooldown</a>	The cooldown time of the tower, by level.
static int	<a href="#">COST_ARCHER</a>	Cost of Corresponding Tower.
static int	<a href="#">COST_BARRACKS</a>	Cost of Corresponding Tower.
static int	<a href="#">COST_CANNON</a>	Cost of Corresponding Tower.
static int	<a href="#">COST_FIREBALL</a>	Cost of Corresponding Tower.
static int	<a href="#">COST_ICEBALL</a>	Cost of Corresponding Tower.
static int	<a href="#">COST_LASER</a>	Cost of Corresponding Tower.
static int	<a href="#">COST_MINES</a>	Cost of Corresponding Tower.
static int	<a href="#">COST_PILLBOX</a>	Cost of Corresponding Tower.
protected	<a href="#">image</a>	

protected int	<b>iy</b>	The column of the grid that the tower is placed on.
protected long	<b>lastTime</b>	The last time the cooldown timer was marked.
protected int	<b>level</b>	The level of the tower.
static int	<b>MAX_LEVEL</b>	The maximum level of any tower.
protected float[]	<b>range</b>	The maximum range of the tower, by level.
protected double	<b>rotation</b>	The rotation image index.

## Constructor Summary

### Constructors

Constructor	Description
<b>Tower(greenfoot.GreenfootImage[][] image, float[] range, float[] cooldown, int x, int y, int ix, int iy, int level)</b>	Creates a tower.

## Method Summary

**All Methods**    **Instance Methods**    **Abstract Methods**    **Concrete Methods**

Modifier and Type	Method	Description
protected boolean	<b>canAct()</b>	Determines if the cooldown timer has expired
void	<b>destroy()</b>	Removes the tower from the world
float	<b>getCooldown()</b>	Get the cooldown at the current level
abstract float	<b>getCost()</b>	Get the cost of the tower
int	<b>getIx()</b>	Get the x-index of this element in the grid
int	<b>getIy()</b>	Get the y-index of this element in the grid
int	<b>getLevel()</b>	Get the current level of the tower
float	<b>getRange()</b>	Get the maximum range at the current level

## Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

## Methods inherited from class Updated

```
_receiveBroadcast, _update
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Field Detail

### MAX\_LEVEL

```
public static final int MAX_LEVEL
```

The maximum level of any tower.

#### See Also:

Constant Field Values

### COST\_ARCHER

```
public static final int COST_ARCHER
```

**COST\_CANNON**

```
public static final int COST_CANNON
```

Cost of Corresponding Tower.

**See Also:**

Constant Field Values

**COST\_BARRACKS**

```
public static final int COST_BARRACKS
```

Cost of Corresponding Tower.

**See Also:**

Constant Field Values

**COST\_FIREBALL**

```
public static final int COST_FIREBALL
```

Cost of Corresponding Tower.

**See Also:**

Constant Field Values

**COST\_ICEBALL**

```
public static final int COST_ICEBALL
```

Cost of Corresponding Tower.

**See Also:**

Constant Field Values

Cost of Corresponding Tower.

**See Also:**

Constant Field Values

## COST\_MINES

```
public static final int COST_MINES
```

Cost of Corresponding Tower.

**See Also:**

Constant Field Values

## COST\_PILLBOX

```
public static final int COST_PILLBOX
```

Cost of Corresponding Tower.

**See Also:**

Constant Field Values

## level

```
protected int level
```

The level of the tower.

## lastTime

```
protected long lastTime
```

The last time the cooldown timer was marked.

**iY**

```
protected int iY
```

The column of the grid that the tower is placed on.

**rotation**

```
protected double rotation
```

The rotation image index.

**image**

```
protected greenfoot.GreenfootImage[][] image
```

2D array of images of the tower: First dimension is level, second dimension is rotation.

**range**

```
protected float[] range
```

The maximum range of the tower, by level.

**cooldown**

```
protected float[] cooldown
```

The cooldown time of the tower, by level.

***Constructor Detail***

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

```
    float[] range,
    float[] cooldown,
    int x,
    int y,
    int ix,
    int iy,
    int level)
```

Creates a tower.

**Parameters:**

`image` - a 2D array of sprites

`x` - the x coordinate of the tower

`y` - the y coordinate of the tower

`ix` - the x index of the tower in the global grid

`iy` - the y index of the tower in the global grid

`level` - the level of the tower

**Method Detail****resetCooldown**

```
protected void resetCooldown()
```

Resets Cooldown Timer to zero.

**canAct**

```
protected boolean canAct()
```

Determines if the cooldown timer has expired

**levelup**

**getLevel**

```
public int getLevel()
```

Get the current level of the tower

**Returns:**

int level

**getIX**

```
public int getIX()
```

Get the x-index of this element in the grid

**Returns:**

int x-index

**getIY**

```
public int getIY()
```

Get the y-index of this element in the grid

**Returns:**

int y-index

**destroy**

```
public void destroy()
```

Removes the tower from the world

**isSelectedTower**

```
public boolean isSelectedTower()
```

```
public float getCooldown()
```

Get the cooldown at the current level

**Returns:**

the cooldown in milliseconds of the tower

**getRange**

```
public float getRange()
```

Get the maximum range at the current level

**Returns:**

the maximum range of the tower

**getCost**

```
public abstract float getCost()
```

Get the cost of the tower

**Returns:**

the cost of the tower

## Class TowerActionButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
        TowerActionButton
```

**Direct Known Subclasses:**

[RemoveTowerButton](#), [UpgradeTowerButton](#)

---

```
public abstract class TowerActionButton
extends ImageButton
```

A button that performs an action on a tower.

**Version:**

2021

**Author:**

Ryan Lin

### ***Field Summary***

**Fields**

Modifier and Type	Field	Description
protected <a href="#">Tower</a>	<a href="#">tower</a>	

### ***Constructor Summary***

**Constructors**

Constructor	Description
<a href="#">TowerActionButton(greenfoot.GreenfootImage image)</a>	Creates a TowerActionButton

### ***Method Summary***

void **setTower(Tower tower)** Make the button track a tower

void **unlinkTower(Tower tower)** Stop the button from tracking a tower

### Methods inherited from class Button

onPress

### Methods inherited from class greenfoot.Actor

addedToWorld, getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge, isTouching, move, removeTouching, setImage, setLocation, setRotation, turn, turnTowards

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

### Field Detail

**tower**

protected Tower tower

### Constructor Detail

TowerActionButton

SUMMARY: NESTED | FIELD | CONSTR | METHOD

image - the image of the button.

DETAIL: FIELD | CONSTR | METHOD

### ***Method Detail***

#### **setTower**

```
public void setTower(Tower tower)
```

Make the button track a tower

**Parameters:**

`tower` - the tower to be tracked

#### **unlinkTower**

```
public void unlinkTower(Tower tower)
```

Stop the button from tracking a tower

**Parameters:**

`tower` - the tower to stop tracking.

#### **act**

```
public void act()
```

Check for clicks.

**Overrides:**

`act` in class `Button`

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

## Class TowerButton

java.lang.Object  
  greenfoot.Actor  
    Button  
      TowerButton

---

```
public class TowerButton
extends Button
```

A button that allows the user to select a tower to place down on the map.

**Version:**

2021

**Author:**

Young Chen

### **Field Summary**

#### Fields

Modifier and Type	Field	Description
static int	ARCH	
static int	ARTY	
static int	BARA	
static int	FIRE	
static int	ICE	
static greenfoot.GreenfootImage[ ]	icons	
static int	IDLE	
static int	LAZER	
static int	MINE	
static int	PILL	
static int	SIZE	
static int	WALL	

**TowerButton(int towerID)**

Constructor for TowerButton class

## Method Summary

All Methods	Instance Methods	Concrete Methods
-------------	------------------	------------------

<b>Modifier and Type</b>	<b>Method</b>	<b>Description</b>
--------------------------	---------------	--------------------

void	<b>addedToWorld</b> (greenfoot.World w)	Display the cost upon adding the TowerButton to the world.
void	<b>onPress()</b>	Update the state of the TowerButton.

## Methods inherited from class Button

act

## Methods inherited from class greenfoot.Actor

getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset,  
 getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset,  
 getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge,  
 isTouching, move, removeTouching, setImage, setImage, setLocation,  
 setRotation, turn, turnTowards

## Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,

## Field Detail

**icons**

**SIZE**

```
public static final int SIZE
```

**See Also:**

Constant Field Values

**IDLE**

```
public static final int IDLE
```

**See Also:**

Constant Field Values

**ARCH**

```
public static final int ARCH
```

**See Also:**

Constant Field Values

**ARTY**

```
public static final int ARTY
```

**See Also:**

Constant Field Values

**BARA**

```
public static final int BARA
```

**See Also:**

Constant Field Values

**See Also:**[Constant Field Values](#)**ICE**

```
public static final int ICE
```

**See Also:**[Constant Field Values](#)**LAZER**

```
public static final int LAZER
```

**See Also:**[Constant Field Values](#)**MINE**

```
public static final int MINE
```

**See Also:**[Constant Field Values](#)**PILL**

```
public static final int PILL
```

**See Also:**[Constant Field Values](#)**WALL**

## Constructor Detail

### TowerButton

```
public TowerButton(int towerID)
```

Constructor for TowerButton class

**Parameters:**

towerID - The ID of the tower to be displayed

## Method Detail

### addedToWorld

```
public void addedToWorld(greenfoot.World w)
```

Display the cost upon adding the TowerButton to the world.

**Overrides:**

addedToWorld in class greenfoot.Actor

### onPress

```
public void onPress()
```

Update the state of the TowerButton.

**Specified by:**

onPress in class Button

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD

SUMMARY: NESTED | FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

DETAIL: FIELD | CONSTR | METHOD

## Class TowerDisplay

```
java.lang.Object
  greenfoot.Actor
    TowerDisplay
```

```
public class TowerDisplay
extends greenfoot.Actor
```

A widget that displays information about a Tower.

**Version:**

2021

**Author:**

Ryan Lin

### Constructor Summary

**Constructors**

Constructor	Description
<code>TowerDisplay()</code>	Creates a TowerDisplay

### Method Summary

**All Methods**    **Instance Methods**    **Concrete Methods**

Modifier and Type	Method	Description
void	<code>addedToWorld(greenfoot.World world)</code>	Initialize widgets
void	<code>hide(Tower tower)</code>	Hides the TowerDisplay for a tower
void	<code>show(Tower tower)</code>	Shows the TowerDisplay for a tower
void	<code>update(Tower tower)</code>	Update the tower

**Methods inherited from class greenfoot.Actor**

**Methods inherited from class java.lang.Object**

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

**Constructor Detail****TowerDisplay**

```
public TowerDisplay()
```

Creates a TowerDisplay

**Method Detail****addedToWorld**

```
public void addedToWorld(greenfoot.World world)
```

Initialize widgets

**Overrides:**

addedToWorld in class greenfoot.Actor

**hide**

```
public void hide(Tower tower)
```

Hides the TowerDisplay for a tower

**Parameters:**

**snow**

```
public void show(Tower tower)
```

Shows the TowerDisplay for a tower

**Parameters:**

tower - the tower to be shown

**update**

```
public void update(Tower tower)
```

Update the tower

## Class TowerLabel

```
java.lang.Object
    greenfoot.Actor
        Label
            TowerLabel
```

**Direct Known Subclasses:**

[TowerLevel](#), [TowerText](#), [TowerUpgrade](#)

---

```
public abstract class TowerLabel
extends Label
```

Write a description of class TowerLabel here.

**Version:**

2021

**Author:**

Ryan Lin

### **Field Summary**

#### **Fields**

Modifier and Type	Field	Description
protected <a href="#">Tower</a>	<b>tower</b>	
protected int	<b>x</b>	
protected int	<b>y</b>	

### **Constructor Summary**

#### **Constructors**

Constructor	Description
<a href="#">TowerLabel(int x, int y, String value)</a>	Constructor for TowerLabel

**Type**

void	<b>addedToWorld</b> (greenfoot.World w)	Called when the TowerLabel is added to the world
void	<b>setTower(Tower tower)</b>	Link the TowerLabel to a tower
void	<b>unlinkTower(Tower tower)</b>	Unlink the TowerLabel from a tower.
abstract void	<b>updateTower(Tower t)</b>	Updates the label with information from a Tower.

**Methods inherited from class Label**`setFillColor, setLineColor, setValue, setValue`**Methods inherited from class greenfoot.Actor**`act, getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset,  
getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset,  
getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge,  
isTouching, move, removeTouching, setImage, setImage, setLocation,  
setRotation, turn, turnTowards`**Methods inherited from class java.lang.Object**`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait`**Field Detail****tower**`protected Tower tower`

**y**

```
protected int y
```

## ***Constructor Detail***

**TowerLabel**

```
public TowerLabel(int x,  
                  int y,  
                  String value)
```

Constructor for TowerLabel

**Parameters:**

**x** - The x coordinate of the tower label

**y** - The y coordinate of the tower label

**value** - The string displayed on the label

## ***Method Detail***

**addedToWorld**

```
public void addedToWorld(greenfoot.World w)
```

Called when the TowerLabel is added to the world

**Overrides:**

addedToWorld in class greenfoot.Actor

**Parameters:**

`tower` - The tower to link to.

**unlinkTower**

```
public void unlinkTower(Tower tower)
```

Unlink the TowerLabel from a tower.

**Parameters:**

`tower` - The tower to unlink from.

**updateTower**

```
public abstract void updateTower(Tower t)
```

Updates the label with information from a Tower.

**Parameters:**

`t` - tower whose information is to be displayed.

## Class TowerLevel

```
java.lang.Object
  greenfoot.Actor
    Label
      TowerLabel
        TowerLevel
```

---

```
public class TowerLevel
extends TowerLabel
```

Write a description of class TowerLevel here.

**Version:**

(a version number or a date)

**Author:**

(your name)

### ***Field Summary***

#### **Fields inherited from class TowerLabel**

```
tower, x, y
```

### ***Constructor Summary***

#### **Constructors**

Constructor	Description
<a href="#">TowerLevel(int x, int y)</a>	

### ***Method Summary***

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
-------------------	--------	-------------

addedToWorld, setTower, unlinkTower

### Methods inherited from class Label

setFillColor, setLineColor, setValue, setValue

### Methods inherited from class greenfoot.Actor

act, getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset, getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset, getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge, isTouching, move, removeTouching, setImage, setImage, setLocation, setRotation, turn, turnTowards

### Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait, wait

## Constructor Detail

### TowerLevel

```
public TowerLevel(int x,  
                  int y)
```

## Method Detail

### updateTower

```
public void updateTower(Tower tower)
```

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SEARCH:  Search

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

**tower** - The tower whose information is to be displayed.

PACKAGE CLASS TREE INDEX HELP

ALL CLASSES

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD

## Class TowerText

```
java.lang.Object
  greenfoot.Actor
    Label
      TowerLabel
        TowerText
```

---

```
public class TowerText
extends TowerLabel
```

Displays the name of the Tower.

**Version:**

2021

**Author:**

Ryan Lin

### ***Field Summary***

#### **Fields inherited from class TowerLabel**

```
tower, x, y
```

### ***Constructor Summary***

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>TowerText(int x, int y)</code>	Constructor for TowerText class.

### ***Method Summary***

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

**Methods inherited from class TowerLabel**`addedToWorld, setTower, unlinkTower`**Methods inherited from class Label**`setFillColor, setLineColor, setValue, setValue`**Methods inherited from class greenfoot.Actor**`act, getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset,  
getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset,  
getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge,  
isTouching, move, removeTouching, setImage, setImage, setLocation,  
setRotation, turn, turnTowards`**Methods inherited from class java.lang.Object**`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait`**Constructor Detail****TowerText**

```
public TowerText(int x,  
                 int y)
```

Constructor for TowerText class.

**Parameters:**

x - The x coordinate of the label.

y - The y coordinate of the label.

```
public void updateTower(Tower tower)
```

Updates the label with information from a Tower.

**Specified by:**

[updateTower](#) in class [TowerLabel](#)

**Parameters:**

`tower` - The tower whose information is to be displayed.

## Class Troll

```
java.lang.Object
    Updated
        Sprite
            Enemy
                Troll
```

---

```
public class Troll
extends Enemy
```

The Troll is decently speedy and has resistance to physical damage. It can also attack from a distance.

**Version:**

2021-01-26

**Author:**

Rachel Tong, Young Chen

### ***Field Summary***

#### **Fields inherited from class Enemy**

```
angle, coolDown, coolDownTime, DEFAULT_HP, DEFAULT_RANGE, hpOffset, range,
rangeSquared, velX, velY
```

### ***Constructor Summary***

#### **Constructors**

Constructor	Description
<code>Troll(double x, double y)</code>	Creates a troll

### ***Method Summary***

```
protected void checkCanAttack(float delta)     Checks whether or not it can attack
```

## Methods inherited from class Enemy

```
_receiveBroadcast, damage, die, getNodeIndex, heal, moveTowards, translate,  
updateHP
```

## Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Troll

```
public Troll(double x,  
            double y)
```

Creates a troll

#### Parameters:

x - the x coordinate of Troll

y - the y coordinate of Troll

**\_update**

```
public void _update(float delta)
```

Troll update method

**Overrides:**

[\\_update](#) in class [Enemy](#)

**Parameters:**

delta - Change in time since last update

**checkCanAttack**

```
protected void checkCanAttack(float delta)
```

Checks whether or not it can attack

**Overrides:**

[checkCanAttack](#) in class [Enemy](#)

**Parameters:**

delta - change in time since last update

**attack**

```
public void attack()
```

Attack to damage JayJay the Dragon

**Overrides:**

[attack](#) in class [Enemy](#)

## Class Utils

java.lang.Object  
    Utils

---

```
public class Utils
extends Object
```

Utility functions

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">Utils()</a>	

### Method Summary

[All Methods](#)    [Static Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
static <a href="#">BufferedImage</a>	<a href="#">read(String file)</a>	Read image file

### Methods inherited from class java.lang.Object

[clone](#), [equals](#), [getClass](#), [hashCode](#), [notify](#), [notifyAll](#), [toString](#), [wait](#), [wait](#)

### Constructor Detail

## ***Method Detail***

### **read**

```
public static BufferedImage read(String file)
```

Read image file

**Parameters:**

file -

**Returns:**

## Class Wall

```
java.lang.Object
    Updated
        Sprite
            Tower
                Wall
```

---

```
public class Wall
extends Tower
```

Wall that does nothing

**Version:**

2021

**Author:**

Ryan Lin

### ***Field Summary***

#### **Fields inherited from class Tower**

```
cooldown, COST_ARCHER, COST_BARRACKS, COST_CANNON, COST_FIREBALL,
COST_ICEBALL, COST_LASER, COST_MINES, COST_PILLBOX, image, ix, iy, lastTime,
level, MAX_LEVEL, range, rotation
```

### ***Constructor Summary***

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>Wall(int x, int y, int ix, int iy)</code>	Creates a basic wall
<code>Wall(int x, int y, int ix, int iy, int level)</code>	Creates a wall

### ***Method Summary***

float	<b>getCost()</b>	Get the cost of the tower
-------	------------------	---------------------------

<b>String</b>	<b>toString()</b>	Returns the string representation of Wall
---------------	-------------------	---

## Methods inherited from class Tower

canAct, destroy, getCooldown, getIX, getIY, getLevel, getRange, isSelectedTower, levelup, resetCooldown

## Methods inherited from class Sprite

animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight, getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation, getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ, isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped, removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime, setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage, setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX, setY, setZ, turnTowards

## Methods inherited from class Updated

\_receiveBroadcast

## Methods inherited from class java.lang.Object

clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait

## Constructor Detail

### Wall

```
public Wall(int x,  
           int y,
```

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iY - the y index of the tower in the global grid

## Wall

```
public Wall(int x,  
           int y,  
           int ix,  
           int iY,  
           int level)
```

Creates a wall

**Parameters:**

x - the x coordinate of the tower

y - the y coordinate of the tower

ix - the x index of the tower in the global grid

iY - the y index of the tower in the global grid

## *Method Detail*

### \_update

```
public void _update(float delta)
```

Be a nice wall and do nothing

**Overrides:**

`_update` in class `Updated`

**Parameters:**

delta - Change in time since last update

Returns the string representation of Wall

**Overrides:**

`toString` in class `Object`

**Returns:**

name of Wall

### getCost

```
public float getCost()
```

**Description copied from class: Tower**

Get the cost of the tower

**Specified by:**

`getCost` in class `Tower`

**Returns:**

the cost of the tower

## Class TowerUpgrade

```
java.lang.Object
  greenfoot.Actor
    Label
      TowerLabel
        TowerUpgrade
```

---

```
public class TowerUpgrade
extends TowerLabel
```

Displays the upgrade cost of a tower.

**Version:**

2021

**Author:**

Young Chen

### ***Field Summary***

#### **Fields inherited from class TowerLabel**

```
tower, x, y
```

### ***Constructor Summary***

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<b>TowerUpgrade(int x, int y)</b>	Constructor for TowerUpgrade class.

### ***Method Summary***

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

**Methods inherited from class TowerLabel**`addedToWorld, setTower, unlinkTower`**Methods inherited from class Label**`setFillColor, setLineColor, setValue, setValue`**Methods inherited from class greenfoot.Actor**`act, getImage, getIntersectingObjects, getNeighbours, getObjectsAtOffset,  
getObjectsInRange, getOneIntersectingObject, getOneObjectAtOffset,  
getRotation, getWorld, getWorldOfType, getX, getY, intersects, isAtEdge,  
isTouching, move, removeTouching, setImage, setImage, setLocation,  
setRotation, turn, turnTowards`**Methods inherited from class java.lang.Object**`clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait`**Constructor Detail****TowerUpgrade**

```
public TowerUpgrade(int x,  
                    int y)
```

Constructor for TowerUpgrade class.

**Parameters:**

x - The x coordinate of the label.

y - The y coordinate of the label.

```
public void updateTower(Tower tower)
```

Updates the label with information from a Tower.

**Specified by:**

[updateTower](#) in class [TowerLabel](#)

**Parameters:**

`tower` - The tower whose information is to be displayed.

## Class UpgradeTowerButton

```
java.lang.Object
  greenfoot.Actor
    Button
      ImageButton
        TowerActionButton
          UpgradeTowerButton
```

---

```
public class UpgradeTowerButton
extends TowerActionButton
```

A button that upgrades a tower.

**Version:**

2021

**Author:**

Ryan Lin

### Field Summary

#### Fields

Modifier and Type	Field	Description
static float	UPGRADE_MULTIPLYER	

### Fields inherited from class TowerActionButton

tower

### Constructor Summary

#### Constructors

Constructor	Description
UpgradeTowerButton()	Constructor for UpgradeTowerButton class.

Modifier and Type	Method	Description
void	<a href="#">onPress()</a>	Action when the button is clicked.

### Methods inherited from class TowerActionButton

[act](#), [setTower](#), [unlinkTower](#)

### Methods inherited from class greenfoot.Actor

[addedToWorld](#), [getImage](#), [getIntersectingObjects](#), [getNeighbours](#),  
[getObjectsAtOffset](#), [getObjectsInRange](#), [getOneIntersectingObject](#),  
[getOneObjectAtOffset](#), [getRotation](#), [getWorld](#), [getWorldOfType](#), [getX](#), [getY](#),  
[intersects](#), [isAtEdge](#), [isTouching](#), [move](#), [removeTouching](#), [setImage](#), [setImage](#),  
 [setLocation](#), [setRotation](#), [turn](#), [turnTowards](#)

### Methods inherited from class java.lang.Object

[clone](#), [equals](#), [getClass](#), [hashCode](#), [notify](#), [notifyAll](#), [toString](#), [wait](#), [wait](#)

### Field Detail

#### UPGRADE\_MULTIPLYER

public static final float UPGRADE\_MULTIPLYER

##### See Also:

[Constant Field Values](#)

### Constructor Detail

## ***Method Detail***

### **onPress**

```
public void onPress()
```

Action when the button is clicked.

**Specified by:**

[onPress](#) in class [Button](#)

## Class Warlock

```
java.lang.Object
    Updated
        Sprite
            Enemy
                Warlock
```

---

```
public class Warlock
extends Enemy
```

The warlock is a magical unit that has resistance to magical damage. It can attack from a distance.

**Version:**

2021-01-26

**Author:**

Rachel Tong, Young Chen

### ***Field Summary***

#### **Fields inherited from class Enemy**

```
angle, coolDown, coolDownTime, DEFAULT_HP, DEFAULT_RANGE, hpOffset, range,
rangeSquared, velX, velY
```

### ***Constructor Summary***

#### **Constructors**

Constructor	Description
<code>Warlock(double x, double y)</code>	Creates a warlock

### ***Method Summary***

```
protected void checkCanAttack(float delta)     Checks whether or not it can attack
```

## Methods inherited from class Enemy

```
_receiveBroadcast, damage, die, getNodeIndex, heal, moveTowards, translate,  
updateHP
```

## Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Warlock

```
public Warlock(double x,  
              double y)
```

Creates a warlock

#### Parameters:

x - the x coordinate of Warlock

y - the y coordinate of Warlock

**\_update**

```
public void _update(float delta)
```

Warlock update method

**Overrides:**

[\\_update](#) in class [Enemy](#)

**Parameters:**

delta - Change in time since last update

**checkCanAttack**

```
protected void checkCanAttack(float delta)
```

Checks whether or not it can attack

**Overrides:**

[checkCanAttack](#) in class [Enemy](#)

**Parameters:**

delta - change in time since last update

**attack**

```
public void attack()
```

Attack to damage JayJay the Dragon

**Overrides:**

[attack](#) in class [Enemy](#)

## Class Updated

java.lang.Object  
Updated

**Direct Known Subclasses:**

[Spawner](#), [Sprite](#)

---

```
public abstract class Updated
extends Object
```

Class that can be updated every frame

**Version:**

2021-01-26

**Author:**

Young Chen

### Constructor Summary

#### Constructors

Constructor	Description
<a href="#">Updated()</a>	

### Method Summary

[All Methods](#)    [Instance Methods](#)    [Concrete Methods](#)

Modifier and Type	Method	Description
void	<a href="#">_receiveBroadcast(int ID)</a>	Broadcast from object manager
void	<a href="#">_update(float delta)</a>	Update called every frame

### Methods inherited from class java.lang.Object

[clone](#), [equals](#), [getClass](#), [hashCode](#), [notify](#), [notifyAll](#), [toString](#), [wait](#), [wait](#)

**Updated**

```
public Updated()
```

***Method Detail*****\_update**

```
public void _update(float delta)
```

Update called every frame

**Parameters:**

delta - Change in time since last update

**\_receiveBroadcast**

```
public void _receiveBroadcast(int ID)
```

Broadcast from object manager

**Parameters:**

ID - Magic number of broadcast

## Class Zap

```
java.lang.Object
    Updated
        Sprite
            Projectile
                Zap
```

---

```
public class Zap
extends Projectile
```

A magical laserbeam that hits a single target

**Version:**

2021

**Author:**

Lucy Zhao

### ***Field Summary***

#### **Fields inherited from class Projectile**

```
damage, isMagic, MAX_LEVEL, speed, target
```

### ***Constructor Summary***

#### **Constructors**

<b>Constructor</b>	<b>Description</b>
<code>Zap(double x, double y, Enemy target)</code>	Constructor for Zap class
<code>Zap(double x, double y, Enemy target, int level)</code>	Constructor for Zap class

### ***Method Summary***

## Methods inherited from class Sprite

```
animate, changeHeight, changeWidth, getFrameCount, getFrameIndex, getHeight,  
getImage, getImageHeight, getImageWidth, getIntX, getIntY, getRotation,  
getScaleX, getScaleY, getTransparency, getWidth, getX, getY, getZ,  
isInsideImage, isRemoved, move, move, moveTowards, nextFrame, nextFrameLooped,  
removeSprite, scale, setAnimation, setAnimation, setAnimationFrameTime,  
setDimensions, setFrameIndex, setHeight, setImage, setImage, setImage,  
setImage, setLocation, setRotation, setScale, setTransparency, setWidth, setX,  
setY, setZ, turnTowards
```

## Methods inherited from class Updated

```
_receiveBroadcast
```

## Methods inherited from class java.lang.Object

```
clone, equals, getClass, hashCode, notify, notifyAll, toString, wait, wait,  
wait
```

## Constructor Detail

### Zap

```
public Zap(double x,  
          double y,  
          Enemy target)
```

Constructor for Zap class

#### Parameters:

x - the starting x coordinate

y - the starting y coordinate

target - the reference enemy target

SUMMARY: NESTED | FIELD | CONSTR | METHOD  
`enemy target,  
int level)`

DETAIL: FIELD | CONSTR | METHOD

Constructor for Zap class

**Parameters:**

`x` - the starting x coordinate  
`y` - the starting y coordinate  
`target` - the reference enemy target  
`level` - the level of the projectile

SUMMARY: NESTED | FIELD | CONSTR | METHOD      DETAIL: FIELD | CONSTR | METHOD