# Assignment 3- Asteroids!

## Authors

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## Design philosophy

We designed our Asteroids game to behave similarly to the Atari 2600 version of the game.

We originally wrote the game using a procedural design methodology. We then rewrote the game from scratch using an object oriented design methodology.

## User interface

The graphical display of the game has a 3x4 aspect ratio which is the same as old school arcade consoles.

At the start of the game, your ship appears stationary at the centre of the display pointing up.

Four asteroids appear on-screen. The asteroids move at a fixed speed. They appear randomly in the left and right quadrants of the screen moving close to an up or down direction. This ensures the ship won’t be hit by an asteroid during the first part of the game. When an asteroid reaches the edge of the display, it wraps around so it appears diagonally opposite on the corresponding edge of the display.

The current score appears in the top left corner of the display.

The current level appears in the display under the score.

Icons representing the remaining lives appear in the display under the level. The user has four lives at the start of the game, so four icons appear. When the number of lives decreases, less icons are displayed.

## Controls

The keyboard is used to control game-play.

|  |  |
| --- | --- |
| **Key** | **Usage** |
| Up arrow | Accelerate ship |
| Down arrow | Decelerate ship |
| Left arrow | Rotate ship left |
| Right arrow | Rotate ship right |
| Space bar | Fire laser bolt |
| Enter | Teleport ship |

## Ship movement

When the user uses the arrow keys to rotate and accelerate the ship, the ship moves with realistic physics around the display. When the ship reaches the edge of the display, it wraps around so it appears diagonally opposite on the corresponding edge of the display.

## Ship exhaust

When the ship accelerates, a visible exhaust appears behind the ship. When the ship decelerates, a visible exhaust appears in front of the ship.

## Scoring

When the user presses the Space bar, the ship fires a laser bolt that moves at a fixed speed in the direction the ship was facing when it fired the bolt. If a laser bolt hits an asteroid, the asteroid is destroyed and the score increases by an amount that depends on the size of the ship hit. You get more points for hitting a smaller asteroid.

The laser bolt travels for a number of pixels equal to the screen height. Many laser bolts can be in flight simultaneously. There's a slight pause before the ship can fire another laser bolt.

|  |  |
| --- | --- |
| **Ship size** | **Score** |
| Large | 25 |
| Medium | 50 |
| Small | 100 |

## Teleporting

When the user releases the Enter key, the ship disappears and reappears at a random location on the display. The ship is stationary when it reappears. Any motion the ship had before teleporting is lost.

## Explosions

When the ship collides with an asteroid, it is destroyed and an explosion animation plays at the location of the ship. The number of lives is reduced by one. If there is remaining lives, the number of icons representing remaining lives is reduced by one, and the ship re-spawns again at the centre of the screen. The ship is stationary when it reappears. If there are no remaining lives, the game ends.

When a laser bolt collides with an asteroid, the asteroid is destroyed and an explosion animation plays at the location of the destroyed asteroid.

## Spawning

When a large asteroid is destroyed, two medium asteroids are spawned in its place. Medium asteroids travel faster than large asteroids.

When a medium asteroid is destroyed, two small asteroids are spawned in its place. Small asteroids travel faster than medium asteroids.

When a small asteroid is destroyed, no asteroids are spawned.

The location of a spawned asteroid is the same as the asteroid destroyed, and the direction of a spawned asteroid is random.

## Level up

When all of the asteroids are destroyed, the game goes to the next level.

The ship returns to the centre of the screen and is stationary.

The asteroids re-spawn the same as at the start of the game, except that the asteroids move faster than they did on the last level so the difficulty of the game increases.

More asteroids appear on each level up.

## Game Parameters

There's a number of game parameters that can be set in the Processing source code that affect game play.

