

Illuminating stellar life cycles: tell star stories with physics and coding

Activity 3: Example code for high-mass stars

Use the calculated values to make a function for each star type. The JavaScript example below is for high-mass stars.

```
function runSunLifecycle (totalDurationSeconds: number) {  
  // Duration for quick flashes (like ignition), in milliseconds.  
  flashDuration = 200  
  
  // Percentage of total time for each main stage of the Sun's life.  
  // [Protostar, main sequence, red giant]  
  // Approx 1%, 89%, 10%  
  stages_percentage = [0.01, 0.89, 0.1]  
  
  // Calculate how long each stage should last in milliseconds (ms).  
  // Protostar stage duration  
  protostar = totalDurationSeconds * 1000 * stages_percentage[0]  
  
  // Ignition flash duration  
  ignition = flashDuration  
  
  // Main-sequence stage duration (the longest part of the Sun's life!)  
  main_sequence = totalDurationSeconds * 1000 * stages_percentage[1]  
  
  // Red giant stage duration  
  red_giant = totalDurationSeconds * 1000 * stages_percentage[2]  
  
  // Shell burning / white dwarf formation flash duration  
  shell_burn = flashDuration  
  
  // STAGE 1: protostar  
  // A young, forming Sun-like star. Dim warm red.  
  // RGB values: Red=401, Green=201, Blue=0.
```

```
setRGB(401, 201, 0)

// Wait for the calculated protostar duration.
basic.pause(protostar)

// IGNITION FLASH for the Sun-like star
// A bright flash as nuclear fusion starts properly.
// RGB values: Red=900, Green=900, Blue=900 (bright white).
setRGB(900, 900, 900)

// Wait for the short flash duration.
// Note: user code uses 'flashDuration' here, which is 'ignition'
basic.pause(flashDuration)

// STAGE 2: main sequence (like our Sun now)
// The star is stable, shining yellow-white.
// RGB values: Red=800, Green=600, Blue=600 (a warm white/yellowish colour).
setRGB(800, 600, 600)

// Wait for the calculated main-sequence duration.
basic.pause(main_sequence)

// STAGE 3: red giant
// The Sun swells up and becomes a large, cooler red giant.
// RGB values: Red=1023 (max red), Green=201, Blue=0 (an orangey-red).
setRGB(1023, 201, 0)

// Wait for the calculated red giant duration.
basic.pause(red_giant)

// STAGE 4: white dwarf formation (shell burning flash)
// The outer layers drift away, leaving the hot core - a white dwarf.
// This is represented by a flash and then the white dwarf colour.
// RGB values: Red=401, Green=401, Blue=401 (a dim white for the flash part here).
setRGB(401, 401, 401)

// Wait for the short flash duration (representing the transition).
// Note: user code uses 'flashDuration' here, which is 'shell_burn'
basic.pause(flashDuration)
```

```
// STAGE 5: white dwarf (remnant)  
// The remaining core is a small, dense, dim white dwarf.  
// RGB values: Red=200, Green=200, Blue=200 (a very dim white).  
setRGB(200, 200, 200)  
// Show "White Dwarf" on the micro:bit display.  
basic.showString("White Dwarf")  
}
```