

Unit 4

The Design Recipe

Students continue to practice the Design Recipe by applying it to simple problems.

Good afternoon!

Warmup: Grab a sheet and complete the exercises.

Unit 4: Warmup

Defining Values

<pre>x = 15 a = 2 b = 6</pre> <p>What is the value of x?</p> <p>a. a function b. 15 c. x</p> <p>What is the value of a+b?</p> <p>a. 8 b. a function c. ab</p> <p>What is the value of x-10?</p> <p>a. x b. 5 c. a function</p>	<pre>(define x 3) (define p 8) (define q "hello")</pre> <p>What is the value of x?</p> <p>a. 3 b. 15 c. Don't know</p> <p>What is the value of (- p x)?</p> <p>a. q b. 3 c. 5</p> <p>What is the value of (string-length q)?</p> <p>a. 1 b. "hello" c. 5</p>
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Defining Functions

<pre>f(x) = x + 3</pre> <p>What is the name of the function?</p> <p>a. f b. x c. 3</p> <p>What is the name of the variable?</p> <p>a. f b. x c. 3</p> <p>What is f(2)?</p> <p>a. 6 b. 5 c. x</p>	<pre>(define (f x) (* x 17))</pre> <p>What is the name of the function?</p> <p>a. x b. 17 c. f</p> <p>What is the name of the variable?</p> <p>a. x b. 17 c. f</p> <p>What is (f 1)?</p> <p>a. 17 b. 117 c. x</p>
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Unit 4: Warmup**Defining Values**

<pre>x = 15 a = 2 b = 6</pre>	<pre>(define x 3) (define p 8) (define q <u>"hello"</u>)</pre>
What is the value of x? a. a function b. 15 c. x	What is the value of x? a. 3 b. 15 c. Don't know
What is the value of a+b? a. 8 b. a function c. ab	What is the value of (- p x)? a. q b. 3 c. 5
What is the value of x-10? a. x b. 5 c. a function	What is the value of (string-length q)? a. 1 b. "hello" c. 5

$f(2) = 2 + 3$

Defining Functions

$f(x) = x * 17$
 $f(1) = 1 * 17$

<div>$f(x) = x + 3$</div> <div>What is the name of the function?</div> <div>a. <u>f</u> b. x c. 3</div> <div>What is the name of the variable?</div> <div>a. f b. <u>x</u> c. 3</div> <div>What is $f(2)$?</div> <div>a. 6 b. <u>5</u> c. x</div>	<div>$(\text{define } (f\ x) (*\ x\ 17))$</div> <div>What is the name of the function?</div> <div>a. x b. 17 c. <u>f</u></div> <div>What is the name of the variable?</div> <div>a. <u>x</u> b. 17 c. f</div> <div>What is $(f\ 1)$?</div> <div>a. <u>17</u> b. 117 c. x</div>
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Where's the game??

Define a function gt, that takes in a Number and produces a solid, green triangle of the given size.

- Three steps:
- step 1: Write the Contract

step 2: Give examples

step 3: Define the function

name: gt

domain: number

range: image

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Fast Functions!		
;	gt	: number -> image
	name	domain range
(EXAMPLE	(gt 25)	(triangle 25 "solid" "green")
(EXAMPLE	(gt 103)	(triangle 103 "solid" "green")
(define	(gt size)	(triangle size "solid" "green")

Using the Design Recipe

1. Write the contract
2. Write 2 examples - circle what changes
3. Define the function

Define a function 'purple-star', that takes in the size of the star and produces an outlined, purple star of the given size. (Use the variable 'size'.)

Contract purple-star : number → image

Examples (EXAMPLE (purple-star 60) (star 60 "outline" "purple"))
(EXAMPLE (purple-star 100) (star 100 "outline" "purple"))

Definition (define (purple-star size) (star size "outline" "purple"))

Handwritten notes: A red arrow points from the word "size" written above to the "size" parameter in the definition. Blue circles highlight the "size" parameter in the examples and the "size" parameter in the definition.

Using the Design Recipe

1. Write the contract
2. Write 2 examples - circle what changes
3. Define the function

2. Define a function `'spot'`, that takes in a color and produces a solid circle of radius 50, filled in with that color. (Use the variable `'color'`.)

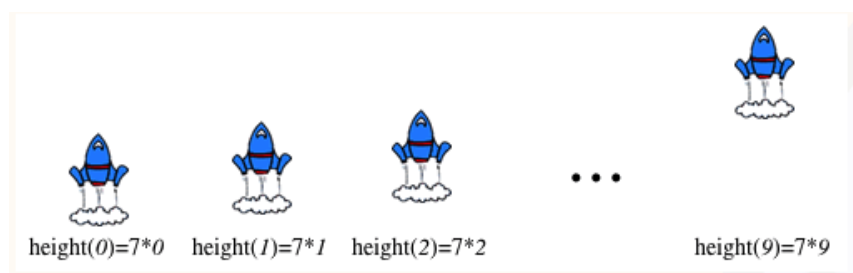
Contract _____

Examples _____

Definition _____

Using the Design Recipe

Animation: think of it like a flip-book:



A rocket blasts off, traveling at 7 meters per second. Write a function called `rocket-height` that takes in the number of seconds that have passed since the rocket took off, and which produces the height of the rocket at that time.

Using the Design Recipe

A rocket blasts off, traveling at 7 meters per second. Write a function called **rocket-height** that takes in the number of seconds that have passed since the rocket took off, and which produces the height of the rocket at that time.

; rocket-height : number → number

Word Problem: rocket-height

Directions: A rocket blasts off, traveling at 7 meters per second. Write a function called 'rocket-height' that takes in the number of seconds that have passed since the rocket took off, and which produces the height of the rocket at that time.

Contract and Purpose Statement

Every contract has three parts ...

; rocket-height : number → number
function name domain range
 ; how high is the rocket after the given number of seconds?
what does the function do?

Examples

Write some examples of your function in action...

(EXAMPLE (rocket-height 14) (* 7 14))
function name input(s) what the function produces
 (EXAMPLE (rocket-height 100) (* 7 100))
function name input(s) what the function produces

Definition

Write the definition, giving variable names to all your input values...

(define (rocket-height seconds)
function name variables
 (* 7 seconds)
what the function does with those variables

