Unidades de Bootstrap

01 Videojuegos y Planos de Coordenadas

02 Contratos, series de caracteres e Imágenes

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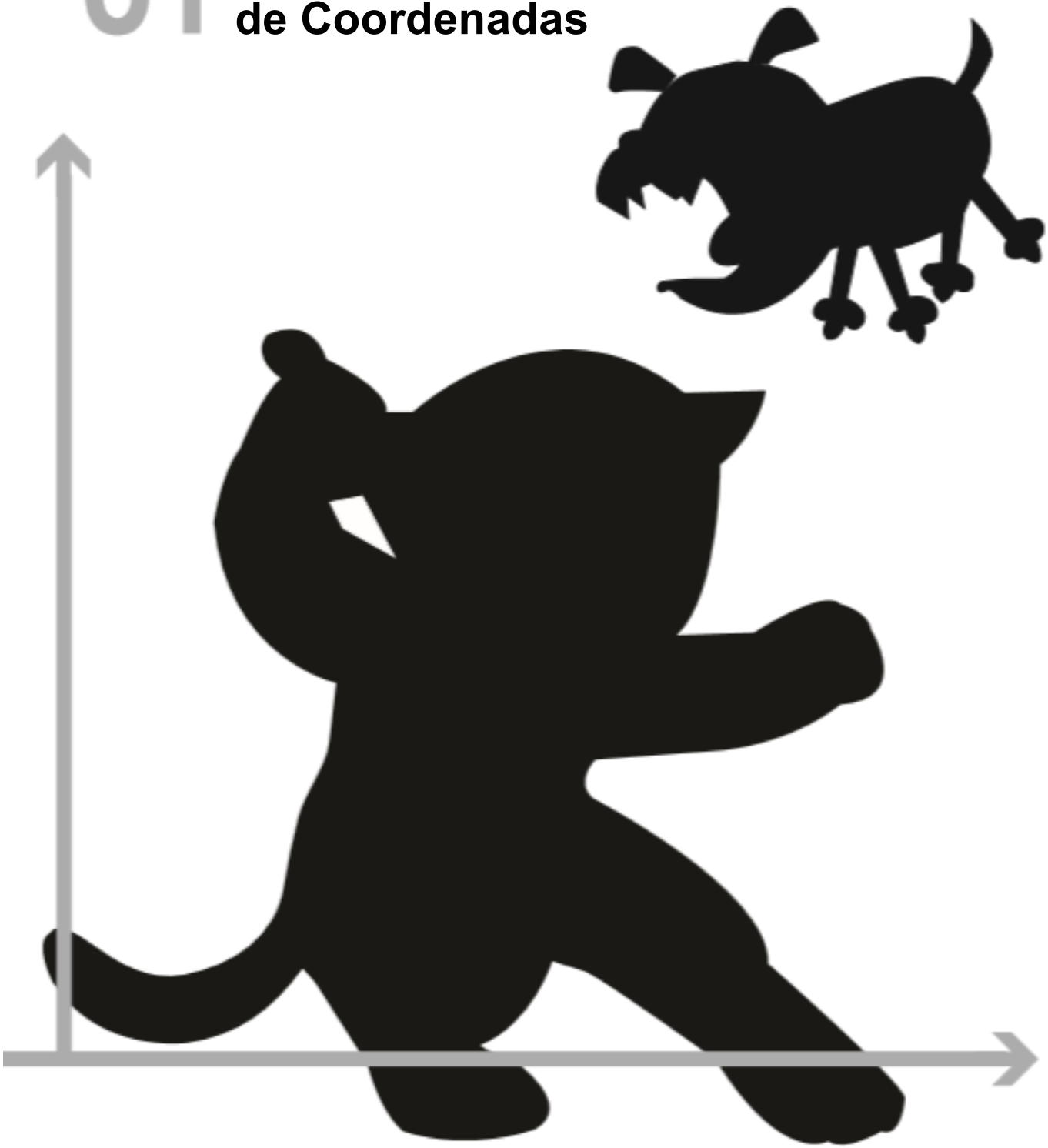
01 Videojuegos y Planos de Coordenadas



Nuestro videojuego

Creado por (escribe tu nombre): _____

El ambiente

Nuestro juego se desarrolla en: _____
(¿El espacio? ¿El desierto? ¿Un centro comercial?)

El jugador

El jugador es un _____.

El jugador se mueve solamente hacia arriba y abajo.

El objetivo

Tu jugador GANA puntos cuando golpea el objetivo.

El Objetivo es un _____.

El Objetivo se mueve solamente de izquierda a derecha.

El peligro

Tu jugador PIERDE puntos cuando golpea el peligro.

El Peligro es un _____.

El Peligro se mueve solamente de izquierda a derecha.

I. Círculo de prácticas de evaluación Tiempo: 5 minutos

No olvides usar los símbolos de la computadora para operaciones como multiplicar y dividir!

Operación matemática	***Círculo de evaluación***	***Código Racket***

5 x 10		
8 + (5 x 10)		
(8 + 2) - (5 x 10)		
$\frac{5 \times 10}{8 - 2}$		

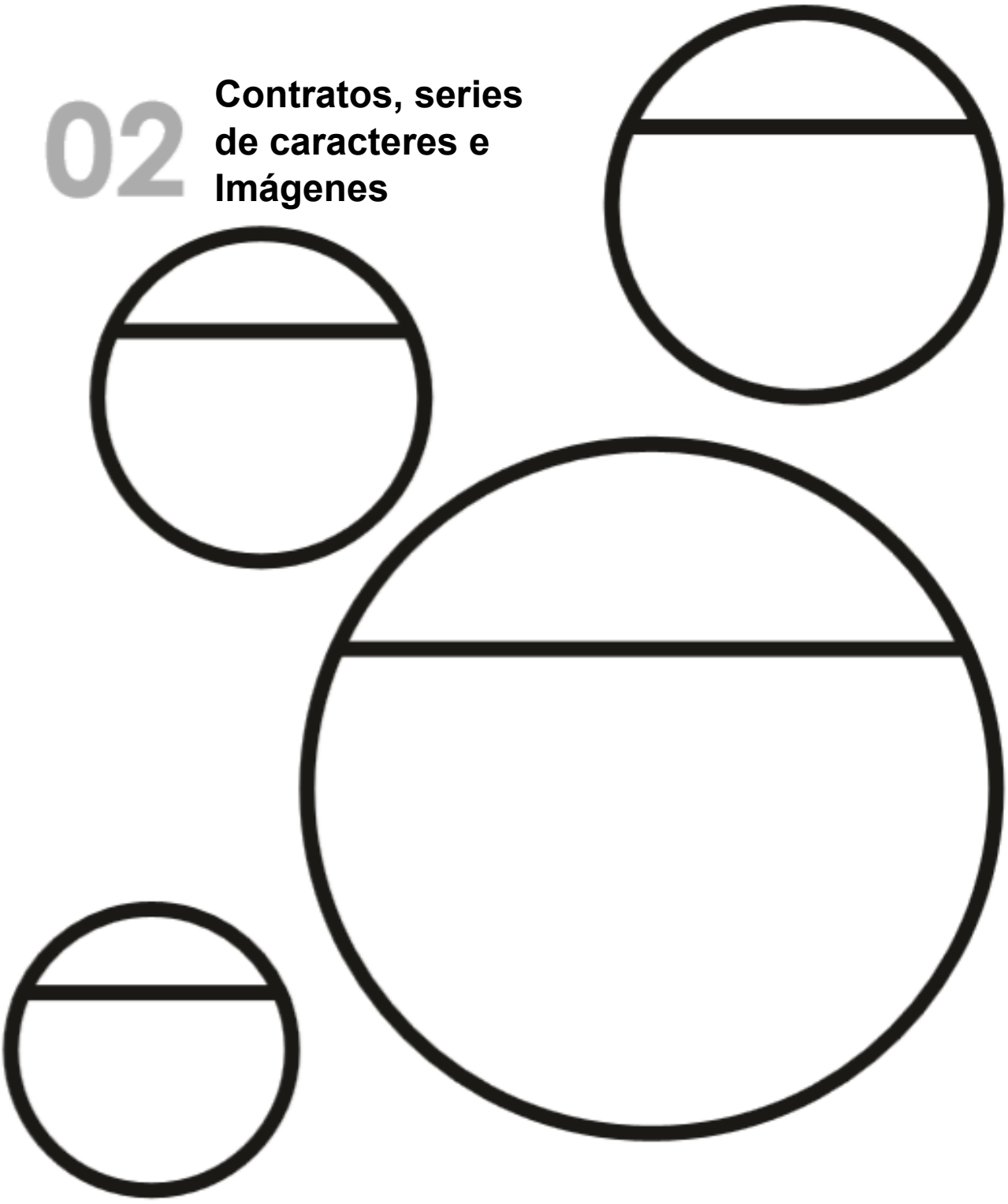
Lección 2

(Dibuja círculos de evaluación aquí si necesitas papel borrador adicional)

Competencia de círculos Tiempo: 5 minutos

	Operación	***Círculo de evaluación***	***Código Racket***
Ronda 1	*(3 * 7) - (1 + 2)*		
Ronda 2	*3 - (1 + 2)*		
Ronda 3	*3 - (1 + (5 * 6))*		
Ronda 4	*(1 + (5 * 6)) - 3*		

02 Contratos, series de caracteres e Imágenes



; _____:_____ -> _____

nombre dominio rango

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)

; _____:_____ -> _____

nombre dominio rango

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)

; _____:_____ -> _____

nombre dominio rango

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)

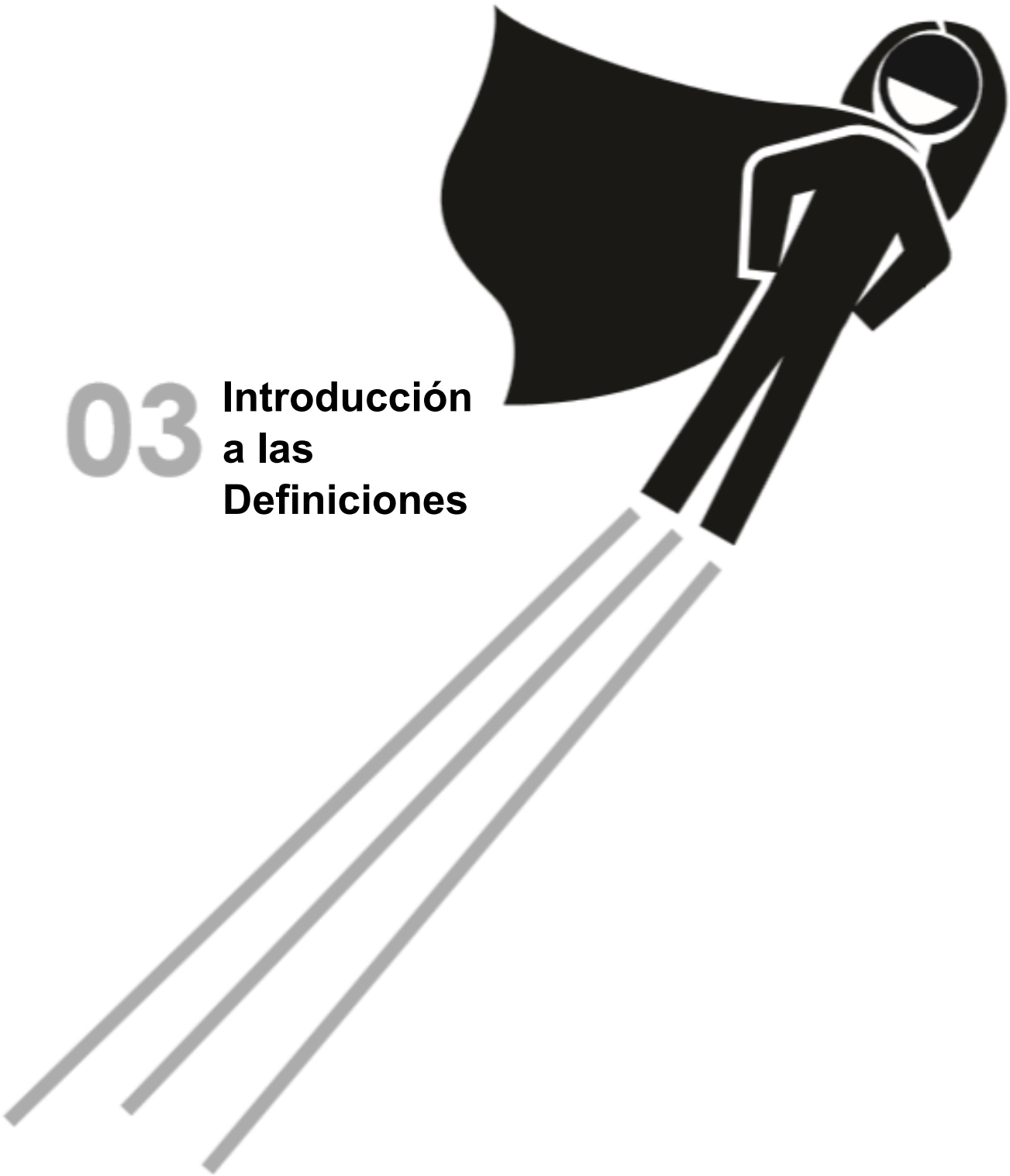
; _____:_____ -> _____

nombre dominio rango

(EJEMPLO (_____ _____) _____)

(EJEMPLO (_____ _____) _____)

(define (_____ _____) _____)



03 Introducción a las Definiciones

Fast Functions

; gt : number -> image

name domain range

(EXAMPLE (gt 500) (triangle 500 "solid" "green"))

(EXAMPLE (gt 7) (triangle 7 "solid" "green"))

(define (gt size) (triangle size "solid" "green"))

; bc : number -> image

name domain range

(EXAMPLE (bc 19) (circle 19 "solid" "blue"))

(EXAMPLE (bc 43) (circle 43 "solid" "blue"))

(define (bc size) (circle size "solid" "blue"))

; double : number -> number

name domain range

(EXAMPLE (double 3) (* 2 3))

(EXAMPLE (double 9) (* 2 9))

(define (double num) (* 2 num))

; _____ : _____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

Fast Functions

; _____:_____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____:_____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____:_____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____:_____ -> _____

name domain range

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

04 **Fórmula Del Diseño**

1 Contrato

2 Ejemplo

3 Definición

Problema de palabras: rocket-height

Direcciones: *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.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Problema de palabras: area-cesped

Direcciones: *Utilizando la Receta de Diseno para escribe una funcion 'area-cesped', la cual toma el ancho y largo de un area de cesped, y calcula el area del cesped. (Recuerda: area = largo * ancho!)*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Problema de palabras: red-square

Direcciones: *Use the Design Recipe to write a function 'red-square', which takes in a number (the length of each side of the square) and outputs a solid red rectangle whose length and width are the same size.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

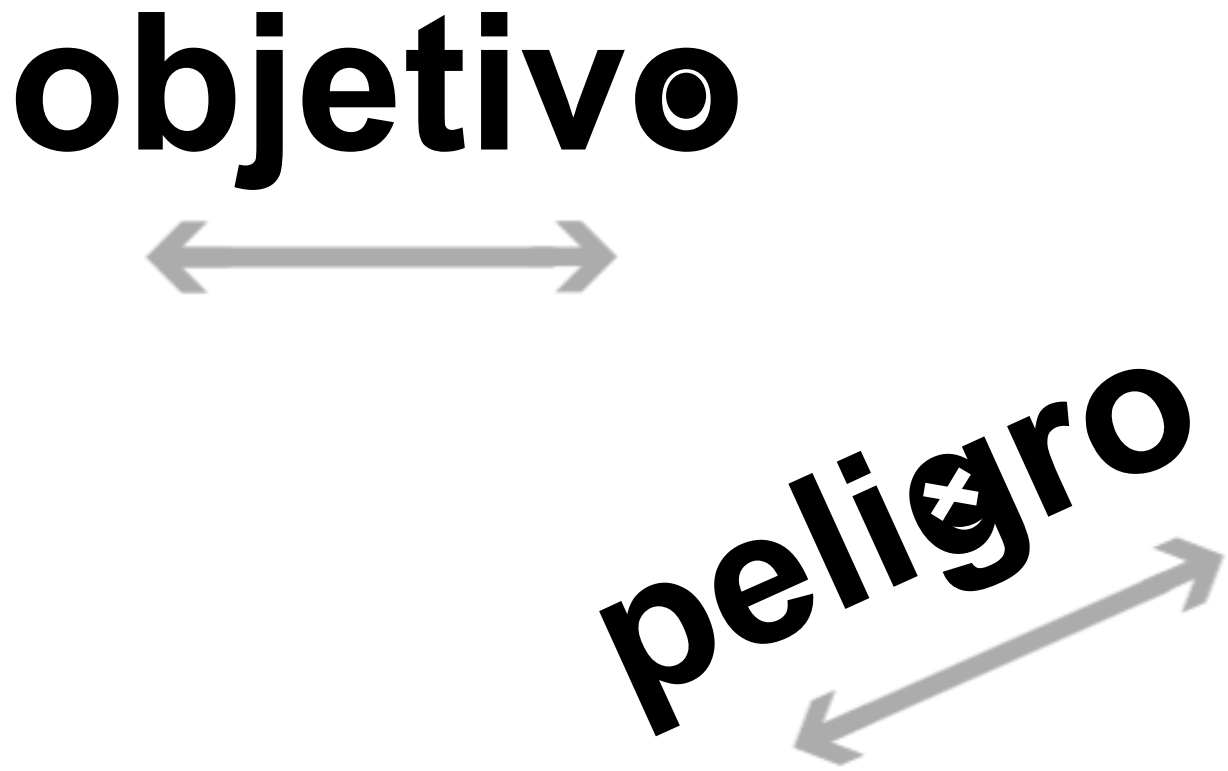
Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables



05 Animación Del Juego

Problema de palabras: update-danger

Direcciones: *Use the Design Recipe to write a function 'update-danger', which takes in the danger's x-coordinate and produces the next x-coordinate, which is 50 pixels to the left.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Problema de palabras: update-target

Direcciones: *Write a function 'update-target', which takes in the target's x-coordinate and produces the next x-coordinate, which is 50 pixels to the right.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

¿“Izquierda segura”?

06 Comparando Funciones

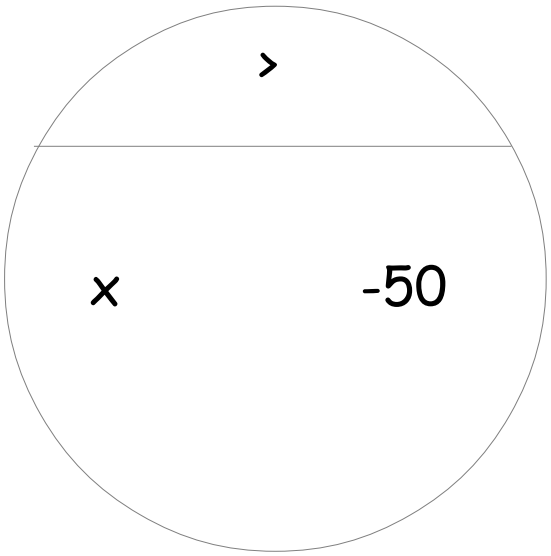
Protecting Sam

Sam is in a 640 x 480 yard. How far he can go to the left and right before he's out of sight?

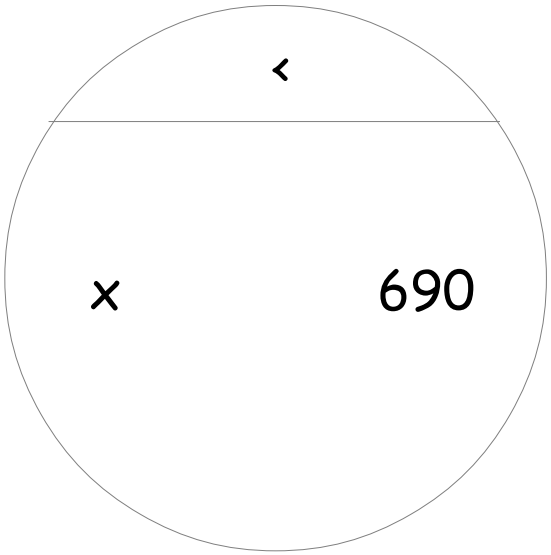
1. A piece of Sam is still visible on the left as long as... (> x -50)

2. A piece of Sam is still visible on the right as long as... (< x 690)

3. Draw the Circle of Evaluation for these two expressions in the circles below:



x -50



x 690

Problema de palabras: safe-left?

Direcciones: *Use the Design Recipe to write a function 'safe-left?', which takes in an x-coordinate and checks to see if it is greater than -50*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Problema de palabras: safe-right?

Direcciones: *Use the Design Recipe to write a function 'safe-right?', which takes in an x-coordinate and checks to see if it is less than 690.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

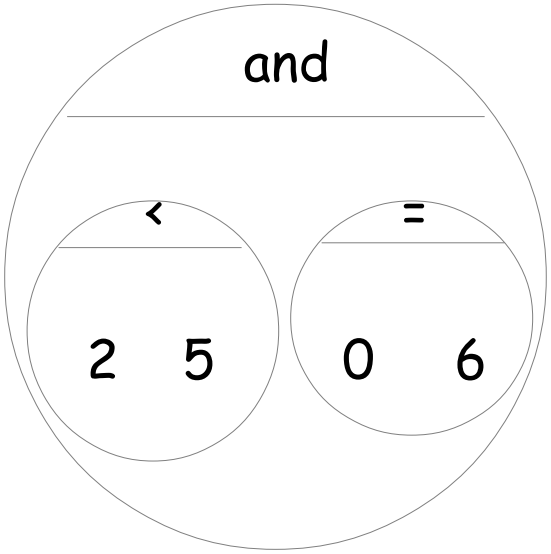
_____)

what the function does with those variables

and / or

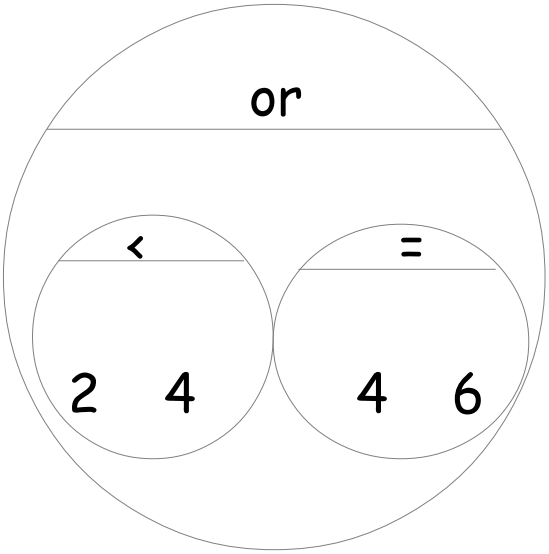
Write the Circles of Evaluation for these statements, and then convert them to Racket

1. Two is less than five, *and* zero is equal to six.



(and (< 2 5) (= 0 6))

2. Two is less than four *or* four is equal to six.



(or (< 2 4) (= 4 6))

Problema de palabras: onscreen?

Direcciones: *Use the Design Recipe to write a function 'onscreen?', which takes in the x-coordinate and checks to see if Sam is safe on the left AND safe on the right.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____)

function name *input(s)*

_____)

what the function produces

(Ejemplo(_____ _____)

function name *input(s)*

_____)

what the function produces

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

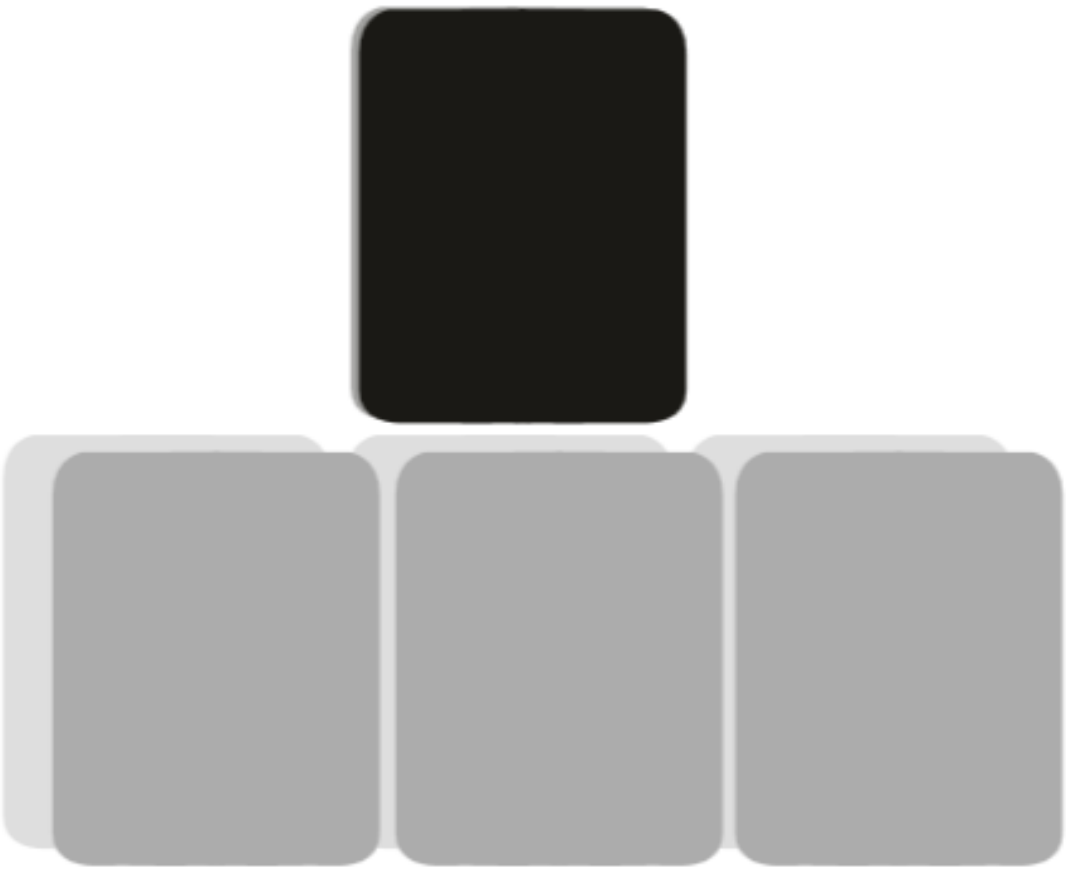
(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

07 Bifurcación Condicional



Problema de palabras: cost

Direcciones: *Luigi's Pizza has hired you as a programmer. They offer Pepperoni ($10.50), Cheese ($9.00), Chicken ($11.25) and Broccoli ($10.25). Write a function called cost which takes in the name of a topping and outputs the cost of a pizza with that topping.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(cost "pepperoni") _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

(cond _____

[_____ _____]

[_____ _____]

[_____ _____]

[_____ _____]

[_____ _____]))

Problema de palabras: update-player

Direcciones: *Write a function called update-player, which takes in the player's y-coordinate and the name of the key pressed, and returns the new y-coordinate.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(update-player 320 "up") _____)

function name *input(s)* *what the function produces*

(Ejemplo(update-player 100 "up") _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

(_____

[_____ _____]

[_____ _____]

[_____ _____]))

08 Detección de Colisiones

colisión

distancia

Problema de palabras: line-length

Direcciones: *Write a function called 'line-length', which takes in two numbers and returns the *positive difference* between them. It should always subtract the smaller number from the bigger one, and if they are equal it should return zero.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(line-length 10 5) (- 10 5))

function name *input(s)* *what the function produces*

(Ejemplo(line-length 2 8) (- 8 2))

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

(cond

[_____ _____]

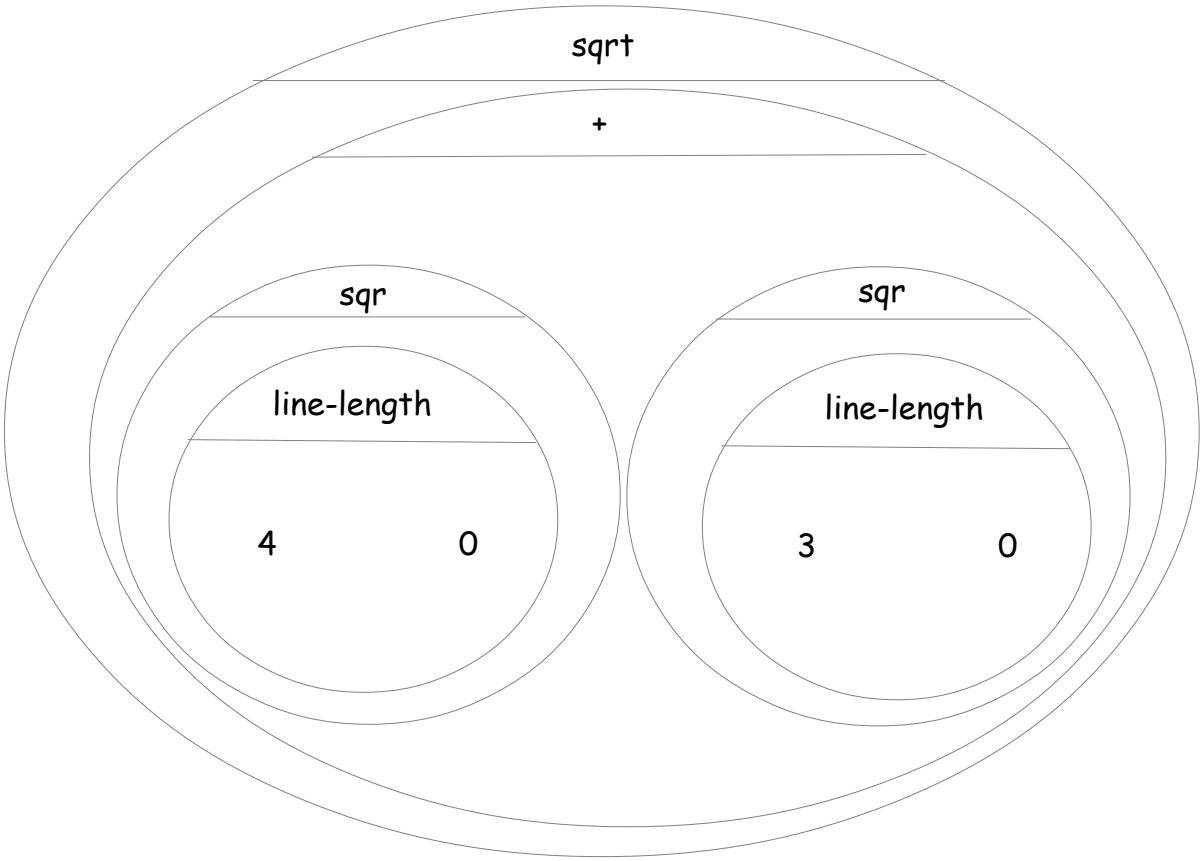
[_____ _____]))

The Distance Formula (an example)

The distance between the points (0, 0) and (4, 3) is given by:

$$\sqrt{(line\text{-}length\ \ 4\ \ 0)^2 + \ (line\text{-}length\ \ 3\ \ 0)^2}$$

Convert the formula above into a Circle of Evaluation (We've already gotten you started!)



Convert the Circle of Evaluation into Racket code:

```
(sqrt (+   (sqr (line-length 4 0))
           (sqr (line-length 3 0)))))
```

Problema de palabras: distance

Direcciones: *Write a function distance, which takes FOUR inputs:*

- *px: The x-coordinate of the player*
- *py: The y-coordinate of the player*
- *cx: the x-coordinate of another game character*
- *cy: the y-coordinate of another game character*

It should return the distance between the two, using the Distance formula. (HINT: look at what you did on the previous page!)

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____)

function name *input(s)*

_____)

what the function produces

(Ejemplo(_____ _____)

function name *input(s)*

_____)

what the function produces

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Problema de palabras: collide?

Direcciones: *Write a function collide?, which takes FOUR inputs:*

- *px: The x-coordinate of the player*
- *py: The y-coordinate of the player*
- *cx: the x-coordinate of another game character*
- *cy: the y-coordinate of another game character*

Are the coordinates of the player within 50 pixels of the coordinates of the other character?

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

09 Preparación de la presentación

Lesson 9

Catchy Intro: Feel like you never get enough to eat? So does Leo. Come catch your prey, and escape the zookeeper!

Name, Age, Grade: Jessica Programmer, 12, 7th grade

Game Title: Run for your Supper

Back Story:One day, a young lion was sitting in his cage. He saw an escaped gazelle come running past. It was lunch time, and he was hungry, so he leapt out to catch food. He has to run fast to grab food and escape the evil zookeeper.

Characters: Player: Leo the lion.

Danger: Zoe Zookeeper.

Target: Gary Gazelle

Explain a piece of your code: My update-danger function takes in the current x coordinate of the gazelle, and adds 50 to it. This moves the gazelle 50 pixels to the right.

Presentation Feedback

For each question, circle the answer that fits best.

Was the introduction catchy?	No way!	A little.	Definitely!
Did they talk about their characters?	No way!	A little.	Definitely!
Did they explain the code well?	No way!	A little.	Definitely!
Did they speak slowly enough?	No way!	A little.	Definitely!
Did they speak loudly enough?	No way!	A little.	Definitely!
Were they standing confidently?	No way!	A little.	Definitely!
Did they make eye contact?	No way!	A little.	Definitely!

Presentation Feedback

For each question, circle the answer that fits best.

Was the introduction catchy?	No way!	A little.	Definitely!
Did they talk about their characters?	No way!	A little.	Definitely!
Did they explain the code well?	No way!	A little.	Definitely!
Did they speak slowly enough?	No way!	A little.	Definitely!
Did they speak loudly enough?	No way!	A little.	Definitely!
Were they standing confidently?	No way!	A little.	Definitely!
Did they make eye contact?	No way!	A little.	Definitely!

Problema de palabras: red-shape

Direcciones: *Write a function called red-shape, which takes in the name of a shape and draws that shape (solid and red). Add an else clause that produces a sensible output.*

Declaración de contrato y propósito

Todo contrato tiene 3 partes...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Ejemplos

Escribe algunos ejemplos, luego circula y marca los cambios...

(Ejemplo(red-shape "circle") (circle 50 "solid" "red"))

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

(Ejemplo(_____ _____) _____)

function name *input(s)* *what the function produces*

Definición

Escribe la definición, nombres de variables a todos sus valores de entrada...

(define(_____ _____)

function name *variables*

(cond

[_____ (circle 50 "solid" "red")]

[_____ _____]

[_____ _____]

[_____ _____]

[_____ _____]))

Translating into Algebrang into Algebra

Value Definitions

Racket Code	Algebra
`(define x 10)`	x = 10
`(define y (* x 2))`	y = x*2
`(define z (+ x y))`	**z = x + y**
`(define age 14)`	**age = 14**
`(define months (* age 12))`	**months = age * 12**
`(define days (* months 30))`	**days = months * 30**
`(define hours (* days 24))`	**hours = days * 24**
`(define minutes (* hours 60))`	**minutes = hours * 60**

Function Definitions

Racket Code	Algebra
`(define (area length width)` `  (* length width))`	area(length, width) = length * width
`(define (circle-area radius)` `  (* pi (sqr radius)))`	**circle-area(radius) = pi * radius^2**

`(define (distance x1 y1 x2 y2)`
`  (sqrt (+ (sqr (- x1 x2))`
`  (sqr (- y1 y2)))))`
	distance(x1, y1, x2, y2)= $\sqrt{(x1-x2)^2+(y1-y2)^2}$

Design Recipe

A rocket is flying from Earth to Mars at 80 miles per second. Write a function that describes the **distance** *D* that the rocket has traveled, as a function of **time** *t*.

I. Contract+Purpose Statement

Every contract has three parts:

; D : Number -> Number

name Domain Range

; Given the number of seconds, produce the height of the rocket if it moves at 80mi/sec

What does the function do?

II. Give Examples

Write an example of your function for some sample inputs

D(1) = 80 * 1

Use the function here What should the function produce?

D(2) = 80 * 2

Use the function here What should the function produce?

D(3) = 80 * 3

Use the function here What should the function produce?

D(4) = 80 * 4

Use the function here What should the function produce?

III. Definition

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

D(time) = 80 * time

Design Recipe

A rocket is traveling from Earth to Mars at 80 miles per second. Write a function that describes the ***time*** the rocket has been traveling, as a function of ***distance***.

I. Contract+Purpose Statement

Every contract has three parts:

; **time** : **Number** -> **Number**

name | Domain | Range

; Given the distance, produce the time-traveled if it moves at 80mi/sec

What does the function do?

II. Give ExamplesGive Examples

Write an example of your function for some sample inputs

time(0) = 0/80

Use the function here | What should the function produce?

time(10) = 10/80

Use the function here | What should the function produce?

time(80) = 80/80

Use the function here | What should the function produce?

time(190) = 190/80

Use the function here | What should the function produce?

III. Definition

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

time(distance) = distance/80

Design Recipe

A rocket leaves Earth, headed for Mars at 80 miles per second. **At the exact same time**, an asteroid leaves Mars traveling towards Earth, moving at 70 miles per second. If the distance from the Earth to Mars is 50,000,000 miles, how long will it take for them to meet?

I. Contract+Purpose Statement

Every contract has three parts:

; **collide** : **Number** -> **Number**

name Domain Range

; Given the distance between a rocket (moving at 80mi/sec) & asteroid (70mi/sec), when will they collide?

What does the function do?

II. Give ExamplesGive Examples

Write an example of your function for some sample inputs

collide(0) = 0/150

Use the function here What should the function produce?

collide(150) = 150/150

Use the function here What should the function produce?

collide(700) = 700/150

Use the function here What should the function produce?

collide(50,000,000) = 50,000,000/150

Use the function here What should the function produce?

III. Definition

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

collide(distance-between) = distance-between/150

Design Recipe

I. Contract+Purpose Statement

Every contract has three parts:

; _____ : _____ -> _____

name Domain Range

; _____

What does the function do?

II. Give Examples

Write an example of your function for some sample inputs

_____ = _____

Use the function here What should the function produce?

_____ = _____

Use the function here What should the function produce?

_____ = _____

Use the function here What should the function produce?

_____ = _____

Use the function here What should the function produce?

III. Definition

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

= _____

Design Recipe

I. Contract+Purpose Statement

Every contract has three parts:

; _____ : _____ -> _____

name Domain Range

; _____

What does the function do?

II. Give Examples

Write an example of your function for some sample inputs

_____ = _____

Use the function here What should the function produce?

_____ = _____

Use the function here What should the function produce?

_____ = _____

Use the function here What should the function produce?

_____ = _____

Use the function here What should the function produce?

III. Definition

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

= _____

Contracts

Name	Domain	Range	*example*
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	

Contracts

Name	Domain	Range	*example*
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	