Unidades de Bootstrap

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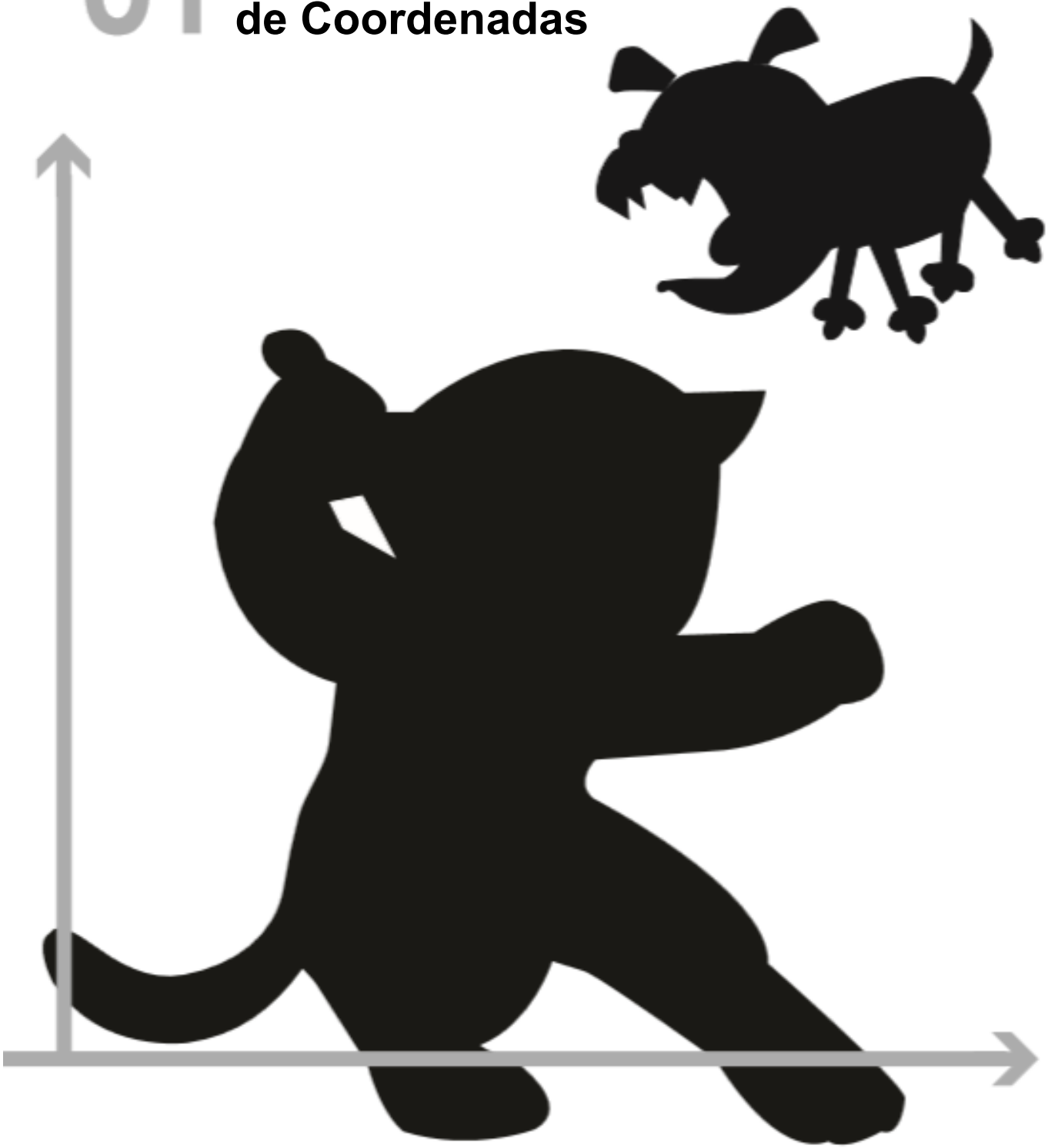
01 Videojuegos y Planos de Coordenadas

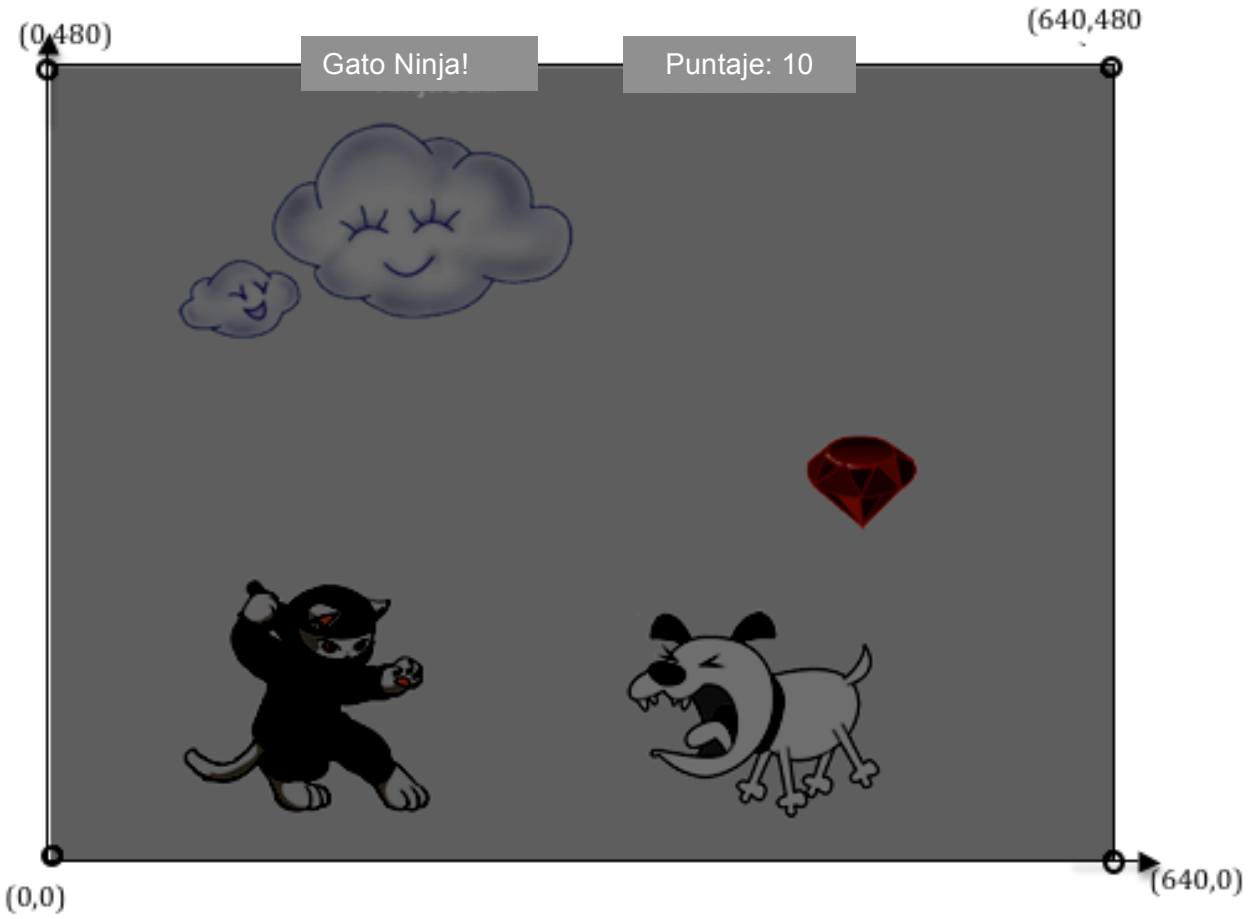


Lección 1

Ingeniería inversa: ¿Cómo funciona El Gato Ninja?

Objeto en el juego…	¿Qué cambia?	Más específicamente...
Nube	*La posición*	*Coordenada x*

Encontrando las coordenadas



Las coordenadas para el JUGADOR (Gato Ninja) son: (,)

Coordenada x *Coordenada y*

Las coordenadas para el PELIGRO (El Perro) son: (,)

Las coordenadas para el OBJETIVO (Rubí) son: (,)

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 _____.

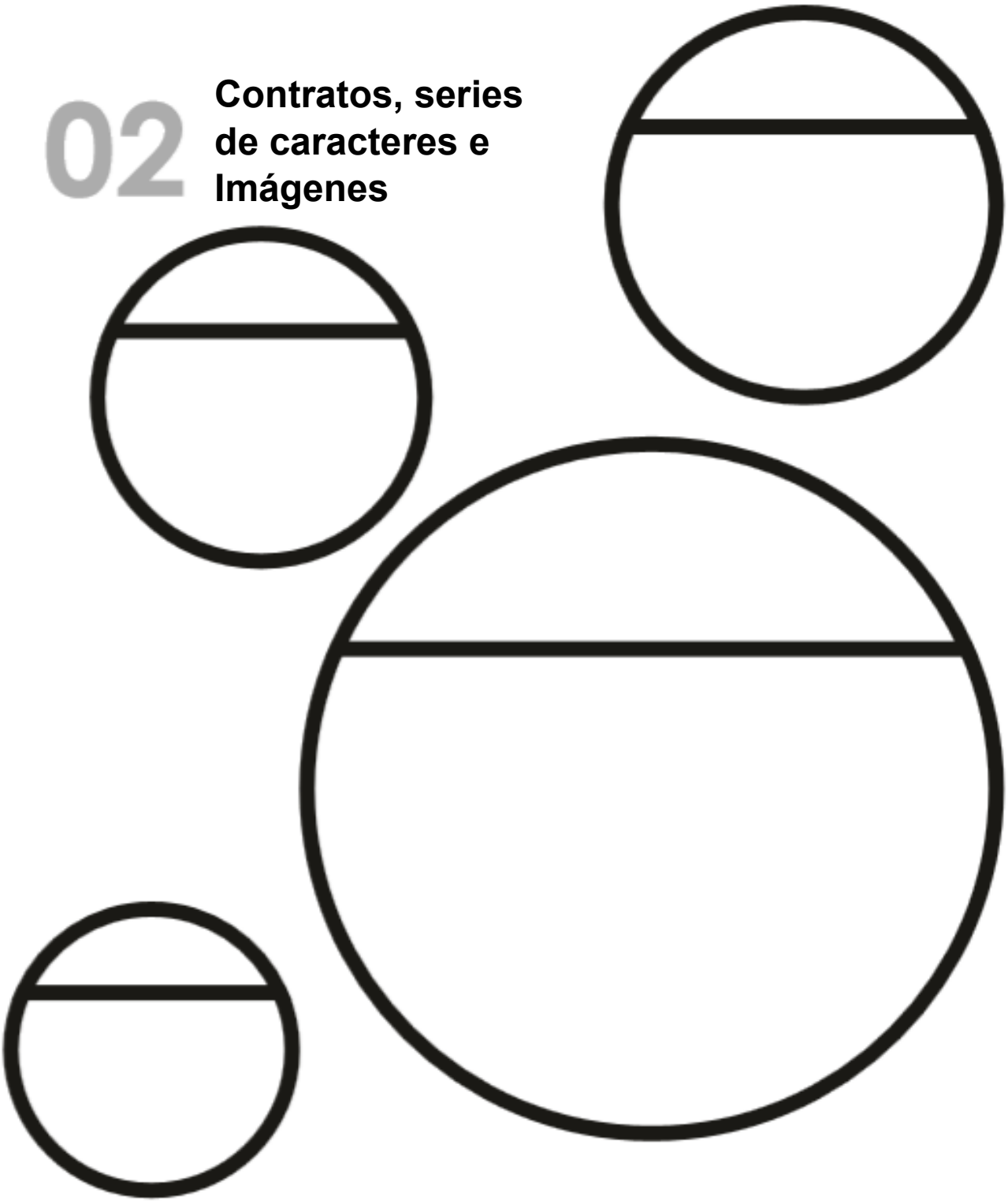
El Peligro se mueve solamente de izquierda a derecha.

Círculo de prácticas de evaluación Tiempo: 5 minutos

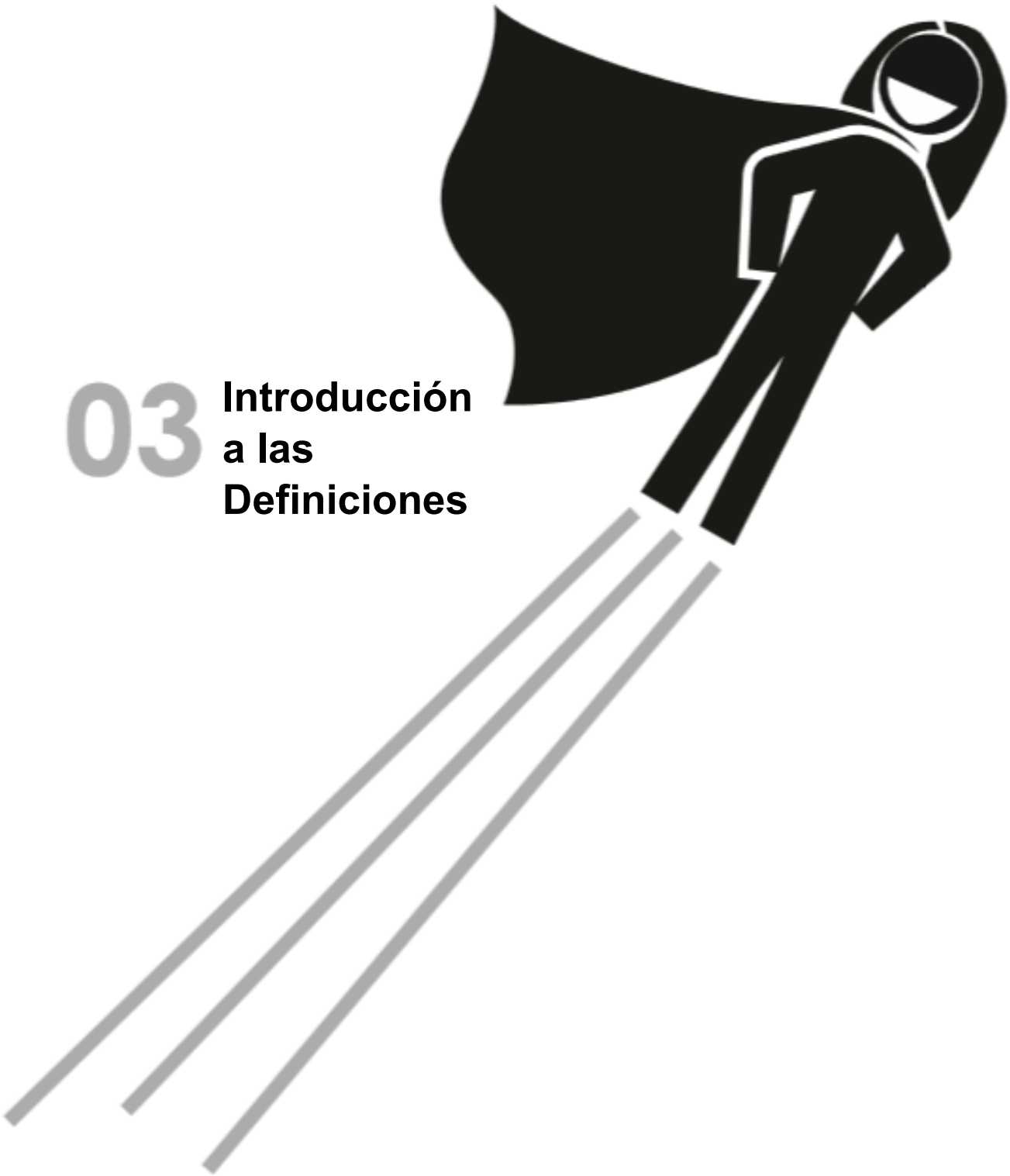
No olvides usar los símbolos de la computadora para operaciones como multiplicar y dividir!

Operación matemática	***Círculo de evaluación***	***Código Racket***
5 x 10		
8 + (5 x 10)		
(8 + 2) - (5 x 10)		
$\frac{5 \times 10}{8 - 2}$		

02 Contratos, series de caracteres e Imágenes



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*		



03 Introducción a las Definiciones

Funciones rápidas

; ______________________:______________________ -> ____________________

nombre dominio rango

(EXAMPLE (______ _______) ___________________________________)

(EXAMPLE (______ _______) ___________________________________)

(define (______ _______) __________________________________)

; ______________________:______________________ -> ____________________

nombre dominio rango

(EXAMPLE (______ _______) ___________________________________)

(EXAMPLE (______ _______) ___________________________________)

(define (______ _______) __________________________________)

; ______________________:______________________ -> ____________________

nombre dominio rango

(EXAMPLE (______ _______) ___________________________________)

(EXAMPLE (______ _______) ___________________________________)

(define (______ _______) __________________________________)

; ______________________:______________________ -> ____________________

nombre dominio rango

(EXAMPLE (______ _______) ___________________________________)

(EXAMPLE (______ _______) ___________________________________)

(define (______ _______) __________________________________)

Funciones rápidas

; _____:_____ -> _____

nombre dominio rango

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____:_____ -> _____

nombre dominio rango

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____:_____ -> _____

nombre dominio rango

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

; _____:_____ -> _____

nombre dominio rango

(EXAMPLE (_____ _____) _____)

(EXAMPLE (_____ _____) _____)

(define (_____ _____) _____)

04 **Fórmula Del Diseño**

1 Contrato

2 Ejemplo

3 Definición

Word Problem: rocket-height

Directions: *Un cohete dispara, viajando a 7 metros por segundo. Escribe una funcion llamada 'cohete-altura' que toma en cuenta el numero de segundos que han pasado desde que el cohete despego, y que produce la altura del cohete en ese momento.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Word Problem: area-cesped

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

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Word Problem: red-square

Directions: *Use la receta de diseño para escribir una función 'cuadro-rojo', que toma un número (la longitud de cada lado del cuadrado) y regresa un rectángulo rojo sólido cuya longitud y ancho son del mismo tamaño.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

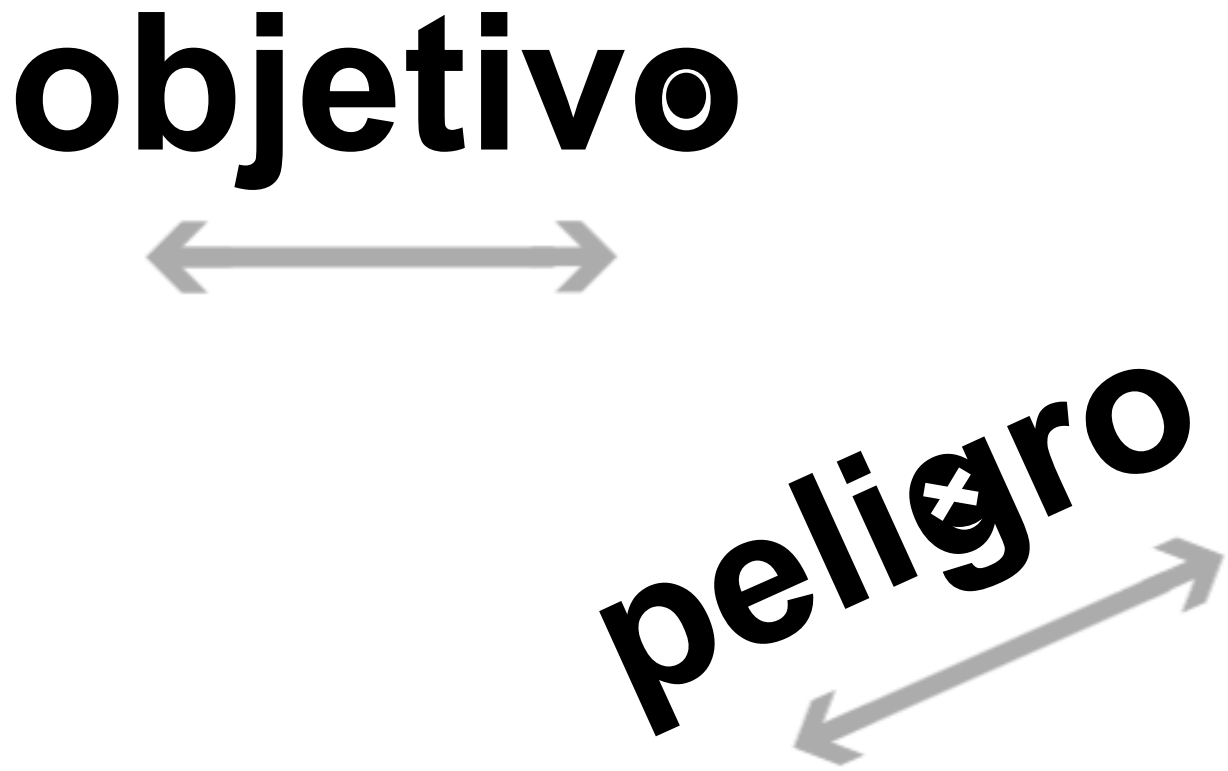
Write the definition, given variable names to all your input values...

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables



05 Animación Del Juego

Word Problem: update-danger

Directions: *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.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Word Problem: update-target

Directions: *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.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

¿“Izquierda segura”?

06 Comparando Funciones

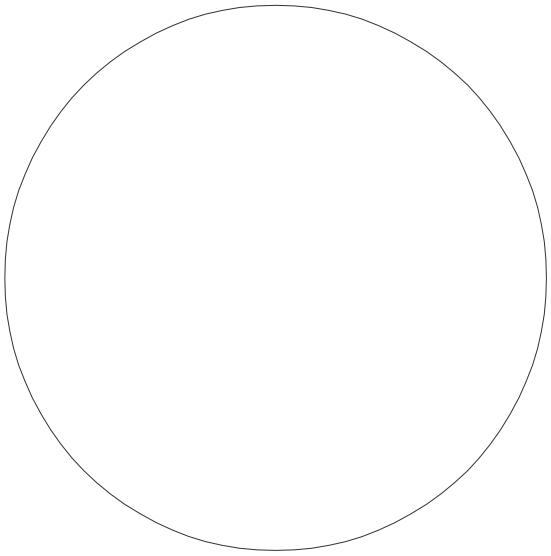
Design Recipe

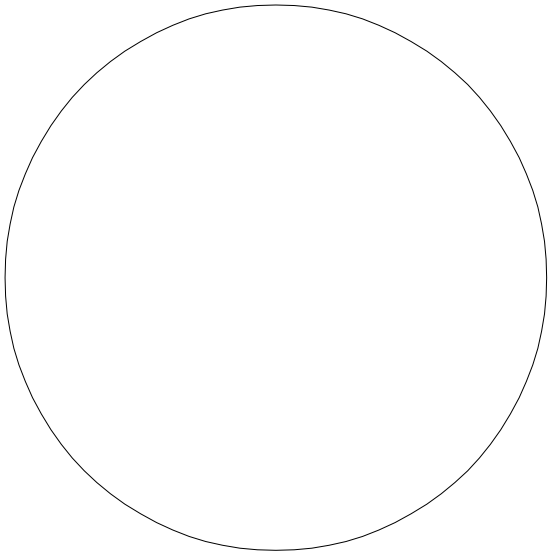
Sam is in a 640 x 480 yard. How far he can go to the left and right before he's out of sight?

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... _____

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





Word Problem: safe-left?

Directions: *¿Utilizar la receta de diseño para escribir una función 'salvo izquierda?', Que toma una coordenada x y comprueba si es mayor que -50*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Word Problem: safe-right?

Directions: *Utilizar la receta de diseño para escribir una función 'safe-right?', Que toma una coordenada x y comprueba si es menos de 690.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

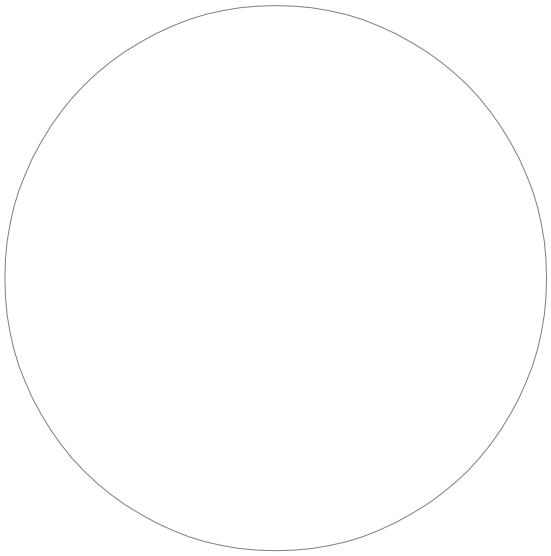
_____)

what the function does with those variables

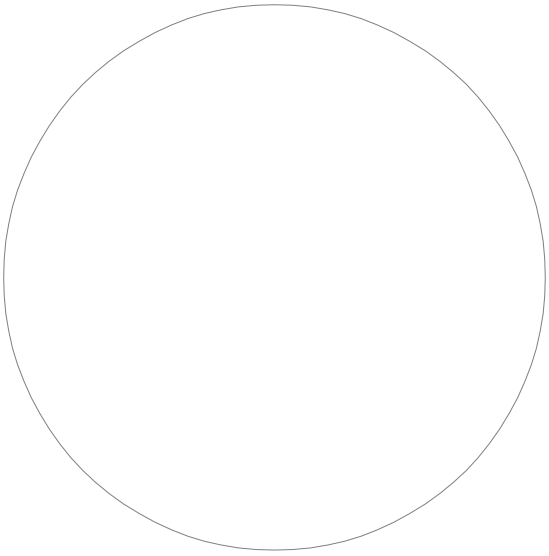
and / or

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.



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



Word Problem: onscreen?

Directions: *¿Utilizar la receta de diseño para escribir una función 'en pantalla?', Que toma en cuenta la coordenada x y comprueba si Sam está a salvo a la izquierda Y salvo a la derecha.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____)

function name *input(s)*

_____)

what the function produces

(EXAMPLE(_____ _____)

function name *input(s)*

_____)

what the function produces

Definition

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

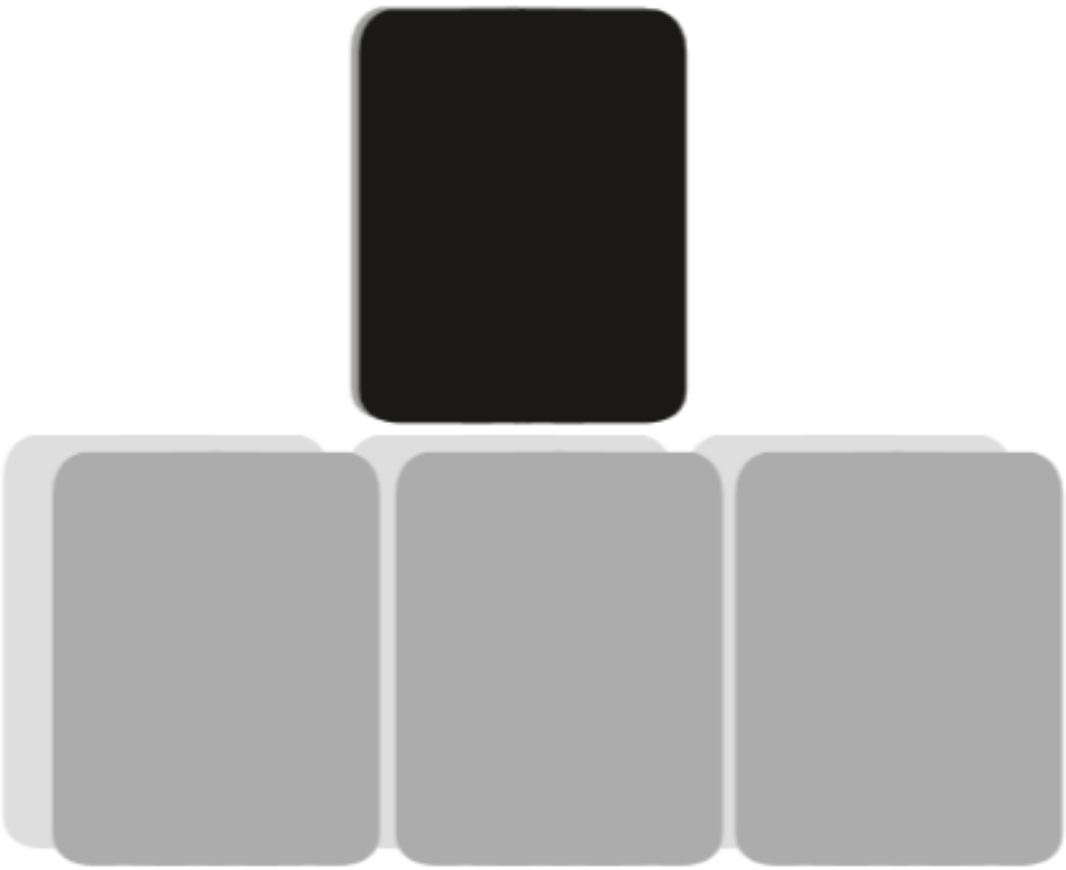
(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

07 Bifurcación Condicional



Word Problem: cost

Directions: *Luigi's Pizza lo ha contratado como programador y ofrece Pepperoni ($10.50), Queso ($9.00), Pollo ($11.25) y Brócoli ($10.25) Escribir una función llamada costo que toma el nombre de un topping y genera el costo de una pizza con esa cobertura.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(cost "pepperoni") _____)

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

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

(cond _____

[_____ _____]

[_____ _____]

[_____ _____]

[_____ _____]

[_____ _____]))

Word Problem: update-player

Directions: *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.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

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

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

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

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

(EXAMPLE(_____) _____)

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

(EXAMPLE(_____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

(_____

[_____ _____]

[_____ _____]

[_____ _____]))

08 Detección de Colisiones

colisión

distancia

Word Problem: line-length

Directions: *Escribe una función llamada 'linea-longitud', que toma dos números y regresa la * diferencia positiva * entre ellos. Siempre debe restar el número más pequeño de la más grande, y si son iguales debe regresar un cero.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(line-length 10 5) (- 10 5))

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

(EXAMPLE(line-length 2 8) (- 8 2))

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

Definition

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

(define(_____ _____)

function name *variables*

(cond

[_____ _____]

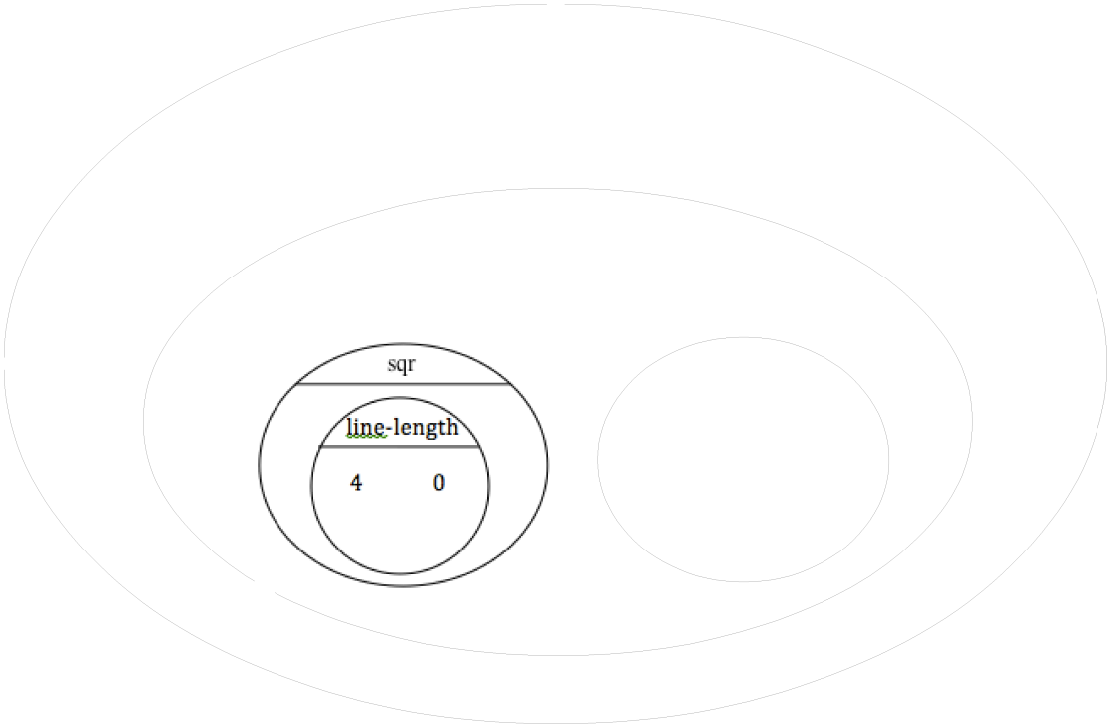
[_____ _____]))

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:

Word Problem: distance

Directions: *Escribe una funcion distancia, que toma cuatro entradas:on 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!)

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____)

function name *input(s)*

_____)

what the function produces

(EXAMPLE(_____ _____)

function name *input(s)*

_____)

what the function produces

Definition

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

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

Word Problem: collide?

Directions: *Escribe una funcion llamada chocar?, la cual toma cuatro entradas:*

- *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?

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

_____)

what the function does with those variables

09 Preparación de la presentación

Lección 9

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

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!

Word Problem: red-shape

Directions: *Escribe una función llamada forma- roja, que toma el nombre de una forma y dibuja esa forma (sólida y roja). Agregue una cláusula else que produzca una salida sensible.*

Contract and Purpose Statement

Every contract has three parts...

; _____ : _____ → _____

function name *domain* *range*

; _____

what does the function do?

Examples

Write some examples, then circle and label what changes...

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

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

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

(EXAMPLE(_____ _____) _____)

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

Definition

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

(define(_____ _____)

function name *variables*

(cond

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

[_____ _____]

[_____ _____]

[_____ _____]

[_____ _____]))

Translating into Algebra

Value Definitions

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

`(define (distance x1 y1 x2 y2)`
`  (sqrt (+ (sqr (- x1 x2))`
`  (sqr (- y1 y2)))))`	

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 : _____ -> _____

name Domain Range

; _____

What does the function do?

II. Give Examples

Write an example of your function for some sample inputs

D(1) =

Use the function here What should the function produce?

D(2) =

Use the function here What should the function produce?

D( ) =

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.

D( ) =

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:

; _____ : _____ -> _____

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

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:

; _____ : _____ -> _____

name Domain Range

; _____

What does the function do?

II. Give Examples

Write an example of your function for <u>some sample inputs</u>

_____ = _____

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.

_____ =

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 <u>some sample inputs</u>

_____ =

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*
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	
;	:	→	