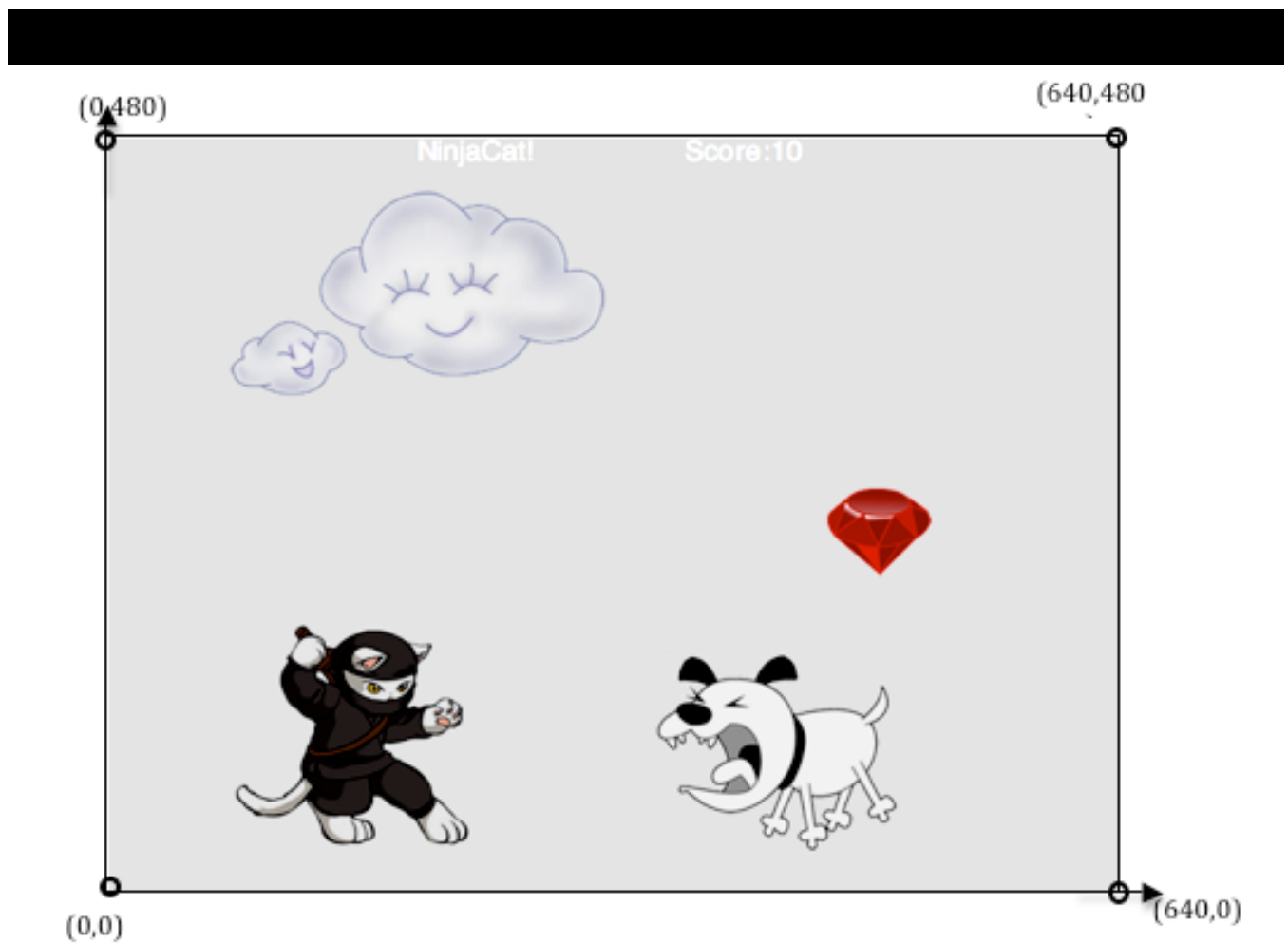


Contracts

[illegible]

Contracts

[illegible]



The coordinates for the PLAYER (NinjaCat) are: (,)
x-coordinate y-coordinate

The coordinates for the DANGER (Dog) are: (,)

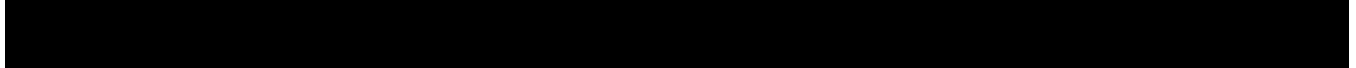
The coordinates for the TARGET (Ruby) are: (,)

Our Videogame

Created by (write your names): _____

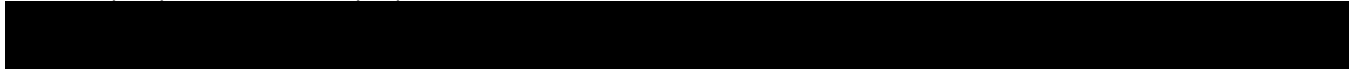


Our game takes place in: _____
(space? the desert? a mall?)



The player is a _____.

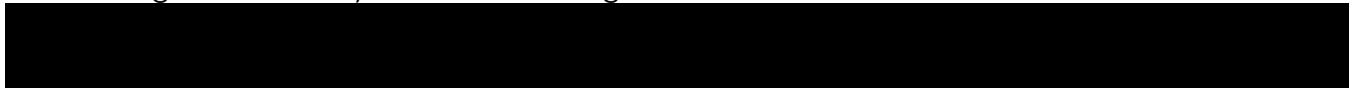
The player moves only up and down.



Your player GAINS points when they hit the target.

The Target is a _____.

The Target moves only to the left and right.



Your player LOSES points when they hit the danger.

The Danger is a _____.

The Danger moves only to the left and right.

Don't forget to use the computer's symbols for things like multiply and divide!

Math	Circle of Evaluation	Racket Code
5×10		
$8 + (5 \times 10)$		
$(8 + 2) - (5 \times 10)$		
$\frac{5 \times 10}{8 - 2}$		



(draw Circles of Evaluation here if you need extra scratch paper)

	Math	Circle of Evaluation	Racket Code
Round 1	$(3 * 7) - (1 + 2)$		
Round 2	$3 - (1 + 2)$		
Round 3	$3 - (1 + (5 * 6))$		
Round 4	$(1 + (5 * 6)) - 3$		

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

;

_____	:	_____	->	_____
name		domain		range

(EXAMPLE (_____) _____)

(EXAMPLE (_____) _____)

(define (_____) _____)

;

_____	:	_____	->	_____
name		domain		range

(EXAMPLE (_____) _____)

(EXAMPLE (_____) _____)

(define (_____) _____)

;

_____	:	_____	->	_____
name		domain		range

(EXAMPLE (_____) _____)

(EXAMPLE (_____) _____)

(define (_____) _____)

;

_____	:	_____	->	_____
name		domain		range

(EXAMPLE (_____) _____)

(EXAMPLE (_____) _____)

(define (_____) _____)



$$; \text{ \underline{\hspace{1cm}} : \underline{\hspace{1cm}} \rightarrow \underline{\hspace{1cm}} }$$

name domain range

(EXAMPLE ())

(EXAMPLE ())

(define ())

$$; \text{ \underline{\hspace{1cm}} : \underline{\hspace{1cm}} \rightarrow \underline{\hspace{1cm}} }$$

name domain range

(EXAMPLE ())

(EXAMPLE ())

(define ())

$$; \text{ \underline{\hspace{1cm}} : \underline{\hspace{1cm}} \rightarrow \underline{\hspace{1cm}} }$$

name domain range

(EXAMPLE ())

(EXAMPLE ())

(define ())

$$; \text{ \underline{\hspace{1cm}} : \underline{\hspace{1cm}} \rightarrow \underline{\hspace{1cm}} }$$

name domain range

(EXAMPLE ())

(EXAMPLE ())

```
(define (_____))
```

[illegible]

Word Problem: rocket-height

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.

Every contract has three parts:

; _____ : _____ -> _____
name Domain Range

; _____
What does the function do?

On the computer, write an example of your function in action, using EXAMPLE.

(EXAMPLE (_____)
the user types...

_____)
.....which should become

(EXAMPLE (_____)
the user types...

_____)
.....which should become

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

(define (_____)
function name variable names

_____)
.....and the computer does this

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

; _____ : _____ -> _____
 Name Domain Range

; _____
 What does the function do?

.....Racket replies

.....Racket turns that into

.....and the computer does this

Word Problem: yard-area

Use the Design Recipe to write a function yard-area, which takes in the width and length of a yard, and returns the area of the yard.

(Don't forget: $\text{area} = \text{length} * \text{width} !$)

Every contract has three parts:

;
; _____ : _____ -> _____
name Domain Range

;
; _____
What does the function do?

On the computer, write an example of your function in action, using EXAMPLE.

(EXAMPLE (_____)
Use the function here

_____)
find another way to get the same result here

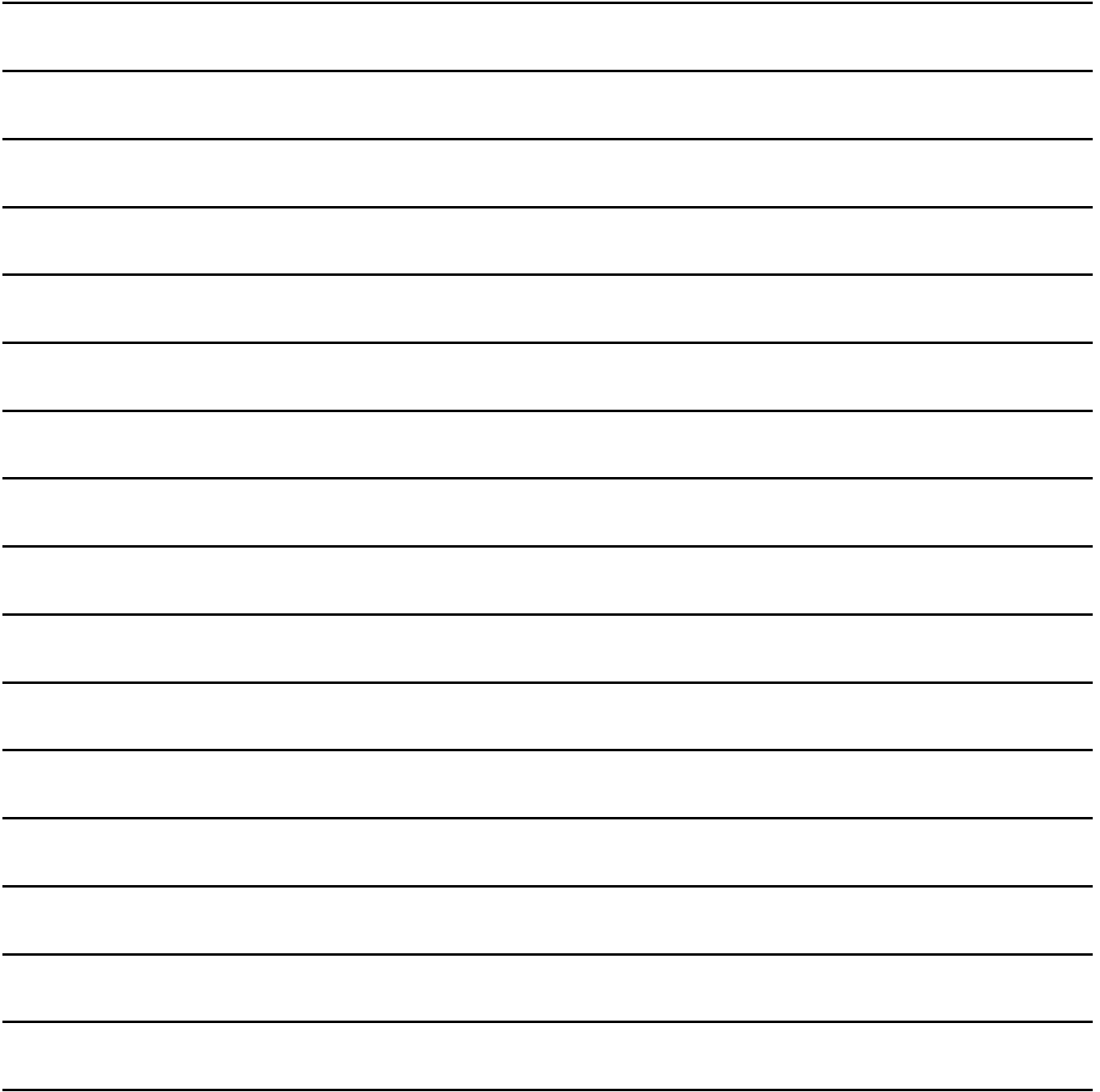
(EXAMPLE (_____)
Use the function here...

_____)
find another way to get the same result here

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

(define (_____)
function name variable names

_____)
.....and the computer does this



Word Problem: update-danger

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.

Every contract has three parts:

; _____ : _____ -> _____
name Domain Range

; _____
What does the function do?

On the computer, write an example of your function in action, using EXAMPLE.

(EXAMPLE (_____)
Use the function here

_____)
find another way to get the same result here

(EXAMPLE (_____)
Use the function here...

_____)
find another way to get the same result here

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

(define (_____)
function name variable names

_____)
.....and the computer does this

Word Problem: *update-target*

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.

Every contract has three parts:

; _____ : _____ -> _____
name Domain Range

; _____
What does the function do?

On the computer, write an example of your function in action, using EXAMPLE.

(EXAMPLE (_____)
Use the function here

_____)
find another way to get the same result here

(EXAMPLE (_____)
Use the function here...

_____)
find another way to get the same result here

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

(define (_____)
function name variable names

_____)
.....and the computer does this

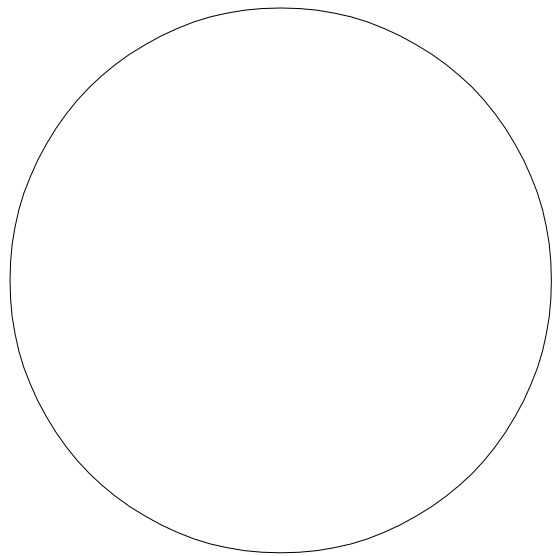
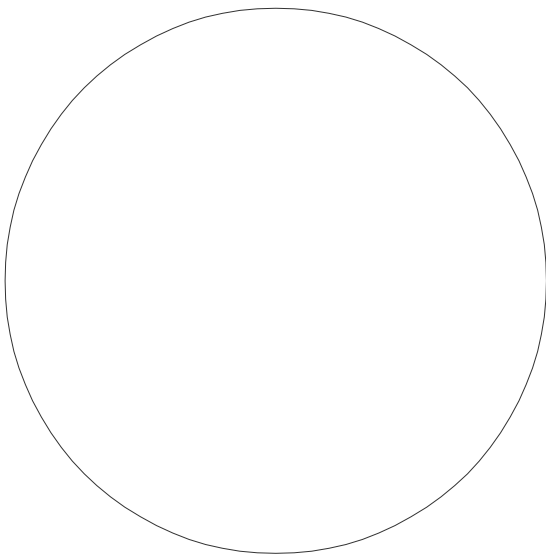


Sam is in a 640 x 480 yard. How far he can go to the left and right before he's out of sight?

1. A piece of Sam is still visible on the left as long as... ($> \frac{x}{-50}$) _____

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?

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.

Every contract has three parts:

;
; _____ : _____ -> _____
name Domain Range

;
; _____
What does the function do?

On the computer, write an example of your function in action, using EXAMPLE.

(EXAMPLE (_____)
Use the function here

_____)
find another way to get the same result here

(EXAMPLE (_____)
Use the function here...

_____)
find another way to get the same result here

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

(define (_____)
function name variable names

_____)

Every contract has three parts:

$$; \text{ \underline{\hspace{1.5cm}} } : \text{ \underline{\hspace{4cm}} } \rightarrow \text{ \underline{\hspace{1.5cm}} }$$

name
Domain
Range

What does the function do?

On the computer, write an example of your function in action, using EXAMPLE.

(EXAMPLE (_____)
Use the function here

_____)
find another way to get the same result here

(EXAMPLE (_____)
Use the function here...

_____)
find another way to get the same result here

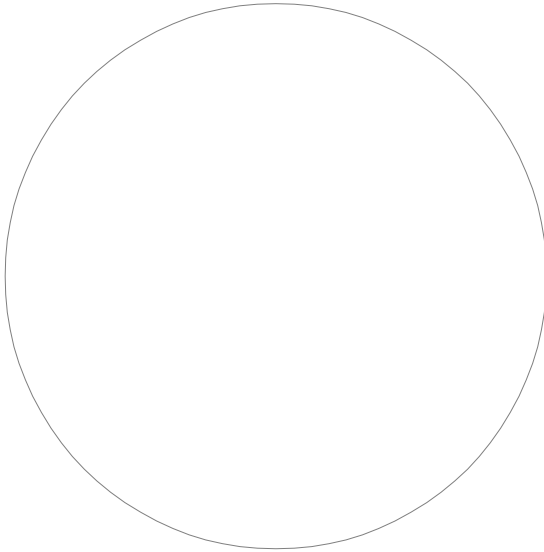
Write the definition, giving variable names to all your input values.

```
(define ( function name variable names )
```

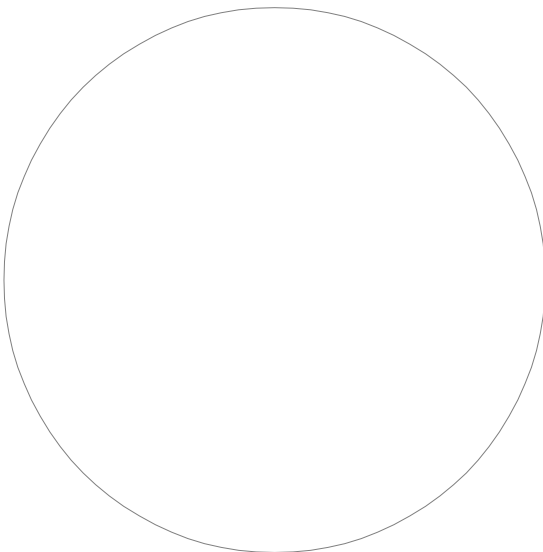
_____)

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?

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

Every contract has three parts:

; _____ : _____ -> _____
name Domain Range

; _____
What does the function do?

On the computer, write an example of your function in action, using EXAMPLE.

(EXAMPLE (_____)
Use the function here

_____)
find another way to get the same result here

(EXAMPLE (_____)
Use the function here...

_____)
find another way to get the same result here

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

(define (_____)
function name variable names

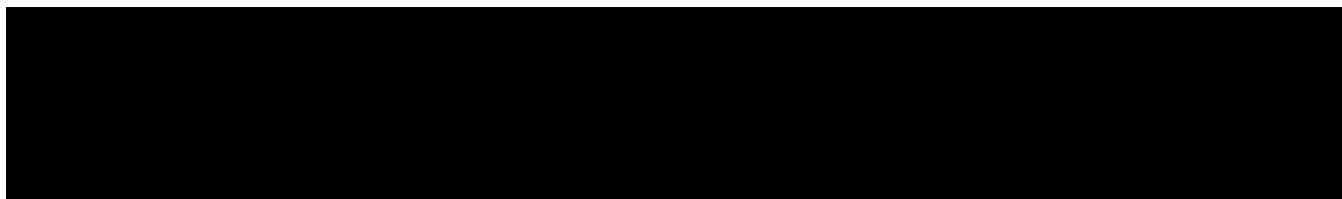
_____)



On the computer, write an example of your function for each topping, using EXAMPLE.

Finish the two examples we've started for you, and make two more

)

[illegible]

Write a function called line-length, which takes in two numbers and returns the difference between them. It should always subtract the smaller number from the bigger one.

Every contract has three parts:

; _____ : _____ -> _____
name Domain Range

(EXAMPLE (line-length 10 5) (- 10 5))
Use the function here What should the function produce?

(EXAMPLE (line-length 2 8) (- 8 2))
Use the function here What should the function produce?

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

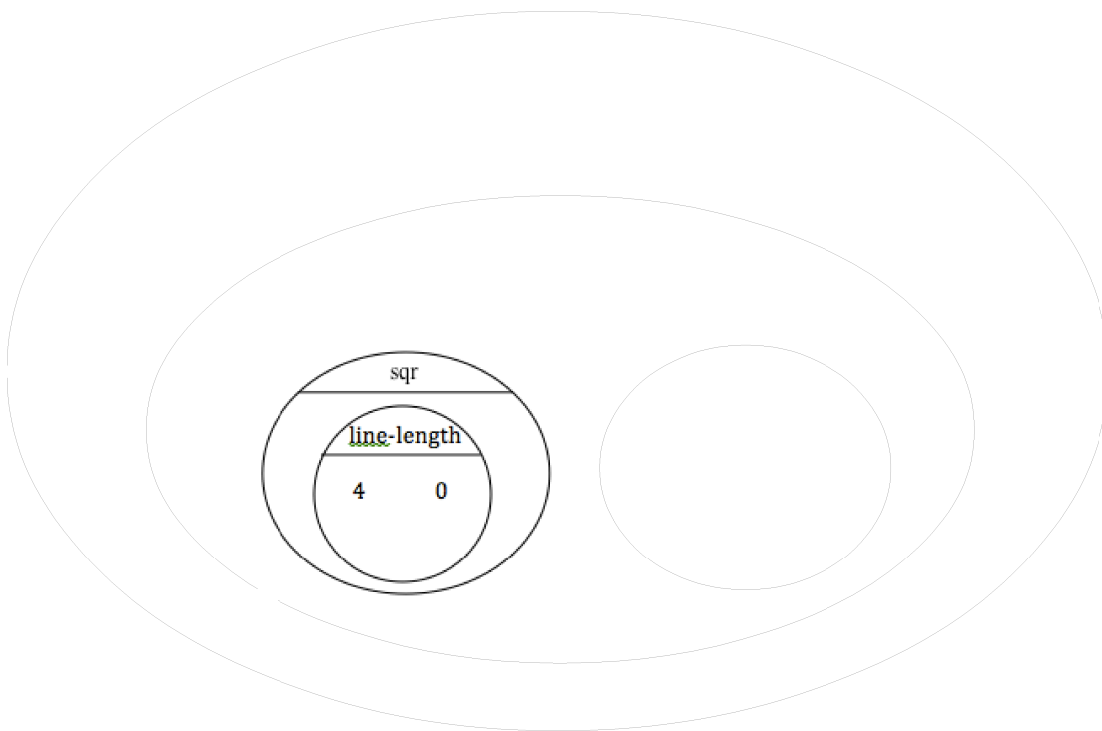
(define (_____)
function name variable names

)

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

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

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



Convert the Circle of Evaluation into Racket code:

- Write a function distance, which takes FOUR inputs:

It should return the distance between the two, using the Distance formula. (HINT: look at what you did on page 27!)

1. *Journal of Management Studies*, 1996, 33, 1, 1-14.

$$; \text{ name} : \text{ Domain} \rightarrow \text{Range}$$

What does the function do?

(EXAMPLE (_____)
Use the function here

_____)
find another way to get the same result here

(EXAMPLE (_____)
Use the function here...

find another way to get the same result here

```
(define (_____))
```

function name variable names

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*

It should return `true` if the coordinates of the player are within 50 **pixels** of the coordinates of the other character. Otherwise, `false`.

;
_____ : _____ -> _____
name Domain Range

;

What does the function do?

(EXAMPLE (_____)
Use the function here

find another way to get the same result here

(EXAMPLE (_____)
Use the function here...

find another way to get the same result here

(define (_____)
function name variable names

_____)



Catchy Intro:

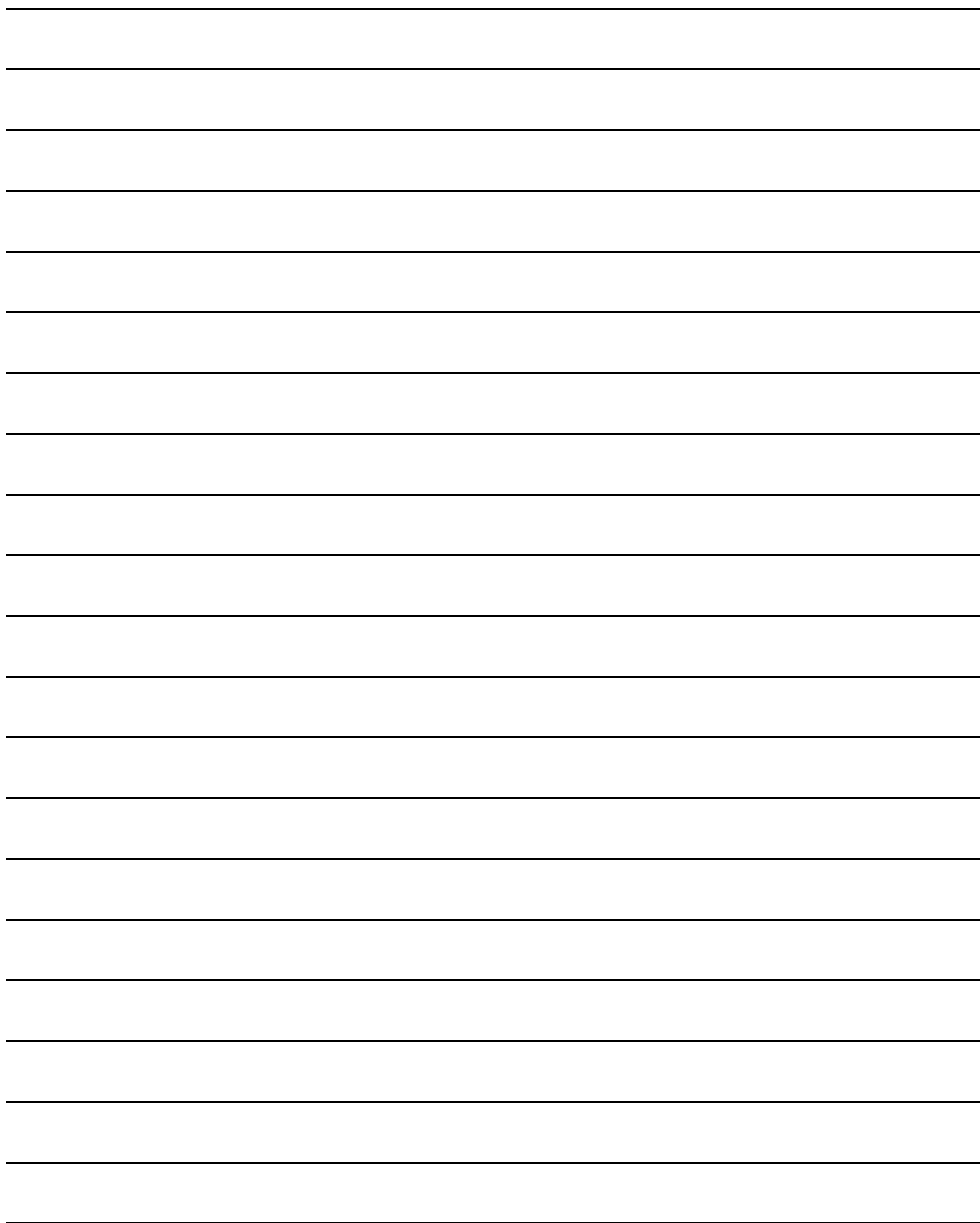
Name, Age, Grade:

Game Title:

Back Story:

Characters:

Explain a piece of your code:



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!

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

Write a function called red-shape, which takes in the name of a shape ("circle", "triangle", "star" or "rectangle"), and draws that shape. All shapes should be solid and red, and can be whatever size you choose

;
name Domain Range
;
What does the function do?

Write some examples of red-shape below. The first one has already been done for you.

(EXAMPLE (red-shape "circle") (circle 50 "solid" "red"))
Use the function here What should the function produce?

(EXAMPLE ())
Use the function here What should the function produce?

(EXAMPLE ())
Use the function here What should the function produce?

(EXAMPLE ())
Use the function here What should the function produce?

III. Definition

(define ())
function name variable names

(cond

(circle 50 "solid" "red")

)

Translating Value Definitions from Code to Algebra

Racket Code	Algebra
<code>(define x 10)</code>	$x = 10$
<code>(define y (* x 2))</code>	$y = x \cdot 2$
<code>(define z (+ x y))</code>	
<code>(define age 14)</code>	
<code>(define months (* age 12))</code>	
<code>(define days (* months 30))</code>	
<code>(define hours (* days 24))</code>	
<code>(define minutes (* hours 60))</code>	

Translating Function Definitions from Code to Algebra

Racket Code	Algebra
<code>(define (area length width) (* length width))</code>	$\text{area}(\text{length}, \text{width}) = \text{length} \cdot \text{width}$
<code>(define (circle-area radius) (* pi (sq radius)))</code>	
<code>(define (distance x1 y1 x2 y2) (sqrt (+ (sq (- x1 x2)) (sq (- y1 y2)))))</code>	

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 .

Every contract has three parts:

;
name Domain Range
;
What does the function do?

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?

$D(\quad)$ =
Use the function here What should the function produce?

=
Use the function here What should the function produce?

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

$D(\quad) =$

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.

Every contract has three parts:

;
name
:
Domain
->
Range
;
What does the function do?

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?

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

=

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?

Every contract has three parts:

$$\begin{array}{ccc} ; & : & -> \\ \text{name} & \text{Domain} & \text{Range} \end{array}$$

$$; \text{ } \text{What does the function do?}$$

Write an example of your function for some sample inputs

$$\text{Use the function here} = \text{What should the function produce?}$$

$$\text{Use the function here} = \text{What should the function produce?}$$

$$\text{Use the function here} = \text{What should the function produce?}$$

$$\text{Use the function here} = \text{What should the function produce?}$$

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

$$\text{ } = \text{ }$$

Every contract has three parts:

$$\begin{array}{lcl} \text{; } \underline{\hspace{2cm}} & \text{:} & \underline{\hspace{10cm}} \text{ -> } \underline{\hspace{2cm}} \\ \text{name} & & \text{Domain} \hspace{10cm} \text{Range} \\ \text{; } \underline{\hspace{20cm}} & & \\ & & \textit{What does the function do?} \end{array}$$

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?

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