Contracts

Name	Domain	Range	example
••	•	↑	
:	:	↑	
••	•	↑	
••		↑	
•	•	^	
••	•	^	
••	:	↑	
••		↑	
••	•	^	
•	•	↑	
••		↑	
••	:	↑	
;	•	^	
••	•	↑	
•		+	
••	:	↑	
•	•	↑	

Contracts

example																	
Range	1	1	1	1	↑	↑	↑	↑	↑	↑	1	↑	↑	↑	↑	↑	1
Domain					•	•	•	:	•	•		:	•	•	•	•	<u></u>
Name	••	••	••	••	••	••	••	••	••	••	••	•	••	••	••	:	••

Thing in the game	What changes about it?	More specifically
cloud	position	x-coordinate



The coordinates for the PLAYER (NinjaCat) ar	e:	(,	,)
		x-coordinate	y-coordinate	
The coordinates for the DANGER (Dog) are:	(,)	
The coordinates for the TARGET (Ruby) are:	(,)	

Our Videogame

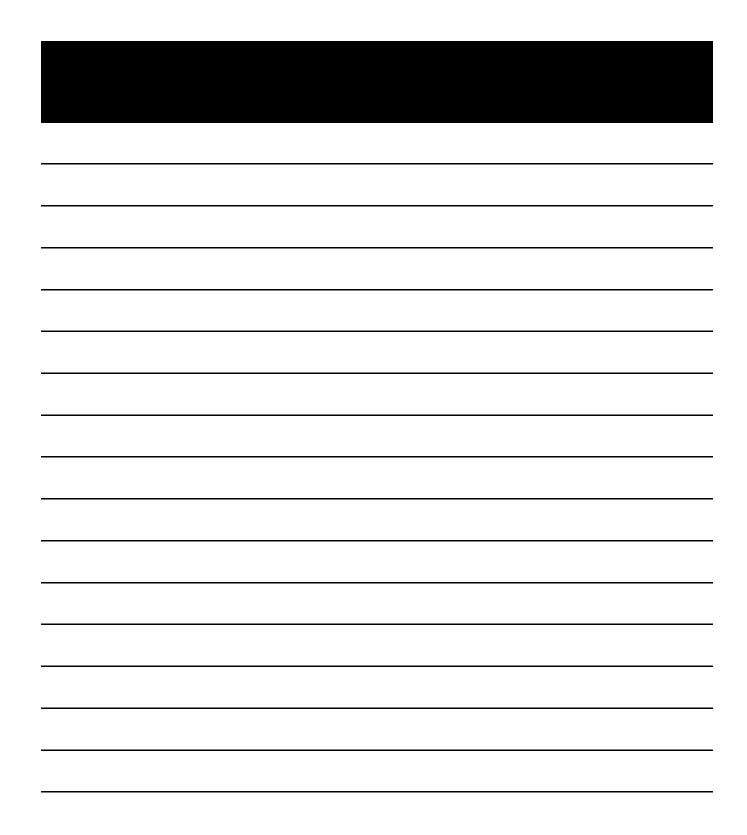
Created by (write your names):
Our game takes place in:(space? the desert? a mall?)
The player is a
me player is a
The player moves only up and down.
The player moves only op and down.
Your player GAINS points when they hit the target.
The Target is a
me ranger is a
The Target moves only to the left and right.
Your player LOSES points when they hit the danger.
The Danger is a
The Danger request only to the left and right
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 x 10		
8 + (5 x 10)		
(8 + 2) - (5 x 10)		
5 10		
<u>5 x 10</u> 8 - 2		



	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			



;		->	
name	domain	range	-
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	<u>:</u>	>	_
name	domain	range	
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	<u>:</u>	>	_
name	domain	range	
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	<u>:</u>	>	_
name	domain	range	
(EXAMPLE ())
(EXAMPLE ())
(define ())

;	:	>	
name	domain	range	
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	_:	>	
name	domain	range	
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	_:	>	
name	domain	range	
(EXAMPLE ())
(EXAMPLE ())
(define ())
;	<u>:</u>	>	
name	domain	range	
(EXAMPLE ())
(EXAMPLE ())

(define ()))

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.

	Domain	Range
name	Domain	Kange
	What does the function do?	
	What does the function do:	
the computer, write an example	e of your function in action, using EX	KAMPLE.
and dompater, write an example		u u, ==:
EXAMPLE ()
the us	er types	
)
	which should become	,
EXAMPLE ()
·	er types	
)
	which should become	/
Write the definition, giving	y variable names to all your input v	values.
)
define (variable names	

Word Problem: red-square

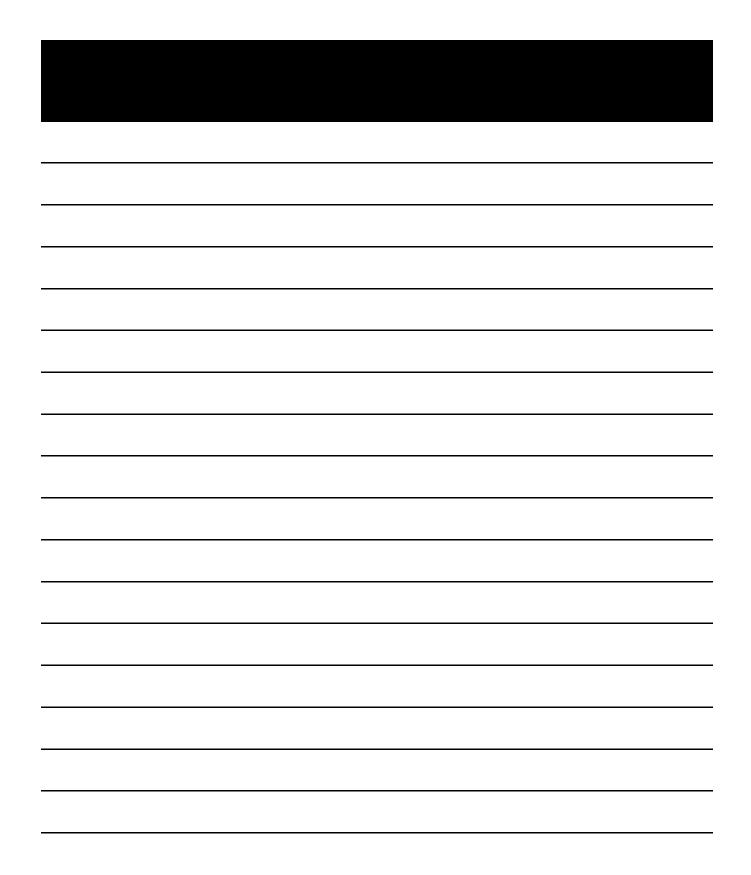
Use the Design Recipe to write a function $\underline{red-square}$, which takes in a number (the size of the square) and outputs a solid red rectangle whose length and width are the same size.

• Every contract has three parts:	> Range	
;·	<u> </u>	
;·	<u> </u>	
,	Range	
Name Domain		
What does the function do?		
What does the function do:		
	AMBLE.	
On the computer, write an example of your function in action, using EXA	AMPLE	
(EXAMPLE ()	
the user says	,	
	,	
Racket replies)	
(EXAMPLE (1	
the user says)	
Docket turns that into)	
Racket turns that into		
Write the definition, giving variable names to all your input vo	alues.	
(define (1	
(define (variable names)	
ranceon name variable names		
		1
and the computer does this)

Word Problem: yard-area

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

(Don't forget: area = 1	length * width !)	
Every contract has three parts:		
;		->
name	Domain	Range
	What does the function do?	
On the computer, write an exan	nple of your function in action, using EXA	AMPLE.
EXAMPLE ()
	se the function here	
)
	find another way to get the same result her	re
(EXAMPLE ()
Us	se the function here	
)
	find another way to get the same result her	re
write the definition, giv	ving variable names to all your input vo	alues.
(define ()
function name	variable names	/
and the	computer does this	



Word Problem: update-danger

Use the Design Recipe to write a function <u>update-danger</u>, which takes in the danger's x-coordinate and produces the next x-coordinate, which is 50 pixels to the left.

name		Domain	Range
	What does th	ne function do?	
computer, write an	example of your fur	nction in action, using E	XAMPLE.
PLE ()
(Use the function here	e	/
			,
	find another	way to get the same result h	<i>)</i> iere
PLE ()
(Use the function here	e	/
			,
-	find another	way to get the same result h	<i>)</i> iere
Mrita the definition	aiving variable n	ames to all your input	values
	i, giving variable in	arries to all your impor	values.
wille the delimilor			
ne ()

Word Problem: update-target

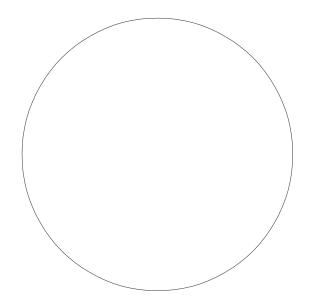
Write a function <u>update-target</u>, which takes in the target's x-coordinate and produces the next x-coordinate, which is 50 pixels to the right.

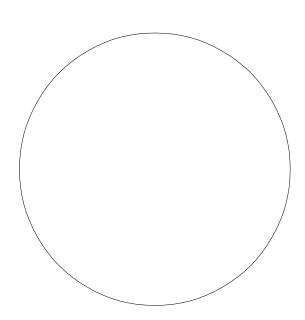
•		>
name	Domain	Range
	What does the function do?	
e computer, write an exa	ample of your function in action, using E	XAMPLE.
MPLE (Use the function here)
·	Use the function here	
)
	find another way to get the same result h	nere
MPLE ()
l	Use the function here	
)
	find another way to get the same result h	ere
Write the definition, g	jiving variable names to all your input	values.
_		
fine (1



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?

Use the Design Recipe to write a function <code>safe-left?</code>, which takes in an x-coordinate and checks to see if it is greater than -50.

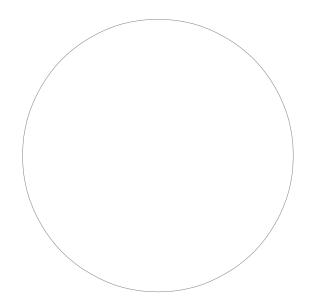
name		
name	Domain	Range
	What does the function do?	
on the computer, write an exc	ample of your function in action,	using EXAMPLE.
EXAMPLE (e the function here)
Use	e the function here	
)
	find another way to get the same resu	ılt here
EXAMPLE (e the function here)
		,
	find another way to get the same resu)
	This another way to get the same rese	Ne fiere
Write the definition givi	ng variable names to all your inp	ut values
ville file defilificit, givi		or valoes.
		`
define ()

Word Problem: safe-right?

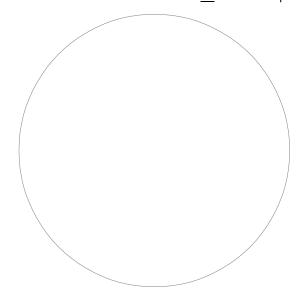
Use the Design Recipe to write a function <u>safe-right?</u>, which takes in an x-coordinate and checks to see if it is less than 690.

Every contract has three pa	rts:	
;:_		>
name	Domain	Range
;		
	What does the function do?	
On the computer write an	xample of your function in action, using E	TYAMDI F
(EXAMPLE (Use the function here)
		,
	find another way to get the same result I	here
(EXAMPLE (Use the function here)
		1
	find another way to get the same result I	here
Write the definition,	giving variable names to all your input	values.
(define (1
function nar	ne variable names)
)

Write the Circles of Evaluation for these statements, and then convert them to Racket 1. Two is less than five, <u>and</u> zero is equal to six.



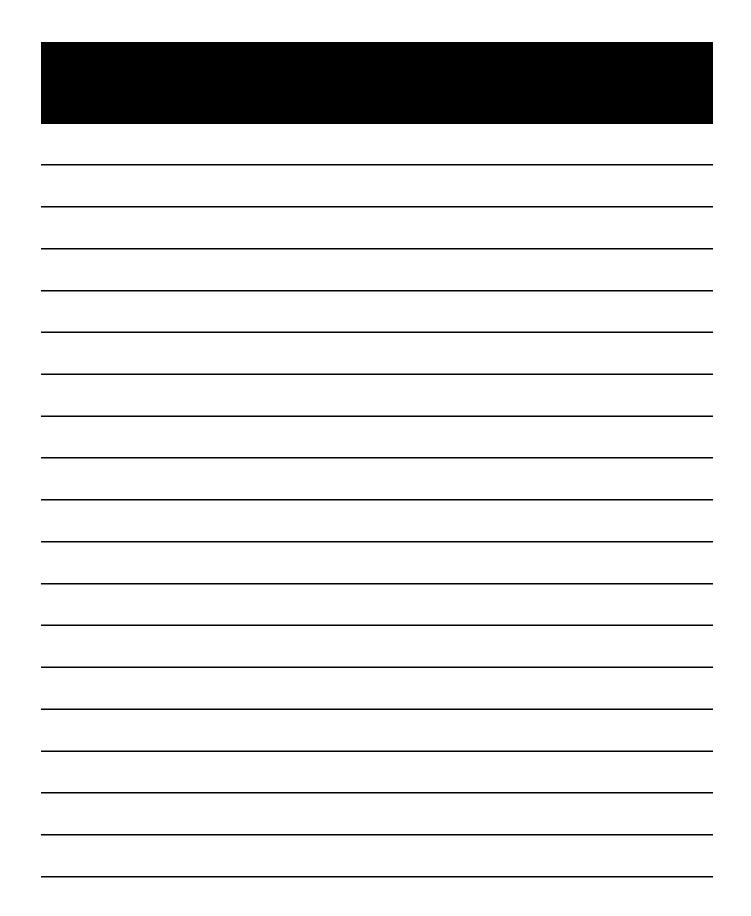
2. Two is less than four <u>or</u> four is equal to six.



Word Problem: onscreen?

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

	·		>
name		Domain	Range
; 			
	W	/hat does the function do?	
2		Constanting in action with F	VAMBLE
In the compu		f your function in action, using E	
(EXAMPLE	(unction here)
	Use the fi	unction here	
	fi	ind another way to get the same result h) Dere
		The another way to get the same result in	iei e
(EXAMPLE	()
(=/ 0	Use the fu	unction here	
)
	fi	ind another way to get the same result h	nere
	the definition, giving vo	ariable names to all your input	values.
Write ⁻			
Write ()



Word Problem: cost

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.

•	Domain	
name	Domain	Range
On the computer, write an ex	cample of your function for <u>e</u>	ach topping, using EXAMPLE.
EXAMPLE (<u>cost</u>	"pepperoni")	
	nction here	What should the function produce
EXAMPLE ()	Miles I de la III de la Constitución de la Constitu
Use the fur	iciion nere	What should the function produce
EXAMPLE (nction here	What should the function produce
EXAMPLE ()	
Use the fur	nction here	What should the function produce
define (variable r	names
_		

Word Problem: update-player

Write a function called <u>update-player</u>, which takes in the player's y-coordinate and the name of the key pressed, and returns the new y-coordinate.

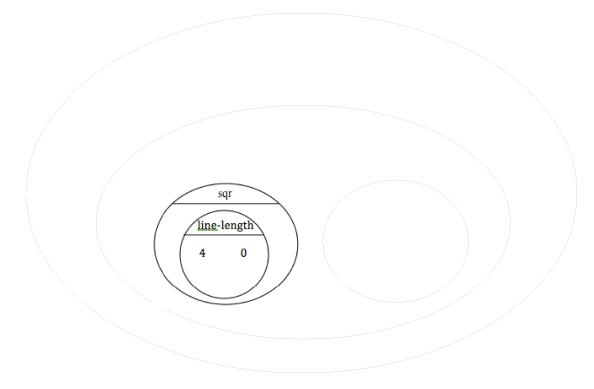
name		main	-> Range	
Finish the two examples we've started for	or you, and	d make two	o more	
EXAMPLE (<u>update-player</u> Use the function here	128 '	<u>'up'')</u>	What should the function produce?	_)
EXAMPLE (<u>update-player</u> Use the function here	451 "da	own''')	What should the function produce?)
(EXAMPLE ()) What should the function produce?	
EXAMPLE (_)) What should the function produce?	
(define ()	
function name		variable nam	nes	

	ion called <u>line-leng</u> Ild always subtract t						difference be	tween
Every contrac	ct has three parts:							
name	:			Domain		>	Range	
(EXAMPLE	(line-length Use the functi	10 ion here	5)	(- What s	10 hould the fu	5) nction produce?)
	(line-length Use the function sixting		8)			2) nction produce?)
(define	the definition, givin		———	variable nar)		
_								-
								_
)								_

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!)

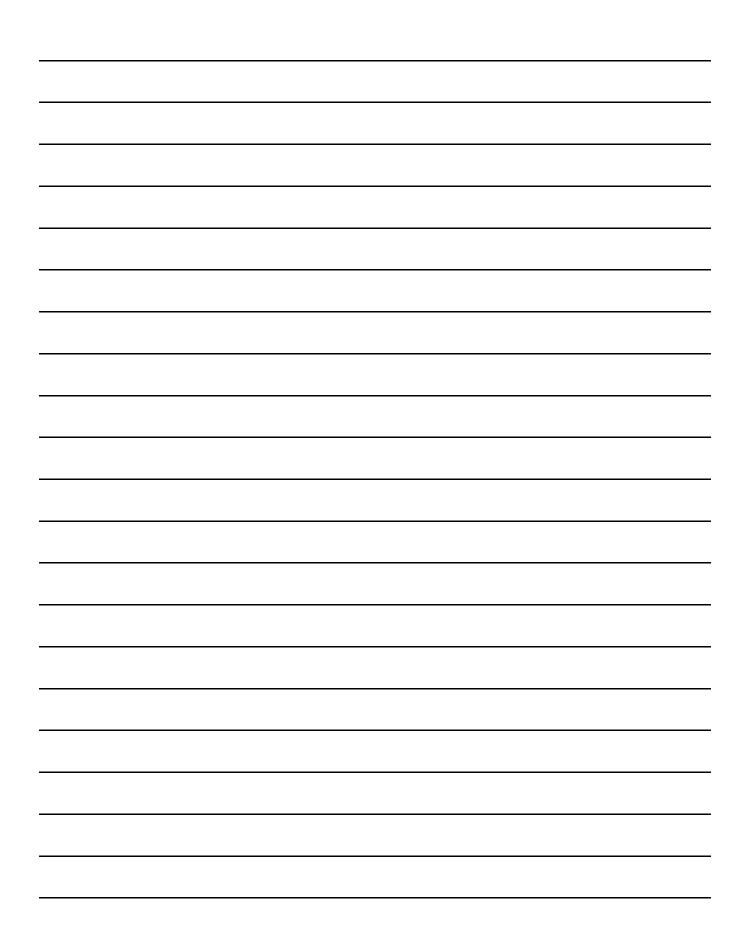


Convert the Circle of Evaluation into Racket code:

Write a function distance, when px: The x-coordinate of py: The y-coordinate of cx: The x-coordinate of cy: The y-coordinate of	the player the player	
It should return the distance be you did on page 27!)	etween the two, using the Distance	formula. (HINT: look at what
		->
name •	Domain	Range
•		
,	What does the function do?	
(EXAMPLE (e the function here)
	find another way to get the same result he	ere
(EXAMPLE (e the function here)
ÜSE	e the function here	
	find another way to get the same result he	ere
(define ()
function name	variable names	
<u>.</u>)

 px: The x-coording py: The y-coording cx: The x-coording cy: The y-coording lt should return to 		are within 50 pixels of the	•
;·	Domain	-> Range	
name	Domain	Kange	
,	What does the function do?		
(EXAMPLE (Use the function here)	
	find another way to get the sar	me result here)
(EXAMPLE (Use the function here)	
	find another way to get the sar	me result here)
(define (name variable n	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! Definitely! A little. Did they talk about their characters? No way! Definitely! A little. Did they explain the code well? No way! A little. Definitely! Did they speak slowly enough? No way! Definitely! A little. Did they speak loudly enough? No way! A little. Definitely! Were they standing confidently? No way! A little. Definitely! Did they make eye contact? Definitely! No way! A little.

Word Problem: red-shape

Write a function called <u>red-shape</u>, 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

<u>wnatever size y</u>	you cnoose			
·	·		>	
name		Domain	Range	
,	What does	the function do	2	
	What does	The folicilon do		
Write some exa	mples of red-shape below. The fi	rst one has alr	eady been done for you.	
(EXAMPLE <u>(</u>)	(circle 50 "solid" "red") 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. Definitio	on			
(define (_)	
(cond	function name	variable na	nmes	
		(circ	ele 50 "solid" "red")	

Translating Value Definitions from Code to Algebra

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))	

Translating Function Definitions from Code to Algebra

Racket Code	Algebra
<pre>(define (area length width) (* length width))</pre>	area(length, width) = length * width
<pre>(define (circle-area radius) (* pi (sq radius)))</pre>	
(define (distance x1 y1 x2 y2) (sqrt (+ (sq (- x1 x2))	

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

<u>D</u> :		->
name	Domain	Range
	What does the function do?	
rite an example of your f	unction for <u>some sample inputs</u>	
D(1) =		
e the function here	What should the function produce?	
D(2)=		
e the function here	What should the function produce?	
D() =		
e the function here	What should the function produce?	
=		
e the function here	What should the function produce?	
tita the formandar airina ann	ariable names to all your input values.	

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

·	>	
name	Domain	Range
	What does the function do?	
Vrite an example of your	function for <u>some sample inputs</u>	
=		
se the function here	What should the function produce?	
=		
se the function here	What should the function produce?	
=		
se the function here	What should the function produce?	
	What should the function produce?	
	What should the function produce? What should the function produce?	
se the function here		

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?

;:_		>
name	Domain	Range
,	What does the function do?	
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?	
Write the Formula, giving	variable names to all your input values.	

very contract has three pa	arts:		
:		->	
name	Domain	Range	
	What does the function do?		
rite an example of your f	unction for <u>some sample inputs</u>		
=			
	What should the function produce?		
	What should the function produce?		
se the function here	What should the function produce? What should the function produce?		
se the function here			
se the function here = se the function here			
se the function here = se the function here = se the function here	What should the function produce?		
se the function here = se the function here =	What should the function produce?		
the function here = the function here = the function here = the function here = the function here	What should the function produce? What should the function produce?		
the function here = the function here = the function here = the function here = the function here	What should the function produce? What should the function produce?		