

CS in Algebra Student Workbook

Reverse Engineering



Code.org CS in Algebra - Stage 1

Thing in the game	What changes about it?	More specifically

Video Game Planning



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Use this form to plan out your video game. Once your game is complete, the player will move up and down, the target and danger will move from left and right, and you will earn points by touching the target and lose points by touching the danger.

Created by:

The game takes place in:

This will be the background image in your game

The player is a:

The player moves up and down

The target is a:

The Target moves left and right

The danger is a:

The Danger moves left and right

Fast Functions



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	:		->	
name	don	nain		range
Example:	() =		
Example:	() =		
Define:	() =		
			>	
name	don	nain		range
Example:	() =		
Example:	() =		
Define:	() =		
			->	
name	 don			range
Example:	() =		
Example:	() =		
Define:	() =		
	\			
name	: don	nain	->	range
Example:	() =		
Example:		\ _		
-				
Define:	() =		

The Design Recipe



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Description:

function r	::::		dom	ain		->	range
		what	does the fu	ınction a	lo?		
Exam	ples						
rite some e	examples for yo	ur func	tion in actio	n			
ample:	function name	_(input(s)) = _	what the fu	nction pi	roduces
	function name						
Defini	ition						

what the function does with those variables

word problem rocket-height



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Description: A rocket blasts off, traveling at 15 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... function name domain what does the function do? **Examples** Write some examples for your function in action... Example: _____ (______) = _____ what the function produces Example: ____ (____) = ____ function name input(s) what the function produces Definition Write the definition, giving variable names to all your input values **Define**: ____ (_____) = function name variables

word problem update-danger



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Directions: Use the Design Recipe to write a function 'updatedanger' which takes in the danger's x-coordinate and produces the next x-coordinate, which is 10 pixels to the left.

function name		dom	nain		nge
	whċ	at does the fu	ınction a	10?	
Examples					
rite some examples for y	our fun	ection in actic	n		
xample:	()=_	what the function produ	
xample: function name	, ,	input(s))=_	what the function produ	ıces
Definition					

word problem update-target



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Directions: Use the Design Recipe to write a function 'update-target' which takes in the target's x-coordinate and produces the next x-coordinate, which is 10 pixels to the right.

::::	domain	> range
	what does the functi	ion do?
Examples		
rite some examples for yo	our function in action	
kample:	()) = what the function produces
xample: function name	() input(s)	what the function produces
Definition		
Vrite the definition, giving	variable names to all yo	our input values

word problem update-player



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

Contract and Purpose Statement Every contract has three parts... domain function name what does the function do? **Examples** Write some examples for your function in action... Example: $\frac{\textit{update-player}}{\textit{function name}} (\frac{128 \quad 38}{\textit{input(s)}}) = \frac{}{\textit{what the function produces}}$ Example: $\frac{\textit{update-player}}{\textit{function name}} (\frac{128 \ 40}{\textit{input(s)}}) = \frac{}{\textit{what the function produces}}$ **Definition** Write the definition, giving variable names to all your input values Define: _

Key Code Reference



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When you press a key on your keyboard, a unique numeric code is sent to your computer, which is then translated into a letter, number, or command. Use this handy key code reference sheet to make your Player sprite respond to different key presses.

Key	Code	Key	Code
left arrow	37	G	71
up arrow	38	Н	72
right arrow	39	I	73
down arrow	40	J	74
Ο	48	K	75
1	49	L	76
2	50	M	77
3	51	Ν	78
4	52	0	79
5	53	Р	80
6	54	Q	81
7	55	R	82
8	56	S	83
9	57	Т	84
Α	65	U	85
В	66	V	86
С	67	W	87

word problem line-length



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Every contract has three parts...

Directions: 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

Contract and Purpose Statement

functio	on name			don	nain		range
		wł	nat doe.	s the fu	unction a	10?	
xar	mples						
te som	ne examples for yo	ur fu	nction	in actic	on		
mple:	line-length	(10	5) =	10 - 5	
•	function name	_ ` _	inp	ut(s)		what the function ,	produces
mple.	line-length	(2	8) =	8 - 2	
	line-length function name	_ ` _	2 inp	ut(s)	/ _	what the function ,	produces
te the	nition definition, giving v	varia.	ble nam	nes to a	all your in	put values	
ine:	function name		variak)/es)=		

word problem distance



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Directions: Write a function 'distance', which 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 use the Distance formula to return the distance between both points

Contract and Purpose Statement

Every cont	ract has three pai	rts		
function	 n name	don	nain	> range
		what does the fu	unction do?	
Exan	nples			
Nrite some	e examples for yo	ur function in actio	on	
Example: _	function name	_(input(s)) = what	the function produces
Example: _	function name	_(input(s)) = what	the function produces
Defir	nition			
Write the c	definition, giving v	variable names to a	all your input vai	'ues
Define:	unction name	(variables	_)=	

word problem collide?



Code.org CS in Algebra

Directions: Write a function 'distance?', which 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

Is the player's x and y within 100 pixels of the other character's x and y

Contract and Purpose Statement

Every cont	tract has three par	ts		
function	::	dom		> range
Ταπειτοι	ii name	GOTT.	alli	range
		what does the fu	nction do?	
Exar	nples			
Write som	e examples for yo	ur function in actio	n	
Example: _	function name	_(input(s)) = what th	ne function produces
Example: _	function name	_(input(s)) = what th	ne function produces
Defi	nition			
Write the	definition, giving v	rariable names to a	ll your input value	25
Define:	function name	(variables	_)=	
	wha	t the function does	with those varia	hles

word problem safe-left?



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Description: Write a function 'safe-left?', which takes in an x-coordinate and checks to see if it is greater than -50.

	::				>
function r	name		dom	nain	range
		what	t does the fu	ınction a	10?
Exam	ples				
rite some e	examples for yo	ur func	ction in actio	pn	
cample:	function name	_(input(s)) = _	what the function produces
					what the function produces
			πραι(3)		what the function produces
Defini	tion				
Vrite the de	finition, giving v	ariable	e names to a	all your in	put values
			variables		

word problem safe-right?



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Description: Write a function 'safe-right?', which takes in an x-coordinate and checks to see if it is less than 450.

	::				>	
function i	name		dom	nain		range
		wha	nt does the fu	inction c	do?	
Exam	ples					
rite some	examples for yo	ur fun	ction in actic	νn		
cample:	function name	_(input(s)) = _	what the function p	roduces
	function name	_ `	input(s)		what the function p	roduces
Defin	ition					
/rito the de	efinition, giving v	/ariabl	e names to a	ıll your ir	nput values	
viile liie de			variables) =		

word problem onscreen?



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Description: Write a function 'onscreen?', which takes in a character's x-coordinate and checks to see if it is safe on the left and on the right.

function name	domain	> <i>range</i>
	what does the function	do?
Examples		
Vrite some examples for yo	ur function in action	
xample:	() =	what the function produces
kample:	() =() =() =	what the function produces what the function produces
xample:	() =	
Vrite some examples for your sample: function name xample: function name Definition	() =	