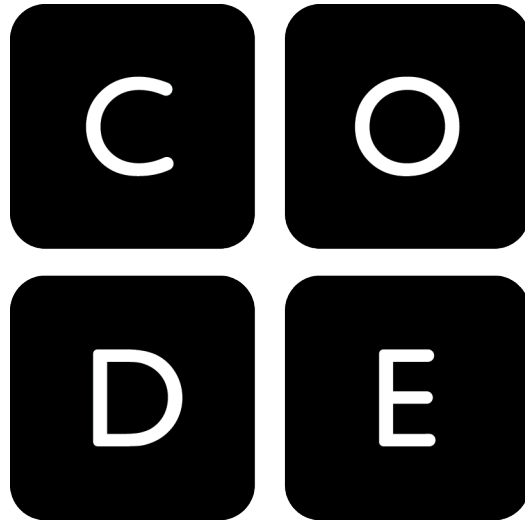


Name: \_\_\_\_\_

Course: \_\_\_\_\_



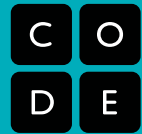
# **CS in Algebra**

*powered by Bootstrap*

## **Student Workbook**

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Per: \_\_\_\_\_

# Reverse Engineering

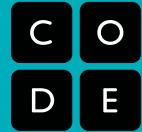


Code.org CS in Algebra - Stage 1

Thing in the game...	What changes about it?	More specifically...

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Per: \_\_\_\_\_

# Video Game Planning



Code.org CS in Algebra - Stage 1

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:

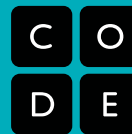
The Danger moves left and right

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Per: \_\_\_\_\_

# Evaluation Blocks

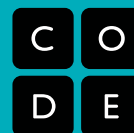


Code.org CS in Algebra - Stage 2

$2 * 5$	<div> <div>*</div> <div></div> </div>	$32 / 3$	
$4 - (3 / 2)$	<div> <div>-</div> <div> <div>4</div> <div> <div>/</div> <div></div> </div> </div> </div>	$(25 + 14) - 12$	
$(3 + 12) * 16$	<div> <div>*</div> <div> <div>3</div> <div></div> </div> </div>	$(23 * 14) * (3 + 2)$	
$1 + (15 * 5)$	<div> <div>+</div> <div></div> </div>	$19 - (12 + 11)$	
$(2 + 17) * (12 - 8)$	<div> <div>*</div> <div> <div></div> <div></div> </div> </div>	$4 - (6 - 17)$	
$9 * (17 + 2)$	<div> <div></div> <div> <div></div> </div> </div>	$(12 * 4) / 3$	

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Per: \_\_\_\_\_

# Fast Functions!



Code.org CS in Algebra - Stage 9

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*name domain range*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*name domain range*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*name domain range*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

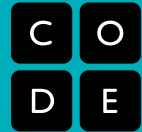
\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*name domain range*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

# The Design Recipe



Code.org CS in Algebra

## Description:

## Contract and Purpose Statement

Every contract has three parts...

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name* *domain* *range*

\_\_\_\_\_

*what does the function do?*

## Examples

Write some examples for your function in action...

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *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

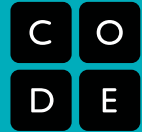
**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *variables*

\_\_\_\_\_

*what the function does with those variables*

word problem

# rocket-height



Code.org CS in Algebra - Stage 10

**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* *range*

\_\_\_\_\_

*what does the function do?*

## Examples

*Write some examples for your function in action...*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *what the function produces*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *what the function produces*

## Definition

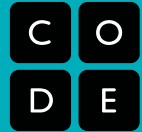
*Write the definition, giving variable names to all your input values*

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *variables*

\_\_\_\_\_

*what the function does with those variables*

# word problem update-target



Code.org CS in Algebra - Stage 12

**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.

## Contract and Purpose Statement

*Every contract has three parts...*

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name* *domain* *range*

\_\_\_\_\_ *what does the function do?*

## Examples

*Write some examples for your function in action...*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *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*

\_\_\_\_\_ *what the function does with those variables*



# word problem update-danger



Code.org CS in Algebra - Stage 12

**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 10 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 for your function in action...*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *what the function produces*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *what the function produces*

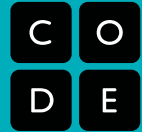
## Definition

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

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *variables*

\_\_\_\_\_ *what the function does with those variables*

# word problem safe-left?



Code.org CS in Algebra - Stage 15

**Description:** Write a function 'safe-left?', which takes in an x-coordinate and checks to see if it is greater than -25.

## Contract and Purpose Statement

*Every contract has three parts...*

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name domain range*

\_\_\_\_\_ *what does the function do?*

## Examples

*Write some examples for your function in action...*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name input(s) what the function produces*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name input(s) what the function produces*

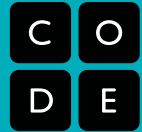
## Definition

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

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name variables*

\_\_\_\_\_ *what the function does with those variables*

# word problem safe-right?



Code.org CS in Algebra - Stage 15

**Description:** Write a function 'safe-right?', which takes in an x-coordinate and checks to see if it is less than 425.

## Contract and Purpose Statement

*Every contract has three parts...*

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name domain range*

\_\_\_\_\_

*what does the function do?*

## Examples

*Write some examples for your function in action...*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name input(s) what the function produces*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name input(s) what the function produces*

## Definition

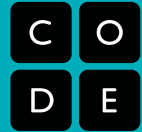
*Write the definition, giving variable names to all your input values*

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name variables*

\_\_\_\_\_

*what the function does with those variables*

# word problem onscreen?



Code.org CS in Algebra - Stage 15

**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.

## Contract and Purpose Statement

*Every contract has three parts...*

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name domain range*

\_\_\_\_\_ *what does the function do?*

## Examples

*Write some examples for your function in action...*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name input(s) what the function produces*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name input(s) what the function produces*

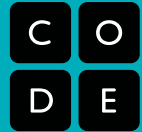
## Definition

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

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name variables*

\_\_\_\_\_ *what the function does with those variables*

# word problem cost



Code.org CS in Algebra - Stage 16

**Directions:** 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.

## Contract and Purpose Statement

*Every contract has three parts...*

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name domain range*

*what does the function do?*

## Examples

*Write some examples for your function in action...*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_

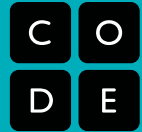
## Definition

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

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) =  
*function name variables*

_____	_____
_____	_____
_____	_____
_____	_____

# word problem update-player



Code.org CS in Algebra - Stage 16

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

Example: update-player ( 38 240 ) = 240 + 10

Example: update-player ( 40 240 ) = 240 - 10

Example: update-player ( 38 250 ) = \_\_\_\_\_

Example: update-player ( 40 250 ) = \_\_\_\_\_

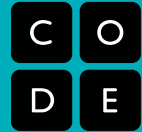
## Definition

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

Define: \_\_\_\_\_ ( \_\_\_\_\_ ) =  
*function name* *variables*

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

# Key Code Reference

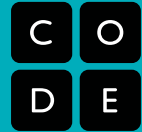


Code.org CS in Algebra - Stage 16

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.

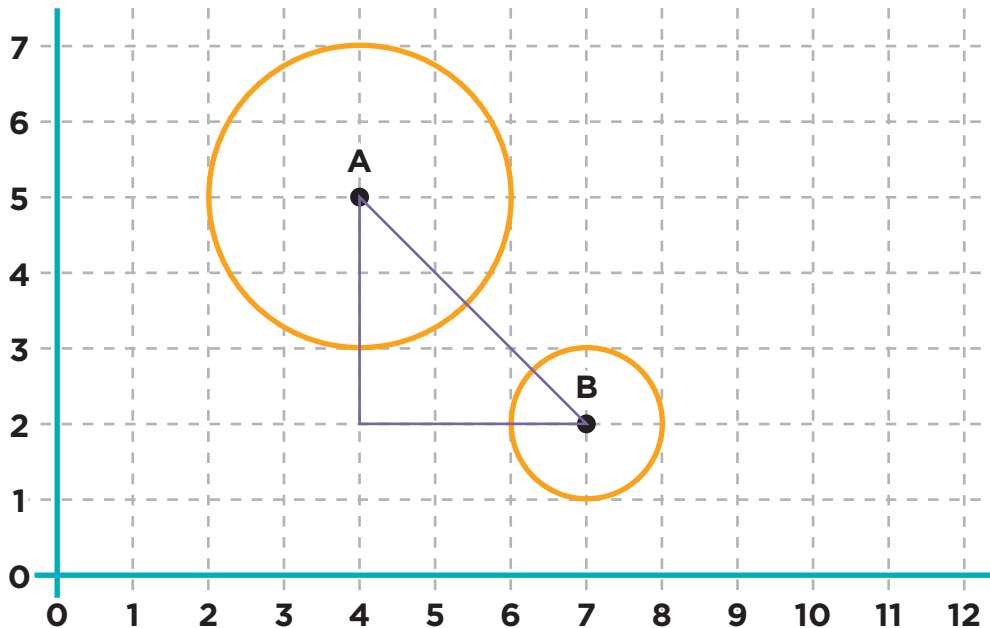
Key	Code	Key	Code
left arrow	37	G	71
up arrow	38	H	72
right arrow	39	I	73
down arrow	40	J	74
0	48	K	75
1	49	L	76
2	50	M	77
3	51	N	78
4	52	O	79
5	53	P	80
6	54	Q	81
7	55	R	82
8	56	S	83
9	57	T	84
A	65	U	85
B	66	V	86
C	67	W	87
D	68	X	88
E	69	Y	89
F	70	Z	90

# Collision Detection



Code.org CS in Algebra - Stage 19

## Graph #1

**On the graph:**

Label the right angle as C

Label segment AB as c

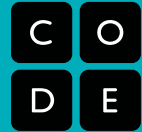
Label segment AC as b

Label segment CB as a

1. What is the radius of circle A? \_\_\_\_\_
2. What is the radius of circle B? \_\_\_\_\_
3. What is Radius A + Radius B \_\_\_\_\_
4. Do the circles overlap? (true/false) \_\_\_\_\_
5. What is the length of side a? \_\_\_\_\_
6. What is the length of side b? \_\_\_\_\_
7. Estimate the length of side c? \_\_\_\_\_
8. What is  $a^2 + b^2$  \_\_\_\_\_

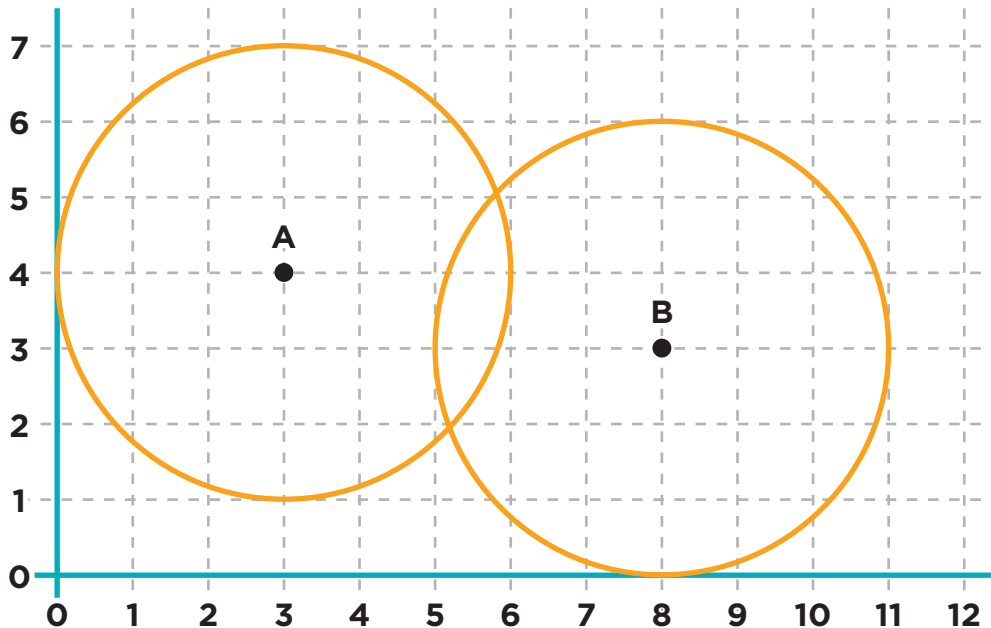


# Collision Detection



Code.org CS in Algebra - Stage 19

## Graph #2



### On the graph:

Draw a segment from point A to point B

Label segment AB as  $c$

Draw a right triangle using segment  $c$  as the hypotenuse.

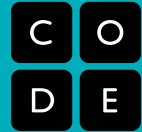
Label the right angle as  $C$

Label segment AC as  $b$

Label segment CB as  $a$

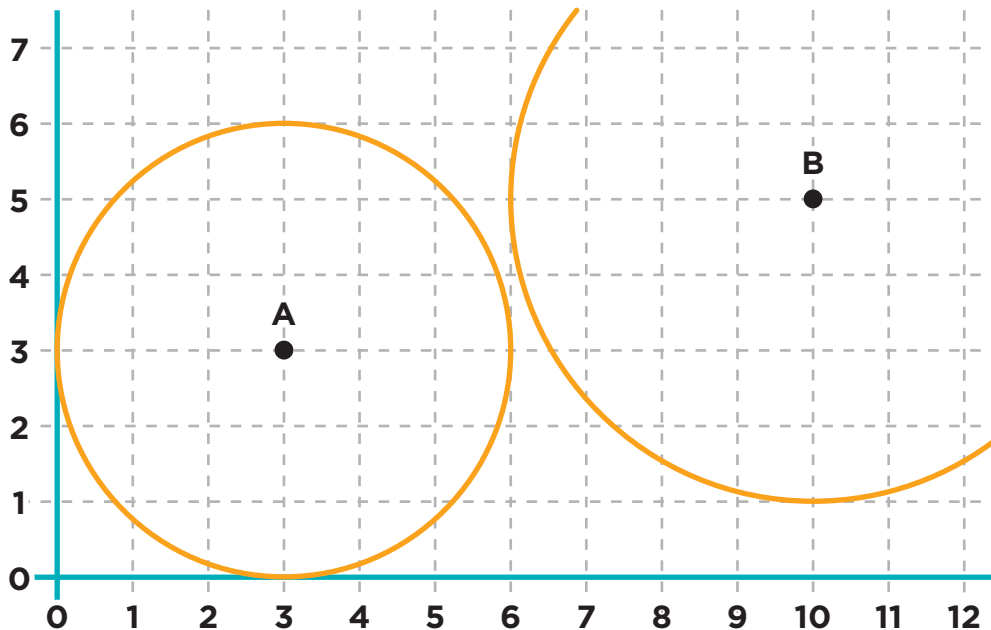
1. What is the radius of circle A? \_\_\_\_\_
2. What is the radius of circle B? \_\_\_\_\_
3. What is Radius A + Radius B \_\_\_\_\_
4. Do the circles overlap? (true/false) \_\_\_\_\_
5. What is the length of side  $a$ ? \_\_\_\_\_
6. What is the length of side  $b$ ? \_\_\_\_\_
7. Estimate the length of side  $c$ ? \_\_\_\_\_
8. What is  $a^2 + b^2$  \_\_\_\_\_

# Collision Detection



Code.org CS in Algebra - Stage 19

## Graph #3



### On the graph:

Draw a segment from point A to point B

Label segment AB as  $c$

Draw a right triangle using segment  $c$  as the hypotenuse.

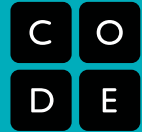
Label the right angle as  $C$

Label segment AC as  $b$

Label segment CB as  $a$

1. What is the radius of circle A? \_\_\_\_\_
2. What is the radius of circle B? \_\_\_\_\_
3. What is Radius A + Radius B \_\_\_\_\_
4. Do the circles overlap? (true/false) \_\_\_\_\_
5. What is the length of side  $a$ ? \_\_\_\_\_
6. What is the length of side  $b$ ? \_\_\_\_\_
7. Estimate the length of side  $c$ ? \_\_\_\_\_
8. What is  $a^2 + b^2$  \_\_\_\_\_

# word problem line-length



Code.org CS in Algebra - Stage 20

**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

*Every contract has three parts...*

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name* *domain* *range*

\_\_\_\_\_ *what does the function do?*

## Examples

*Write some examples for your function in action...*

**Example:**  $\frac{\text{line-length}}{\text{function name}} \left( \frac{10 \quad 5}{\text{input(s)}} \right) = \frac{10 - 5}{\text{what the function produces}}$

**Example:**  $\frac{\text{line-length}}{\text{function name}} \left( \frac{2 \quad 8}{\text{input(s)}} \right) = \frac{8 - 2}{\text{what the function produces}}$

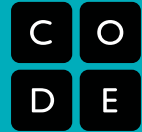
## Definition

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

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) =  
*function name* *variables*

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# word problem distance



Code.org CS in Algebra - Stage 20

**Directions:** 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 use the Distance formula to return the distance between both points

## Contract and Purpose Statement

Every contract has three parts...

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name* *domain* *range*

\_\_\_\_\_

*what does the function do?*

## Examples

Write some examples for your function in action...

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *what the function produces*

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *what the function produces*

## Definition

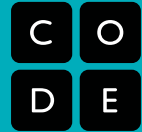
Write the definition, giving variable names to all your input values

**Define:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *variables*

\_\_\_\_\_

*what the function does with those variables*

# word problem collide?



Code.org CS in Algebra - Stage 20

**Directions:** 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

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

## Contract and Purpose Statement

Every contract has three parts...

\_\_\_\_\_ : \_\_\_\_\_ -> \_\_\_\_\_  
*function name* *domain* *range*

\_\_\_\_\_

*what does the function do?*

## Examples

Write some examples for your function in action...

**Example:** \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_\_  
*function name* *input(s)* *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*

\_\_\_\_\_

*what the function does with those variables*

# Contract Log

[illegible]

# Contract Log

[illegible]