Name: _____ Course: _____

Computer Science in Algebra

powered by BOOTSTRAP

Student Workbook

Name: _____ Date: _____ Per: _____

1

Stage 1

Reverse Engineering

Code.org Computer Science in Algebra

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

Name: _____ Date: _____ Per: _____

1

Stage 1

Video Game Planning

Code.org Computer Science in Algebra

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: _____

2

Stage 2

Evaluation Blocks

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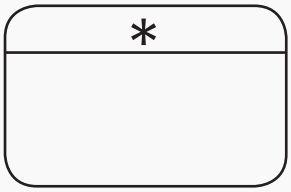
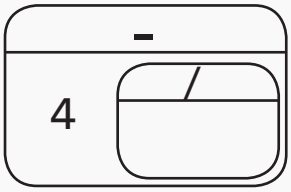
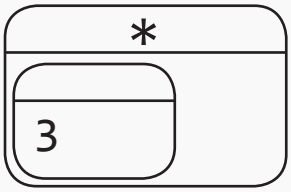
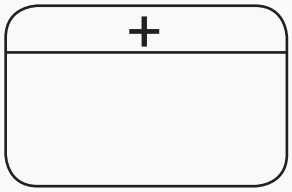
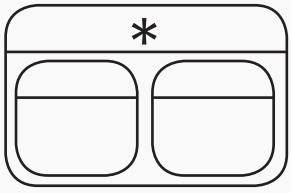
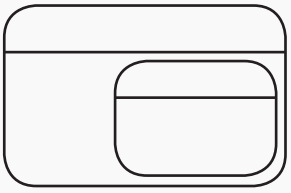
Create the evaluation blocks for the provided equations.

2 * 5	
4 - (3 / 2)	
(3 + 12) * 16	
1 + (15 * 5)	
(2 + 17) * (12 - 8)	
9 * (17 + 2)	

32 / 3	
(25 + 14) - 12	
(23 * 14) * (3 + 2)	
19 - (12 + 11)	
4 - (6 - 17)	
(12 * 4) / 3	

Name: ______________________ Date: __________ Per: ________

9

Stage 9

Fast Functions!

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CODE

________ : ________________ -> ________
name *domain* *range*

Example: ________ (________) = ________________

Example: ________ (________) = ________________

Define: ________ (________) = ________________

________ : ________________ -> ________
name *domain* *range*

Example: ________ (________) = ________________

Example: ________ (________) = ________________

Define: ________ (________) = ________________

________ : ________________ -> ________
name *domain* *range*

Example: ________ (________) = ________________

Example: ________ (________) = ________________

Define: ________ (________) = ________________

________ : ________________ -> ________
name *domain* *range*

Example: ________ (________) = ________________

Example: ________ (________) = ________________

Define: ________ (________) = ________________

Name: _____ Date: _____ Per: _____

D

Design Recipe

The Design Recipe

Code.org Computer Science in Algebra

C O D E

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

Name: _____ Date: _____ Per: _____

D

Design Recipe

The Design Recipe

Code.org Computer Science in Algebra

C O D E

Description:

Contract and Purpose Statement

Every contract has three parts...

_____ : _____ -> _____

function name | domain | range

_____

what does the function do?

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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

Name: _____ Date: _____ Per: _____

D

Design Recipe

The Design Recipe

Code.org Computer Science in Algebra

C O D E

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

10

Stage 10

Name: _____ Date: _____ Per: _____

rocket-height (word problem)

Code.org Computer Science in Algebra

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

Name: _____ Date: _____ Per: _____

12

Stage 12

update-target (word problem)

Code.org Computer Science in Algebra

Description: 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

12

Stage 12

Name: _____ Date: _____ Per: _____

update-danger (word problem)

Code.org Computer Science in Algebra

Description: 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

Name: _____ Date: _____ Per: _____

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Stage 15

safe-left? (word problem)

Code.org Computer Science in Algebra

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

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

Name: _____ Date: _____ Per: _____

15

Stage 15

safe-right? (word problem)

Code.org Computer Science in Algebra

Description: Write a function **`safe-right?`**, which takes in an x-coordinate and checks to see if it is less than 350.

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

Name: _____ Date: _____ Per: _____

15

Stage 15

onscreen? (word problem)

Code.org Computer Science in Algebra

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

Name: _____ Date: _____ Per: _____

18

Stage 18

cost (word problem)

Code.org Computer Science in Algebra

Description: 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

_____ _____

_____ _____

_____ _____

_____ _____

_____

18

Stage 18

Name: _____ Date: _____ Per: _____

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	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

18

Stage 18

Name: _____ Date: _____ Per: _____

update-player (word problem)

Code.org Computer Science in Algebra

Description: Write a function called **`update-player`**, which takes in the key code 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

_____ _____

_____ _____

_____ _____

_____ _____

_____

Name: _____ Date: _____ Per: _____

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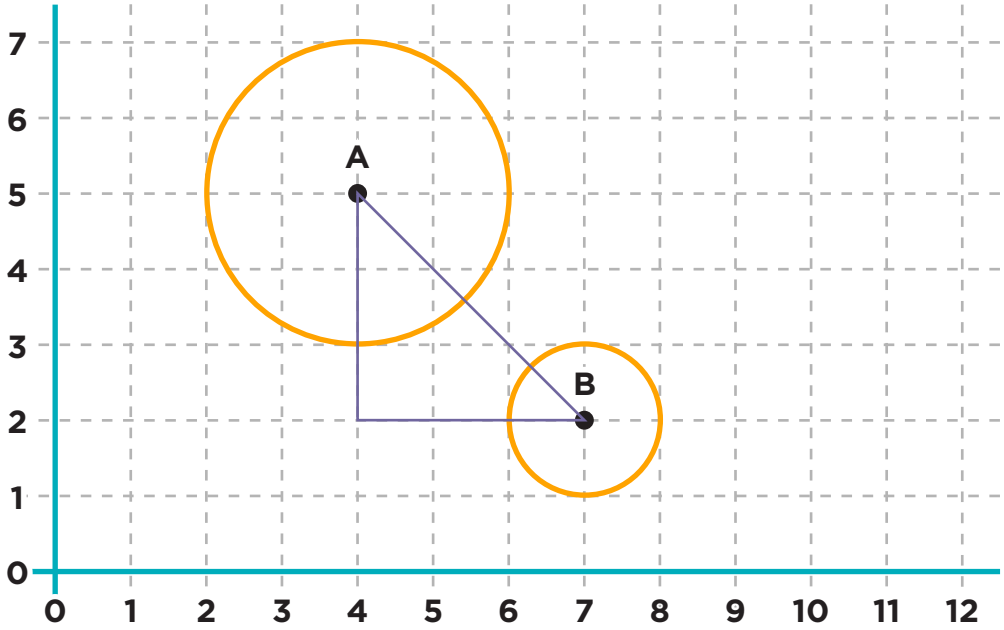
Stage 19

Collision Detection

Code.org Computer Science in Algebra

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

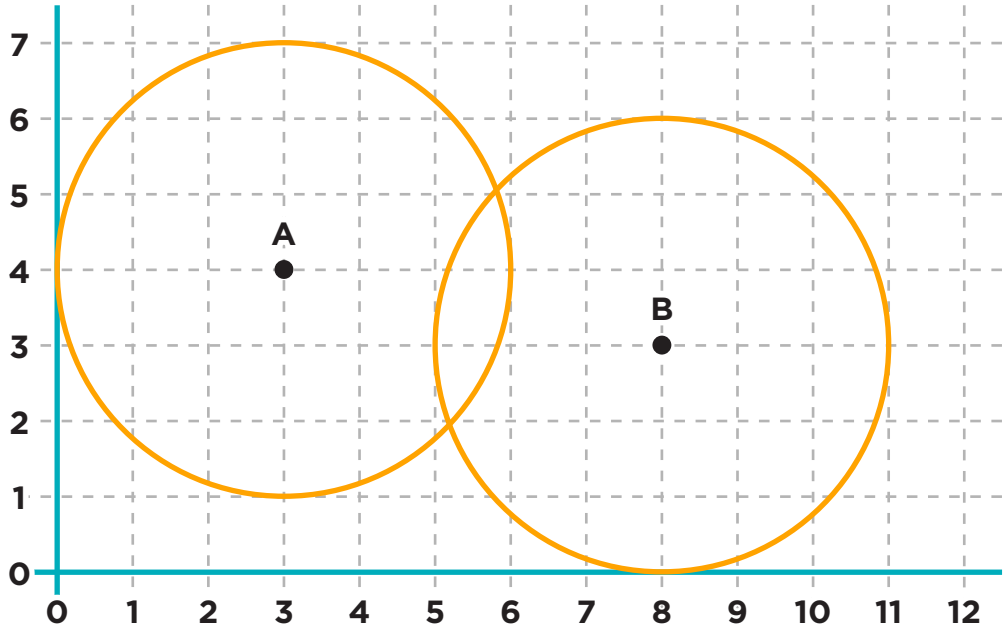
1. What is the radius of circle A? _____
2. What is the radius of circle B? _____
3. What is Radius A + Radius B _____
4. Do the circles overlap? (true/false) _____
5. What is the length of side a? _____
6. What is the length of side b? _____
7. Estimate the length of side c? _____
8. What is $a^2 +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

Name: _____ Date: _____ Per: _____

Collision Detection

Code.org Computer Science in Algebra

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

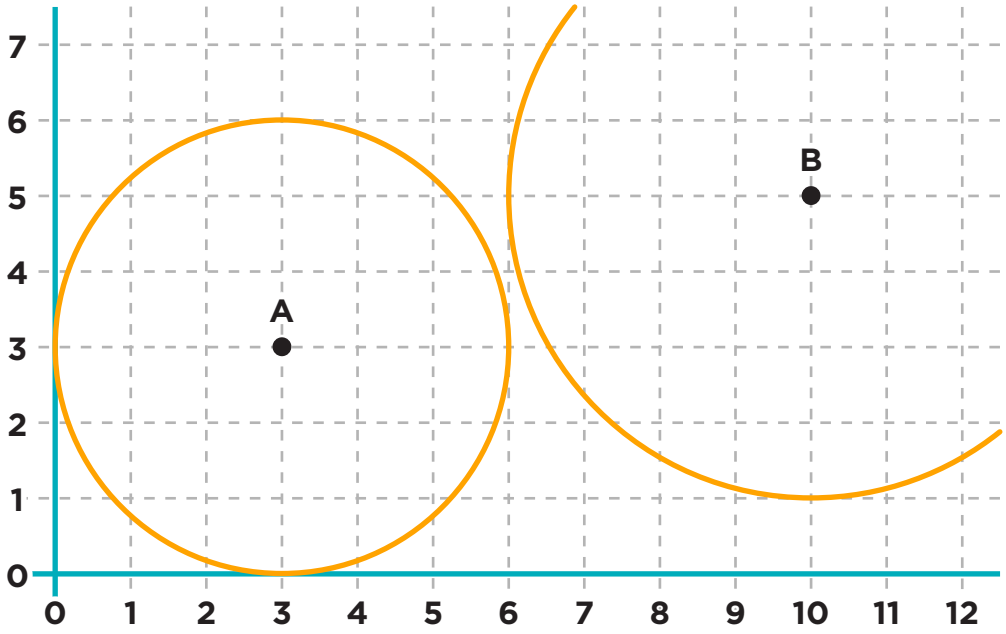
1. What is the radius of circle A? _____
2. What is the radius of circle B? _____
3. What is Radius A + Radius B _____
4. Do the circles overlap? (true/false) _____
5. What is the length of side a? _____
6. What is the length of side b? _____
7. Estimate the length of side c? _____
8. What is $a^2 +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

Name: _____ Date: _____ Per: _____

Collision Detection

Code.org Computer Science in Algebra

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 $a^2 + b^2$ _____

20

Stage 20

Name: _____ Date: _____ Per: _____

line-length (word problem)

Code.org Computer Science in Algebra

Description: 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: 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, giving variable names to all your input values

Define: _____ (_____) =

function name | variables

_____ _____

_____ _____

_____ _____

_____ _____

_____

Name: _____ Date: _____ Per: _____

20

Stage 20

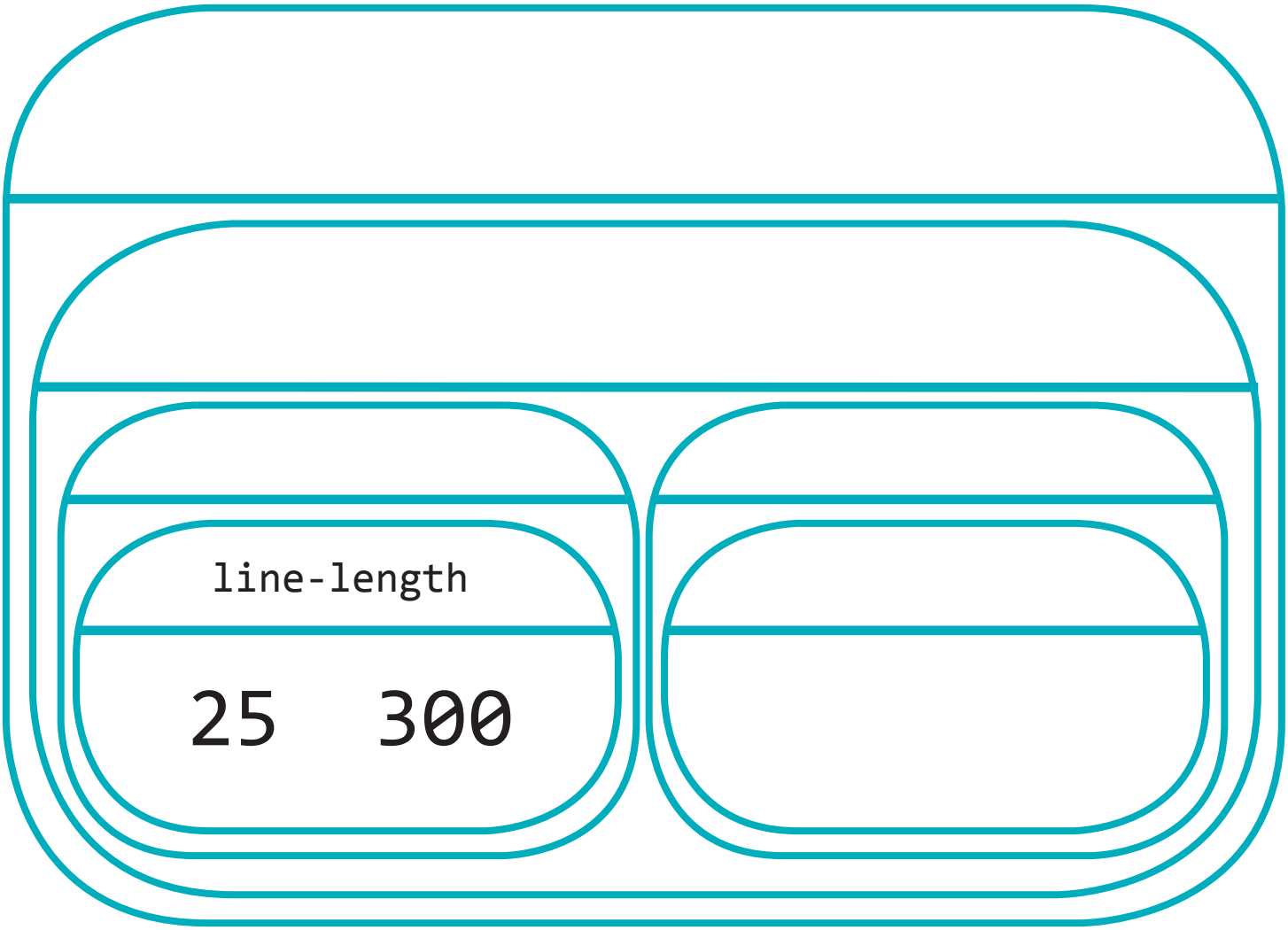
The Distance Formula

Code.org Computer Science in Algebra

The distance between two points (25, 50) and (300, 400) can be calculated with the distance formula as

$$\sqrt{\texttt{line-length}(25,\ 300)^2 + \texttt{line-length}(50,\ 400)^2}$$

Convert the formula in a circle of evaluation.



Name: _____ Date: _____ Per: _____

20

Stage 20

distance (word problem)

Code.org Computer Science in Algebra

Description: 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

Name: _____ Date: _____ Per: _____

20

Stage 20

collide? (word problem)

Code.org Computer Science in Algebra

Description: 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

Name	Domain	Range	Example

Contract Log

Name	Domain	Range	Example