Name:	Course:	



# Computer Science in Algebra

powered by BOOTSTRAP



Student Workbook

Draft

Name:
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Date:		
Date.		

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

1 Stage 1

# Reverse Engineering



Thing in the game	What changes about it?	More Specifically

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Stage 1

Name: Date:	Per:
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# **Video Game Planning**

C O E

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)			

Stage 2

# **Evaluation Blocks**

Code.org Computer Science in Algebra



Create the evaluation blocks for the provided equations.

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

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# **Fast Functions!**



			->	
name ·	domain		~	range
Example:	(	) =		
Example:	_ (	) =		
Define:	_(	) =		
::			->	
name	domain		<del></del> -	range
Example:	(	) =		
Example:	_ (	) =		
Define:	(	) =		
	_ `			
name :				range
::::::	domain		->	range
name  Example:	domain (	) =	->	range
:::	domain (	) =	->	range
name ::::::::	<i>domain</i> (((	) =	>	range
name ::::::::	<i>domain</i> (((	) =	>	range
name ::::::::	<i>domain</i> (((	) =	>	range
name ::::::::	<i>domain</i> (((	) =	>	range
name  Example:  Example:  Define:	domain  (  (  domain	) =	>	range
name  Example:  Example:  Define:  :  name  Example:	domain	) =	>	range
name  Example:  Example:  Define:  :  name	domain	) =	>	range

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Name:	Date:	Per:
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# The Design Recipe



Desc	ription:		
Cont	ract and Purpo	se Statement	
-	ntract has three part		
	on name	domain	range
		what does the function o	?ob
Exam	ples		
Write son	ne examples for you	r function in action	
Example:	function name	input(s) = _	what the function produces
Example	function name	input(s) = _	what the function produces
Defin	ition		
Write the	definition, giving va	ariable names to all your i	nput values
Define: _	function name	variables ) =	

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Design	
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# The Design Recipe



Descr	iption:			
Contra	act and Purpe	ose Stater	nent	
Every con	tract has three par	<i>ts</i>		
	::			> range
functio	n name		domain	range
		what does t	the function (	do?
Exam	ples			
Write som	e examples for you	ur function in	action	
Example:	function name	() _ input	) = . (s)	what the function produces
Example:	function name	( input	) = .	what the function produces
	ranction name	Прис	(3)	what the function produces
Defini	at			
Defini	tion			
Write the	definition, giving v	ariable name.	s to all your i	input values
Define: _		() variable	) =	
f	unction name	variable	·S	

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# The Design Recipe



Description:		
Description.		
Contract and Purp	ose Statement	
Every contract has three pa	rts	
		->
function name	domain	range
	what does the function o	do?
Examples		
Write some examples for yo	our function in action	
Example:	( )=	
function name	input(s)	what the function produces
Example:	()=	what the function produces
function name	input(s)	what the function produces
Definition		
Write the definition, giving	variable names to all your in	nput values
<b>Define</b> : function name	_ ( ) = ) =	
Tanadan name	Va.142.163	
wh	at the function does with th	nose variables

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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.

the hei	the height of the rocket at that time.			
Contra	act and Purp	ose Stateme	nt	
Every con	tract has three pai	erts		
	::			> range
functio	n name	do	main	range
		what does the	function (	 do?
Exam	oles			
Write some	e examples for you	our function in act	ion	
Example:		(	)=	
				what the function produces
Example: _	function name	( input(s)	) = _	what the function produces
Defini	tion			
Write the	definition, giving v	variable names to	all your ii	input values
<b>Define</b> :f	unction name	variables	)=	

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#### update-target (word problem)



Stage 12

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... domain function name what does the function do? **Examples**

Write some examples for your function in action...

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

#### **Definition**

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

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Name:	Date:	Per:

#### update-danger (word problem)



Stage 12

Code.org Computer Science in Algebra

Description: Write a function update-danger which takes in the

_	els to the left.	e and produces	s the n	ext x-coordinate, which is
Contra	act and Purpo	ose Statemen	t	
-	tract has three par :			->
function	n name	dom	ain	range
		what does the fu	nction d	0?
Exam	ples			
Write som	e examples for you	ır function in actio	n	
				what the function produces
Example: _	function name	_(input(s)	)=_	what the function produces
Defini	tion			
Write the	definition, giving v	rariable names to a	ll your in	put values
<b>Define</b> :	function name	(variables	_)=	

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Name:	Date:	Per:

#### safe-left? (word problem)



Stage 15

**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.

x coordinate and checks to see in it is greater than 50.					
Contr	act and Purpo	ose	Statemen	t	
Every con	ntract has three par	ts			
	:				->
functio	n name		dom	ain	> range
		wha	at does the fu	ınction c	lo?
		VVIIC	at does the re	inction d	10:
Exam	ples				
Write som	ne examples for you	ır fun	ction in actio	n	
Example:		(		) =	
					what the function produces
Example:	function name	_(	input(s)	)=_	what the function produces
	runction name		iliput(s)		what the function produces
Defin	ition				
Write the	definition, giving v	ariab	le names to a	ell your ir	nput values
Define: _	function name	(	variables	_)=	

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15	

Name:	Date:	Per:

#### safe-right? (word problem)



Stage 15

**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.

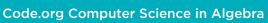
# x-coordinate and checks to see if it is less than 350. **Contract and Purpose Statement** Every contract has three parts... domain function name what does the function do? **Examples** Write some examples for your function in action... **Example**: \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_ metalon name input(s) what the function produces Definition Write the definition, giving variable names to all your input values

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15	

Stage 15

Name:	Date:	Per:

#### onscreen? (word problem)





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... domain function name what does the function do? **Examples** Write some examples for your function in action... **Example**: \_\_\_\_\_ ( \_\_\_\_\_ ) = \_\_\_\_ metalon name input(s) what the function produces **Example**: \_\_\_\_\_ ( \_\_\_\_\_\_ ) = \_\_\_\_ metather function name input(s) what the function produces **Definition** Write the definition, giving variable names to all your input values **Define**: \_\_\_\_ ( \_\_\_\_ ) = function name variables

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Name:	Date:	Per:
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#### cost (word problem)

Stage 16

**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.

called <b>cost</b> which takes in the that topping.	ne name of a topping and outputs	the cost of a pizza with
Contract and Purpo	se Statement	
Every contract has three parts	5	
::	domain	->
function name	domain	range
	what does the function do?	
Examples		
Write some examples for your	function in action	
	() =	
	() =	
Example:	() =	
Example:	() =	
Definition		
Write the definition, giving var	riable names to all your input value	25
Define: ( function name	variables ) =	

Name:			

Player sprite respond to different key presses.

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

Per:

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#### **Key Code Reference**

**Code.org Computer Science in Algebra** 

C O E

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

Key	Code	Key	Code
left arrow	37	G	71
up arrow	38	Н	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	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
D	68	X	88
E	69	Y	89
F	70	Z	90

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Name: Date:	Per:
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#### update-player (word problem)



Stage 16

**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.

the key pressed and the player	's y-coc	ordinate, and	returns the new y-coord	dinate.
Contract and Purpose	State	ement		
Every contract has three parts				
::				
function name		domain		range
wh	hat does	s the function	n do?	
Examples				
Write some examples for your fu	ınction i	in action		
Example: <u>update-player</u> (_	38	<u>240</u> )=	240 + 10	
Example: <u>update-player</u> (_	40	<u>240</u> )=	240 - 10	
Example: <u>update-player</u> (_	38	<u>250</u> )=		
Example: <u>update-player</u> ( _	40	<u>250</u> )=		
Definition				
Write the definition, giving varial	ble nam	es to all your	input values	
Define: (	variab	) = les		

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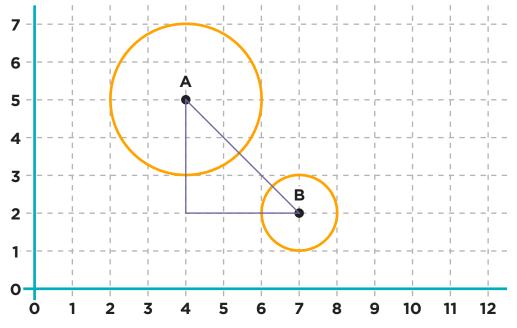
#### **Collision Detection**

C O D E

**Code.org Computer Science in Algebra** 

#### Graph #1

Stage 19



#### 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  $a^2 + b^2$ 

\_\_\_\_\_

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

Per:

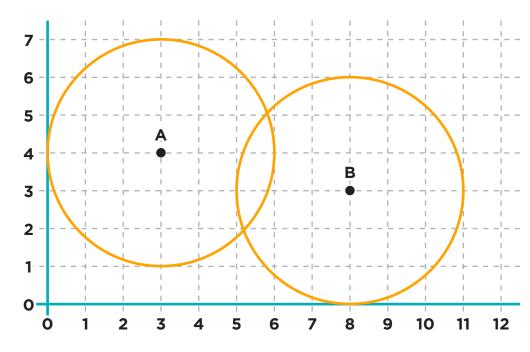
#### **Collision Detection**

C O D E

Stage 19

**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  $a^2 + b^2$ 

\_\_\_\_

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

Per: \_\_

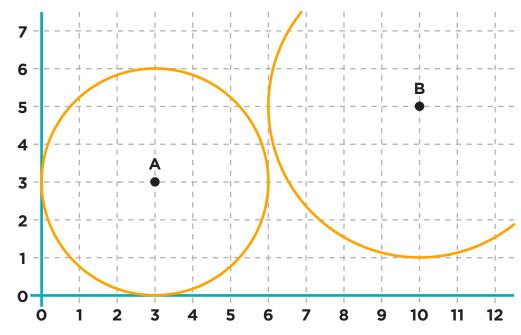
#### Stage 19

#### **Collision Detection**

C O D E

**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  $a^2 + b^2$

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Name:	Date:	Per:	

#### line-length (word problem)



**Code.org Computer Science in Algebra** Stage 20

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.						
Cont	ract and Purp	ose	Stateme	nt		
Every co	ntract has three pai	rts				
::::		don	nain	> range		
		wha	at does the f	unction o	do?	
Exan	nples					
Write so.	me examples for yo	ur fur	nction in acti	on		
Example	: line-length	_(	10	<u></u>	<i>IO - 5</i> what the function produces	
Example	function name	_ (	input(s)	<u> </u>	what the function produces	
Defir	nition					
Write the	e definition, giving v	ariabi	le names to a	all your ir	nput values	
Define:	function name	(	variables	)=		

20	

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

#### The Distance Formula

C O D E

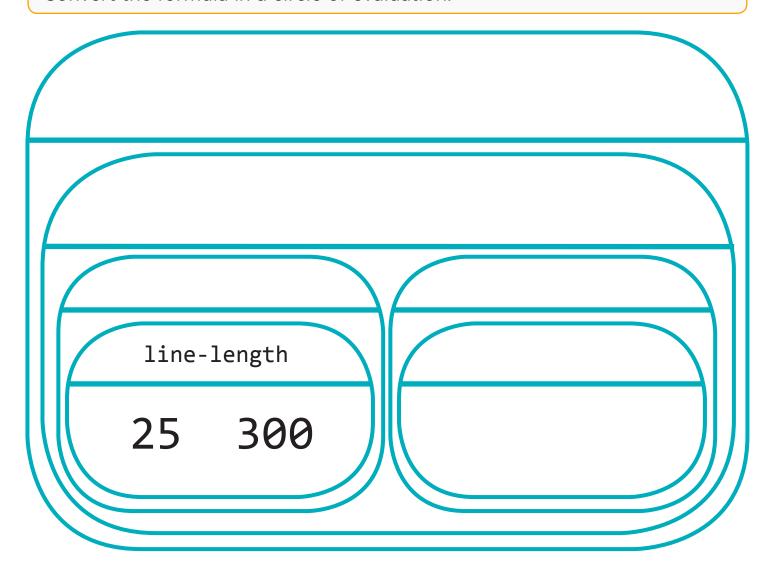
Stage 20

**Code.org Computer Science in Algebra** 

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

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

Convert the formula in a circle of evaluation.



20	

Stage 20

Name:	Date:	Per:

#### 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 con	tract has three pai	rts				
	::			>		
function name		domain		range		
		what does the f	unction d	o?		
Exam	ples					
	ne examples for you	ur function in actio	on			
Example:		(	) =			
	function name	input(s)		what the function produces		
Example:	function name	_ (input(s)	) = _	what the function produces		
Defini	ition					
Write the definition, giving variable names to all your input values						
Define: _	function name	(variables	)=			

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Stage 20

Name:	Date:	Per:

#### collide? (word problem)

C O E

**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?

is the player 3 x and y within 100 pixels of the other character 3 x and y:						
Contract and Purpose Statement						
Every cor	ntract has three par	ts				
function	:: on name		dom		->	
Tunctic	on name		don	IdIII	range	
		wha	nt does the fu	unction c	lo?	
Exam	ples					
Write son	ne examples for you	ur fun	ction in actio	n		
	,					
Example:		_(		) = _		
	function name		input(s)		what the function produces	
Example:		(		) =		
	function name	_ `	input(s)		what the function produces	
Defin	ition					
Defili	Ition					
Write the	definition, giving v	ariabi	le names to a	all your ir	nput values	
Define: _	function name	(		)=		
	function name		variables			

# Example Contract Log Range Domain Name

# Example Contract Log Range Domain Name