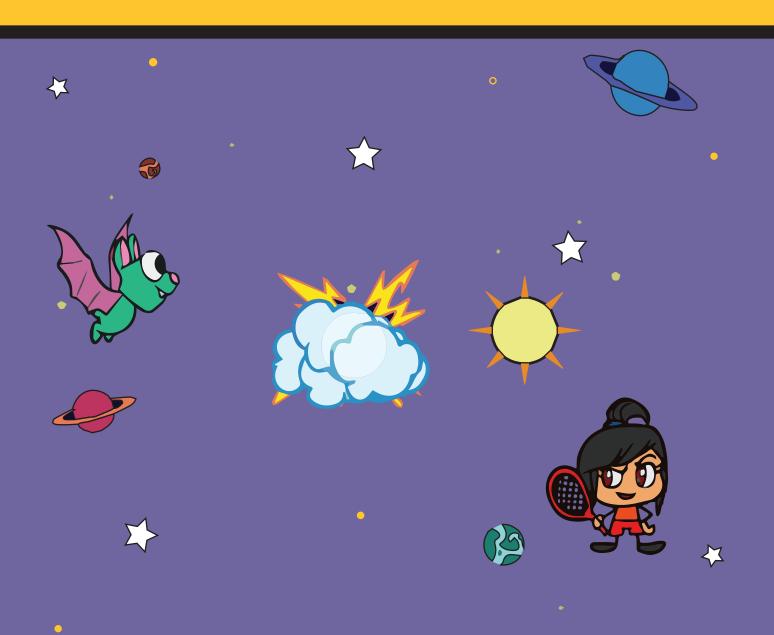
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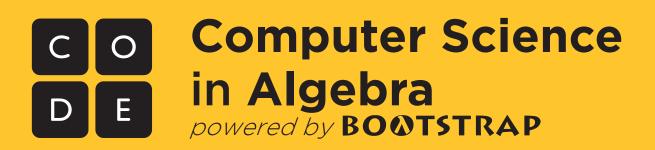


# Computer Science in Algebra

powered by BOOTSTRAP



**Student Workbook** 



# Course A

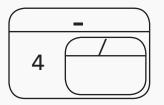
# **Evaluation Blocks**

**Code.org Computer Science in Algebra** 

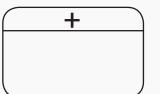


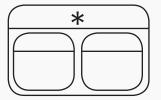
Create the evaluation blocks for the provided equations.

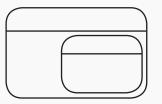












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# **Fast Functions!**

**Code.org Computer Science in Algebra** 



:		domain	>	*2000
name	C.	IOITIAIIT		range
Example:	(	) =		
Example:	(	) =		
Define:	(	) =		

:			->
name	do	main	range
Example:	(	) =	
Example:	(	) =	
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	:		->	
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Example:	(	) =		
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Example:	(	) =		
Example:	(	) =		
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# **Fast Functions!**

**Code.org Computer Science in Algebra** 



: :		domain	->	range
Example:	(	) =		
Example:	(	) =		
Define:	(	) =		

	:		->	
name	do	main		range
Example:	(	) =		
Example:	(	) =		
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Define:	(	) =		

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Code.org Computer Science in Algebra



Descr	iption:			
Contr	act and Purpo	ose Statemer	nt	
Every con	tract has three par	ts		
	::			>
functio	n name	dom	ıaın	range
		what does the fo	unction d	lo?
Exam	ples			
Write som	e examples for you	ur function in actic	יח	
Example:		_(	)=_	what the function produces
Example:	function name	_ ( input(s)	) = _	what the function produces
Defini	ition			
Write the	definition, giving v	rariable names to a	all your in	iput values
Define: _		(	) =	
1	function name	variables		

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Description:					
Contract and Pu	rpose Statement				
Every contract has three					
function name	domain	>range			
	what does the function c	do?			
Examples					
Write some examples for	r your function in action				
<b>Example</b> :function nam	ne input(s) = _	what the function produces			
<b>Example</b> :function nam	ne input(s)	what the function produces			
Definition					
Write the definition, givin	ng variable names to all your ir	nput values			
<b>Define</b> :function name	() =) =				

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Code.org Computer Science in Algebra



Description:					
Contr	act and Purpo	ose Stateme	ent		
Every con	tract has three par	rts			
	::			>	
functio	n name	do	main	range	
		what does the	function c	do?	
Exam	ples				
Write som	ne examples for you	ur function in act	ion		
Example:		_(	)=	what the function produces	
	function name	input(s)		what the function produces	
Example:		_ (	) = _	what the function produces	
	function name	input(s)		what the function produces	
Defin	ition				
Write the	definition, giving v	variable names to	all your in	nput values	
Define: _	function name	(variables	) =		
	ranetion name	variables			

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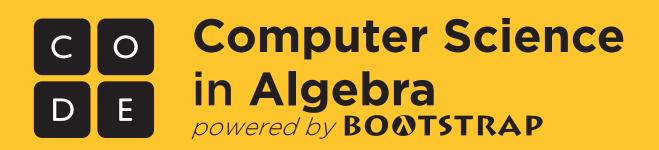
# rocket-height (word problem)

**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.

Cont	ract and Purp	ose S	Statemer	nt	
Every co.	ntract has three pa	rts			
	::				> range
function	on name		dom	nain	range
		wha	t does the fu	unction c	do?
Exam	nples				
Write sor	me examples for yo	ur func	tion in actic	on	
Example	·	_(		) = _	what the function produces
Example	function name	_ (	input(s)	)=_	what the function produces
Defin	nition				
Write the	e definition, giving v	ariable/	e names to a	all your ir	nput values
Define: _	function name	(	variables	) =	



# Course B

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# Reverse Engineering Code.org Computer Science in Algebra



Thing in the game	What changes about it?	More Specifically

Name:	Date:	Per:

## **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:
上 <i>乙</i> UDC Codegorg2Computer Science in A	date-target	(word problem)	C O D E
<b>Description:</b> Write a target's x-coordinate an pixels to the right.			
Contract and Purpos	se Statement		
Every contract has three parts	:		
function name	domain	> _	range
<del></del> -	what does the function	do?	
Examples			
Write some examples for your	function in action		
Example: (			
<b>Example</b> : (function name	( ) = input(s)	what the functi	ion produces

#### **Definition**

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

Define: function name

Name:		Date:	Per:
<b>以</b> <b>以</b> CgdegergzComputer Science	odate-danger	(word problem)	C O D E
-	a function <b>update-da</b> e and produces the ne	•	
Contract and Purp	ose Statement		
Every contract has three par	rts	->	
function name	domain		range
	what does the function do	o?	
Examples			
Write some examples for yo	ur function in action		
<b>Example</b> : function name			
<b>Example</b> :function name	() =	what the function	n produces
Definition			

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

Define: function name

Name:	Date:	Per:

# safe-left? (word problem)



ငတ္ခြင့္မွာင္Computer 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 C001C	illiate alla che	CK3 (0 36	e ii it is	great	er than 50.	
Contra	act and Purpo	ose Sta	tement			
Every cont	ract has three par	'ts				
	:				->	
function	n name		doma	ain	> range	
		what do	es the fur	action d	2	
		What do	es the ful	iction a	O:	
Examp	oles					
Write some	e examples for you	ır function	in action	)		
Example:		(		) =		
					what the function produces	
Example: _	function name	_ (ip		)=_	what the function produces	
	runction name	1111	Jul(s)		what the function produces	
Definit	tion					
Write the c	definition, giving v	ariable na	mes to all	l your in	put values	
<b>Define</b> :	 unction name	( Varia	bles	_)=		

	Name:	Date:	Per:
--	-------	-------	------

## safe-right? (word problem)



Code ၉ g 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.

Contr	act and Purpo	ose Statemen	t	
Every con	tract has three par	ts		
	:			->
functio	n name	dom	ain	> range
		what does the fu	nction c	lo?
Exam	ples			
Write som	e examples for you	ır function in actio	n	
Example:	function name	_(input(s)	) = _	what the function produces
				what the function produces
	function name	input(s)		what the function produces
Defini	ition			
Write the	definition, giving v	ariable names to a	ll your ir	nput values
Define: _	function name	( variables	_)=	

Name:		Date:	Per:
<b>L り</b> Ol Codegor朝SComputer Science	nscreen?	(word proble	m) C O D E
-			takes in a character's left and on the right.
Contract and Purp		nt	
Every contract has three pa	arts		
function name		main	> range
	what does the	function do?	
Examples			
Write some examples for yo	our function in acti	ion	
Example:function name			
<b>Example</b> :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:

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## cost (word problem)



Codegerg 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 <b>cost</b> which takes in that topping.			·
Contract and Purp	oose Stateme	nt	
Every contract has three p	arts		
:			>
function name	dor	main	range
	what does the t	function do?	
Examples			
Write some examples for ye	our function in acti	on	
Example:	(	) =	
Example:	(	) =	
Example:	(	) =	
Example:	(	) =	
Definition			
Write the definition, giving	variable names to	all your input values	5
<b>Define</b> :function name	_ ( variables	) =	

Name <sup>.</sup>	Date:	Per·
Name:	Date	i Ci.

# L & Key Code Reference



Code ၉၈၄၉ Computer Science in Algebra

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.

		Code
37	G	71
38	Н	72
39	1	73
40	J	74
48	K	75
49	L	76
50	М	77
51	Ν	78
52	0	79
53	Р	80
54	Q	81
55	R	82
56	S	83
57	Т	84
65	U	85
66	V	86
67	W	87
68	X	88
69	Y	89
70	Z	90
	38 39 40 48 49 50 51 52 53 54 55 56 57 65 66 67 68 69	38 H 39 I 40 J 48 K 49 L 50 M 51 N 52 O 53 P 54 Q 55 R 56 S 57 T 65 U 66 V 67 W 68 X 69 Y

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## update-player (word problem)



Cotcherer BComputer 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	 e

what does the function do?

#### **Examples**

Write some examples for your function in action...

Example: <u>update-player</u> ( <u>38 240</u>) = <u>240 + 10</u>

Example: <u>update-player</u> ( <u>40 240</u>) = <u>240 - 10</u>

Example: <u>update-player</u> ( <u>38 250</u> ) = \_\_\_\_\_

Example: <u>update-player</u> ( <u>40 250</u> ) = \_\_\_\_\_

#### **Definition**

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

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

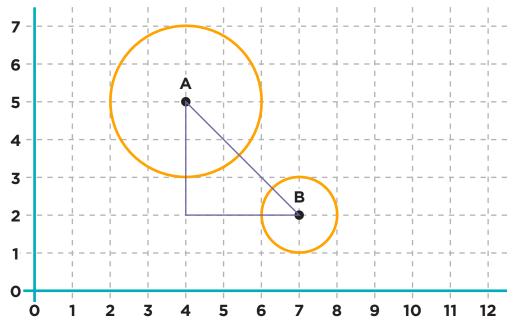
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## **Collision Detection**

C O D E

Code ျပော့ 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  $a^2 + b^2$ 

\_\_\_\_\_

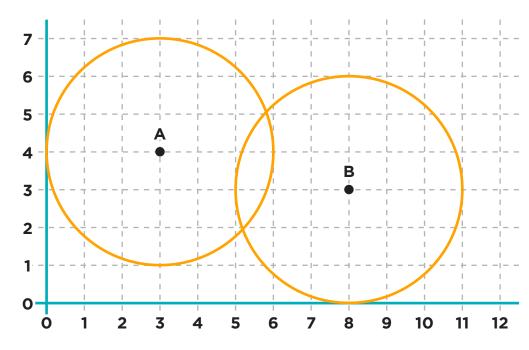
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## **Collision Detection**

C O D E

Code Prop 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  $a^2 + b^2$ 

\_\_\_\_\_

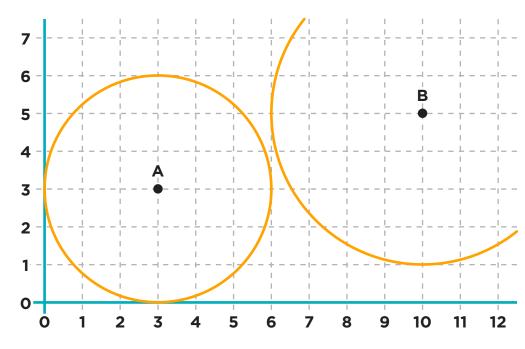
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## **Collision Detection**

C O D E

Code Or 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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## line-length (word problem)



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

Example: 
$$\frac{\textit{line-length}}{\textit{function name}}$$
 (  $\frac{2}{\textit{s}}$ ) =  $\frac{8-2}{\textit{what the function produces}}$ 

#### **Definition**

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

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

# The Distance Formula

പ്രേട്ടില്പള് 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.

line-length

300

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# distance (word problem)

C O E

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**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.					
Contra	act and Purp	ose S	Statemen	t	
Every con	tract has three par	rts			
functio	::::		dom	ain	> range
		wha	t does the fu	ınction d	 lo?
Exam	ples				
Write som	e examples for you	ur fund	ction in actio	n	
Example:	function name	_(	input(s)	)=_	what the function produces
Example:	function name	_(	input(s)	)=_	what the function produces
Defini	tion				
Write the	definition, giving v	ariabl'	e names to a	ell your in	nput values
Define:	function name	(	variables	_)=	

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# collide? (word problem)



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**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 p	layer's x and y v	within <sup>1</sup>	100 pixels	of the	other character's x and y?	
Contra	act and Purpo	ose St	atemen	t		
Every con	tract has three par	ts				
	::				>	
function	n name		dom	ain	> range	
		what	does the fu	ınction d	lo?	
Exam	ples					
Write som	e examples for you	ır functı	ion in actio	n		
Example:		_(		) =	what the function produces	
Example:	function name	_(	input(s)	)=	what the function produces	
Defini	tion					
Write the	definition, giving v	ariable	names to a	ll your in	put values	
<b>Define</b> :f	unction name	( va	riables	_)=		

# Example Contract Log Range Domain Name

# Example Contract Log Range Domain Name