Haunted Code Chronicles: Mission 1 Answer Key

Warm-Up	
What do you already know about programming?	Answers for the warm-up questions will vary. There is no “correct” answer. These are great points of discussion.
What do you know about Python?	
What is something you hope to learn during this mission?	
Mission 1 – The Front Porch	
Mission 1 Objective 1: Read the instructions. Complete the goal.	
Mission 1 Objective 2: Read the instructions.	
Click on the Hints Icon and read both hints. Where will you find your score?	Click on the progress button (looks like a bar graph) on the left side of the text editor.
Mission 1 Objective 3: Read the instructions. Click on the word “debugging.” • Complete the goal by opening your toolbox.	
Mission 1 Objective 4: Read the instructions. • If a file is already open in the text editor, make any change by first clicking in the code. • If you don’t have an open file in the text editor, make a new file (File → New File) and call it HCC_obj4.	
Mission 1 Objective 5: Read the instructions and the Hint. • Complete the goals. You will need to spin the virtual scene at least twice.	
Mission 1 Objective 6: Read the instructions and the Hints. • Complete the goal. Use the camera controls to rotate the ‘bot so you see its back.	
Mission 1 Objective 7: Read the instructions.	
What is an LED?	It is a tiny electronic component that produces light. It stands for Light Emitting Diode.
Mission 1 Objective 8: Read ALL the instructions. When you are ready to run your code, close CodeTrek and the Objective Panel so you can see CodeBot’s LEDs.	
What does the * mean?	It means to import everything.
What is the code for turning on LED #7?	leds.user(7, True)
Mission 1 Objective 9: Read ALL the instructions. When you are ready to run your code, close CodeTrek and the Objective Panel so you can see CodeBot’s LEDs and the ‘bot move.	
What does a comment look like?	A comment starts with #
What is the fastest speed CodeBot can go?	Its power level goes from -100 to 100.

How do you move the ‘bot in a straight line?	Use the same positive power in both wheels.
How do you move the ‘bot in a curved line?	Use different positive power in both wheels.
How do you move the ‘bot backward?	Use the same negative power in both wheels.
How do you rotate the ‘bot?	Use the same but opposite power to the wheels.
Mission 1 Objective 10: Read ALL the instructions and the Hints.	
After zooming out, identify the spiders you want to tag, and the order you will tag them. You can use the image below to help you plan. Write your plan here ➔	A plan might look like this: First move backward to tag spider #1. Then move forward to tag spider #3 and #4. Rotate clockwise about 60 degrees. Move forward to tag spider #6.
Write the code for the challenge, one spider at a time. Add comments to separate the movements for each spider; this will help you as your code gets longer. Also, try different cameras and find the one that helps you the most. Important note: CodeBot doesn’t move exactly the same every time you run the code. If your code looks good, but the program run is a little off, just reset the scene and run it again.	
Mission 1 Objective 11: Read the instructions. Use the Universal camera to explore the front porch and find the envelope.	
What information is in the note?	The message warned of rats. It gave a list of names and numbers. It also said CodeX was captured.
Mission 1 Objective 12: Read ALL the instructions.	
What is the challenge for this objective?	Play a melody for each rat to put it to sleep. There must be silence in between the melodies. The last rat needs to hear its melody more than once. Use the CodeBot speaker to play the melodies.
Start a new file. Copy the code from the instructions and paste it in the new file. You can delete the comments starting on line 12. Check CodeTrek to get started. Don’t forget to import your libraries. And don’t forget about Sarah! Put her to sleep after Jeff. Rotate the camera before you run the code so you can see the rats being put to sleep.	
Mission 1 Objective 13: Read the instructions and the Hint. Use CodeTrek to get the code started.	
What code will you use to drive CodeBot through the hole in the door? The faster you get through, the higher the score.	motors.run(LEFT, 100) motors.run(RIGHT, 100)
Reflection	
What is something you learned about programming today?	Answers will vary. The answer could be programming related, like how to move CodeBot or turn on a light. It could be something about themselves, like “I have patience” or “I like programming.”


5
4
6
3
2
1

Haunted Code Chronicles: Mission 2 Answer Key

Warm-Up	

You type in this code, and the 'bot doesn't move. What is the problem?
`from botcore import *`
`from time import sleep`
 	
`motors.run(LEFT, 40)`
`motors.run(RIGHT, 40)`
`sleep(3)`
	The motors were not enabled.
	
	The code needs:
	motors.enabled(True)

For this mission, CodeBot will need to detect when the TV is on. How do you think it will do this?	Answers will vary. They may think about using a sensor, or their answers may be very creative.
Mission 2 – The Living Room	
Mission 2 Objective 1: Read the instructions.	
How does CodeBot curve to the right?	Power to the left wheel is a little more than the power to the right wheel.
How does CodeBot curve to the left?	Power to the left wheel is a little less than the power to the right.
Mission 2 Objective 2: Read the instructions and the Hints. Continue your code in ***PopcornMunch***.	
Will you use a function (Yes or No)?	Students decide to use a function or not – Yes or No
Complete the goal by munching at least 3 pieces of popcorn. There is no time limit, so if you want to increase your score by munching more than three, you can take your time and write more code.	
Mission 2 Objective 3: Read the instructions and the Hint.	
What is the challenge of this objective?	Drive through the living room doorway.
You can choose to go straight through the door, or take a detour and munch more popcorn first for a higher score.	
Mission 2 Objective 4: Read the instructions and the Hint.	
When does the door start to close?	The door starts to close when the TV flickered on, or when the face appears.
What does CodeBot use to detect infrared?	Proximity sensors
Mission 2 Objective 5: Read the instructions and the Hints.	
What is another name for REPL?	The Console
What is it used for?	Output messages using the print function, and get keyboard input using the input function.

CodeTrek uses very little code for this objective. You can delete your code and follow CodeTrek. If you want to keep your popcorn munching code for use later, you can do a File ➔ Save As and give your program a different name.	
Open the console before running your code. Let the code run for a little bit. Pay attention to the reading when the TV is on and when the TV is off.	
Sensor reading when the tv is on:	(True, True)
Sensor reading when the tv is off:	(False, False)
Mission 2 Quiz: Answer the two quiz questions.	
Mission 2 Objective 6: Read the instructions and Hints.	
What is a while loop used for?	A while loop is used to repeat a block of code while a condition is true.
What is the challenge of this objective?	Turn on a line sensor LED when the TV is off, and turn off the LED when the TV is on.
Open the console and run your code. You can zoom in to see the LEDs. Let the code run for about 30 seconds until the goal is met. Stop the code by clicking the STOP button.	
Mission 2 Objective 7: Read the instructions. You do not need the console for this objective.	
What is the challenge for this objective?	Escape through the living room door by moving only when the TV is off.
Think about how you can code the 'bot to complete this challenge. Type your plan in the space provided ➔	Answers will vary. A possible answer: Set the same power for the left and right wheels. Use a while loop to constantly read the proximity sensors. If the TV is off, turn on the LED and enable the motors. If the TV is on, turn off the LED and disable the motors.
Reflection	
Review your answer to the second warm-up question. How did you write code to detect if the TV was on? Compare the actual code to your answer.	Answers for the question will vary. They should mention using the proximity sensors to detect the television on/off, and also reference their prediction from the warm-up question.
What is something you learned about yourself during this mission?	Answers for the question will vary. It could be something like "I have patience" or "I like programming" or "I am good at finding errors."

Haunted Code Chronicles: Mission 3 Answer Key

Warm-Up	
What do you know about binary numbers?	Answers will vary. They may know nothing. Or possible answers: • Used by computers to represent data • 8 bits is a byte • Has two digits: 0 and 1 • Can be used to represent all numbers
What do you know about hexadecimal numbers?	Answers will vary. Again, they may know nothing. Or possible answers: • Used by computers to represent data • Has 16 digits • Can be used to represent all numbers
Mission 3 – The Kitchen	
Mission 3 Objective 1: Read the instructions.	
What does the binary number “0” represent?	Off (or False)
What does the binary number “1” represent?	On (or True)
Which user LEDs are turned on with this line of code? `leds.user(0b10000101)`	User LEDs 7, 2 and 0
Mission 3 Objective 2: Read the instructions and the Hints. Continue your code in ***BinaryBits***. You can delete the code under the imports, and then add your code for this objective.	
What is the value of “True or False”?	True
What is the value of “True and False”?	False
Complete the challenge by answering the Boolean question, and then turning on or off the user LEDs. Two examples: LED 5 True and False? – LED 5 will be off, since True and False is False. All other lights will be on. LED 5 True or False? – LED 5 will be on, since True or False is True. All other lights will be off.	
Mission 3 Objective 3: Read the instructions. Continue your program in ***BinaryBits*** by deleting the code for Objective 2.	
What is the bitwise operator for AND?	&
What is the bitwise operator for OR?	|
What is 0 & 1?	0
What is 0 | 1?	1
Solve the bitwise math problem and then turn on/off the LEDs, or use the Hints for a higher score.	
Mission 3 Objective 4: Read the instructions and the Hint. `0x` is used to designate a hexadecimal number, just like `0b` is used to designate a binary number.	

What are the 16 hex digits?	0-9 and A-F

Modify your code in the ***BinaryBits*** program to complete the challenge using hexadecimal numbers.

Mission 3 Objective 5: Read the instructions and the Hints.

Use the camera controls to explore the kitchen. Each of the four pumpkins on mats has a 2-digit hexadecimal number hovering above it. Write down the number for each pumpkin. You will need these numbers in your program.
Numbers may be different for each student. They should record the hex numbers above their pumpkins.

Gray mat pumpkin 0x84	Purple mat pumpkin 0x2C	Green mat pumpkin 0x48	Dark red mat pumpkin 0x9E

The first Hint gives the algorithm for dispelling each pumpkin. Write the algorithm in the space provided ➔	Drive to first pumpkin (gray mat) under table Unhex the pumpkin, using 0x84 Drive to second pumpkin (purple mat) Unhex the pumpkin using 0x2C Drive to the third pumpkin (green mat) Unhex the pumpkin using 0x48

This is a difficult challenge. Don't give up! Remember – CodeBot won't work the same way each time. Try your code several times. You need to reach three of the four pumpkins. There is a time limit! CodeTrek gives the code for the first pumpkin. Then move to the next pumpkin and repeat the steps for dispelling the pumpkin.

Mission 3 Objective 6: Read the instructions and Hints.

There is no time limit on this challenge, so it is your chance to really work on your CodeBot moving skills. You can go straight for the door, or take your time and munch on snacks. This challenge is all about moving CodeBot.

Reflection

What did you learn about binary and hexadecimal numbers?	Answers will vary. Anything learned from the mission is an acceptable answer.
What is a problem you had during this mission? How did you overcome the problem?	This is a good reflection question for students to share. They can realize they are not alone when having problems with coding, and learn from each other some debugging techniques. A discussion will also promote a growth mindset.

Haunted Code Chronicles: Mission 4 Answer Key

Warm-Up	
What do you remember about proximity sensors?	Answers will vary. Possible answers: • They detect reflected light. • They are used to detect objects in front of CodeBot. • The proximity sensor reading can be used to control the 'bot.
What is a common programming error? What can you do to avoid it?	Many possible answers. Have students share, or create a chart with their responses.

Mission 4 – The Hallway	
Mission 4 Objective 1: Read the instructions.	
What do line sensors detect?	They detect how much light is reflected from the floor.
What are two factors in determining the brightness level?	Reflectivity and distance
What is the range of values for a line sensor reading?	The range is from 0 to 4095
What type of reading do you get with a darker floor?	A higher reading (more reflection results in lower sensor readings).
Follow the code in CodeTrek. Don't forget to open the Console before running your program. Stop the code after the goal is met. Keep the Console open for the next objective.	
Mission 4 Objective 2: Read the instructions and the Hint.	
What is a reading on the floor?	2849 (or similar numbers)
What is a reading on the dark stain?	3785 (or similar numbers)
Pick a value in between the readings as your threshold. What did you choose?	Possible threshold: 3300
Add code to your program so the 'bot stops when it reaches the spot.	
Mission 4 Objective 3: Read the instructions. Continue your program in ***BinaryBits*** by deleting the code for Objective 2.	
How do you read all the line sensors at the same time?	ls.check(threshold)
What does the reading return?	A tuple of five Booleans, such as (False, False, True, False, False)
How do you access only the middle reading (line sensor 2)?	middle = vals[2] Use the index of the sensor you want to access.
Use CodeTrek to modify your code to read all the sensors. Be careful! Some small changes are made, such as changing val to vals for the reading, using the variable middle, and modifying the if statement.	

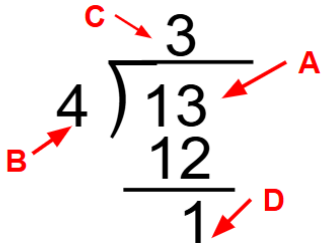
Mission 4 Objective 4: Read the instructions.	
Explain the Bang Bang Controller algorithm:	If the left sensor is hit, turn left. If the right sensor is hit, turn right. Otherwise, go straight.
Modify your code in the ***HallwayStains*** program to complete the challenge using the code from CodeBat. Run the code. Then adjust the SPEED and TURN_FACTOR as needed to meet the goal.	
Reflection	
You learned how to use the line sensors to follow a dark line. What other ways could CodeBot use the line sensors?	Answers will vary. The line sensors can be used to detect a line and then avoid it, or to stay off a line, or to tell if the floor has changed, like to a tile instead of wood floor.
What is something you enjoy about programming?	Answers will vary. Hopefully students have at least one thing they like about programming. If they don't like anything, have them explain why not. Don't let them just say "nothing" or "everything".

Haunted Code Chronicles: Mission 5 Answer Key

Warm-Up

This mission uses division. What are the parts of a long division problem?

A. Dividend
B. Divisor
C. Quotient
D. Remainder



Answer these division problems:

A. $19 \div 5$
B. $8 \div 3$
C. $4 \div 6$
D. $24 \div 4$

	Quotient	Remainder
A	3	4
B	2	2
C	0	4
D	6	0

Mission 5 – The Library

Mission 5 Objective 1: Read the instructions and the Hints.

What is your plan for knocking off the box?	Answers may vary. Possible answer: Turn slightly to the right and then straight ahead at top speed.
After completing the challenge, read the completion message. Click on the tool 🔧**Modulo**. What Python code gives the quotient and remainder separately?	17 // 5 = 3 (quotient) 17 % 5 = 2 (remainder)

Mission 5 Objective 2: Read the instructions.

Light up each lamp individually, following the instructions. Is there a pattern?	Possible answer: The lamps are numbered clockwise, going around the room.
Light up all the lamps at the same time. What happens?	Nothing happens. No lamps are lit.
Follow CodeTrek. Run the code again. Change the camera to Rotate to see the Spectral Energy Card. What do you observe?	The energy goes up when the ghost is near the lamp and goes to zero when it is not near the lamp.

Mission 5 Objective 3: Read the instructions in the Objective Panel and in CodeTrek.

What code cycles to the next light?	light = light + 1

Why do you need this line of code:
`if light == 5:`
`  light = 0`
	The lamps are numbered 0-4, so when light reaches 5, it needs to be reset to 0.

Mission 5 Objective 4: Read the instructions and Hints	
What is “Epoch time”?	The number of seconds since Jan. 1, 1970, which is a frame of reference computers use to count time.
What code lets you achieve “floor”?	Use the int() function.
What is “mod” short for? What symbol in Python do you use for it?	Short for modulo %
Modify your code in the ***Lamplighter*** program to complete the challenge. Use the Hints for the equation. Then run the code and watch the spectral energy reach 100.	
Mission 5 Objective 5: Read the instructions and the Hints.	
Follow CodeTrek and the Hints to drive CodeBot up the fallen shelf. It will fall off.	
Mission 5 Objective 6: Read the instructions and Hints.	
What is the accelerometer?	A sensor that can detect motion and gravitational acceleration
When CodeBot’s nose is pointed straight up, what is the x-axis?	0
Which way do you steer if the x-axis is negative?	Steer left
Which way do you steer if the x-axis is positive?	Steer right
Use CodeTrek to help with the code. The second Hint also provides some really useful information.	
Reflection	
Other than the spectral dance, what is another example of when to use modulo?	Answers will vary. Possible answers: • When you only want to know the left-over amount. • To split a number, like a 2-digit number into its tens and ones. • When you have inches and you want to know feet and inches. • You can use it to keep track of whose turn it is in a multi-player game. • To stay within a range of numbers.
Other than driving uphill, what is another example of when to use the accelerometer?	Answers will vary: • Detect motion • Detect sideways position • Detect gravity

Haunted Code Chronicles: Mission 6 Answer Key

Warm-Up	
What do you know about encryption?	Answers will vary. Possible answers: • Used by computers to protect data • Part of cybersecurity • Uses a key to convert data, like a secret code • Many types of encryption, like substitution, symmetric and asymmetric
What do you know about how computers represent letters or colors?	Answers will vary. Possible answers: • Computers use codes to change a letter to a number • Computers use codes to change colors to numbers • Computers use math to change sound waves to numbers
Mission 6 – The Attic	
Mission 6 Objective 1: Read the instructions and the Hints.	
What is your plan for making the LEDs swish?	If students follow the plan in the instructions, it is like this: • Turn on LED 0 for 0.1 seconds • Turn off LED 0 • Turn on LED 1 for 0.1 seconds • Turn off LED 1 • Repeat for all LEDs one way, and then the next Students may choose to use loops. Their algorithm will be different. The point here is to have a plan before starting to code.
Use CodeTrek and the hints to complete the challenge. The LEDs need to swish a few times before the goal is met.	
Mission 6 Objective 2: Read the instructions. The note from CodeBat gives a lot of important information.	
What is the algebraic equation for a line?	y = mx + b
What is the numeric code?	2024
What are the numbers in the numeric code used for?	As the values for x. Run the equation 4 times, and each time use one of the values for x.
Research Turing's birth year:	1912
Research Turing's death year:	1954
Use CodeTrek and the Hints to write the code to encrypt the message.	
Mission 6 Objective 3: Read the instructions and Hint.	
What are the three goals for this objective?	• Collect at least 6 trinkets • Drive close to the window (and stop there) • Run a program. Bonus for using a function.
Mission 6 Objective 4: Read the instructions and CodeTrek. The note left by CodeBat again contains an important clue.	

<table>
<tr><td>What word needs to be spelled in morse code?</td><td>DEBUG</td></tr>
<tr><td>CodeTrek gives the values of important variables. What are these values?</td><td>MORSE_TONE = 600
T_DOT = 0.1
T_DASH = 0.4
T_GAP = 0.1
T_PAUSE = 0.5</td></tr>
<tr><td>Where is the Pocket Signal Disk?</td><td>At the base of the candlesticks</td></tr>
<tr><td>What are the morse codes needed to unlock the trunk?</td><td><table><tr><td>Letter</td><td>Morse Code</td></tr><tr><td>D</td><td>Dash dot dot</td></tr><tr><td>E</td><td>dot</td></tr><tr><td>B</td><td>Dash dot dot dot</td></tr><tr><td>U</td><td>Dot dot dash</td></tr><tr><td>G</td><td>Dash dash dot</td></tr></table></td></tr>
<tr><td colspan="2">Use CodeTrek as a guide, but you cannot just copy the code. CodeTrek shows how to play an ‘A’, but that is not part of the code word. Look at the first two Hints as you start to write your program. Have your sound turned on to hear the beeps.</td></tr>
<tr><td colspan="2">Mission 6 Objective 5: Read the instructions and Hints.</td></tr>
<tr><td>What is the challenge for this objective?</td><td>Break the spell by displaying each letter of the magic work on the user LEDs.</td></tr>
<tr><td>Type the code to check out the ord() function. It prints the ASCII for A and a.</td><td>ord(‘A’) = 65
ord(‘a’) = 97</td></tr>
<tr><td colspan="2">Use CodeTrek to help with the code. Don’t forget to read the Hint; it has some really useful information.</td></tr>
<tr><td colspan="2">Reflection: Now that you have completed the mission pack, reflect back on your experience.</td></tr>
<tr><td>What mission, or room was your least favorite, and why?</td><td>Answers will vary.</td></tr>
<tr><td>What mission, or room was your favorite, and why?</td><td>Answers will vary.</td></tr>
<tr><td>What skills have you gained or improved while working through the Haunted Code Chronicles?</td><td>Answers will vary. Possible answers could include:
Critical thinking, Problem solving, Patience
Growth mindset</td></tr>
</table>