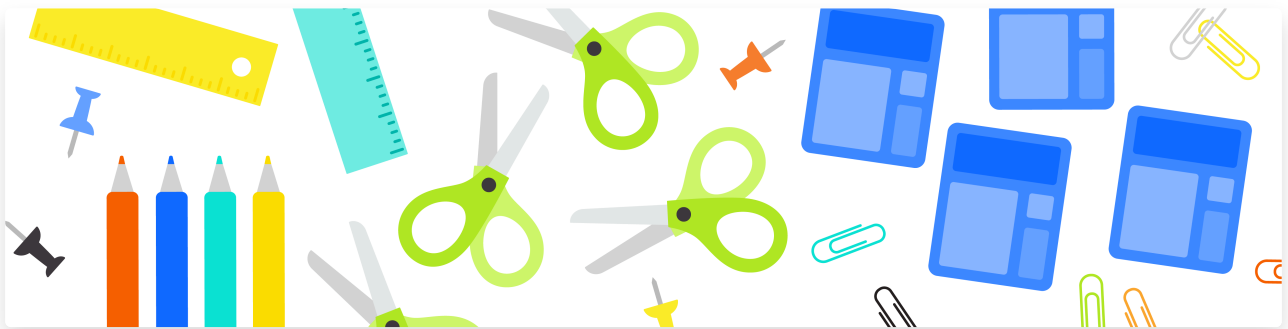


Variables

Textbook

Variables

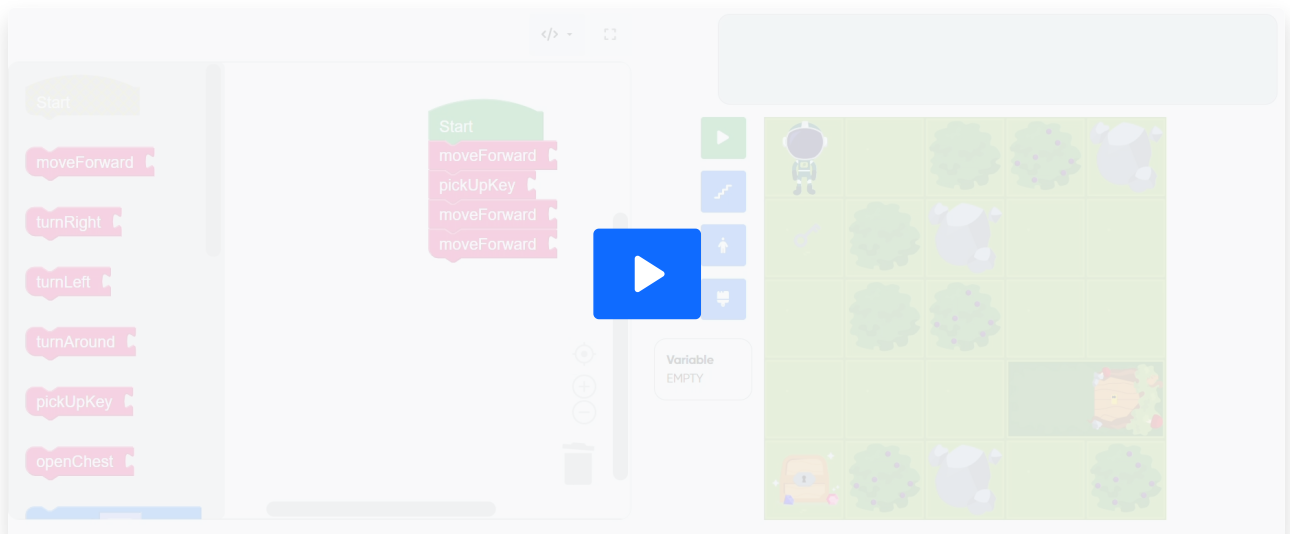


You are a big fan of organization, so you like to organize your school supplies into labeled boxes. One box is for pencils, another for markers, and another for erasers. If you run out of pencils, you can refill the box with more, but the box itself doesn't change, it still holds pencils. Similarly, if you decide to use that box for something else, like paper clips, you can replace what's inside. Variables in programming work the same way, they store information that you can update or change as needed!

A variable is like a container in programming that can hold a piece of information or value. This value can be a number, text, or even more complex things like a list of items. Here's how variables work:

1. **Storing Information:** You can assign a value to a variable, like storing a number or a name in a container.
2. **Reusing Information:** Once a variable is created, you can use it multiple times in your program.
3. **Updating Information:** Variables can change their value.

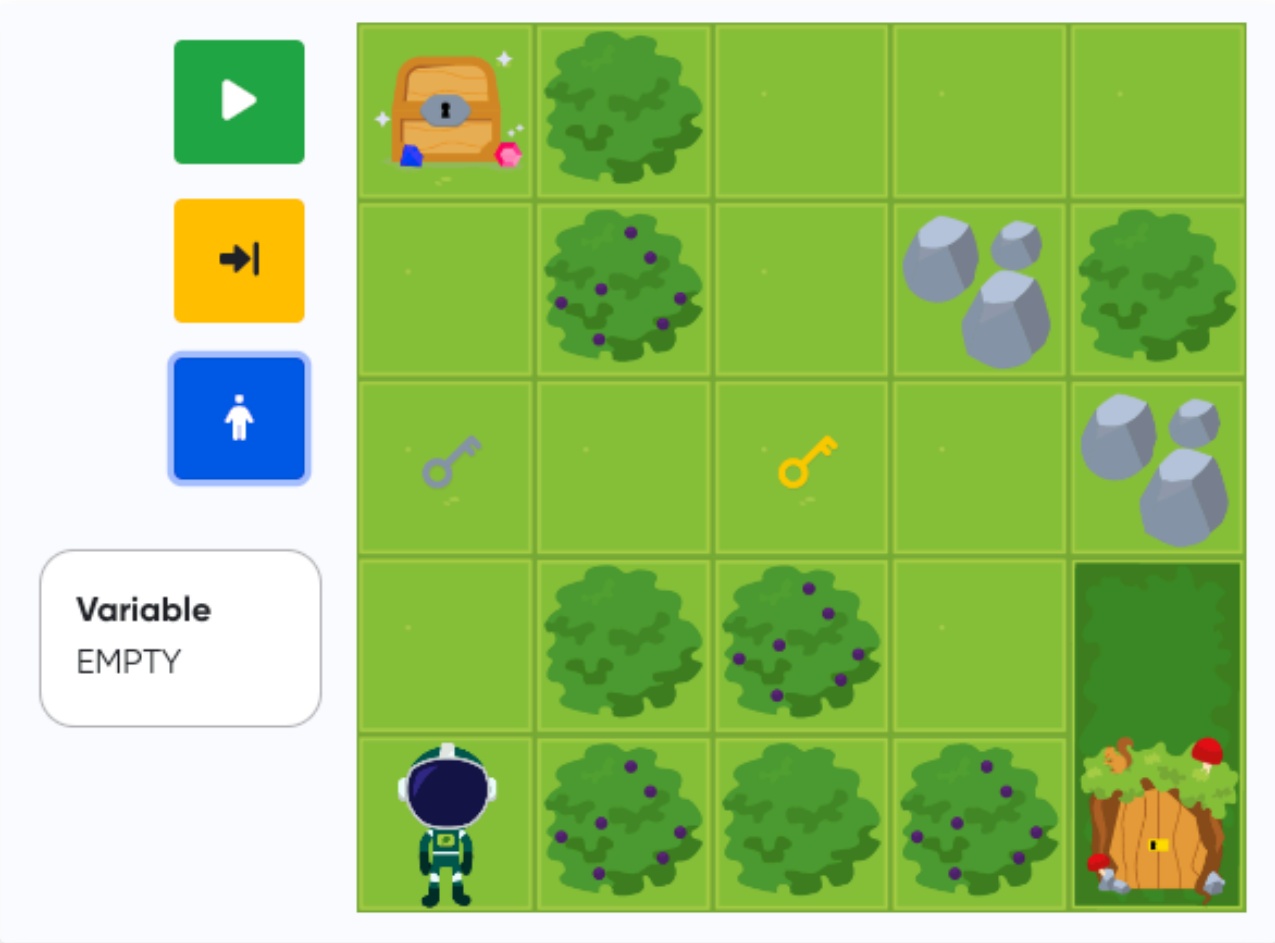
Variables Video



Practice Using Variables

Try programming with variables in the code puzzles!

In the puzzle, the variable acts like a pocket for our character. The key that you can pick up goes into the variable. Notice where it says "variable" next to the puzzle.



The block that says `pickUpKey` will put the key into your variable. If you pick up another key with a key already in your variable, the new key will replace what is in there. The variable can only hold one thing at a time.

The silver key opens the chest. The gold key opens the door. The chest must be open and the gold key collected to finish the puzzle.

Here is both the block and syntax code that will allow the character above to pick up a key and open the chest.

Blocks	Syntax
	<pre>1 turnAround(); 2 moveForward(); 3 moveForward(); 4 pickUpKey() 5 moveForward(); 6 openChest();</pre>

Critical Thinking Questions

1. Can you think of an example in your daily life where you use something like a "variable" to hold or update information? How does it help you stay organized?
2. Why do you think it's important for variables in programming to be able to change their value as needed?

Questions (5)

1. What is a variable in programming?

MULTIPLE CHOICE

Choose the correct answer:

- A. A kind of container that holds code
- B. A randomized value of code
- C. A kind of programming language
- D. The order of code

2. True or False: You cannot replace what's inside a variable

MULTIPLE CHOICE

Choose the correct answer:

- A. True
- B. False

3. If a variable in a program holds the value "5", and then you change it to hold "10", what has changed?

MULTIPLE CHOICE

Choose the correct answer:

- A. The color of the variable
- B. The shape of the variable
- C. The contents or value

4. In a program, if you have a variable called "myNumber" and you set it to 7, what value is stored in "myNumber"?

MULTIPLE CHOICE

Choose the correct answer:

- A. 1
- B. 5
- C. 3
- D. 7

5. How is using a variable in programming similar to using an empty bag?

MULTIPLE CHOICE

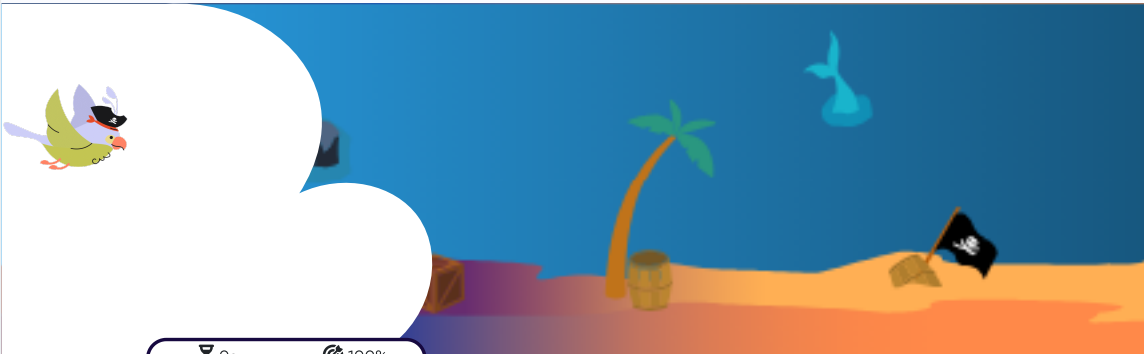
Choose the correct answer:

- A. They both can hold many different things
- B. They both are very small
- C. They both are made of glass

Games (2)

1. Variables Typing Game

Full Screen Audio Instructions Restart Pause



0s 100%

Using a variable in progr

2. Variables Memory Game

Full Screen

Audio

Instructions

Answer Key

Pause

Flips: 0

1

Variable
EMPTY

2

Variable
EMPTY

3


4

5

6

7

8



Puzzles (10)

1. Variables #1

Instructions

Answer Key

</>

Start

moveForward

turnRight

turnLeft

turnAround

pickUpKey

repeat 10 times

do

repeat while

do

if

do

and

not

isClearAhead

isClearLeft

Variable
EMPTY

		Robot	Bush	Rock
		Rock	Bush	Water
	Rock	Bush	Rock	Water
		Bush	Bush	Water
Key		Grass	Grass	Bush

2. Variables #2

Instructions

Answer Key

</>

Start

moveForward

turnRight

turnLeft

turnAround

pickUpKey

openChest

repeat 10 times

do

repeat while

do

if

do

and



not

isClearAhead

Variable
EMPTY

Grass	Rock	Key	Rock	Chest
Grass			Rock	
Rock	Bush		Rock	
Bush				Key
Robot		Rock	Rock	

3. Variables #3

Instructions  Answer Key 

Start

moveForward

turnRight

turnLeft

turnAround

pickUpKey

openChest

repeat 10 times

do

repeat while

do

if

do

and

not

isClearAhead

Start

▶



↗

👤

🔌

Variable
EMPTY

4. Variables #4

Instructions  Answer Key 

Start

moveForward

turnRight

turnLeft

turnAround

pickUpKey

openChest

repeat 10 times

do

repeat while

do

if

do

and

not

isClearAhead

Start

▶



↗

👤

🔌

Variable
EMPTY

5. Variables #5

Instructions  Answer Key 

Start

moveForward

turnRight

turnLeft

turnAround

pickUpKey

openChest

repeat 10 times

do

repeat while

do

if




do





and

not














isClearAhead

Start







Variable
EMPTY

6. Variables #6

Instructions  Answer Key 

Start

moveForward

turnRight

turnLeft

turnAround

pickUpKey

pullLever

openChest

repeat 10 times

do




repeat while





do

if






















do

and

Variable
EMPTY

7. Variables #7

Instructions
Answer Key

Start
 moveForward
 turnRight
 turnLeft
 turnAround
 pickUpKey
 pullLever
 openChest
 repeat 10 times
 do
 repeat while
 do
 if
 do
 and

Start



</>
 [Icons]

Play
 Up Arrow
 Down Arrow
 Variable EMPTY

8. Variables #8

[illegible]

9. Variables #9

Instructions  Answer Key 

Start

moveForward

turnRight

turnLeft

turnAround

pickUpKey

pullLever

openChest

repeat 10 times

do

repeat while




do

if

do



and

Start

Variable
EMPTY

10. Variables #10

Instructions  Answer Key 

Start

moveForward

turnRight

turnLeft

turnAround

pickUpKey

pullLever

openChest

repeat 10 times

do

repeat while




do

if

do

and

Start

Variable
EMPTY

Answer Keys & Solutions

Questions

1. What is a variable in programming?

MULTIPLE CHOICE

Correct Answer:

- A. A kind of container that holds code ✓ Correct
- B. A randomized value of code ✗ Incorrect
- C. A kind of programming language ✗ Incorrect
- D. The order of code ✗ Incorrect

Explanation:

A variable holds information.

2. True or False: You cannot replace what's inside a variable

MULTIPLE CHOICE

Correct Answer:

- A. True ✗ Incorrect
- B. False ✓ Correct

Explanation:

The information in a variable can change.

3. If a variable in a program holds the value "5", and then you change it to hold "10", what has changed?

MULTIPLE CHOICE

Correct Answer:

- A. The color of the variable ✗ Incorrect
- B. The shape of the variable ✗ Incorrect

C. The contents or value

✓ Correct

Explanation:

Think about how you can update the contents of a variable, just like replacing items in a bag.

4. In a program, if you have a variable called "myNumber" and you set it to 7, what value is stored in "myNumber"?

MULTIPLE CHOICE

Correct Answer:

A. 1

✗ Incorrect

B. 5

✗ Incorrect

C. 3

✗ Incorrect

D. 7

✓ Correct

Explanation:

Consider how you can assign a specific value to a variable, just like putting something specific into a bag.

5. How is using a variable in programming similar to using an empty bag?

MULTIPLE CHOICE

Correct Answer:

A. They both can hold many different things

✓ Correct

B. They both are very small

✗ Incorrect

C. They both are made of glass

✗ Incorrect

Explanation:

Consider how both a bag and a variable can hold different items or values, and how they help in organizing and moving things around.

Games

1. Variables Typing Game

Typing game - no answer key needed. Students practice typing the provided content.

2. Variables Memory Game

Memory Game Pairs:

1.  A white box that says "Variable Empty" ↔  A white box that says "Variable Empty"
2.  silver key ↔  silver key
3.  gold key ↔  gold key
4.  door ↔  door

Students must find all matching pairs by flipping cards and remembering their positions.

Puzzles

1. Variables #1

Solution:

```
1 turnRight();
2 moveForward();
3 moveForward();
4 turnLeft();
5 moveForward();
6 moveForward();
7 moveForward();
8 moveForward();
9 pickUpKey();
10 turnLeft();
11 moveForward();
12 moveForward();
```

2. Variables #2

Solution:

```
1 turnLeft();
2 moveForward();
3 turnLeft();
4 moveForward();
5 turnRight();
6 moveForward();
7 moveForward();
8 moveForward();
9 pickUpKey();
10 turnLeft();
```

```
11 moveForward();
12 moveForward();
13 openChest();
14 turnAround();
15 moveForward();
16 moveForward();
17 turnRight();
18 moveForward();
19 moveForward();
20 turnRight();
21 moveForward();
22 moveForward();
23 moveForward();
24 pickUpKey();
25 turnAround();
26 moveForward();
27 turnRight();
28 moveForward();
29 moveForward();
```

3. Variables #3

Solution:

```
1 moveForward();
2 moveForward();
3 moveForward();
4 moveForward();
5 turnLeft();
6 moveForward();
7 moveForward();
8 pickUpKey()
9 turnLeft();
10 moveForward();
11 moveForward();
12 moveForward();
13 openChest();
14 turnAround();
15 moveForward();
16 moveForward();
17 moveForward();
18 turnRight();
19 moveForward();
20 moveForward();
21 pickUpKey()
22 moveForward();
23 moveForward();
24 turnRight();
25 moveForward();
26 moveForward();
27 moveForward();
28 moveForward();
```

4. Variables #4

Solution:

```
1 turnRight();
2 moveForward();
3 moveForward();
4 moveForward();
5 moveForward();
6 moveForward();
7 turnRight();
8 moveForward();
9 moveForward();
10 moveForward();
11 turnAround();
12 pickUpKey()
13 moveForward();
14 moveForward();
15 moveForward();
16 turnLeft();
17 moveForward();
18 moveForward();
19 turnLeft();
20 moveForward();
21 moveForward();
22 openChest();
23 turnAround();
24 moveForward();
25 moveForward();
26 turnLeft();
27 moveForward();
28 moveForward();
29 turnLeft();
30 moveForward();
31 moveForward();
32 moveForward();
33 turnRight();
34 moveForward();
35 pickUpKey()
36 turnAround();
37 moveForward();
38 turnLeft();
39 moveForward();
40 moveForward();
41 turnLeft();
42 moveForward();
```

5. Variables #5

Solution:

```
1 turnLeft();
2 moveForward();
3 moveForward();
4 moveForward();
```

```
5 pickUpKey()
6 turnAround();
7 moveForward();
8 moveForward();
9 moveForward();
10 turnRight();
11 moveForward();
12 moveForward();
13 moveForward();
14 moveForward();
15 openChest();
16 turnAround();
17 moveForward();
18 moveForward();
19 turnLeft();
20 moveForward();
21 moveForward();
22 moveForward();
23 pickUpKey()
24 turnAround();
25 moveForward();
26 moveForward();
27 moveForward();
28 turnRight();
29 moveForward();
30 moveForward();
31 turnRight();
32 moveForward();
33 moveForward();
34 turnLeft();
35 moveForward();
```

6. Variables #6

Solution:

```
1 turnLeft();
2 moveForward();
3 moveForward();
4 moveForward();
5 moveForward();
6 moveForward();
7 turnLeft();
8 moveForward();
9 moveForward();
10 pickUpKey();
11 moveForward();
12 moveForward();
13 moveForward();
14 pullLever();
15 turnLeft();
16 moveForward();
17 moveForward();
18 moveForward();
19 moveForward();
20 moveForward();
21 pullLever();
22 turnLeft();
23 moveForward();
```



```
24 moveForward();
25 moveForward();
26 openChest();
27 turnLeft();
28 moveForward();
29 moveForward();
30 moveForward();
31 pickUpKey();
32 turnLeft();
33 moveForward();
```

7. Variables #7

Solution:

```
1  turnAround();
2  moveForward();
3  turnLeft();
4  moveForward();
5  turnRight();
6  moveForward();
7  turnLeft();
8  moveForward();
9  moveForward();
10 turnLeft();
11 moveForward();
12 moveForward();
13 pickUpKey()
14 turnAround();
15 moveForward();
16 moveForward();
17 turnRight();
18 moveForward();
19 moveForward();
20 turnRight();
21 moveForward();
22 openChest();
23 turnAround();
24 moveForward();
25 turnLeft();
26 moveForward();
27 turnRight();
28 moveForward();
29 pullLever()
30 moveForward();
31 moveForward();
32 moveForward();
33 turnRight();
34 moveForward();
35 moveForward();
36 pickUpKey()
37 turnRight();
38 moveForward();
39 moveForward();
40 moveForward();
```

8. Variables #8

Solution:

```
1 moveForward();
2 turnLeft();
3 moveForward();
4 turnRight();
5 moveForward();
6 moveForward();
7 turnRight();
8 moveForward();
9 pickUpKey()
10 turnAround();
11 moveForward();
12 turnLeft();
13 moveForward();
14 turnRight();
15 moveForward();
16 moveForward();
17 moveForward();
18 turnLeft();
19 moveForward();
20 turnRight();
21 moveForward();
22 turnLeft();
23 openChest();
24 turnLeft();
25 moveForward();
26 pullLever()
27 moveForward();
28 turnRight();
29 moveForward();
30 pickUpKey()
31 turnAround();
32 moveForward();
33 moveForward();
34 turnLeft();
35 moveForward();
36 turnRight();
37 moveForward();
```

9. Variables #9

Solution:

```
1 moveForward();
2 pullLever()
3 turnAround();
4 moveForward();
5 turnLeft();
```

```
6 moveForward();
7 moveForward();
8 pullLever()
9 moveForward();
10 turnRight();
11 moveForward();
12 pickUpKey()
13 turnAround();
14 moveForward();
15 turnLeft();
16 moveForward();
17 pullLever()
18 moveForward();
19 turnRight();
20 moveForward();
21 moveForward();
22 turnRight();
23 moveForward();
24 pullLever()
25 moveForward();
26 turnLeft();
27 openChest();
28 turnLeft();
29 moveForward();
30 pullLever()
31 moveForward();
32 turnLeft();
33 moveForward();
34 moveForward();
35 moveForward();
36 turnRight();
37 moveForward();
38 moveForward();
39 moveForward();
40 pickUpKey()
41 turnAround();
42 moveForward();
43 turnLeft();
44 moveForward();
45 moveForward();
46 moveForward();
47 turnLeft();
48 moveForward();
```

10. Variables #10

Solution:

```
1 moveForward();
2 turnRight();
3 moveForward();
4 pullLever()
5 moveForward();
6 turnRight();
7 moveForward();
8 moveForward();
9 turnRight();
```

```
10 moveForward();
11 turnLeft();
12 moveForward();
13 moveForward();
14 moveForward();
15 pullLever()
16 turnRight();
17 moveForward();
18 turnLeft();
19 moveForward();
20 turnRight();
21 moveForward();
22 moveForward();
23 moveForward();
24 moveForward();
25 pickUpKey()
26 turnAround();
27 moveForward();
28 moveForward();
29 moveForward();
30 moveForward();
31 turnLeft();
32 moveForward();
33 turnRight();
34 moveForward();
35 turnLeft();
36 moveForward();
37 moveForward();
38 turnLeft();
39 moveForward();
40 moveForward();
41 turnRight();
42 moveForward();
43 turnLeft();
44 moveForward();
45 moveForward();
46 turnLeft();
47 moveForward();
48 openChest();
49 turnRight();
50 moveForward();
51 turnLeft();
52 moveForward();
53 pickUpKey()
54 turnAround();
55 moveForward();
56 turnRight();
57 moveForward();
58 turnLeft();
59 moveForward();
60 turnRight();
61 moveForward();
62 turnLeft();
63 moveForward();
64 moveForward();
65 turnLeft();
66 moveForward();
```

