

Light

Textbook

Light



There's an old saying that "when the streetlights come on, it's time to go home." That's because they always came on at a certain time, right around dinnertime. Why? There were sensors at dusk that would trigger them on at night. The micro:bit can help us create our very own nightlight using its built-in light sensor! In this lesson, you'll learn how to program the micro:bit to respond to the level of light in its environment. Just like how your phone screen brightens in the sunlight, the micro:bit can use light sensors to change its behavior based on how bright or dark it is.

Output

An output is a place where information is produced on a computer. For example, the LED light display is an example of an output. It shows the code you create using its 25 LEDs arranged in a 5x5 grid on the front of the micro:bit. You can show words, pictures, and more using these lights. These LEDs also act as light sensors to sense light.

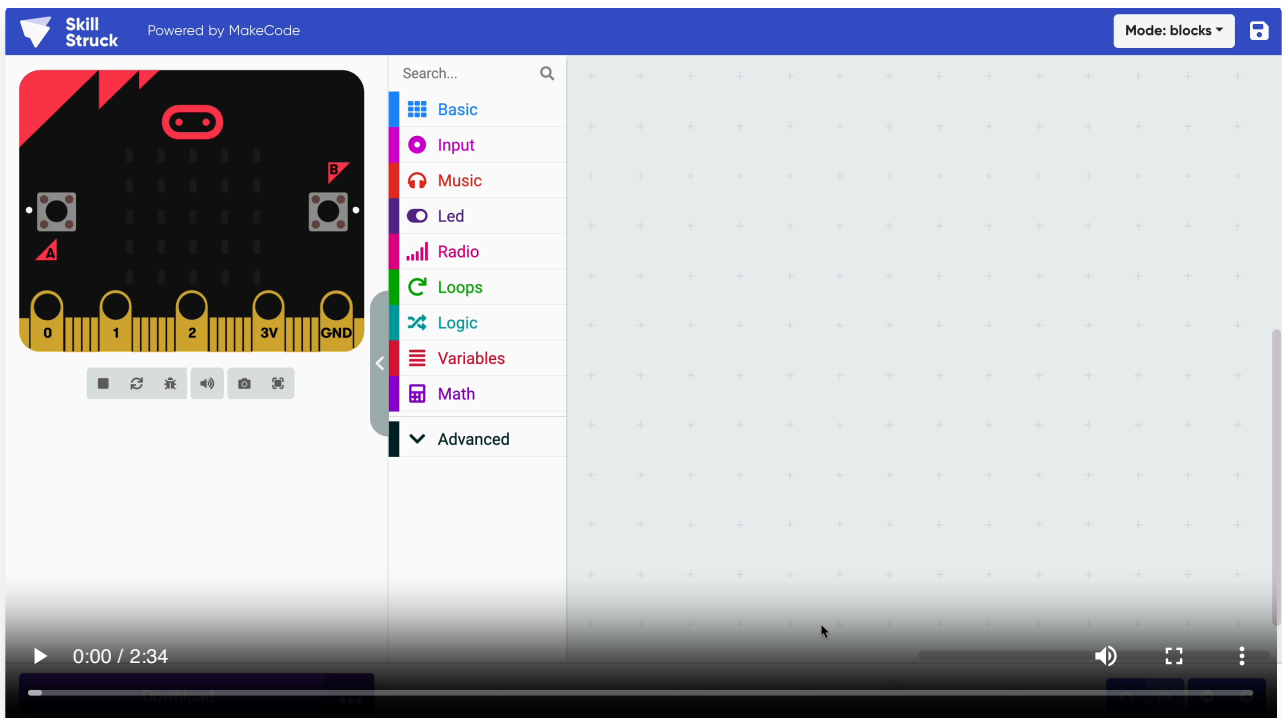
Learn more by watching the following video:



Light Variables

We learned in the last lesson that IF ELSE statements help us build conditionals in our coding programs. We can use variables in these IF ELSE statements. Remember, a variable can find and store information. Another example of a variable with the micro:bit is light. This means the micro:bit has a light sensor in its processor.

The light information collected by the micro:bit is an example of a variable since that information can be remembered, used, and changed with the micro:bit. The light sensor measures the amount of light in an area and responds by turning a light on or off. We see these used in everyday life, like when street lamps turn on when it gets dark, or when a nightlight turns off when the room's light turns on.



Code It! - Light

Let's practice coding a program that tells the micro:bit, "if the light level < 120 then turn on the light, or else leave the light off." To do this:

1. Drag a forever block into the code editor. You want to use a forever block since the goal is to have

this night light code work forever and not just once!

2. Drag an IF ELSE block into your forever block.
3. Look inside your logic category to determine which comparison block will let us set a less than IF statement. It should say $0 < 0$.
4. Next, you will see a pink variable block that says "light level" in the input category. Drag this variable to replace the first 0 in your comparison block. It should now read "If light level < 0 then."
5. If I'm trying to build a nightlight that turns on in the dark I might say, "If light level < 120 then" and drag a Show LEDs block to show the image you want illuminated as your night light when it starts getting darker; ELSE clear screen so the micro:bit shows nothing when it is brighter.

Adopted from microbit.org platform

Critical Thinking Questions

1. How can the micro:bit's light sensor help in creating smart homes or gardens? Can you think of other ways light sensors can make a space more comfortable?
2. What role do light sensors play in other areas of our lives, like in photography, healthcare, or transportation? How could the micro:bit help in these industries?
3. In places where sunlight is limited, such as in the far north, how do people make sure they get enough light? How could technology like the micro:bit help improve their lives during the darker months?

Questions (5)

1. Why do we use a forever block when making a nightlight?

MULTIPLE CHOICE

Choose the correct answer:

- A. So it only works one time
- B. So the light keeps flashing
- C. So the micro:bit keeps checking the light level in the room over and over
- D. So the screen stays black

2. Which block helps the micro:bit check if the room is dark?

MULTIPLE CHOICE

Choose the correct answer:

- A. The "repeat" block
- B. The "light level" block
- C. The "music" block
- D. The "temperature" block

3. If you want your micro:bit to light up a smiley face at night, what block should you drag into the IF space?

MULTIPLE CHOICE

Choose the correct answer:

- A. Show number
- B. Show LEDs
- C. Play sound
- D. Pause

4. Why would someone in a dark country like Finland use a light sensor?

MULTIPLE CHOICE

Choose the correct answer:

- A. To help turn lights on when it gets dark
- B. To count the number of snowy days
- C. To track how loud the wind is
- D. To take pictures of the snow

5. What makes a light sensor different from a regular light bulb?

MULTIPLE CHOICE

Choose the correct answer:

- A. It plays music
- B. It can sense brightness and react
- C. It shines brighter than other bulbs
- D. It changes color automatically

Games (2)

1. Light Typing


Full Screen

Audio

Instructions

Restart

Pause



0s 100%

Remember, a variable ca

2. Light Matching

Full Screen

Audio

Instructions

Answer Key

Pause

Clear All

Check Matches

Attempts: 0

Output

Light Sensor

LED

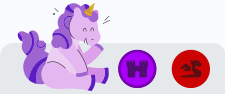
Information produced by a computer.

IF ELSE statement

Computer part that measures light

Conditional

A type of light



Robotics Challenges (5)

1. Light Up the Screen

Challenge

Textbook

Step 1

Begin with the **forever** block.

Light Up the Screen Step 1 of 2

◀ 1 ▶ Next

Requirements

- ☐ Add the forever block.
- ☐ Add the if true then else block
- ☐ Add the input:button A is pressed block.
- ☐ If button A is pressed, show a light.
- ☐ Else, clear the screen.

Answer Key

Submit

Download

...

Toolbox

Search...

Basic

Input

Music

Led

Radio

Loops

Logic

Variables

Math

Extensions

Advanced

2. Light Level

Challenge
 Textbook

Light Level

Code the micro:bit so if the light level is greater than 128, then it will show the LED screen lit. Else, it will clear the screen.

Requirements

- Add the forever block

- Add an if statement to see if the light level is greater than 128.

- Else, it will clear the screen. Use the clear screen block.

- Code the LED screen to light up if the light level is greater than (>) 128

[Download](#)

3. Light and Laughter

Challenge

Textbook

Light and Laughter

Code the micro:bit to show a funny icon and play a melody if the light level is less than 100. Otherwise, clear the screen.

Requirements

- ☐ Add the forever block
- ☐ Add an if statement to see if the light level is less than 100.
- ☐ If the light level is less than 100, show an icon and play a melody.
- ☐ Else, it will clear the screen. Use the clear screen block.

Answer Key

Step 1

Code the micro:bit to show a funny icon and play a melody if the light level is less than 100. Otherwise, clear the screen.

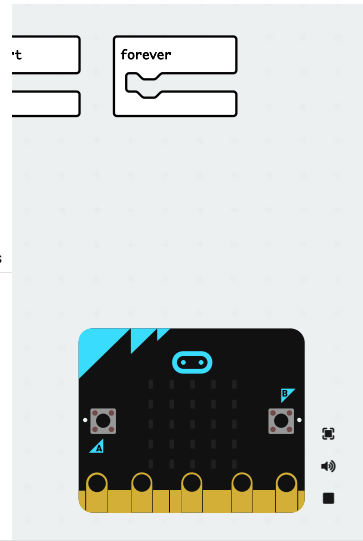
Light and Laughter Step 1 of 1

1 Done

Toolbox

Search...

- Basic
- Input
- Music
- Led
- Radio
- Loops
- Logic
- Variables
- Math
- Extensions
- Advanced



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4. Nightlight

Challenge

Textbook

Nightlight

Create your own night light! Code the micro:bit to become a night light when the light level reaches below 100.

Adopted from [micro.bit.org projects](https://micro.bit.org/projects)

Requirements

- ☐ Add the forever block
- ☐ Add an if statement to see if the light level is less than 100.
- ☐ If the light level is less than 100, show a night light with the 'show LEDs' block
- ☐ Else, it will clear the screen. Use the clear screen block.

Step 1

Code the LED screen on the micro:bit to light up when the light level reaches below 100.

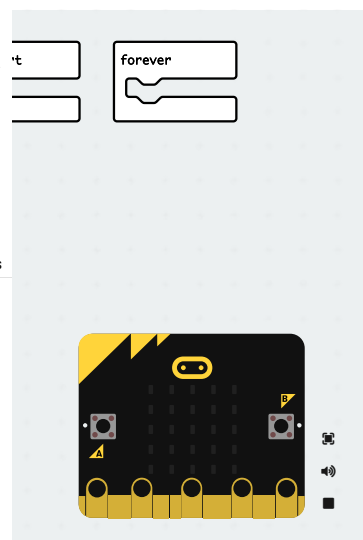
Night Light Step 1 of 2

1 Next

Toolbox

Search...

- Basic
- Input
- Music
- Led
- Radio
- Loops
- Logic
- Variables
- Math
- Extensions
- Advanced



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5. Sunlight Moonlight

Challenge

Textbook

Sunlight Moonlight

Code the micro:bit to do the following:

If the light level is greater than 120 show a sun.

Else if the light level is equal to 120 show a setting sun.

Otherwise, show a moon.

Requirements

☐ Add the forever block

☐ If the light level is greater than 120 show a sun.

☐ Else if the light level is equal to 120 show a setting sun.

☐ Otherwise, show a moon.

Step 1

Code the micro:bit to show a sun if the light level is greater than 120.

Sunlight Moonlight Step 1 of 3



1

Next

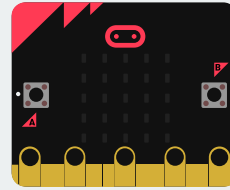
Toolbox

Search...

Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
Extensions

Advanced

forever



Download

Answer Keys & Solutions

Questions

1. Why do we use a forever block when making a nightlight?

MULTIPLE CHOICE

Correct Answer:

- A. So it only works one time ✗ Incorrect
- B. So the light keeps flashing ✗ Incorrect
- C. So the micro:bit keeps checking the light level in the room over and over ✓ Correct
- D. So the screen stays black ✗ Incorrect

Explanation:

"Forever" means the code repeats and keeps working all the time.

2. Which block helps the micro:bit check if the room is dark?

MULTIPLE CHOICE

Correct Answer:

- A. The "repeat" block ✗ Incorrect
- B. The "light level" block ✓ Correct
- C. The "music" block ✗ Incorrect
- D. The "temperature" block ✗ Incorrect

Explanation:

This block reads how bright or dark the room is.

3. If you want your micro:bit to light up a smiley face at night, what block should you drag into the IF space?

MULTIPLE CHOICE

Correct Answer:

A. Show number

✗ Incorrect

B. Show LEDs

✓ Correct

C. Play sound

✗ Incorrect

D. Pause

✗ Incorrect

Explanation:

This lets you create a picture using light.

4. Why would someone in a dark country like Finland use a light sensor?

MULTIPLE CHOICE

Correct Answer:

A. To help turn lights on when it gets dark

✓ Correct

B. To count the number of snowy days

✗ Incorrect

C. To track how loud the wind is

✗ Incorrect

D. To take pictures of the snow

✗ Incorrect

Explanation:

Light sensors are useful where there isn't much sunlight.

5. What makes a light sensor different from a regular light bulb?

MULTIPLE CHOICE

Correct Answer:

A. It plays music

✗ Incorrect

B. It can sense brightness and react

✓ Correct

C. It shines brighter than other bulbs

✗ Incorrect

D. It changes color automatically

✗ Incorrect

Games

1. Light Typing

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

2. Light Matching

Matching Game Solutions:

1. →
2. →
3. →
4. →

Students must drag items from the left to match with corresponding items on the right.