

# Exactly 11

60 minutes

Microbit Innovators

**WHAT THIS LESSON DOES**

Follow this guide to build a fun timing game on your Microbit. Start by creating a new project, set up variables for timing, and program buttons to track and display how close you get to exactly 11 seconds.

**WHAT STUDENTS SHOULD BE ABLE TO DO**

- Develop skills in creating and utilising variables in Microbit projects.
- Understand and apply the concept of running time in programming.
- Gain proficiency in using mathematical operations to calculate time differences.
- Learn to use conditional statements to display different outcomes based on user input.
- Enhance problem-solving skills through the creation of a time-guessing game.

**BEFORE THE LESSON**

- Microbit devices charged and ready, one per pupil or pair
- Confirm pupils can open a new Microbit project and download or flash to the device
- Sound and LEDs working so icons and numbers on the display are visible

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## HOW THE LESSON RUNS

Create a new Microbit project

Create a 'starttime' variable

Set the start time

Create a 'taken' variable

Set the taken time

Create a 'difference' variable

Calculate the difference

Show the result

## TEACHING MOVES

1. Create a new Microbit project. Get every pupil into a blank Microbit project before any blocks or code are added.
2. Create a 'starttime' variable. Have them create starttime now. Explain it will remember the moment the player starts the clock.
3. Set the start time. On button A, set starttime to running time and show the small diamond. Stress that running time is in milliseconds and 1000 ms equals one second.
4. Create a 'taken' variable. Create taken next. It will store how many milliseconds passed between pressing A and pressing B.
5. Set the taken time. Inside the B handler, set taken to current running time minus starttime. Check they use the same B handler, not a second copy.
6. Create a 'difference' variable. Create difference to hold how far the guess was from 11 seconds (11000 milliseconds).
7. Calculate the difference. Still on B, set difference to the absolute value of taken minus 11000. Explain abs so early and late guesses both count as distance from target.
8. Show the result. Finish the B handler: happy icon if difference is under 1000 ms, otherwise sad, pause one second, then show the difference number.

## WHAT TO WATCH FOR

- Pupils treat the target as 11 instead of 11000, mixing seconds with milliseconds. Point back to the running-time note: one second is 1000 ms, so eleven seconds is 11000. Have them say both units aloud before editing the sum.
- Pupils expect a negative difference when they finish early and think the score is wrong. Show that absolute value drops the sign. Compare taken minus 11000 with and without abs using a quick example such as -5 becoming 5.
- Pupils press B without pressing A first, so starttime is still 0 and the result looks random. Rehearse the play order as a class: A starts and shows the diamond, wait, then B scores. Reset and try one clean run together.

#### **DIFFERENTIATION**

- Emerging: Sit them with a partner and build one variable and one button handler at a time before moving on. Have them retell the A-then-B sequence while you watch the diamond appear.
- Developing: Ask them to explain why taken subtracts starttime and why the target is 11000 before they add the next line. If the B handler breaks, get them to read their full B block aloud and match it to the lesson steps.
- Proficient: Challenge them to change the target time or tighten the happy threshold below 1000 ms and retest. Ask them to explain to a partner how absolute value turns early and late guesses into the same kind of score.