Digital Technologies @ Home
Unplugged activities for students

This page is for
Teachers
Parents and carers

This activity is for: Years 3-6

Number guessing: I'm thinking of a number...

This activity teaches...

Computers follow instructions to solve problems. It's our job, as humans, to decide on the best set of instructions to give to computers to solve problems. There are often lots of ways to solve the same problem. How do you know which is best?

This activity will take up to **60 minutes**. Print pages 2 and 3 for students. If you are a teacher, read through page 4 for further information.

Getting started (read this with your child):

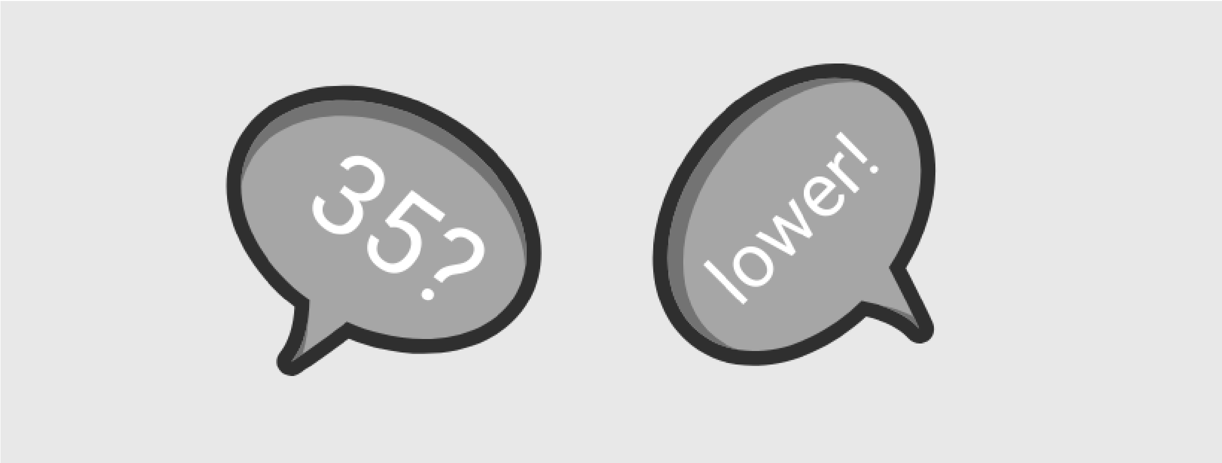
I'm thinking of a number between 1 and 100. Can you guess it?

We're going to experiment with different ways to guess a number, and come up with the best way.

Step by step

WIth a partner, one person thinks of a number between 1 and 100 (person A), while the other one guesses it (person B). Person A can only say 'higher' or 'lower' after Person B gusses.

Follow the steps on the worksheet to create an algorithm to win the game by guessing the other person's number in the least number of guesses.



This page is for

Students

Number Guessing

I'm thinking of a number between 1 and 100 … can you guess it?

Step 1

With a family member, take turns thinking of a number from 1 to 100. One person thinks of the number, and the other person has to guess the number. (The first person has to tell you if the number they are thinking of his higher or lower than your guess.)

Record the results in the table on the right (the first line is an example). Play as many rounds as you like, and keep practicing to see how good you can get at this game.

Round	The number was..	I guessed it in __ guesses
1	74	12
2		
3		
4		
5		

Step 2

Have you figured out the best way to play this game?
How can you guess the number with the smallest number of guesses? Write step by step instructions here:

Step 1	
Step 2	
Step 3	

Hint: Will your instructions work for every game, or just one?
Try to come up with a general set of instructions that will always work.
Try using words like 'if', 'then' and 'repeat'

This page is for

Students

Step 3
Play the game again, following the instructions you just made EXACTLY and record your results on the table on the right.

Round	The number was..	I guessed it in __ guesses
1		
2		
3		
4		

Step 4
Do you need to change the instructions? If so, go back and change them.

Step 5
Now think of a number between 1 and 1,000. Before you start guessing, how many total guesses do you think it will take to guess the number? Write your guess here: ________________

Step 6
Play four rounds and record your results here.

Round	The number was	I guessed it in _ guesses
1		
2		
3		
4		

You've created an **algorithm** to find a number out of a big collection of numbers. If your algorithm is to do with splitting the group of numbers in half over and over, you're thinking like a computer scientist!

When computers have to search through lots and lots of information it's really helpful to have a set of instructions, or algorithm, that can do it the quickest way possible. Splitting sets of ordered numbers in half, over and over, is called **binary search.**

Step 7
Are you surprised with how quickly you can guess a number between 1 and 1,000?

Want more?

Here are some further activities, online resources, assessment ideas and curriculum references.

Adapting this activity

For younger students, you can start this activity guessing a number between 1 and 10.

For older students, ask them to create a flowchart as well as a written set of instructions. This flowchart should show both **decisions** and **repetition.**

Ask students what they found hardest about this activity? It's quite intuitive to apply **binary search** when playing this game, but coming up with a general set of written instructions can be challenging - doing the activity with a partner ensures you follow the instructions precisely and see where they may need a tweak.

Keep learning

Searching and sorting algorithms are crucial in computing. With datasets containing billions of items, finding the most efficient way to search or sort can save huge amounts of money and resources, not to mention customers - people will click away from shopping or entertainment websites if results take too long to show.

You can explore how more of these algorithms work at www.sorting.at.

For more lesson plans and ideas for teaching sorting and searching algorithms look at the CS Unplugged website: csunplugged.org/en/topics/ - there is a collection of resources specifically on sorting algorithms.

For teachers creating a portfolio of learning or considering this task for assessment

Ask students to submit the worksheet with their record of rounds played, results, and algorithm (and in the case of older students, flowchart).

Linking it back to the Australian Curriculum: Digital Technologies

Algorithms
Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them (ACTDIP010 - see cmp.ac/algorithms) (Years 3-4)

Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) (ACTDIP019 - see cmp.ac/algorithms) (Years 5-6)

Refer to aca.edu.au/curriculum for more curriculum information.