Odd or even machine

Use this lesson to incorporate algorithmic thinking and properties of odd and even numbers.

Materials:

- Pencil and paper (for recording ideas and plans)
- Odd or even machine slide deck

Learning intention

- We are learning about the properties of odd and even numbers.
- We are learning that algorithms can be used to describe a process.

Success criteria

- Identify odd and even numbers and explain your reasoning.
- Write a rule to work out if a number is odd or even.
- Follow an algorithm to identify if a number is odd or even.
- Create an algorithm to identify if a number is odd or even.

Launch

a) Activate student prior knowledge relevant to the challenge by inviting them to think about and share what they know about what makes a number even or odd. Make a list of ideas as they are contributed. Ideas might include:
   - even numbers have 2, 4, 6, 8 or 0 in the ones place
   - odd numbers have 1, 3, 5, 7, 9 in the ones place
   - even numbers are divisible by 2 (with no remainders)
   - odd numbers are not divisible by 2.

b) Discuss and provide an example of an algorithm such as steps to make toast. Explain that an algorithm is a series of steps to achieve an outcome and often includes decisions.

Explore

Present students with the following challenge:

- Create an algorithm for a ‘machine’ that identifies odd and even numbers.

Use the Odd or even machine slide deck to illustrate the challenge and to guide a discussion about how the machine might work and how it would decide if the number was odd or even. Make connections with the properties of odd and even numbers.

Differentiation

You may decide to provide a basic flowchart as an example for students to follow rather than create their own algorithm. Students can use the flowchart to follow an algorithm to identify a selection of numbers as odd or even.

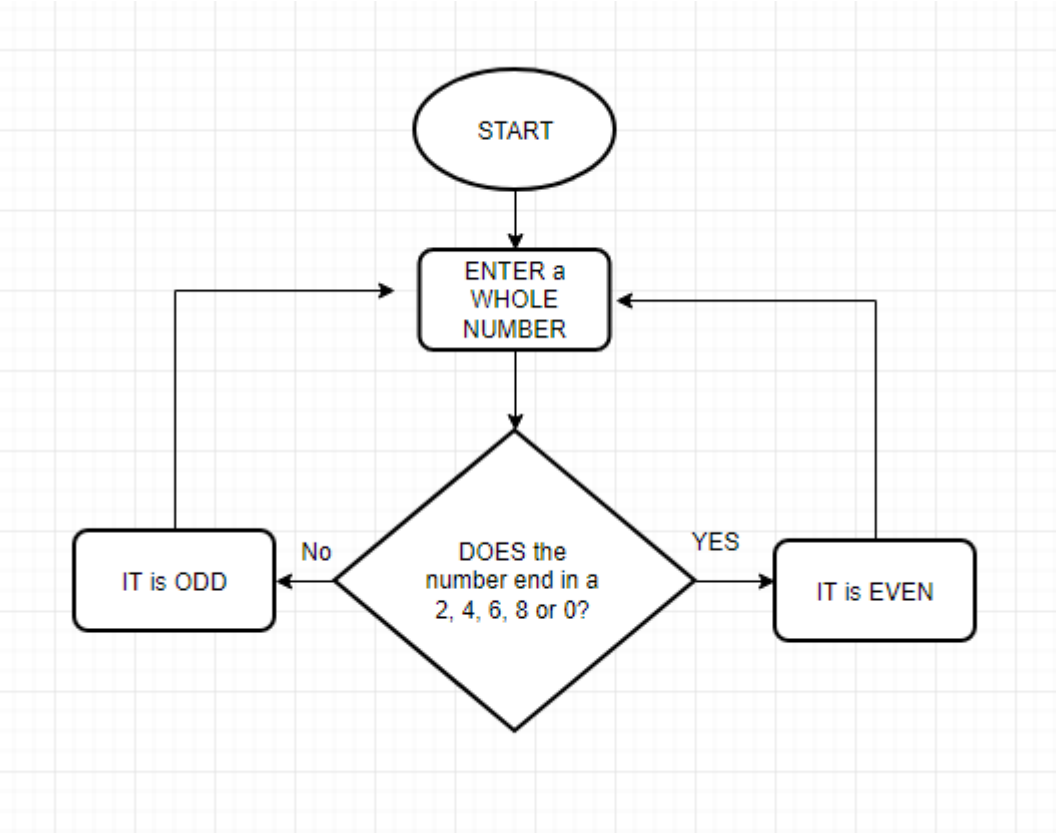
Students may be able to modify the example by changing the rule in the decision diamond, for example, changing the rule and making the 'yes' branch equal 'It is odd'.

Extend

Some students may be able to incorporate the 'divisible by 2' rule in their algorithm.

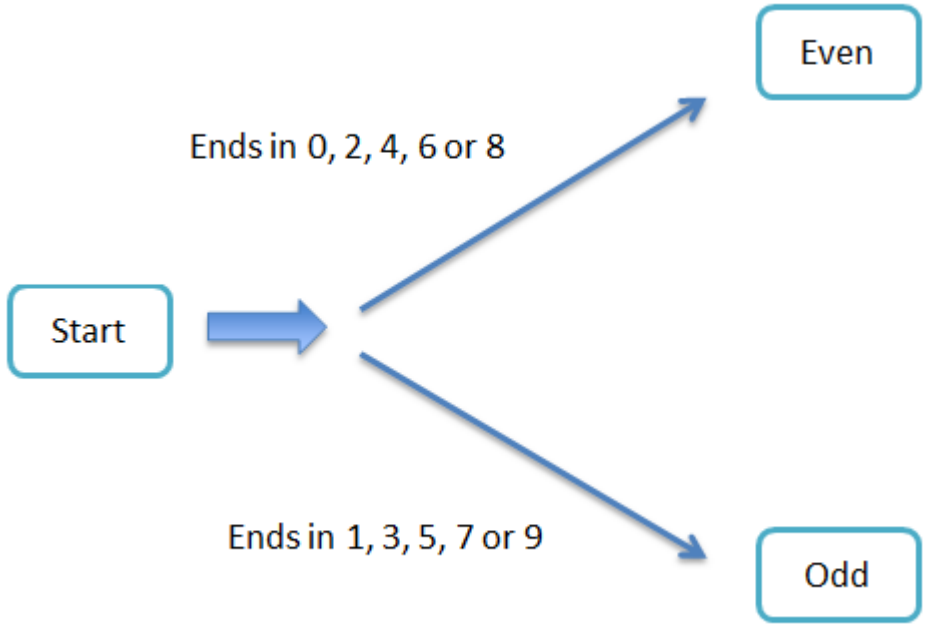
Consider how to include error feedback for incorrect entry of a non-whole number, for example, a decimal fraction.

Note this example algorithm is not intended to be used for programming purposes.



Another way to represent

This flowchart can be used for students who are not ready to create their own algorithm but can follow an algorithm.



Try these numbers

50 225 3010 113

Discuss

Provide time at the end of the session to share discoveries and reflections. Refer to the following questions and points to guide the discussion.

- How useful was the algorithm you used or created?
- Invite sharing of different approaches to following or creating an algorithm.
- What properties of odd and even did you use?

- List the rules that students used to decide if the number was odd or even.

Extension

Ask students to work out patterns with multiplying by odd and even numbers

- If you multiply an odd number by an even number, what happens?
- If you multiply an odd number by an odd number, what happens?
- If you multiply an even number by an even number, what happens?
- If you multiply an even number by an odd number, what happens?

Variation: Try the same approach for adding odd and even numbers.