Australian Curriculum: Digital Technologies
Year 3/4 and 5/6 Blockly Wombot Challenge

Overview

https://groklearning.com/course/aca-dt-mini-34-bk-wombot/

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Introduction

**Wombot** is an interactive entry-level Blockly coding challenge, using a modified version of the Turtle/Logo environment.

It is designed as a basic challenge for young or beginner students, and incorporates a very simple set of Turtle Blockly code. Students learn to move Wombot around its environment in search of carrots to eat. The challenge addresses a number of the content descriptors of the Australian Curriculum: Digital Technologies and is a suitable entry point into teaching Digital Technologies for year 3/4 students.

Mapping against the Australian Curriculum: Digital Technologies

<table>
<thead>
<tr>
<th>Years 3/4 Band</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Content Descriptor Code</th>
<th>Content Descriptor</th>
<th>Key Concepts</th>
<th>Addressed by Wombot through:</th>
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<tbody>
<tr>
<td>ACTDIK008</td>
<td>Recognise different types of data and explore how the same data can be represented in different ways</td>
<td>Representations, Types of data</td>
<td>Length and distance represented as Integers</td>
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<tr>
<td>ACTDIP010</td>
<td>Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them.</td>
<td>Defining (Specification), Decompose problem, Functional Requirements, Constraints</td>
<td>Solving problems by following sequences of steps, and describing algorithms</td>
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<td>ACTDIP011</td>
<td>Implement simple digital solutions as visual programs with algorithms involving Branching (decisions) and user input</td>
<td>Designing (Algorithms), Tracing</td>
<td>Coding of geometric shapes: line, square, path through a maze. Selection of maze path through input and decisions.</td>
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What are students learning?

In this coding challenge, students learn about programming in Blockly, including data representation, decomposition, design, user input, branching, tracing and evaluation. That’s a basic coverage of the key concepts of the Australian Curriculum: Digital Technologies.
Synopsis

The students meet Wombot, an Australian animal with a taste for carrots.

Students learn to move Wombot around in its environment: first by moving forward a specified number of steps, and then combining forward movement with turning left or right.

Using multiple movements and turns they direct Wombot through simple mazes to reach food. By adding user input, different paths through the mazes can be selected: a simple YES/NO decision allows Wombot to move to one carrot, or another elsewhere in the maze.

The final Wombot Playground allows students to practice what they have learned, and for the very keen it includes some extra code blocks that do not appear elsewhere in the challenge.
Module overview

The challenge consists of three modules, which are summarised below.

Module 1: Say Hello to Wombot!

https://groklearning.com/learn/aca-dt-mini-34-bk-wombot/1/0/

This module gets the students familiar with the challenge by introducing Wombot and using a very simple instruction: move Wombot forward a number of steps.

By the end of this module students will have a basic introductory knowledge of the blockly code and our problem-solving environment, and will be able to work out simple commands to help Wombot move forward to get a carrot. This leads into Module 2 for more complex movements around the grid.

Module 2: Turning Wombot

https://groklearning.com/learn/aca-dt-mini-34-bk-wombot/2/0/

Moving forward only gets Wombot so far — so the next thing students need to learn is how to make Wombot turn. In the Turtle environment, it’s possible to turn the Turtle by any angle; here we limit Wombot to 90-degree turns left or right.
Students begin by exploring turning left and right, and getting used to seeing things from Wombot’s point of view. Then they combine moving with turning, to guide Wombot through a simple maze, and around a square path.

By the end of the module students understand how to combine blockly blocks to form more complex programs, and are planning out their algorithms to guide Wombot around. This leads to Module 3, where we introduce simple user input and decision-making.

Module 3: Making Decisions


What if Wombot has a choice to make: this carrot, or that carrot? Students are introduced to a simple form of “if”-statement in the form of an “ask”-block: a piece of code that asks a question, and then gives Wombot instructions depending on the students’ yes/no answer:
By the end of the module — and the challenge — students can combine moving, turning and decisions to take on the **Final Test**: write code that helps Wombot move through the maze to eat one carrot or the other.

Badges

At the end of each module students receive a badge to celebrate their success, in the following order:

**Wombot Wrangler!**

**Carrot Cruncher!**

**Maze Master!**

Wombot Playground

After the Final Test, the students can play and experiment with code to move Wombot around in the **Wombot Playground**. Here they have access to several new blockly blocks that are not covered in the rest of the challenge — including moving backwards, turning by different angles, changing Wombot’s trail colour (the Turtle pen), and even simple looping using a “repeat” block.
While we don’t cover these extra blocks explicitly in this challenge, we have included them in the Playground for keen students (and their teachers!) to discover and experiment — and to encourage them to move on to more coding with the wide range of ACA’s blockly, Turtle, python and other challenges!

Offline Activity

The ACA has an offline Wombot activity, which introduces students to simple algorithms by moving a cut-out Wombot around the floor following a sequence of instructions.

You can download the resource at: https://aca.edu.au/resources/wom-bot/

Next Steps

The ACA has a load of challenges and resources for students who complete the Wombot Challenge and are looking for more, including:

- **Turtle challenges**: blockly and python versions to explore drawing more complex shapes with the Turtle, like satellites and Christmas trees
- **Blockly challenges**: use code blocks to make a micro:bit rocket, create a cookie clicker or space invaders game, or write a chat-bot program
- **Python, html and javascript challenges**: go beyond blocks to learn different programming languages and create simple interactive web pages
- **Cyber Security**: older students can become white-hat IT security experts, learning about information privacy and security, encryption, networking and web app security
- **For further resources** that might extend, enrich or deepen the classroom experience or support assessment, we recommend visiting the Digital Technologies Hub at https://www.digitaltechnologieshub.edu.au.

You can find all of these and many more at https://aca.edu.au/resources/
Appendix 1: Wombot Plans and flowcharts

The following pages provide worksheets to help you and your students plan out their solutions to problems in Module 3: “Which Carrot, Wombot?” and “Wombot’s Final Test”.

You can also download them as PDF files:

- Which Carrot, Wombot? Plan — [Download PDF]
- Wombot’s Final Test Plan — [Download PDF]
Which carrot to eat?

Help Wombot choose

First

Then

Then

Then

Then

What does Wombot do next?

What does Wombot do next?

What does Wombot do next?

What does Wombot do next?
HELP WOMBOT CHOOSE WHICH CARROT TO EAT

WOMBOT?

WHICH CARROT?

AND EAT THE CARROT?

MOVED FORWARD 100 STEPS

WHAT DOES WOMBOT DO NEXT?

IF NO (ELSE) TURN RIGHT

WHAT DOES WOMBOT DO NEXT?

IF ANSWER IS YES TURN LEFT

WHAT DOES WOMBOT DO NEXT?

ASK "TURN LEFT?"

DETERMINE WHICH WAY TO TURN:

WHAT DOES WOMBOT DO NEXT?

MOVED FORWARD 200 STEPS

WHAT DOES WOMBOT DO FIRST?
Help Wombot choose which carrot to eat.

- Eat carrot
- Move forward 100 steps
- Turn left
- Move forward 200 steps
- Turn right

Ask: Turn left? Yes, eat carrot.
Wombot’s final test!

Help Wombot through the maze to find a carrot

Here’s one way to do it!

Can you think of other ways?

Start

ask: Eat the closest carrot?

yes

no

Move forward 100 steps

Move forward 300 steps

Turn left

Move forward 200 steps

Turn left

Move forward 100 steps

Turn left

Move forward 100 steps