DTiF
Digital Technologies in focus
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CLASSROOM IDEAS: YEARS 2–4

Data, robots and computational thinking

*To implement this activity, materials and equipment that will allow students to identify and practically apply Australian Curriculum: Digital Technologies key concepts, key ideas and related ways of thinking are required. Teachers are advised to research available options before purchasing**.*

Description: This classroom resource comprises four worksheets to accompany a lesson on data and computational thinking. These materials are designed for teachers to use simple line-following robots (Ozobots**) to engage students in computational thinking process and working with data.

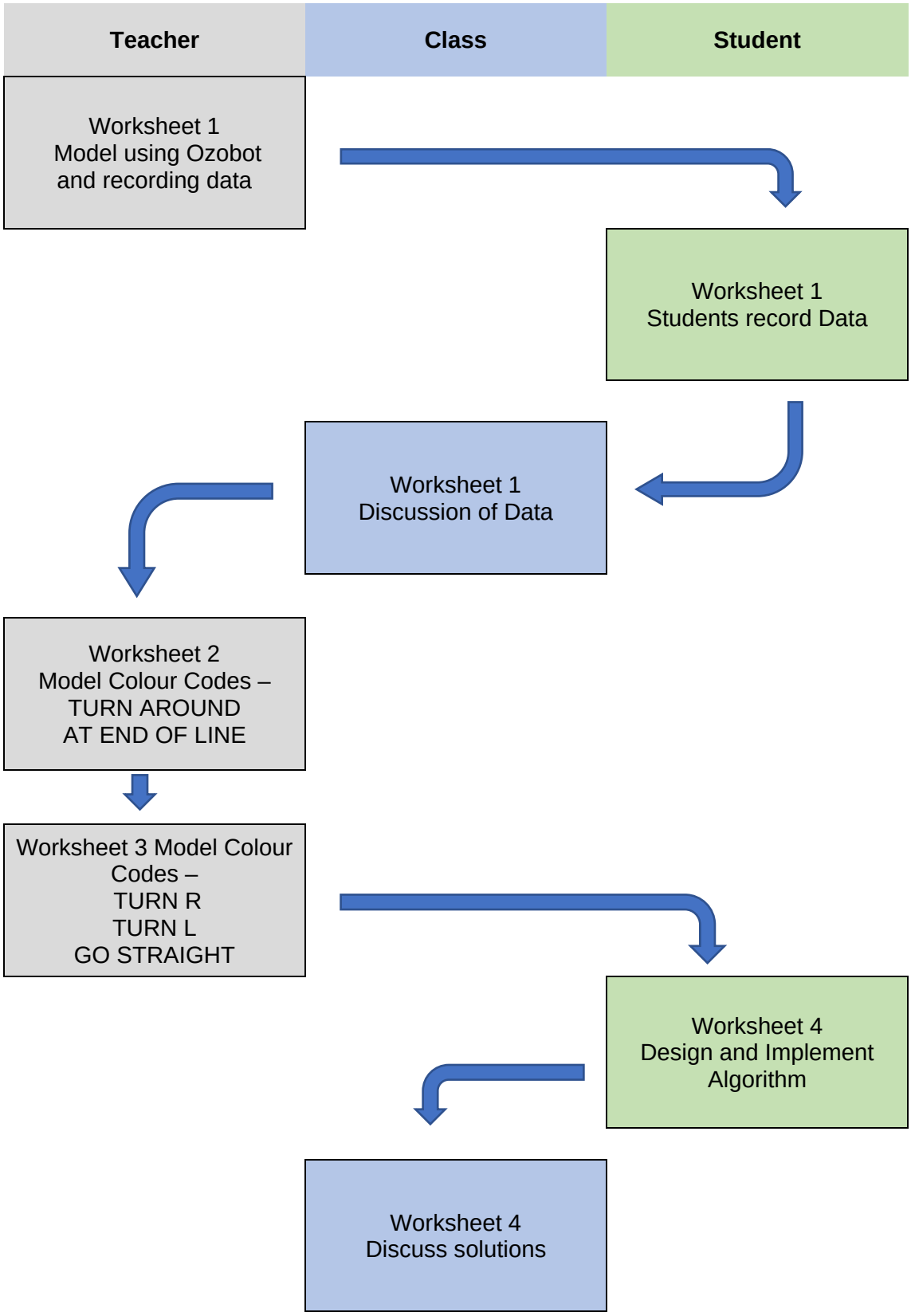
This activity provides opportunities for students to explore the Digital Technologies key concepts:

- data representation
- algorithms
- data collection
- data interpretation
- implementation
  (*Note: the content descriptions do not explicitly address Implementation in band F-2)*

Resources Required Ozobot (one per student or group of students)

- Print resources
  1. Worksheet 1: Ozo-Data per student or group of students
  2. Worksheet 4: Ozo-Destination per student or group of students
  3. Worksheet 2: Ozo-Bounce x 1 (for teacher)
  4. Worksheet 3: Ozo-Turn x 3 (for teacher)
- Set of coloured markers (red, green, blue, black) per student or group of students

Flow of Activities



Worksheet 1 instructions (Teacher/Student)

- Students investigate the unpredictability of an Ozobot when it encounters a crossroad.
- Using tallies, they record what happens each time the Ozobot runs on a black line.
- They discuss what data they have collected.

Worksheet 1: OZO-DATA

1.  PLACE YOUR OZOBOT ON ‘START’.
2.  WATCH WHICH WAY IT TURNS.
3.  PUT A TALLY MARK NEXT TO CLOUD, SUN OR GECKO.
4.  REPEAT STEPS 1–3 (TOTAL 20 TIMES).
5.  ADD UP THE TALLY MARKS FOR EACH OF SUN, CLOUD AND GECKO.
6.  COMPARE YOUR TALLY WITH YOUR CLASS.

Worksheets 2 and 3 instructions (Teacher)

- Teacher models how adding colour codes to the black line changes movement of the Ozobot including turning at the end of the line. Teacher may print several worksheets to model several colour codes.

Worksheets 2 and 3: OZO-DATA

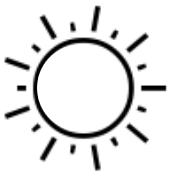
1.  PLACE YOUR OZOBOT ON ‘START’.
2.  ADD COLOUR CODES TO TEMPLATE AND WATCH MOVEMENT OF THE OZOBOT.
3.  DISCUSS THE WAY THE SENSOR ON THE DEVICE READS AND EXECUTES THE COLOURED CODES.

Worksheet 4 instructions (Student)

- Students design an algorithm for navigating a maze, and then use colour codes to program the Ozobot.

Worksheet 4: OZO-DESTINATION

1.  PLACE YOUR OZOBOT ON ‘START’.
2.  YOUR OZOBOT MUST VISIT THE SUN, CLOUD AND GECKO *ONCE* (IN ANY ORDER).
3.  COLOUR THE SQUARES TO CODE YOUR OZOBOT.
4.  HOW MANY DIFFERENT SOLUTIONS ARE THERE? COMPARE WITH YOUR CLASS.



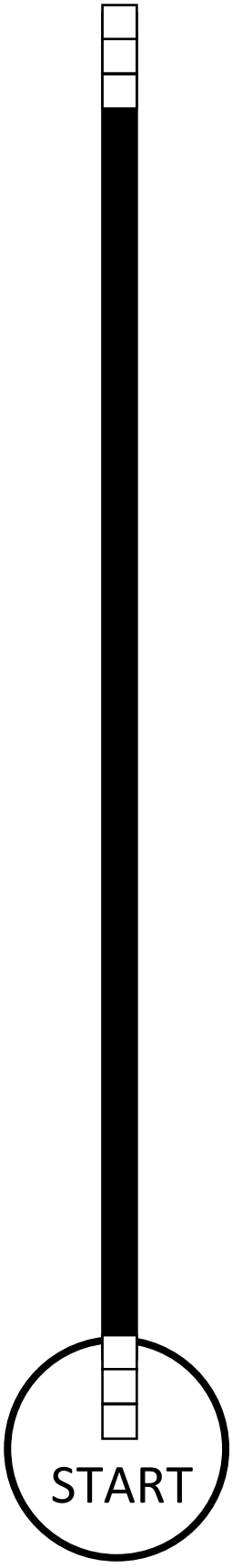
Sun Tally
Total

Geko Tally
Total

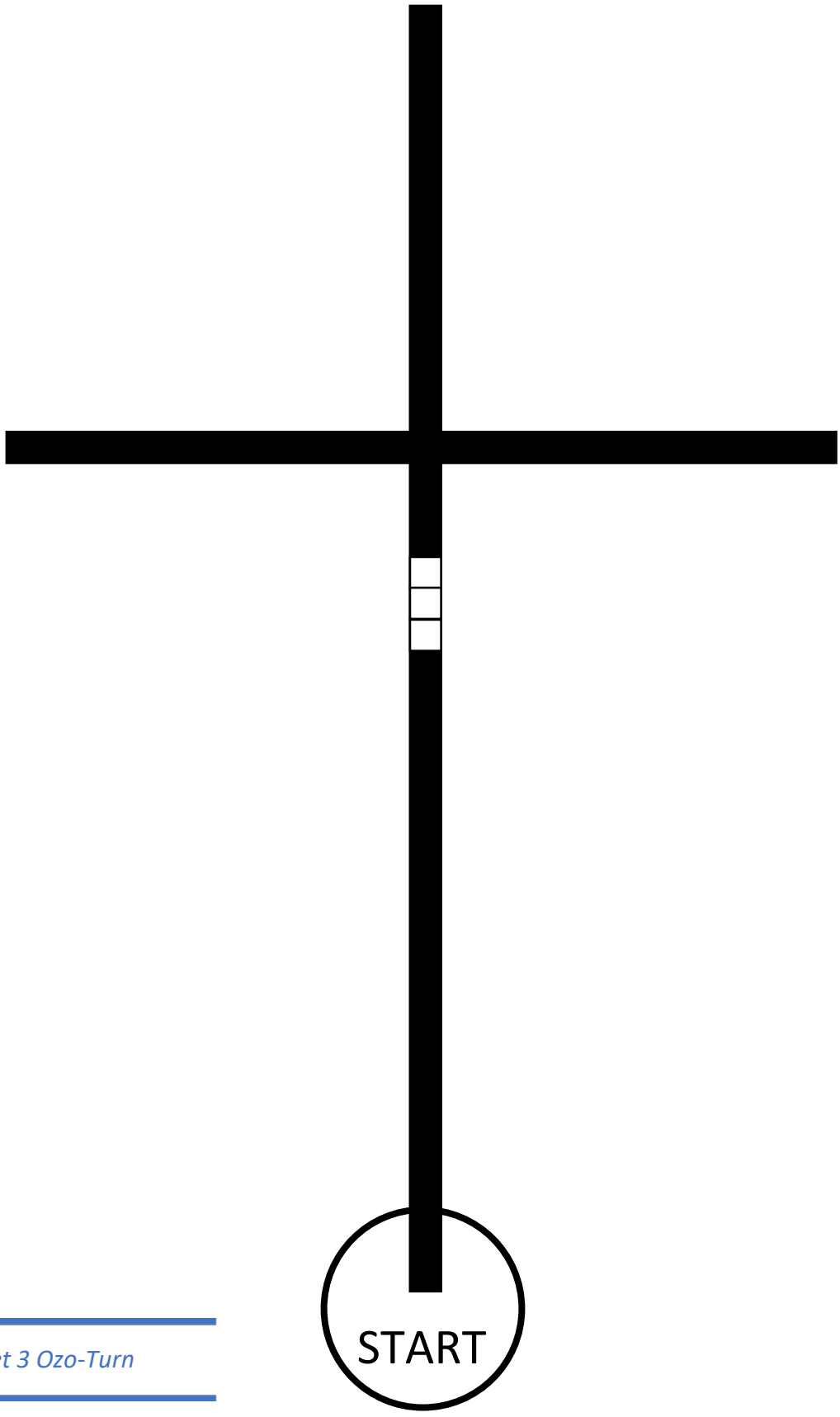
Cloud Tally
Total

START

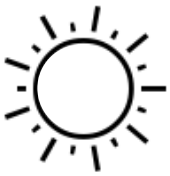
Worksheet 1 Ozo-Data

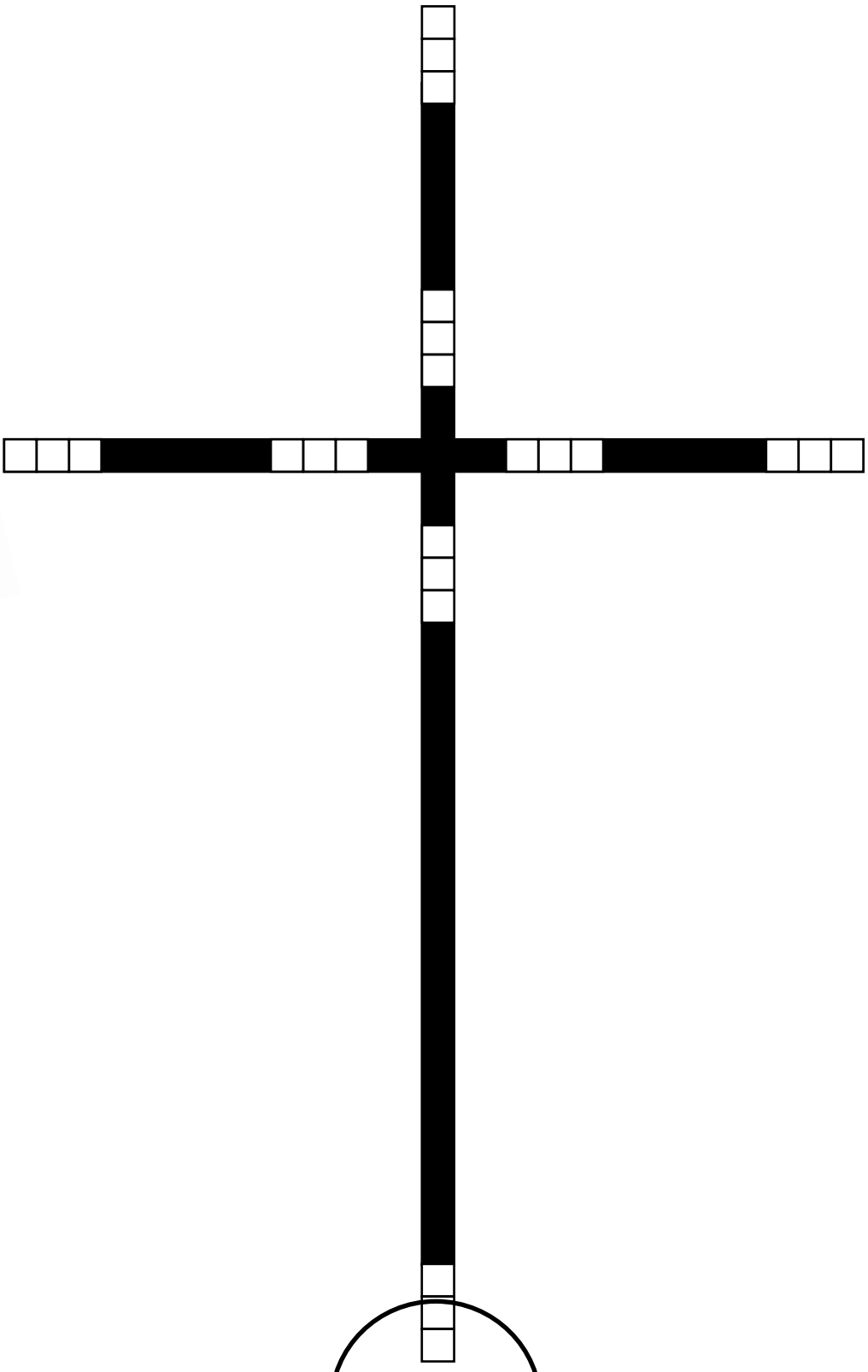


Worksheet 2 Ozo-Bounce



Worksheet 3 Ozo-Turn





Worksheet 4 Ozo-Destination

Links to the Australian Curriculum

Tables 1 and 2 give teachers an opportunity to see related aspects of the Australian Curriculum: Digital Technologies which may be addressed depending upon the task.

Table 1: Links to the Australian Curriculum: Digital Technologies Years F–2

Digital Technologies ***Achievement standard***	By the end of Year 2, students identify how common digital systems (hardware and software) are used to meet specific purposes. They use digital systems to represent simple patterns in data in different ways. Students design solutions to simple problems using a sequence of steps and decisions. They collect familiar data and display them to convey meaning. They create and organise ideas and information using information systems and share information in safe online environments.		
Strands	Digital Technologies knowledge and understanding • Data representation Digital Technologies processes and production skills • Collecting, managing and analysing data • Creating designed solutions by: – Investigating and defining		
Content descriptions	• Recognise and explore patterns in data and represent data as pictures, symbols and diagrams (ACTDIK002) • Collect, explore and sort data, and use digital systems to present the data creatively (ACTDIP003) • Follow, describe and represent a sequence of steps and decisions (algorithms) needed to solve simple problems (ACTDIP004)		
Key concepts	• algorithms • data representation • data collection	***Key ideas***	Thinking in Technologies • computational thinking
Cross-curriculum priorities		***General capabilities***	• Information and Communication Technology (ICT) Capability • Numeracy

Useful links

- Australian Curriculum: Digital Technologies https://www.australiancurriculum.edu.au/f-10-curriculum/technologies/digital-technologies/
- Australian Computing Academy (ACA) Unpack the curriculum – F-2 (algorithms, data representation and data collection) https://aca.edu.au/curriculum/
- Digital Technologies Hub – Computational thinking resources https://www.digitaltechnologieshub.edu.au/teachers/topics/computational-thinking
- Digital Technologies Hub – Introduction to Ozobot and colour codes https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/introduction-to-ozobot-and-colour-codes

Table 2: Links to the Australian Curriculum: Digital Technologies Years 3–4

Digital Technologies ***Achievement standard***	By the end of Year 4, students describe how a range of digital systems (hardware and software) and their peripheral devices can be used for different purposes. They explain how the same data sets can be represented in different ways. Students define simple problems, design and implement digital solutions using algorithms that involve decision-making and user input. They explain how the solutions meet their purposes. They collect and manipulate different data when creating information and digital solutions. They safely use and manage information systems for identified needs using agreed protocols and describe how information systems are used.		
Strands	Digital Technologies knowledge and understanding • Data representation Digital Technologies processes and production skills • Collecting, managing and analysing data • Creating designed solutions by: – Investigating and defining – Producing and implementing		
Content descriptions	• Recognise different types of data and explore how the same data can be represented in different ways (ACTDIK008) • Collect, access and present different types of data using simple software to create information and solve problems (ACTDIP009) • Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them (ACTDIP010) • Implement simple digital solutions as visual programs with algorithms involving branching (decisions) and user input (ACTDIP011)		
Key concepts	• algorithms • data representation • data collection • implementation	***Key ideas***	Thinking in Technologies • computational thinking
Cross-curriculum priorities		***General capabilities***	• Information and Communication Technology (ICT) Capability • Numeracy

Useful links

- Australian Curriculum: Digital Technologies https://www.australiancurriculum.edu.au/f-10-curriculum/technologies/digital-technologies/
- Australian Computing Academy (ACA) Unpack the curriculum – 3-4 (algorithms, data representation, data collection, implementation) https://aca.edu.au/curriculum/