Helping Your Child with Algorithms

Number & Algebra · Foundation to Year 6 · Australian Curriculum Mathematics

An **algorithm** is a set of clear, step-by-step instructions for solving a problem. You already use algorithms every day — **a recipe is an algorithm**. So is following directions, or a morning routine. In maths, your child learns to read, follow, and write algorithms to explore number patterns and solve problems. This skill builds from simple patterns in Foundation right through to designing programs in Year 6.

Year level	What your child learns	What this looks like
Foundation	**Following a repeating rule** Your child follows and continues patterns — this is the first step toward algorithms. A pattern has a **rule** — a repeating instruction for what comes next. **pattern** — something that repeats in a predictable way **rule** — the instruction that tells you what comes next Example: red, blue, red, blue, red... the rule is: **red then blue, repeat**	Clap, stomp, clap, stomp... **"What comes next?"** Set the table: fork, plate, knife — repeat. **"What is the rule for our pattern?"**
Year 1	**Skip counting — a number rule** Your child uses **skip counting** — counting in equal steps using a rule. **Count in 2s: 2, 4, 6, 8, 10...** **Count in 5s: 5, 10, 15, 20...** This is an algorithm: **start at 0, add 5, write it down, repeat**. **sequence** — a list of numbers that follow a rule, in order	Count steps going up stairs together. Count in 2s — one number per step. **"Count the $2 coins by jumping in 2s."** How far can you go?
Year 2	**Writing instructions for others** Your child creates a pattern and **writes the instructions** so someone else can copy it. This is a key algorithm skill — **clear instructions anyone can follow**. **increasing pattern** — a pattern that grows: 3, 6, 9, 12... **decreasing pattern** — a pattern that shrinks: 20, 16, 12, 8... **constant** — the amount added or subtracted each time	Make a pattern with blocks: 1, 3, 5, 7... **"Write down the rule. Read it to me."** Can I follow your instructions and get the same pattern?
Year 3	**Steps and decisions — first algorithms** Your child follows and creates algorithms with **steps** and **decisions**. A decision has two paths: **YES or NO**. **Example algorithm: "Is this number a multiple of 2?"** Step 1: Divide the number by 2. Step 2: Is there a remainder? **YES → not a multiple of 2. NO → it is a multiple of 2.**	**"Is 14 a multiple of 2?"** 14 ÷ 2 = 7, no remainder → YES **"Is 15 a multiple of 2?"** 15 ÷ 2 = 7 remainder 1 → NO
Year 4	**Flow charts — drawing algorithms** Your child draws a **flow chart** — a diagram that shows an algorithm as boxes and arrows. **flow chart** — a picture of an algorithm using shapes and arrows They use algorithms to generate number sequences: **Start at 3. Multiply by 2. Write it down. Repeat.** **3 → 6 → 12 → 24 → 48...** They also use **spreadsheets** to run algorithms and see patterns emerge.	Draw the algorithm as boxes: **[Start] → [×2] → [Write it] → [Repeat]** **"What is the 5th number in this sequence?"** Use a calculator to check.
Year 5	**Algorithms with branching — YES or NO paths** Your child creates more complex algorithms with **branching** — multiple YES/NO decisions. They test if numbers are **factors** or **multiples** of other numbers. **divisible** — a number divides evenly with no remainder **Example: Is 36 divisible by 4?** **36 ÷ 4 = 9, no remainder → YES** They run these algorithms on digital tools and describe patterns.	**"Is 42 divisible by 6?"** 42 ÷ 6 = 7, no remainder → YES **"Name a number divisible by both 3 and 4."** Answer: 12 (3×4=12, 12÷3=4 ✓, 12÷4=3 ✓) *Year 6 on next page*

	Year 6	**Writing and explaining algorithms** Your child designs algorithms that others — or a computer — can follow. They explain **why** each step is needed and what patterns emerge. **input** — the starting number or information you give **output** — the result the algorithm produces **Example: Input 5 → ×3 → +1 → Output 16** They also write algorithms for shapes — like instructions **to move a robot: forward 3, turn right, forward 2.**	**"Design an algorithm: multiply any number by 3 then subtract 2."** Test it: input 4 → 4×3=12 → 12−2=10 **"If input is 10, what is the output?"** 10×3=30, 30−2=28

★ Reading a flow chart — a worked example: Is this number a multiple of 5?

Flow chart shape	Symbol	What it means	In our example
START / END	**(oval)**	Where the algorithm begins or finishes	START: Pick a number
STEP	**[rectangle]**	An action or instruction to carry out	Divide the number by 5
DECISION	**< diamond >**	A YES or NO question — two paths branch off	Is there a remainder?
YES path	**→ YES**	What happens if the answer is YES	YES → Not a multiple of 5 STOP
NO path	**→ NO**	What happens if the answer is NO	NO → It IS a multiple of 5 STOP

Test it: number = 20. 20 ÷ 5 = 4, no remainder → **20 IS a multiple of 5 ✓** Test: number = 13. 13 ÷ 5 = 2 remainder 3 → **13 is NOT a multiple of 5 ✓**

Helping at Home — Algorithms

Worked examples and questions to ask · Foundation to Year 6

Algorithms in action — worked examples

Every day — A recipe is an algorithm!

Algorithm: Make a bowl of cereal

Step 1	Get a bowl.
Step 2	Pour in cereal.
Step 3	Add milk.
Decision	Is it enough milk? YES → done. NO → add more, go back to Step 3.

Every algorithm has steps and at least one decision point.

Year 3 — Is this number a multiple of 2?

Algorithm: Test any number

Step 1	START: Pick a number.
Step 2	Look at the last digit.
Decision	Is the last digit 0, 2, 4, 6 or 8?
YES	It IS a multiple of 2. STOP.
NO	It is NOT a multiple of 2. STOP.

Test it: 48 → last digit 8 → YES ✓ 37 → last digit 7 → NO ✓

Year 4 — Generate a number sequence

Algorithm: "Start at 3. Multiply by 2. Write it down. Repeat 5 times."

Start	× 2	× 2	× 2	× 2	× 2
3	**6**	**12**	**24**	**48**	**96**

The pattern doubles each time. **Doubling** is a rule — and this algorithm generates it automatically.

Year 6 — Input and output

Algorithm: Multiply the input by 4, then subtract 3.

Input	× 4	− 3	Output	Pattern?
5	5×4=20	20−3=17	**17**	Input×4−3
8	8×4=32	32−3=29	**29**	Input×4−3

"What input gives an output of 45?"

Work backwards: 45 + 3 = 48, then 48 ÷ 4 = 12. So the input is 12.

Questions to ask your child

You do not need to know the answer. Ask the question and let your child think it through!

F Foundation

→ What comes next in this pattern?
→ What is the rule for this pattern?
→ Can you make your own pattern for me to continue?

1 Year 1

→ Count in 5s with me — what rule are we following?
→ What is the next number if we keep adding 10?
→ What number comes before 30 when counting in 5s?

2 Year 2

→ Tell me the rule for this number pattern: 4, 7, 10, 13...
→ Write the instructions so I can make your pattern.
→ Can I follow your instructions and get the same result?

3 Year 3

→ Is 36 a multiple of 3? Walk me through the steps.
→ Write an algorithm to test if a number ends in 0 or 5.
→ Use your algorithm to test 45. Now test 47.

4 Year 4

→ Draw a flow chart for: Start at 2, add 3, write it down, repeat.
→ What is the 6th number in the sequence 5, 10, 20, 40...?
→ What is the rule in this sequence: 1, 3, 9, 27...?

5 Year 5

→ Is 72 divisible by 8? Show me the steps.
→ Write an algorithm to find all factors of 24.
→ What is the lowest common multiple of 4 and 6?

6 Year 6

→ Design an algorithm: triple the input, then add 2.
→ If the output is 20, what was the input?
→ Write instructions for moving a robot: forward 4, turn right, forward 2.

Things to try at home

Any age: Find algorithms at home! A recipe, a morning routine, instructions for a game — read them together and find the steps.	**Year 1–2:** Make a body-movement algorithm together: jump, clap, turn. Write the steps. Follow them. Can you repeat it 3 times?
Year 2–3: Make a number pattern: start at 1, add 4 each time. Write the rule down. How high can you go in 60 seconds?	**Year 3–4:** Draw a flow chart for sorting laundry: Is it dark? YES → dark pile. NO → light pile. Test it with real clothes.
Year 5: Pick a number. Is it divisible by 2? By 3? By both? Create an algorithm — write the YES/NO steps out clearly.	**Year 6:** Invent your own input/output machine: triple the number and add 5. Test it. Can your child work backwards from the output?

Key words to learn together

algorithm: a clear set of step-by-step instructions for solving a problem	**pattern:** something that repeats in a predictable way
rule: the instruction that describes how a pattern works	**sequence:** a list of numbers that follow a rule, in order
step: one single action in an algorithm	**decision:** a YES or NO question that sends the algorithm down different paths
flow chart: a diagram showing an algorithm using shapes and arrows	**branching:** when an algorithm splits into two paths based on a YES or NO answer
input: the starting number or information you give to an algorithm	**output:** the result the algorithm produces from the input
divisible: a number divides evenly with no remainder (e.g. 12 is divisible by 4)	**constant:** the amount added or subtracted each time in a growing pattern