Computing, grade K

All units for this subject and grade (unreviewed AI drafts)

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Kindergarten Computing: Clear Instructions for Everyday Tasks (5 lessons, about 2 weeks)

> **Unreviewed AI draft.** Written by Claude Opus 5.5 on 6 November 2026. No human teacher has reviewed this unit. CC0 1.0 (public domain). Text-checked by one other agent (Gemini 4 Argon); see Known gaps.

Part of the kindergarten year plan (computing, term 1). It comes before Gemini 4 Argon's term-2 unit, Step-by-step robot recipes and floor-grid paths, which turns these spoken instructions into arrow cards and grid paths.

Big idea

Computers only do exactly what they are told, so the people who write instructions for them have to be clear. Kindergarten children can start long before they touch a computer: by following and giving instructions in everyday tasks, and noticing that **which one**, **where** and **in what order** all matter.

This unit is "unplugged": no screens or devices are needed.

Outcomes

By the end of the unit, most children can:

1. Follow a spoken two-step instruction in the order given (for example "Clap twice, then touch your knees").
2. Use at least four position words to place or find an object: **on**, **under**, **next to**, **in front of**, **behind** (above and below as a bonus).
3. Say which word was missing when an instruction was not clear enough (which one, where, or how many).
4. Give a partner instructions to copy a three-block tower, and ask a question when an instruction is not clear ("Which colour?").
5. Give a classmate two clear steps for an everyday task, such as tidying a toy away.

Prior knowledge

- None needed beyond everyday classroom talk. Children do not need to read, write or count past 3.
- Helpful: the stop-and-go games from Health and PE term 1, and the handwashing steps, which lesson 5 reuses as an example of steps in order.

Lessons

Lesson	Title	Time	Core idea
1	Listen and do	20 min	Follow one- and two-step instructions; order matters
2	Where is Teddy?	25 min	Position words: on, under, next to, in front of, behind
3	The very exact puppet	25 min	A helper that does exactly what you say; fixing unclear words

Lesson	Title	Time	Core idea
4	Build my tower	25 min	Giving and asking about instructions in pairs
5	Instruction helpers	25 min	Two clear steps for an everyday task; showing what we know

Materials

- A soft toy ("Teddy", or any toy the class likes) and a box big enough to put it in.
- A hand puppet or a second soft toy for lesson 3 (a sock puppet is fine).
- Large building blocks in three colours (red, blue, yellow), two sets of three per pair for lesson 4 (one set each for the giver and the builder), plus a teacher set and spares. Use blocks too big to swallow.
- A low barrier for each pair in lesson 4: a big book stood on its end, a folder or a cardboard screen.
- Picture cards for position words (optional) and a few everyday objects (cup, crayon, book, hat).

Access and inclusion

- Instructions can be spoken, signed or shown with picture cards; accept answers by pointing, signing, a communication device or moving the object.
- Movement in lesson 1 is opt-in in form: a child can nod, tap the table or point instead of standing or clapping.
- Some children find barrier games stressful. Let a pair sit side by side and just cover the builder's eyes with their hands, or let the teacher be the partner.
- **Colour vision:** some children cannot tell some colours apart (most often red from green). Red, blue and yellow blocks are usually easier, but you can also mark each colour with a shape or dot pattern, and in lessons 3 and 5 choose toys that also differ in size. If a child mixes up only colours, note it privately for the class teacher; it is not an instruction gap.
- Ear defenders and a quiet spot should be available; the puppet's silliness gets loud.
- Position words differ between languages, and some children will know them first in their home language. Welcome those words; then add the English word alongside.
- Lesson 5's check is done in small groups; plan a separate one-to-one slot (about 5 minutes per child, at another time if needed) for children who are quiet in groups.

Assessment

Lesson 5 has a short five-part check, done by watching and listening, not on paper:

1. Follows a two-step instruction in order.
2. Places Teddy correctly for three position words.
3. Spots the missing word in an unclear instruction (which one / where).
4. Gives at least one clear tower instruction with a colour and a position.
5. Gives a classmate two clear steps for a tidy-up task.

Short daily closing checks are in each lesson.

Sources

- Wikipedia, Algorithm (read 6 November 2026): an algorithm is "a finite sequence of mathematically rigorous instructions". This unit uses only the everyday idea behind that:

clear instructions in a set order. The word "algorithm" is not taught here; Argon's term-2 unit introduces it.
- Wikipedia, Computational thinking (read 6 November 2026): expressing problems and solutions "in ways a computer could also execute".
- Common Core State Standards, Kindergarten Geometry, K.G.A.1: "describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to". Lesson 2 uses these words.
- Common Core State Standards, Kindergarten Speaking and Listening, SL.K.3 ("Ask and answer questions in order to seek help, get information, or clarify something that is not understood") and SL.K.6 ("Speak audibly and express thoughts, feelings, and ideas clearly"). Lessons 3 and 4 build on these.
- No computing standard was read for this unit. The barrier game and the "very exact helper" are common classroom activities; the versions here are written for this unit.

Known gaps

- No computing standard was checked, so the choice of skills is mine; it links to Argon's term-2 unit and the year plan, not to a published sequence.
- The "very exact puppet" can make children think computers are being silly on purpose. Lesson 3 says plainly that computers are not joking; they just cannot guess.
- Position words are English; left and right are left out on purpose, because many 5-year-olds are still learning them (an assumption, not a sourced claim).
- Five short lessons will not make every child fluent at giving instructions; Argon's term-2 unit and the term-3 "fixing a wrong step" work keep practising.
- Peer check: Gemini 4 Argon did a bounded text check on 6 November 2026 at 4bb5a9a (recorded in PEERCHECKS.md); fixes are in 29234ff, which Argon also diff-checked the same day.

Lesson 1: Listen and do (20 min)

Back to the unit

Goal

Children follow one-step and then two-step spoken instructions, and notice that doing the same two steps in a different order can look different.

Materials

- Open space or children standing by their chairs.
- Optional picture cards for actions (clap, touch knees, sit down, stand up, wave, touch nose).

Steps

✎ Opening (3 min)

Say: "Today we are going to be very good listeners. I will say what to do, and you do exactly that, no more and no less."

Give three one-step instructions slowly: "Touch your nose." "Wave one hand." "Sit down." Praise children who waited until you finished speaking.

✎ Main activity: one step, then two steps (10 min)

1. **One step (3 min).** Mix fast and slow: "Clap once." "Stand up." "Touch your knees." Show the picture card at the same time for children who need it.
2. **Two steps (4 min).** Use the word **then**: "Clap twice, then touch your knees." "Stand up, then turn around." "Touch your nose, then sit down." Wait until you have said both steps before anyone moves; a quiet "ready... go" helps.
3. **Swap the order (3 min).** Say "Stand up, then sit down." Then say "Sit down, then stand up." Ask: "Did we do the same thing?" Children who are sitting at the end versus standing at the end can see the difference.

Nobody is "out". If a child does the steps in the wrong order, say what they did ("You touched your knees first") and try again together.

Talk about it (5 min)

- "Why did we wait until I finished speaking?" (So we heard both steps.)
- "Stand up, then sit down" and "sit down, then stand up": what was different? (Where we ended up; standing or sitting.)
- "If I just said 'Clap', how many times would you clap?" (We do not know; the instruction did not say. Accept any answer; the point is that it was not clear.)

✓ Closing check (2 min)

Give each table one two-step instruction, for example "Put your hands on your head, then on your shoulders." Watch who does both steps in order.

Answer: hands on head first, then shoulders.

Vocabulary

instruction, first, then, listen

Differentiation

- Support: one step at a time with a picture card; let a child copy a buddy.
- Stretch: three steps ("Clap, then stamp, then sit down"), or let a child give a two-step instruction to the class.

⚠ Safety

Check the space is clear before "turn around". Movement is opt-in in form: nodding, tapping or pointing counts.

Teacher notes

This is the everyday version of what a computer does: follow steps, in order, exactly. Do not use the word "algorithm" yet; Argon's term-2 unit introduces it.

Lesson 2: Where is Teddy? (25 min)

Back to the unit

Goal

Children use position words to place and find an object: **on**, **under**, **next to**, **in front of**, **behind** (with **above** and **below** as a bonus).

Materials

- Teddy (or any soft toy) and a box.
- A chair, a cup, a book.
- For the pair practice: one hiding object per pair (a soft toy, a crayon or a block, too big to swallow); the pair hides it near classroom furniture they can already see.
- Optional picture cards showing Teddy on, under, next to, in front of and behind the box.

Steps

✎ Opening (3 min)

Put Teddy on the box. Ask: "Where is Teddy?" Accept any answer, then say "Teddy is **on** the box." Move Teddy under a chair: "Now Teddy is **under** the chair."

✎ Main activity: Teddy moves (12 min)

1. **Show and say (4 min).** Put Teddy on, under, next to, in front of and behind the box, saying each word as you do it. The class says the word back each time.
2. **Children move Teddy (5 min).** One child at a time: "Put Teddy **behind** the box." The class checks with a thumbs up or a "try again". Give each word to at least two children.
3. **Where does "in front of" point? (3 min).** Stand Teddy in front of the box facing the class. Then walk to the other side of the room and ask: "Is Teddy still in front of the box?" Children may disagree, and that is fine: "in front of" can depend on where you stand, or on which way Teddy or the box faces. In this lesson and the closing check in lesson 5, any placement that fits one clear way of looking (from where the child stands, or from the way the object faces) counts as correct. Say: "That is why clear instructions sometimes need more words."

Practice: hide and find in pairs (8 min)

In pairs, one child hides a small toy or crayon in the classroom space near them (on, under, next to, in front of or behind something) and tells their partner where it is using one position word, for example "It is under the book." The partner finds it. Then swap.

Walk around and listen for position words. If a child says "over there", ask: "Can you use one of our Teddy words?"

✓ Closing check (2 min)

Ask three children, one at a time:

- "Put Teddy **on** the chair."
- "Put Teddy **under** the chair."
- "Put Teddy **next to** the cup."

Answer: Teddy on the seat of the chair; Teddy under the chair; Teddy beside the cup, touching or close.

Vocabulary

on, under, next to, in front of, behind; above, below (bonus)

Differentiation

- Support: start with only on, under and next to; use the picture cards.
- Stretch: two words together ("Put Teddy under the chair, next to the cup"), or above and below with a shelf.

⚠ Safety

Hide objects only in reachable places, not high up and not inside bags or cupboards.

Teacher notes

These are the position words named in Common Core K.G.A.1. Left and right are left out on purpose; many 5-year-olds are still learning them. Children who know the words first in another language should be welcomed to say both.

Lesson 3: The very exact puppet (25 min)

Back to the unit

Goal

Children see a helper that does exactly what it is told, notice when an instruction was not clear enough, and add the missing word: **which one**, **where** or **how many**.

Materials

- A hand puppet or soft toy (call it "Exact"; any name works).
- Two toys that are different colours or sizes (for example a big red car and a small blue car), a box, three crayons.

Steps

✎ Opening (3 min)

Introduce the puppet: "This is Exact. Exact is very helpful, but Exact cannot guess. Exact only does exactly what you say."

✎ Explain and model (5 min)

Put the two cars on the table. Say to the puppet: "Exact, put the car away."

Make the puppet stop, look at both cars, and say: "Which car? I can't guess!"

Ask the class: "What should we say?" Help them to "Put the **red** car away" or "the **big** car".

Now say: "Exact, put the red car." Make the puppet hold the red car up and freeze. "Put it where? I can't guess!" The class adds: "**in** the box".

✎ Main activity: fix it for Exact (12 min)

Give the puppet these unclear instructions one at a time. After each, the puppet shows what it would do (or says "I can't guess!"). The class fixes the words.

Unclear instruction	What Exact does	A clear version
"Give me a crayon."	Holds all three, can't choose	"Give me the **green** crayon."
"Put the book down."	Holds it over the floor, freezes	"Put the book **on the table**."
"Clap."	Claps and claps and does not stop	"Clap **two times**."
"Put Teddy next to it."	Looks around: next to what?	

Unclear instruction	What Exact does	A clear version
		"Put Teddy **next to the box**."
"Stand up, sit down." (said fast and unclear)	Stands and sits over and over	"Stand up, **then** sit down."

Each time ask: "What word did Exact need? Which one, where, or how many?" Accept any clear fix; there is more than one right answer.

Talk about it (3 min)

- "Was Exact being silly?" Say plainly: "No. Exact was not joking. Exact just couldn't guess what we meant."
- "Computers are a bit like Exact. They do what they are told and they can't guess. People who make computers do things have to be very clear."

✓ Closing check (2 min)

Puppet: "Exact, put the car in the box." (Both cars are still on the table.)

Ask: "What does Exact need to know?"

Answer: which car (for example "the blue car" or "the small car").

Vocabulary

clear, exact, which one, where, how many

Differentiation

- Support: show the choices with gestures or pictures; let the child point to the thing Exact needs.
- Stretch: children make up an unclear instruction and the class fixes it.

⚠ Safety

Keep the puppet's actions gentle; no throwing. Some children find a puppet that "won't listen" frustrating; keep it light and switch to a fix quickly.

Teacher notes

The puppet's job is to show that unclear words lead to guessing or getting stuck, not to make the children feel they got it wrong. Praise every clear fix. Asking "which one?" is a good question for children to ask too (Common Core SL.K.3: ask questions to clarify something not understood); lesson 4 practises that.

Lesson 4: Build my tower (25 min)

Back to the unit

Goal

Children give a partner clear instructions to copy a three-block tower, and the builder asks a question when an instruction is not clear.

Materials

- For each pair: two sets of three large blocks (one red, one blue, one yellow), and a low barrier (a big book stood on end, a folder or a cardboard screen).
- One set for the teacher's demonstration.

Steps

✎ Opening (3 min)

Remind the class of Exact: "Exact couldn't guess. Today **you** are going to be the builder who can't see, and your partner has to be clear."

✎ Explain and model (5 min)

Build a tower behind the barrier where only the class can see it: red at the bottom, blue in the middle, yellow on top. Ask a volunteer to be the builder on the other side.

Model good instructions, one block at a time:

1. "Put the **red** block on the table."
2. "Put the **blue** block **on** the red block."
3. "Put the **yellow** block **on** the blue block."

Then lift the barrier. Same tower? Celebrate.

Model a question too: say "Put the next block on top," and have the builder ask "**Which colour?**" Praise the question: "Good builders ask when they are not sure."

✎ Main activity: pairs build (12 min)

1. Pairs sit with the barrier between them. The giver builds a tower of three blocks on their side, in any order they like.
2. The giver tells the builder how to make the same tower, one block at a time. The builder may ask questions: "Which colour?" "On top or next to?"
3. Lift the barrier and compare. If the towers are different, find the step where they went different, and fix it together.
4. Swap roles and build again. Most pairs can do two to four rounds.

Walk around. Listen for colour words and position words. If a giver says "put that one there", ask the builder: "Do you know which one and where?"

Talk about it (3 min)

- "Which words helped the most?" (Colour words; on, next to.)
- "When did a question help?" (When the builder didn't know which block or where.)
- "If the towers were different, was anyone bad at building?" (No. Usually a word was missing or heard wrong, and we fixed it.)

✓ Closing check (2 min)

Show a tower: red at the bottom, blue in the middle, yellow on top. Ask a child to say the first instruction, then a second child the next one, then a third.

Answer: "Put the red block on the table." "Put the blue block on the red block." "Put the yellow block on the blue block." (Any version that names the colour and says "on" is right.)

Vocabulary

builder, giver, on, on top, next to, question

Differentiation

- Support: two blocks only; or the teacher is the partner; or the pair sits side by side with the builder covering their eyes.
- Stretch: four blocks, or a block **next to** another as well as on top, or let the builder use only questions ("Is the bottom one red?").

⚠ Safety

Use large blocks only (nothing small enough to swallow). Barriers should be light and stable.

Teacher notes

This is a version of a common "barrier game" used for speaking and listening. Here it practises the computing idea that instructions must be complete and in order, and Common Core SL.K.3 (asking to clarify) and SL.K.6 (speaking clearly).

Lesson 5: Instruction helpers (25 min)

Back to the unit

Goal

Children give a classmate two clear steps for an everyday task, spot a missing step, and show what they have learned in a short check.

Materials

- A few everyday objects for tidy-up tasks (book, crayon pot, hat, cup).
- A chair, a cup, two different toy cars, and two large blocks (one red, one blue) for the closing check.
- Teddy and a box; the handwashing step cards from Health and PE term 1 if you have them.

Steps

✎ Opening (3 min)

Say: "We have been very clear instruction-givers. Today we are instruction helpers for everyday jobs."

Remind children of the handwashing steps: wet, soap, rub, rinse, dry. Ask: "What would happen if we dried our hands before we washed them?" (They'd be wet again; the order matters.)

✎ Main activity: two clear steps (10 min)

1. **Model (3 min).** "Mia, pick up the **book**, then put it **on the shelf**." Point out the two steps, the **then**, the **which one** and the **where**.
2. **Pairs (7 min).** In pairs, one child gives two clear steps for a tidy-up job using the objects ("Pick up the hat, then put it in the box"). The partner does it. Then swap. Listen for which-one and where words.

Spot the missing step (5 min)

Say each set of steps and ask: "What's missing?"

- "Get a cup. Drink the water." **Answer:** fill the cup with water (between getting the cup and drinking).
- "Put on your coat. Go outside. Open the door." **Answer:** the steps are in the wrong order; open the door before going outside. (Accept "out of order" as the answer; finding and fixing a wrong step is practised again in term 3.)

✓ Closing check: five parts (7 min)

Do this with small groups while others draw "me giving clear instructions"; use a one-to-one slot for quieter children.

1. Say: "Touch your head, then clap once." **Watch for:** head first, then one clap.
2. Say: "Put Teddy **under** the chair." Then "**behind** the box." Then "**next to** the cup." **Watch for:** all three placed correctly. For "behind", accept a placement that fits where the child stands or the way the box faces.
3. With two cars on the table, say: "Put the car in the box." Ask: "What's missing?" **Answer:** which car.
4. Show a two-block tower (blue on red). Ask: "Tell me how to build this." **Watch for:** a colour word and a position word ("Put the blue block on the red block").
5. Ask the child to tell a classmate two steps for tidying a book away. **Watch for:** two steps, with which one and where.

Record each part as "yes", "with help" or "not yet". A "not yet" is fine at this stage; Argon's term-2 unit keeps practising.

Vocabulary

steps, order, then, missing, clear

Differentiation

- Support: accept pointing, signing or picture cards in every part. In part 1, keep both steps in one instruction (spoken, signed, or two picture cards shown together) so the check still tests order; a seated or pointing action is fine. In the other parts, one step at a time is fine.
- Stretch: three steps for a job; or ask the child to say why a step order matters.

⚠ Safety

Keep tidy-up tasks to safe, light objects within reach. No climbing to shelves.

Teacher notes

Next term, Argon's robot recipes unit turns these spoken steps into arrow cards and picture cards in First, Next, Last order, and introduces the word "algorithm".

Kindergarten Computing: Patterns and Fixing a Wrong Step (5 lessons, about 2 weeks)

> **Unreviewed AI draft.** Written by Claude Opus 5.5 on 6 November 2026. No human teacher has reviewed this unit. CC0 1.0 (public domain). Text-checked by one other agent (Gemini 4 Argon); see Known gaps.

Part of the kindergarten year plan (computing, term 3). It comes after Clear instructions for everyday tasks (term 1) and Gemini 4 Argon's Step-by-step robot recipes and floor-grid paths (term 2). Argon's unit already fixes a wrong step on a floor grid and repeats action patterns; this unit uses **picture-card patterns** instead, and adds the job of a **tester** who checks the work against a goal.

Big idea

A pattern is something that repeats in a way you can predict, so you can say what comes next. When a pattern or a list of steps goes wrong, you can look for the one part that does not fit and fix just that part. People who write programs do the same: they check the result, find the wrong step (a **bug**) and change it.

This unit is "unplugged": no screens or devices are needed.

Outcomes

By the end of the unit, most children can:

1. Copy and continue a simple sound or movement pattern (for example clap, stamp, clap, stamp).
2. Say or show what comes next in a picture pattern of the kinds AB, ABB and AAB.
3. Make their own repeating pattern that repeats at least twice.
4. Find the one card that does not fit in a broken pattern and fix it.
5. Take a turn as programmer, bot or tester, and as tester find and swap one wrong instruction card.

Prior knowledge

- Following and giving instructions in order (term 1) and using arrow or step cards (Argon's term-2 unit).
- Telling red from blue, and circles from squares (the cards use both, so either is enough).
- Children do not need to read or write. Counting to 6 helps in lesson 4 but is not required.

Lessons

Lesson	Title	Time	Core idea
1	Pattern detectives	20 min	Sound, movement and picture patterns; the part that repeats
2	What comes next?	25 min	Continuing AB, ABB and AAB patterns; making our own
3	The broken pattern	25 min	Finding the one card that does not fit and fixing it

Lesson	Title	Time	Core idea
4	The tester's job	25 min	Programmer, bot and tester; finding and swapping a wrong card
5	Pattern show	25 min	Showing our patterns; a short one-to-one check

Materials

- **Pattern cards** (about 8 cm across, card or laminated paper): every card shows a shape filled with one colour, so shape and colour both tell the cards apart.
  - Red circle cards and blue square cards: 6 of each per pair (lessons 2, 3 and 5).
  - A large teacher set: 10 red circles, 10 blue squares and 4 yellow triangles (lessons 1–5), plus a strip of card or a line of floor tape to lay them along.
  - Raised versions for children who need them: a felt or foam circle and square glued on (lessons 1–5).
- **Building pieces** for lesson 4, per group of three: 4 red round blocks (short cylinders, stood on end) and 4 blue square blocks (cubes). Use pieces too big to swallow; no beads.
- **Lesson 4 card sets**, per group of three: one goal strip (a picture of the finished line), six instruction cards with one deliberately wrong card (sets A, B and C in lesson 4), and three spare cards of each kind.
- **Teacher strips** for lesson 4: a demonstration set (goal red, blue, red, blue, red, blue; instruction cards red, blue, red, red, red, blue) and a closing-check set (goal red, blue, blue, red, blue, blue; instruction cards red, blue, red, red, blue, blue).
- **Check strip** for lesson 5, part 5: a goal strip showing red, blue, red, blue, four instruction cards (one red circle, three blue squares) and a spare red circle card.
- **Role badges** for lesson 4, one set per group: programmer (a picture of a hand laying a card), bot (a robot face), tester (a magnifying glass).
- A small drum or a table to tap for sound patterns (optional; claps and stamps are enough).
- A class list for the lesson 5 check.

Access and inclusion

- Every card uses shape **and** colour, so a child who cannot tell red from blue can use the shapes, and a child who is still learning shape names can use colours. Accept "circle", "red", "round" or pointing.
- Answers can be spoken, signed, pointed to, given with a communication device or shown by moving a card.
- Children with limited hand movement can direct an adult or partner ("that one, there") instead of placing cards themselves; directing counts fully.
- Low vision: use the raised cards and hold them close; read the pattern aloud while the child touches each card in order.
- Deaf or hard-of-hearing children: every sound pattern is also a movement pattern they can see (clap, stamp), and a child can rest a hand on the drum or table to feel taps.
- Movement is opt-in in form: tapping knees, nodding or pointing counts as a clap or stamp.
- Some children find being "wrong" upsetting. The broken patterns are made by the teacher or a partner on purpose, and finding a mistake is the goal, not a failure.
- The lesson 5 check is one-to-one, about 3 minutes per child, at a separate time if needed.

Assessment

Lesson 5 has a six-part one-to-one check (about 3 minutes per child), done by watching and listening, not on paper:

1. Copies clap, stamp, clap, stamp and continues it with one more clap, stamp.
2. Says what comes next: circle, square, circle, square, circle, ? (**square**).
3. Says what comes next: circle, square, square, circle, square, square, circle, ? (**square**).
4. Finds the wrong card in circle, square, circle, square, circle, circle, circle, square (**the 6th card**, a circle, should be a square).
5. As tester, compares a goal of red, blue, red, blue with instruction cards red, blue, blue, blue, and swaps **card 3** for a red card.
6. Makes their own pattern of at least six cards that repeats at least twice.

Short daily closing checks are in each lesson.

Sources

- Wikipedia, Pattern (read 6 November 2026): a pattern is a regularity whose elements repeat in a predictable manner, and patterns can be observed with any of the senses. Lessons 1 and 2 use sound and movement patterns as well as picture patterns for this reason.
- Wikipedia, Debugging (read 6 November 2026): debugging is finding the root cause of bugs and possible fixes. Lessons 3 and 4 use only the everyday idea: find the one part that is wrong and fix it.
- CS Unplugged, Kidbots (read 6 November 2026): uses the roles of programmer, bot and tester, and describes programming as planning, coding, testing, tracking down bugs and changing the program so it works; real programs are often written by teams with separate roles. Lesson 4 borrows these three roles; its card-pattern activity is written for this unit, not copied from CS Unplugged.
- No computing standard was read for this unit.

Known gaps

- No computing standard was checked, so the choice of skills is mine; it links to the term-1 and term-2 units and the year plan, not to a published sequence.
- The pattern types (AB, ABB, AAB) and the order they appear in are my choice, not taken from a source.
- One wrong card per broken pattern keeps the idea simple; real bugs can be several, or hard to find, and that is left for later grades (for example Argon's grade 2 unit).
- Some 5-year-olds will find ABB and AAB hard. Lesson 2 keeps AB as the core and treats the others as next steps; lesson 5 notes which kinds each child could do.
- Peer check: Gemini 4 Argon did a bounded text, timing and answer-key check at 338d05b (not an educator, safety or accessibility review) and found no timing or answer-key errors. Its two optional notes (list the lesson 4 and 5 teacher strips in Materials; say how a child with low vision can be the tester) were added in a47787e, which Argon also diff-checked the same day (see PEERCHECKS.md). Not reviewed by a teacher.

Lesson 1: Pattern detectives (20 min)

Back to the unit

Goal

Children copy and continue sound and movement patterns, see the same kind of pattern in picture cards, and find the part that repeats.

Materials

- The large teacher set of pattern cards (red circles, blue squares) and a strip or line of floor tape to lay them along.
- Raised cards for children who need them.
- Optional: a small drum or a table to tap.

Steps

✎ Opening (3 min)

Without speaking, clap, stamp, clap, stamp, clap, stamp. Then stop and wait. Most children will want to fill the gap. Ask: "What do you think comes next?" (A clap.)

Say: "That was a **pattern**. A pattern repeats, so we can guess what comes next. Today we are pattern detectives."

✎ Main activity: hear it, move it, see it (10 min)

1. **Copy me (3 min).** Do each pattern twice, then the class joins in: clap, stamp (AB); clap, clap, stamp (AAB); pat knees, clap, clap (ABB). Say the words as you go ("clap, stamp, clap, stamp") so children can hear as well as see the pattern.
2. **The part that repeats (3 min).** Do clap, stamp, clap, stamp again and ask: "What part keeps coming back?" (Clap, stamp.) Show it with two fingers: "This little bit, again and again."
3. **See it (4 min).** Lay red circle, blue square, red circle, blue square, red circle, blue square along the strip. Read it together: "circle, square, circle, square..." or "red, blue, red, blue...". Ask a child to point to the part that repeats (one circle and one square). Then do the clap, stamp pattern while you point: circle = clap, square = stamp.

Nobody is "out". If the class loses the pattern, stop, say it slowly together and start again.

Talk about it (5 min)

- "How did you know a clap came next?" (It kept going clap, stamp, clap, stamp; it repeats.)
- "Is circle, square, circle, square the same kind of pattern as clap, stamp, clap, stamp?" (Yes: two things taking turns.)

- "Can you find a pattern in our room?" Accept any repeating thing children notice (stripes, tiles, a border on a display). If none are easy to see, that is fine; the cards are enough.

✓ Closing check (2 min)

Lay red circle, blue square, blue square, red circle, blue square, blue square. Ask: "Which part repeats?" Children point or say.

Answer: circle, square, square (one red circle and two blue squares).

Vocabulary

pattern, repeat, next

Differentiation

- Support: stay with two-part (AB) patterns; let a child copy a buddy.
- Stretch: a three-thing pattern (clap, stamp, pat knees), or let a child lead a pattern for the class.

⚠ Safety

Check the space is clear before stamping. Stamping can be replaced with tapping a table or the knees.

Teacher notes

A pattern here is "something that repeats in a way you can predict". The word "core" for the repeating part is used in some classrooms; it is left out here, and "the part that repeats" is enough. Children who are deaf or hard of hearing can follow the movements; children with low vision can follow the sounds and the raised cards.

Lesson 2: What comes next? (25 min)

Back to the unit

Goal

Children say or show what comes next in AB, ABB and AAB picture patterns, and make a repeating pattern of their own.

Materials

- The large teacher set of pattern cards and the strip or floor tape.
- Per pair: 6 red circle cards and 6 blue square cards (raised cards for children who need them).

Steps

✎ Opening (3 min)

Clap, stamp, clap, stamp, clap... and stop. "What comes next?" (Stamp.) Say: "Yesterday we found patterns. Today we will guess what comes next, then make our own."

✎ Main activity: guess, then make (14 min)

1. **What comes next? (6 min).** Lay each pattern, read it together, then leave a gap and ask what goes in it. Let a child place the card.
    - Red circle, blue square, red circle, blue square, red circle, **?** (blue square)
    - Circle, square, square, circle, square, square, circle, **?** (square)
    - Circle, circle, square, circle, circle, square, circle, **?** (circle)
    - If children guess wrongly, read the pattern again slowly, tapping each card, and say the part that repeats aloud.
2. **Make your own (6 min).** Each pair makes a pattern with their cards that repeats at least twice. Walk round and ask: "What is the part that repeats?" Some pairs will copy one of yours; that is fine.
3. **Swap and say (2 min).** Each pair covers the last card of their pattern with a hand. The pair next to them says what is under the hand.

Talk about it (5 min)

- "How did you know what came next?" (We found the part that repeats and kept going.)
- "Circle, square, square: how is that different from circle, square?" (It has two squares each time, not one.)
- "Was it a pattern if the cards were just mixed up?" (No; nothing repeated, so we could not guess.)

✓ Closing check (3 min)

Lay circle, circle, square, circle, circle, square, circle, circle and ask: "What comes next?"

Answer: square (the part that repeats is circle, circle, square).

Vocabulary

pattern, repeat, next, guess

Differentiation

- Support: AB patterns only; place the next card together while saying the pattern aloud.
- Stretch: add the yellow triangle cards for a three-part pattern (circle, square, triangle), or make a pattern and say it as claps and stamps.

⚠ Safety

No special safety issues. Keep cards on tables or the carpet so they are not slipped on.

Teacher notes

Note which children can continue AB, ABB and AAB patterns; lesson 5 records this. Many children find AB easy and ABB or AAB harder at first. A pattern a child makes that repeats only once (circle, square) is a good start; ask them to make it "go again".

Lesson 3: The broken pattern (25 min)

Back to the unit

Goal

Children find the one card that does not fit in a broken pattern and fix it by swapping just that card.

Materials

- The large teacher set of pattern cards and the strip or floor tape.
- Per pair: 6 red circle cards and 6 blue square cards (raised cards for children who need them).

Steps

✎ Opening (3 min)

Clap, stamp, clap, stamp, stamp, stamp, clap, stamp. Pull a puzzled face. "Hmm. Did that sound right?" (No.) "Something went wrong in my pattern. Today we are going to find the part that went wrong and fix it."

✎ Main activity: find it, fix it (14 min)

1. **Spot the odd one (5 min).** Lay circle, square, circle, square, square, square, circle, square. Read it together, touching each card. Ask: "Which card does not fit?"
    - **Answer:** the 5th card (a square) should be a circle. Let a child swap it, then read the fixed pattern together.
    - Show children how to check: say the part that repeats ("circle, square") and walk along the cards two at a time until something is different.
2. **A harder one (3 min).** Lay circle, square, square, circle, circle, square, circle, square, square.
    - **Answer:** the 5th card (a circle) should be a square; the part that repeats is circle, square, square.
3. **Partner game (6 min).** In pairs, child A makes a circle, square pattern with 8 cards and says it aloud. A closes their eyes (or turns around) while B swaps **one** card for the other kind, using a spare card. A opens their eyes, finds the card that does not fit and fixes it. Swap roles.

Say: "When people make computer programs, a mistake like this is called a **bug**. Finding it and fixing it is a big part of the job." Make clear that a bug is not a real insect here, and that everyone makes them.

Talk about it (5 min)

- "How did you find the wrong card?" (We said the pattern and looked for where it stopped matching.)
- "Did we need to start the whole pattern again?" (No; we only changed the one wrong card.)
- "Is it bad to make a bug?" (No. Everybody makes them; the job is to find and fix them.)

✓ Closing check (3 min)

Lay circle, circle, square, square, circle, square, circle, circle, square. Ask: "Which card is the bug, and what should it be?"

Answer: the 4th card (a square) should be a circle; the part that repeats is circle, circle, square.

Vocabulary

pattern, wrong, fix, bug

Differentiation

- Support: AB patterns of 6 cards, with the wrong card near the start; let the child touch each card while the teacher says the pattern.
- Stretch: B swaps two cards; or A finds the bug in a sound pattern B claps.

⚠ Safety

No special safety issues. If a child is upset at having made a mistake in their own pattern, point out that the partner made the bug on purpose and finding it is the goal.

Teacher notes

This lesson uses one wrong card at a time so the idea stays clear. Gemini 4 Argon's term-2 unit fixes a wrong step on a floor grid; here the same idea is used with patterns, ready for lesson 4, where the "bug" is in a set of instructions.

Lesson 4: The tester's job (25 min)

Back to the unit

Goal

Children take turns as **programmer**, **bot** and **tester**: the programmer lays instruction cards, the bot follows them exactly, and the tester compares the result with the goal, finds the wrong card and swaps it.

Materials

Per group of three:

- One set of role badges: programmer, bot, tester.
- 4 red round blocks (short cylinders, stood on end) and 4 blue square blocks (cubes).
- Three card sets, each a goal strip plus six instruction cards with one wrong card (below), and three spare red circle and three spare blue square cards.

Card sets (R = red circle card or red round block; B = blue square card or blue square block):

Set	Goal strip	Instruction cards (with one bug)	Wrong card	Fix
A	R B R B R B	R B R B B B	5th	swap for R
B	R B B R B B	R B B R R B	5th	swap for B
C	R R B R R B	R R B B R B	4th	swap for R

A teacher demonstration set: goal R B R B R B; cards R B R R R B (the 4th card should be B).

Steps

✎ Opening (3 min)

Show the three badges. Say: "People who make computer programs often work as a team. Today we have three jobs. The **programmer** lays out the instruction cards. The **bot** does exactly what the cards say, one card at a time, no guessing. The **tester** checks that the result matches the goal, and if it does not, finds the wrong card."

✎ Main activity: build, test, fix (15 min)

1. **Demonstration (4 min).** With two children as programmer and bot, lay the demonstration cards R B R R R B in a row. The bot puts down one block for each card, left to right, in a line. You are the tester: hold the goal strip next to the line and touch both, one place at a time. "Red, red. Blue, blue. Red, red. Red... but the goal says blue!" Point to the 4th instruction card: "Here's the bug." Swap it for a blue square card, clear the blocks, and let the bot build again. Check again: it matches.
2. **Groups (11 min).** Give each group set A. The programmer lays the six instruction cards in a row (already in order, with the bug in them). The bot builds. The tester

compares, finds the wrong card and swaps it, and the bot builds again to check. Then rotate badges and do set B, then set C, so each child has each job once.
    - The bot follows the cards even when they look wrong; that is how the tester can find the bug.
    - A child with low vision can be the tester using raised goal strips and cards, comparing by touch: the round blocks and square blocks feel different, so the built line can be checked by hand, one place at a time.
    - If a group finishes early, the programmer makes their own goal strip and cards, with or without a bug, for the others.

Talk about it (4 min)

- "Why did the bot build the wrong line?" (The bot did exactly what the cards said, and one card was wrong.)
- "How did the tester find the bug?" (By comparing the line with the goal, one place at a time.)
- "After the swap, why did the bot build again?" (To check that the fix worked.)

✓ Closing check (3 min)

Show a goal strip R B B R B B and instruction cards R B R R B B. Ask: "Tester, which card is the bug, and what should it be?"

Answer: the 3rd card (a red circle) should be a blue square.

Vocabulary

programmer, bot, tester, instruction, bug, fix, check

Differentiation

- Support: work with an adult as one of the three jobs; use set A only; the tester points to each place while an adult says the colours.
- Stretch: two bugs in one set, or the programmer writes a new goal strip and the tester checks a friend's cards.

⚠ Safety

Use blocks too big to swallow; no beads or small parts. Clear blocks away between turns so the table stays tidy.

Teacher notes

The three roles come from CS Unplugged's Kidbots activities (see the unit's Sources); the card-and-block task is written for this unit. "Bot" means a robot that follows instructions; the

child playing the bot is a person doing a job, not someone being told off. The bug is always in the cards, never in the bot: this is the point to make.

Lesson 5: Pattern show (25 min)

Back to the unit

Goal

Children show a pattern they made and a bug they fixed, and the teacher finds out, one to one, what each child can do.

Materials

- Per pair: 6 red circle cards and 6 blue square cards (raised cards for children who need them).
- The large teacher set and the strip or floor tape.
- For the one-to-one check: 6 red circle and 6 blue square cards, and for part 5 a goal strip showing red, blue, red, blue, four instruction cards (one red circle, three blue squares) and a spare red circle card.
- A class list to note results.

Steps

✎ Opening (3 min)

Clap, stamp, clap, stamp with the class. Say: "This week we were pattern detectives, bug finders and testers. Today we show what we can do."

✎ Main activity: pattern show (15 min)

1. **Make (5 min).** Each pair makes a pattern of at least six cards that repeats at least twice.
2. **Show (7 min).** Pairs take turns to show the class. The class reads the pattern aloud (or claps it: circle = clap, square = stamp) and says what comes next.
3. **Bug hunt (3 min).** While the class closes their eyes, the teacher swaps one card in a pair's pattern. The class finds the bug and the pair fixes it.

Pairs who prefer not to show to the whole class can show the teacher or a small group instead.

Talk about it (4 min)

- "What is a pattern?" (Something that repeats, so you can guess what comes next.)
- "What is a bug?" (A wrong part, like a card that does not fit.)
- "What does a tester do?" (Checks the result against the goal and finds the wrong part.)

✓ Closing check (3 min)

Lay red circle, blue square, red circle, blue square, red circle, ? and ask the class what comes next.

Answer: blue square.

One-to-one check (about 3 minutes per child)

Do this during choosing time or at another time over the following days, not during the 25-minute lesson. Children can answer by speaking, signing, pointing, moving a card or directing an adult.

1. Clap, stamp, clap, stamp; ask the child to keep going. **Looks for:** one more clap, stamp (taps or nods are fine).
2. Lay circle, square, circle, square, circle and ask what comes next. **Answer:** square.
3. Lay circle, square, square, circle, square, square, circle and ask what comes next. **Answer:** square.
4. Lay circle, square, circle, square, circle, circle, circle, square and ask which card does not fit. **Answer:** the 6th card (a circle) should be a square.
5. Show a goal strip of red, blue, red, blue and instruction cards red, blue, blue, blue. Ask the child, as tester, to find the bug and fix it. **Answer:** swap the 3rd card for a red circle card.
6. Ask the child to make their own pattern. **Looks for:** at least six cards with a part that repeats at least twice.

Note which parts each child managed. A child who manages parts 1, 2 and 4 has the main ideas; parts 3, 5 and 6 are next steps. This check is for planning next term, not for a grade.

Vocabulary

pattern, repeat, next, bug, fix, tester

Differentiation

- Support: in the check, use AB patterns only and lay fewer cards; accept pointing.
- Stretch: ask the child to make a broken pattern for the teacher to fix, and to say how they would check the fix.

⚠ Safety

No special safety issues. Keep showing optional in form: showing a small group or the teacher counts.

Teacher notes

Results from part 4 and part 5 are a useful guide for grade 1 work on finding and fixing wrong steps. A child who finds the bug by touch, by sound or by colour alone has still found it.

Unit: Step-by-Step Robot Recipes and Floor-Grid Paths (Computing, Kindergarten)

> **Unreviewed AI draft.** Written by Gemini 4 Argon (2026-11-05). No human teacher has reviewed this unit. All content is CC0 1.0 Public Domain.

Overview

How does a toy robot or a computer know what to do? It cannot guess—a person must give it a clear, ordered list of steps called an **algorithm**.

Across five 30-minute unplugged movement and picture-card lessons, Kindergarten students (`ages 5–6`) learn the foundations of computational thinking through whole-body play. Students put 3-card daily routines into `First → Next → Last` order, guide a "Walking Robot" partner across a 3×3 floor grid using physical arrow cards (`↑ Step Forward`, `↺ Turn Left`, `↻ Turn Right`), notice when a missing or extra arrow makes the robot miss the target (**a bug**), act out simple action patterns (`Clap, Tap, Clap, Tap`), and press paper "buttons" to make a partner perform a matching sound or motion (connecting to Kindergarten Science: Pushes and Pulls).

Prior knowledge

- No reading or writing is required; all activities use picture cards, arrows, and spoken/movement commands.
- Students can count to 5 and follow one-step classroom directions.
- Helpful cross-link: Pushes and pulls (Science, Kindergarten) explores how pushing a button or object causes a motion.
- Leads to: Symbols, signals, sorting, and step-by-step recipes (Computing, Grade 1) and Computing & systems progression.

Learning goals

By the end of this unit, a student can:

1. Arrange 3 picture cards into **`First → Next → Last`** order for a familiar routine and tell what happens if the first and last cards are switched (Lesson 1).
2. Follow a 3-arrow floor-grid path (`↑ Step Forward` one square at a time) without jumping over squares (Lesson 2).
3. Spot the **bug** (mistake) when a 3-arrow path lands on a mud-puddle square instead of the treasure star, and swap in the card that fixes it (Lesson 3).
4. Continue a 2-part repeating action pattern (`Clap, Stomp, Clap, Stomp, ...`) and name the core part that repeats (Lesson 4).
5. Match a button press (**input**) to the action or sound a machine makes (**output**) in a partner game (Lesson 5).

Lesson sequence

Lesson	Title	Time	Core idea
Lesson 1	First, Next, Last: Putting Daily Routines in Order	30 min	Instructions happen one step at a time in order (**sequence**)
Lesson 2	Walking the Floor Grid: One Square at a Time	30 min	A robot follows arrow cards (↑) literally, moving one square per card
Lesson 3	Oops, Wrong Square! Fixing a Bug on the Rug	30 min	When a robot lands in the wrong place, we check the arrow cards and fix the **bug**
Lesson 4	Do It Again! Repeating Action Patterns	30 min	Many dances, songs, and computer tasks repeat a small pattern over and over
Lesson 5	Push a Button, Make It Go: Buttons and Actions	30 min	Pushing a button gives a machine an instruction to start an action or sound

Materials for the whole unit

- Masking tape or painter's tape to mark a 3×3 grid of large squares on the classroom floor (each square big enough for a child to stand inside)
- Large printed or hand-drawn picture cards:
- 3-step routine sets (Washing Hands, Building a Snowman, Getting Ready for Rain)
- 6 large Arrow Cards (`↑ Step Forward`, `↺ Turn toward the Window`, `↻ Turn toward the Door`)
- 1 paper **Gold Star** (goal) and 1 paper **Mud Puddle** (obstacle)
- 3 paper "Button Circles" (Blue Star Button, Yellow Bell Button, Purple Frog Button) and 1 large `[ □ PUSH BUTTON ]` action card (Lesson 5)
- Large tabletop robot tokens (oversized wooden blocks or plush toys at least 5 cm wide for Lesson 3's pair strip; avoid coins, small erasers, or small linking cubes that could pose a choking hazard for 5-year-olds)

Assessment summary

Each lesson finishes with a 3-question oral, thumbs-up/thumbs-down, or physical card-pointing check with worked teacher answers. In Lesson 5, students guide a plush toy or classmate across a 3-square path to press a paper button and trigger the matching class action.

Sources

These references provide teacher background for the concepts introduced in Kindergarten. All links were checked to load on 2026-11-05.

- Sequence (ordered list of elements or steps): https://en.wikipedia.org/wiki/Sequence — background for Lesson 1's `First → Next → Last` ordering.
- Algorithm (step-by-step procedure): https://en.wikipedia.org/wiki/Algorithm — background for Lessons 1–2.
- Grid (spatial index / square floor grid navigation): https://en.wikipedia.org/wiki/Grid_(spatial_index) — background for Lesson 2's 3×3 floor-grid movement.
- Debugging (finding and correcting faults in instructions): https://en.wikipedia.org/wiki/Debugging — background for Lesson 3's arrow-card repair.
- Pattern (repeating regularity in actions or shapes): https://en.wikipedia.org/wiki/Pattern — background for Lesson 4's repeating movement patterns.

- Bell, T., Witten, I. H., & Fellows, M. (2015). CS Unplugged (pedagogical reference for screen-free early computing activities; all lesson text and games in this unit are original CC0 work): https://www.csunplugged.org/

Known gaps and cautions

- **Unreviewed AI draft:** This unit has not yet been reviewed by a human Kindergarten educator or tested with 5-year-old students.
- **Left/Right vs. Classroom Landmarks (Lesson 2):** Many 5-year-olds are still developing automatic left/right recall. In Lessons 2 and 3, pair turn arrows with concrete **classroom wall landmarks** (for example, "Turn toward the Window wall" vs. "Turn toward the Bookshelf wall", or tape a blue circle on the robot's left shoe and a yellow square on the right shoe).
- **Safe spacing on the floor grid:** Have only one "Robot" student stand inside the 3×3 tape grid at a time while the rest of the group sits around the perimeter as "Programmers" and "Bug Checkers" so students do not bump into each other.

Lesson 1: First, Next, Last — Putting Daily Routines in Order

- **Unit:** Step-by-Step Robot Recipes and Floor-Grid Paths (Computing, Kindergarten)
- **Time:** 30 minutes
- **Grouping:** Whole class on the circle rug, then pairs

Learning objective

Students will arrange 3 picture cards into **`First → Next → Last`** order for an everyday routine and explain what happens when the order is mixed up.

Materials

- 3 large demonstration picture cards for **Building a 3-Ball Snowman**:
- **Card A (First):** Roll a big bottom snowball on the ground
- **Card B (Next):** Lift a middle snowball on top of the big one
- **Card C (Last):** Put a small head snowball and carrot nose on top
- Per pair of students: a 3-card picture set for **Getting Ready for Rain**:
- Put on rain boots and raincoat
- Open the umbrella outside
- Walk through the rain staying dry

Vocabulary

- **First:** The step that happens at the very beginning (`Step 1`).
- **Next:** The step that happens in the middle (`Step 2`).
- **Last:** The step that finishes the job (`Step 3`).
- **Recipe (Algorithm):** A list of steps in the right order to do a job.

Lesson flow

✎ 1. Opening: The Upside-Down Snowman (6 min)

1. Hold up the 3 Snowman cards in the **wrong order**:
2. **First:** Put the tiny head snowball in the air (`Card C`)!
3. Pretend to hold a tiny snowball high in the air with nothing underneath it and let it drop ("Plop!").
4. Ask: "Why did my snowman head fall on the ground? Which snowball has to go **First** on the bottom so it can hold up the others?"
5. Students point to the big bottom snowball (`Card A`).

✎ 2. Main activity: Ordering `First → Next → Last` (15 min)

1. **Whole-class Snowman Line-Up (5 min):**
2. Invite 3 volunteers to hold `Card A`, `Card B`, and `Card C` at the front of the rug.

3. The class helps them stand in left-to-right order: `First` **(Big bottom ball)** → `Next` **(Middle ball)** → `Last` **(Head and nose)**.
4. Everyone acts out rolling the big ball, lifting the middle ball, and placing the head and carrot nose.
5. **Partner Rainy-Day Sort (10 min):**
6. Hand each pair the 3 **Getting Ready for Rain** picture cards shuffled face-up.
7. Partners talk together and line their 3 cards up from left to right:
    1. **First:** Put on boots and coat inside.
    2. **Next:** Open the umbrella at the door.
    3. **Last:** Walk in the rain staying dry.
8. Ask pairs to test a silly swap: "What happens if you do Card 3 (Walk in the rain) **First**, and Card 1 (Put on raincoat) **Last**?" (You get soaked before your coat is on!)

✓ 3. Discussion questions (4 min)

- **Question 1:** "When you eat a bowl of cereal, which comes **First**: pouring the cereal and milk into the bowl, or scooping with your spoon?"
- Example good answer: Pouring the cereal and milk into the bowl comes **First**, or else your spoon scoops an empty bowl!
- **Question 2:** "Why do machines and robots need their steps in the right order?"
- Example good answer: Because a robot only does the exact step you tell it, so mixed-up steps make a silly mess.

✓ 4. Closing check (5 min)

Read 3 quick checks; students point or hold up 1, 2, or 3 fingers:

1. Look at these 3 pictures for painting a picture:
2. **(1)** Wash the paint off the brush at the end
3. **(2)** Dip the clean brush into the paint cup
4. **(3)** Paint a bright sun on the paper Which picture happens **First**?
5. Which of those 3 pictures happens **Last**?
6. What happens if you wash the brush and put it away **before** you paint on the paper?

Worked answers for closing check

1. **(2) Dip the clean brush into the paint cup** happens **First**.
2. **(1) Wash the paint off the brush at the end** happens **Last**.
3. The paper stays blank because you put the brush away before painting!

Differentiation

- **Extra support:** Place a 3-box mat labeled with dots (`•`, `••`, `•••`) on the floor so students can place one card in each box from left to right.
- **Extra challenge:** Give pairs a 4th blank card to draw what happens after coming back inside from the rain (Take off wet boots and close the umbrella).

Teacher notes

- **Common misconception:** Some students place cards from right to left or in a vertical pile. Point to the green dot on the left side of the rug/table as the starting spot so everyone reads the sequence in the same direction.

Lesson 2: Walking the Floor Grid — One Square at a Time

- **Unit:** Step-by-Step Robot Recipes and Floor-Grid Paths (Computing, Kindergarten)
- **Time:** 30 minutes
- **Grouping:** Whole class seated around a 3×3 floor tape grid

Learning objective

Students will guide a classmate ("the Walking Robot") from a Start square to a Gold Star square on a 3×3 floor grid by lining up `↑ Step Forward` and `Turn` arrow cards one step at a time.

Materials

- A 3×3 floor grid made with painter's tape on the rug: `[ ★ ] [ ] [ ]` (Row 3: Top — ★ starts at Top-Left for Opening & Path 1; moves to Row 2 Col 2 for Path 2 and Top-Right Row 3 Col 3 for Path 3) `[ ] [ ] [ ]` (Row 2: Middle) `[ R ] [ ] [ ]` (Row 1: Bottom — R = Robot Start at Bottom-Left facing UP ↑)
- 6 large Arrow Cards:
- 4 cards showing `↑ Step Forward 1 Square`
- 2 cards showing `↻ Turn Toward the Door (Right)` / `↺ Turn Toward the Window (Left)`
- 1 paper **Gold Star (★)**

Vocabulary

- **Grid:** Squares lined up in neat rows so we can count exact steps.
- **Command Card:** An arrow card that tells the robot one exact move.
- **Step Forward (↑):** Move 1 square straight ahead in the direction your toes are pointing.
- **Turn In Place (↺ / ↻):** Spin your feet inside the **same square** to face a new wall (without stepping into a new square yet!).

Lesson flow

✎ 1. Opening: How Does a Floor Robot Move? (6 min)

1. Stand inside the bottom-left corner square `[R]` of the 3×3 tape grid with your toes pointing toward the top row. Place the **Gold Star (★)** two squares straight ahead in the top-left corner.
2. Ask: "If I want to walk from my Start square to the Gold Star without stepping outside the lines, how many squares forward do I need to step?"
3. Count together as you step: `1` **step forward** (into the middle-left square), `2` **steps forward** (onto the Gold Star!).
4. Show that **2** `↑ Step Forward` **arrow cards** (`[ ↑ ] [ ↑ ]`) write down that exact recipe!

✎ 2. Main activity: Human Robot & Programmer Teams (15 min)

1. **Practice the "Turn in Place" Rule (5 min):**
2. Have all students stand up on their spot around the rug.
3. Hold up `↑ Step Forward`: everyone takes 1 small step forward (and steps back).
4. Hold up `↻ Turn Toward the Door`: everyone pivots their feet inside their spot so their nose and toes point toward the classroom door—**without** stepping forward!
5. Emphasize: "A turn card only spins our toes inside our square. To move into the next square, we still need a `↑ Step Forward` card!"
6. **3-Challenge Grid Game (10 min):**
7. For each round, choose 1 **Robot** (stands on `[R]` facing North/Up) and 2 **Programmers** (lay the arrow cards in a row beside the grid while the class checks):
    - **Path 1 (Straight Line):** Star is 2 squares straight ahead (`Row 3, Col 1`).
    - Recipe: `[ ↑ ] [ ↑ ]` (2 cards).
    - **Path 2 (One Corner Turn):** Move the Star to `Row 2, Col 2` (1 square up, 1 square toward the door/right).
    - Recipe: `[ ↑ ] [ ↻ Turn Toward Door ] [ ↑ ]` (3 cards).
    - **Path 3 (All the Way to the Top-Right Corner ★):** Star is at `Row 3, Col 3` (2 squares up, 2 squares right).
    - Recipe: `[ ↑ ] [ ↑ ] [ ↻ Turn Toward Door ] [ ↑ ] [ ↑ ]` (5 cards).
8. For each path, the class chants the cards in order while the Robot performs one card per chant.

✓ 3. Discussion questions (4 min)

- **Question 1:** "In Path 2, why did we need THREE cards (`↑`, `↻ Turn`, `↑`) even though the Robot only stepped into TWO new squares?"
- Example good answer: Because one card had to turn the Robot's toes toward the door before the Robot could step sideways into the Star square!
- **Question 2:** "Is there a second road of squares that also reaches the Top-Right Star (`Row 3, Col 3`)?"
- Example good answer: Yes! You could turn toward the door first, walk 2 squares across the bottom row, turn up, and walk 2 squares up!

✓ 4. Closing check (5 min)

Place the Robot on the bottom-left square facing **Up (`↑`)** and place the **Gold Star (`★`)** just **1 square straight ahead** (`Row 2, Col 1`).

1. How many `↑ Step Forward` cards does the Robot need to land right on the Gold Star?
2. What happens if we give the Robot **two** `↑ Step Forward` cards (`[ ↑ ] [ ↑ ]`) instead of one?
3. When the Robot sees a `↻ Turn` card, does the Robot move into a new square or spin its toes inside the same square?

Worked answers for closing check

1. **One card** (1 `↑ Step Forward` card) to reach the Gold Star 1 square ahead.
2. **Two cards (`[ ↑ ] [ ↑ ]`):** The Robot walks **right past** the Gold Star into the top-left square (`Row 3, Col 1`)!
3. **Turn card (↻):** It **spins its toes inside the same square** (it does not step into a new square).

Differentiation

- **Extra support:** Give the Robot a paper steering wheel or tape a big paper arrow onto the top of their shoes so everyone can see which way the Robot is facing before reading the next card.
- **Extra challenge:** Place a plush puppy on one square as a "Sleeping Puppy" obstacle and ask students to build a path to the Star that walks around the puppy without waking it up.

⚠ Safety

- Walk slowly one square at a time inside the tape grid; never run or jump across squares.

Teacher notes

- **Common misconception:** Just like in Grade 3 grid algorithms, young children naturally combine "Turn and step" into one motion. Practicing **"Glue your heels to your square while you turn"** makes the distinction between `Turn` and `Step Forward` crystal clear and fun.

Lesson 3: Oops, Wrong Square! — Fixing a Bug on the Rug

- **Unit:** Step-by-Step Robot Recipes and Floor-Grid Paths (Computing, Kindergarten)
- **Time:** 30 minutes
- **Grouping:** Whole class around the 3×3 floor tape grid, then pairs

Learning objective

Students will watch a Robot follow a broken arrow-card path, point to the exact card that caused the Robot to miss the Gold Star or step in a Mud Puddle (**a bug**), and fix the path.

Materials

- The 3×3 floor tape grid from Lesson 2
- 6 large Arrow Cards (`↑ Step Forward`, `↻ Turn Toward Door`, `↺ Turn Toward Window`)
- 1 paper **Gold Star (★)** and 1 brown paper **Mud Puddle (▯)**
- Per pair (for Mystery 3): a 3-square paper strip (`[ Start ] [ Middle ] [ ★ ]`), 3 paper `[ ↑ ]` cards, and 1 **large wooden block or plush robot token** (at least 5 cm wide; do not use coins or small erasers)

Vocabulary

- **Bug:** A mistake in our arrow cards that sends the Robot to the wrong square.
- **Fix (Debug):** Finding the wrong card and trading it for the right card so the Robot reaches the goal.
- **Test:** Having the Robot walk the cards from the beginning to check if our fix worked.

Lesson flow

✎ 1. Opening: The Mud-Puddle Mistake (6 min)

1. Set up the 3×3 floor grid with:
2. **Robot (R)** at Bottom-Left (`Row 1, Col 1`), facing **Up (↑)**
3. **Gold Star (★)** at Middle-Left (`Row 2, Col 1`, 1 square straight ahead)
4. **Mud Puddle (▯)** at Top-Left (`Row 3, Col 1`, 2 squares straight ahead)
5. Lay down **two** `↑ Step Forward` cards: `[ ↑ ] [ ↑ ]`.
6. Act out the Robot:
7. Card 1 (↑): Step onto the Gold Star (`Row 2, Col 1`)—"Yay!"
8. Card 2 (↑): "Wait, there is still another card! Robots must follow every card!" Step forward off the Star and SPLASH! right into the Mud Puddle (`Row 3, Col 1`)!
9. Ask: "Oh no! Why did the Robot step into the Mud Puddle? Which card was the **bug**?"
10. Students point to the **extra second ↑ card**! Take away the second ↑ card and **test** again—now the Robot stops safely on the Gold Star.

✎ 2. Main activity: Three Bug-Fix Mysteries (15 min)

Invite student **Bug Detectives** to solve three broken programs on the rug:

1. **Mystery 1 — The Too-Short Recipe (Missing Card Bug):**
2. **Goal (★):** Top-Left (`Row 3, Col 1`, 2 squares straight ahead from Start).
3. **Broken Cards on Rug:** `[ ↑ ]` (only 1 card!).
4. **Test:** Robot takes 1 step to the middle square and stops one square short of the Star.
5. **How to Fix:** Add one more **`[ ↑ ]`** card at the end (`[ ↑ ] [ ↑ ]`) and re-test!
6. **Mystery 2 — The Wrong-Way Turn Bug:**
7. **Robot (R):** Starts in the **Bottom-Middle square (`Row 1, Col 2`)**, facing **Up (↑)**.
8. **Goal (★):** Middle-Right square (`Row 2, Col 3`, toward the Door).
9. **Mud Puddle (▯):** Middle-Left square (`Row 2, Col 1`, toward the Window).
10. **Broken Cards on Rug:** `[ ↑ ] [ ↺ Turn Toward Window ] [ ↑ ]`.
11. **Test:** Robot steps up to the center square, turns toward the Window, and steps into the Mud Puddle!
12. **How to Fix:** Which card was the bug? **Card 2 (`↺ Turn Toward Window`)!** Swap Card 2 for **`[ ↻ Turn Toward Door ]`**, then re-test from the start to watch the Robot land on the Gold Star!
13. **Mystery 3 — Pair Tabletop Bug Fix (5 min):**
14. Each pair gets a small 3-square strip drawn on paper (`[ Start ] [ Middle ] [ ★ ]`) and 3 paper arrow cards placed on the side: `[ ↑ ] [ ↑ ] [ ↑ ]`.
15. Partners slide their large wooden block or plush robot token along the 3 squares, see that 3 steps goes off the end of the paper strip, and remove 1 `↑` card so their token lands right on `[ ★ ]`.

✓ 3. Discussion questions (4 min)

- **Question 1:** "When our Robot stepped in the Mud Puddle, was the Robot being naughty, or was it just following our cards?"
- Example good answer: The Robot was doing its job following the cards! The mistake (**bug**) was in the cards, not the Robot.
- **Question 2:** "Why do we always walk the path again from the Start square after we change a card?"
- Example good answer: To **test** our fix and make sure the new cards really reach the Gold Star!

✓ 4. Closing check (5 min)

1. A Robot needs to move **2 squares forward** to reach the Gold Star (`[ Start ] → [ Square ] → [ ★ ]`), but the programmer only put down **1 `↑` card**. Where will the Robot stop, and how do you fix the bug?
2. What do computer scientists call a mistake in a list of instructions?
3. After you fix a bug in your arrow cards, what should you do next to be sure your fix works?

Worked answers for closing check

1. The Robot stops **1 square too early** (on the middle square). Fix it by **adding one more `↑ Step Forward` card** (`[ ↑ ] [ ↑ ]`).
2. A **bug**.
3. **Test it** by having the Robot walk the arrow cards from the Start square.

Differentiation

- **Extra support:** Touch each arrow card with a pointer stick at the exact moment the Robot takes that step so students see the 1-to-1 match between the card on the floor and the Robot's footstep.
- **Extra challenge:** Give pairs a path with **two** bugs (wrong turn AND one missing forward step) to fix one bug at a time.

⚠ Safety

- Use only **large wooden blocks, plush toys, or large paper cards** (at least 5 cm across) as tabletop robot tokens; never use coins, beads, or small erasers that could be a choking hazard for 5-year-olds.
- Keep only one student walking inside the 3×3 floor tape grid at a time while classmates sit around the outside edge.

Teacher notes

- **Building a warm debugging culture:** Celebrate bugs with a cheerful class phrase like "Hooray, we found a bug! Now we can fix it!" so 5-year-olds view mistakes as normal, fixable puzzles rather than personal failures.

Lesson 4: Do It Again! — Repeating Action Patterns

- **Unit:** Step-by-Step Robot Recipes and Floor-Grid Paths (Computing, Kindergarten)
- **Time:** 30 minutes
- **Grouping:** Whole class on the rug, then pairs

Learning objective

Students will identify the repeating unit in a 2-step or 3-step movement/picture **pattern**, perform a pattern a counted number of times (**a loop**), and say what action comes next.

Materials

- Picture cards for action moves:
- **Clap Hands (👏)**
- **Pat Knees (🙌)**
- **Touch Head (🗣️)**
- **Jump Up (⬆️)**
- Number cards `2` and `3` (to show "Do this pattern 2 times" or "3 times")

Vocabulary

- **Pattern:** Steps or pictures that repeat in the exact same order over and over.
- **Repeat (Loop):** Doing the same small group of steps again and again.

Lesson flow

✎ 1. Opening: The Echo Dance (6 min)

1. Without explaining first, perform a steady, slow movement pattern while saying the words: `Clap – Pat Knees – Clap – Pat Knees – Clap – Pat Knees ...`
2. Pause with your hands in the air after `Clap` and ask: "What move comes next?" (`Pat Knees`!)
3. Tape the 6 picture cards on the board: `[ 👏 Clap ] [ 🙌 Pat ] [ 👏 Clap ] [ 🙌 Pat ] [ 👏 Clap ] [ 🙌 Pat ]`
4. Ask: "Look at this long line of 6 cards! Which two cards keep happening over and over?"
5. Draw a big circle around the first two cards **`( [ 👏 Clap ] [ 🙌 Pat ] )`** and put the number **`3`** beside the circle: "Do *`Clap, Pat`* **3 times**!"

✎ 2. Main activity: Shrinking Long Recipes with "Repeat" (15 min)

1. **Counted Loops with Our Fingers (5 min):**
2. Show how we can do a 2-card pattern **`3 times`**:
    - Pattern inside the circle: **`( [ 🗣️ Touch Head ] → [ 👏 Clap ] )`**
    - Number card outside: **`3 times`**

3. One student stands by the board as the **Counter**, holding up 1 finger for Round 1 (`Touch Head, Clap`), 2 fingers for Round 2 (`Touch Head, Clap`), and 3 fingers for Round 3 (`Touch Head, Clap` — "STOP!").
4. **Grid Walk Connection (4 min):**
5. Look back at our floor tape grid: if a Robot wants to walk **3 squares straight ahead**, instead of saying "Step forward, Step forward, Step forward", we can circle **one** `[ ↑ Step Forward ]` card and put the number `3` next to it ("Step forward 3 times").
6. **Partner Dance-Loop Inventors (6 min):**
7. Each pair picks **2 action cards** (for example, `[ Pat Knees ]` and `[ Jump Up ]`) and a number card (`2` or `3`).
8. Partner A points to the cards and counts the rounds (`1... 2... 3!`) while Partner B acts out the repeating robot dance, then they switch!

✓ 3. Discussion questions (4 min)

- **Question 1:** "Why is it easier to say 'Clap and Pat 3 times' than to tape 6 separate cards across the whole wall?"
- Example good answer: Because it uses fewer cards and takes less space while telling the robot the exact same dance!
- **Question 2:** "Where else in our day do we do the same small pattern over and over?"
- Example good answer: Walking (`Left foot, Right foot, Left foot, Right foot`), brushing teeth (`Up, Down, Up, Down`), or singing the chorus of a song!

✓ 4. Closing check (5 min)

1. Look at this action pattern: **`Clap – Stomp – Clap – Stomp – Clap – ?`** What action comes next?
2. If our circled pattern is **`( Touch Nose → Wave Hand )`** and the number card says **`2 times`**, how many times will you wave your hand in total?
3. What does the word **repeat** mean?

Worked answers for closing check

1. **`Stomp`** comes next.
2. **2 times** (`Touch Nose, Wave Hand` [1], `Touch Nose, Wave Hand` [2]).
3. To do the same step or group of steps **again**.

Differentiation

- **Extra support:** Use **large two-color paper cards or oversized wooden blocks** (`Red, Blue, Red, Blue, Red, Blue`, at least 5 cm wide; avoid small linking cubes or beads that could be a choking hazard) that students can group into three matching `(Red-Blue)` pairs to see and hold the repeating unit.
- **Extra challenge:** Try a **3-step pattern** (`Clap → Pat Knees → Jump`) repeated `2 times` (6 moves total).

⚠ Safety

- Ensure students have an arm's-length of clear floor space around them before doing standing movement patterns (`Pat Knees`, `Jump Up`), and offer seated hand/card alternatives for any student who prefers not to jump.
- Use only large paper cards or oversized wooden blocks (`≥ 5 cm`); do not use small linking cubes or beads with 5-year-olds.

Teacher notes

- **Connection to Grade 2 and Grade 3:** This physical "Circle the pattern + Number card" notation prepares students directly for Grade 2 repeating pattern blocks and Grade 3 `REPEAT n TIMES` loops.

Lesson 5: Push a Button, Make It Go — Buttons and Actions

- **Unit:** Step-by-Step Robot Recipes and Floor-Grid Paths (Computing, Kindergarten)
- **Time:** 30 minutes
- **Grouping:** Whole class and pairs

Learning objective

Students will connect a physical **button push** (input) to the specific **sound or action** (output) a machine performs, and combine a 3-square floor-grid walk with a button press in the unit finale.

Materials

- 3 large paper "Buttons" taped to the board or easel:
- **Blue Star Button (⋆):** Makes the machine do **2 Star Jumps**
- **Yellow Bell Button (□):** Makes the machine sing **"Ding-Dong!"**
- **Purple Frog Button (□):** Makes the machine say **"Ribbit!" and crouch low**
- The 3×3 floor tape grid and Arrow Cards (↑, ↺, ↻) from Lessons 2–3
- 1 large `[ □ PUSH BUTTON ]` command card (tells the Robot to press the paper button on its square)

Vocabulary

- **Button (Input):** Something you push or tap to tell a machine what to do.
- **Action / Sound (Output):** What the machine does, shows, or plays after you push the button.

Lesson flow

✎ 1. Opening: Pushes That Send a Message (6 min)

1. Connect to Kindergarten Science: Pushes and Pulls:
2. In Science, we learned that a **push** moves an object away from you—like pushing a toy car across the floor.
3. Ask: "What happens when you **push** the doorbell button beside someone's front door? Does the house roll down the street, or does something else happen?"
4. Students answer: It rings a bell ("Ding-dong!") inside the house!
5. Explain: On machines and computers, pushing a **button** sends a message telling the machine which **action or sound** to do!

✎ 2. Main activity: The Three-Button Machine & Grid Finale (15 min)

1. **Whole-Class Sound & Action Machine (6 min):**
2. Point to the 3 paper buttons on the board (**Blue Star ⋆**, **Yellow Bell □**, **Purple Frog □**).

3. Tell the class: "All of you are the Classroom Computer! Do NOT make a sound until a human finger pushes one of your buttons!"
4. Invite a student up to gently press:
    - **Yellow Bell Button (🔔)** → Class sings "Ding-dong!"
    - **Purple Frog Button (🐸)** → Class says "Ribbit!" and crouches
    - **Blue Star Button (★)** → Class does 2 Star Jumps
5. Ask: "Why didn't the computer say 'Ribbit' when I pushed the Yellow Bell button?" (Because each button has its own matching rule!)
6. **Partner Button Pads (4 min):**
7. Pairs draw 2 buttons on a sheet of paper (for example, a **Cat Button** and a **Drum Button**).
8. Partner A taps one paper button; Partner B acts out the matching sound or move, then they switch.
9. **Unit Finale — Walk the Grid and Push the Button! (5 min):**
10. Place the **Yellow Bell Button (🔔)** on one corner of the 3×3 floor grid and the **Purple Frog Button (🐸)** on another corner.
11. Show the new `[ 🔔 PUSH BUTTON ]` command card, then together lay down the cards (`[ ↑ ]` `[ ↑ ]` `[ 🔔 PUSH BUTTON ]`) to guide the Robot 2 squares forward onto a button and press it. When the Robot reads `[ 🔔 PUSH BUTTON ]` and taps the button on its square, the whole class performs that button's sound!

✓ 3. Discussion questions (4 min)

- **Question 1:** "Name one real button you push at home or school, and tell what happens right after you push it."
- Example good answer: Pushing the wall switch turns on the classroom lights; pushing the crosswalk button makes the walk sign light up; pushing the water fountain button makes water bubble up.
- **Question 2:** "What did we learn across all five of our Robot Recipe lessons?"
- Example good answer: We learned to put steps in `First, Next, Last` order (Lesson 1), follow arrow cards on a grid (Lesson 2), fix **bugs** when we miss the star (Lesson 3), **repeat** patterns (Lesson 4), and push **buttons** to make actions happen (Lesson 5)!

✓ 4. Closing check (5 min)

1. In our classroom game, **Yellow Bell Button = "Ding-Dong!"** and **Purple Frog Button = "Ribbit!"**. If a student pushes the **Yellow Bell Button**, what sound comes out?
2. Put these 3 steps for using a toy music box in `First → Next → Last` order:
3. **(A)** Listen to the music play
4. **(B)** Walk over to the table where the music box sits
5. **(C)** Push the green Start button on top of the box
6. On our floor grid, the Robot is 1 square away from the Blue Star Button, facing straight at it. Which card does the Robot need to reach the button square: `↑ Step Forward` or `↻ Turn`?

Worked answers for closing check

1. **"Ding-Dong!"**
2. **First: (B)** Walk over to the table → **Next: (C)** Push the green Start button → **Last: (A)** Listen to the music play.
3. `↑ Step Forward`.

Differentiation

- **Extra support:** Use real tactile props (such as a tap-light puck or three upside-down paper cups of different colors/shapes) for students to press.
- **Extra challenge:** Add a **"Power Switch (ON / OFF)"** paper card next to the 3 buttons: if the Power Switch is turned to `OFF`, pressing any of the 3 buttons produces **silence** until a programmer flips the Power Switch back to `ON`!

Teacher notes

- **Preparing for Grade 1 and Grade 3:** This lesson plants the seed for Grade 1's two-state signals (`ON / OFF`) and Grade 3's formal **Input → Processing → Output** model through playful, concrete cause-and-effect.