

“Computing Unplugged” ideas for Children

Age Range	Topics	Suggested framing
Ages 4–6	Algorithms, debugging, simple sorting, simple searching, image grids, decision questions, simple networks	Use movement, pictures, colors, routines, and oral language; avoid technical vocabulary until after the game
Ages 6–8	Sorting methods, binary with 1–2–4–8, encoding, simple compression, shortest routes, parallel work, Caesar cipher, decision trees	Introduce comparison, efficiency, patterns, rules, and representations
Ages 8–11	binary search, run-length encoding, routing, parity, merge-like parallel sorting, weighted paths, classification error, scheduling	Name the formal computing concept after children have experienced it concretely

Computing idea	Unplugged activity	What children learn
1. Sorting	Give 6–10 children numbered cards and ask them to arrange themselves in order. Then impose rules corresponding to bubble sort or selection sort.	Algorithms; different ways to solve the same problem
2. Searching	Hide a number in an ordered set of cards. Compare checking every card with repeatedly dividing the cards in half.	Linear vs. binary search
3. Robot	One child is a “robot.” Others must give exact instructions: “take 3 steps; turn right; pick up the cup.”	Computers do exactly what they are told

Computing idea	Unplugged activity	What children learn
4. Debugging	Give the robot deliberately faulty instructions and have children identify and repair mistake.	Bugs and debugging
5. Binary numbers	Five children hold cards labeled 1, 2, 4, 8, 16. Facing up = 1; down = 0. Ask them to represent numbers such as 13.	Binary representation
6. Encoding letters	Give letters small binary codes and let children encode/decode secret messages.	How computers represent information
7. Image representation	Give children an 8×8 grid of 0's and 1's (with 0=black, 1=white) and ask them to reveal the picture.	Pixels and digital images
8. Data compression	Show AAAAAAABBBCCCCC and ask for a shorter way to describe it: 8A3B6C.	Compression and run-length encoding
9. Networks	Children stand in a network connected by string. One child passes a “message packet” to another through intermediate children.	Internet routing
10. Error detection	Children hold 0/1 cards in a grid. Add parity bits, secretly flip one card, and have the group find the error.	Error detection and reliable communication
11. Parallel computing	Have one child sort 20 cards, then four children each sort five cards and combine the results.	Parallelism and division of work
12. Graphs / shortest path	Make a floor map of connected “cities” with different distances. Children find the shortest route.	Graph algorithms and optimization
13. Machine learning	Give cards showing animals with attributes—wings, four legs, fur, etc. Children devise rules to classify them.	Classification and features
14. Decision trees	“Guess my animal”: Does it fly? Does it have four legs? Does it live in water?	Decision trees

Computing idea	Unplugged activity	What children learn
15. AI training	Give examples labeled “cat” and “dog,” then introduce ambiguous examples and ask children to improve their rule.	Learning from examples rather than explicit programming
16. Encryption	Use a Caesar cipher: shift every letter by 3. Children encrypt messages for another group to decode.	Cryptography
17. Scheduling	Several children represent jobs of different lengths; ask how to organize them to finish efficiently.	Scheduling and optimization