



Gurukul Technicals Institute

Computer education · Robotics · Science projects · Delhi

FREE EBOOK

ROBOTICS AND ELECTRONICS

Robotics for Young Children

Activities for parents and teachers of KG to class 2

INSIDE THIS BOOK

- Talking to children about robots
- Sequencing games: coding without a screen
- Patterns and loops with beads, claps and dance
- Simple machines with toys
- Building with blocks and a cardboard robot
- ...and 6 more chapters, practice questions and a glossary

Beginner

Parents and teachers of children aged 4 to 8

engineergurukul.com

+91 97116 99511

Robotics for Young Children

Simple, screen-free ways to introduce children aged 4 to 8 to robots and coding. Parents and teachers will find games, crafts and safe adult-led circuit activities, tips on screen time and on talking about mistakes, and 20 ready-to-use activity cards with materials, steps and what the child learns.

WHO IT IS FOR	Parents and teachers of children aged 4 to 8
LEVEL	Beginner
SUBJECT AREA	Robotics and electronics
WHAT IS INSIDE	11 chapters, practice questions with answers, and a glossary

HOW TO USE IT

Read one chapter at a time and try the examples as you go: on a computer, at your workbench or in your notebook. The boxes give tips, safety points and short activities. When you finish, test yourself with the practice questions and check your answers at the end. Words you may not know are explained in the glossary.



Gurukul Technicals Institute

A-10, Chief Commissioner Colony, opposite Rana Pratap Bagh, Delhi 110007
Phone 011 2721 1512 · Mobile and WhatsApp +91 97116 99511
engineergurukul@yahoo.co.in · engineergurukul.com

Free ebook. You may read, print and share this ebook for learning. It may not be sold or changed.

© 2026 Gurukul Technicals Institute. First edition, October 2026. The information was checked when it was written; software, prices and rules change, so for anything official always check the latest source.

What you will find inside

1	Talking to children about robots	4
2	Sequencing games: coding without a screen	5
3	Patterns and loops with beads, claps and dance	7
4	Simple machines with toys	8
5	Building with blocks and a cardboard robot	10
6	Lighting an LED with a battery (adult-led)	12
7	Making things move with a small motor (adult-led)	13
8	Robot stories and imaginative play	15
9	Screen time and learning from mistakes	16
10	Activity cards 1 to 10	18
11	Activity cards 11 to 20	21
	Practice questions	23
	Answers	25
	Glossary	26

Talking to children about robots

Young children love robots. They see them in cartoons, toy shops and films. But many children think a robot is a metal man who can do anything. This book helps you give them a truer and more exciting picture, through play.

You do not need to be an engineer. You need curiosity, a few household things and about fifteen minutes at a time. Every activity in this book can be done at home or in a classroom.

What is a robot, in child language?

Here is a simple way to say it to a child of four or five:

"A robot is a machine that can feel what is around it, decide what to do, and then move or do a job. But it can only do what people have taught it."

For older children, you can name the three parts:

Robot part	What it means	Like your...
Sense	It notices things, such as light, touch or sound	Eyes, ears and skin
Think	It follows instructions to decide what to do	Brain
Act	It moves, lights up, makes a sound or picks something up	Hands and legs

Robots around us

Help your child spot real robots and robot-like machines:

- A robot vacuum cleaner that turns when it bumps into a wall.
- Robot arms in a car factory that weld and paint.
- Automatic doors at a mall that open when someone comes near.

- Rovers that drive on the Moon and Mars to study the ground.

Ask: "What does this machine sense? What does it do then?" The automatic door senses a person and then opens. That simple pattern, sense then act, is the heart of robotics.

DID YOU KNOW

In 2023, India's Chandrayaan-3 mission landed near the Moon's south pole. A small six-wheeled rover called Pragyan rolled out and studied the Moon's soil. Children love hearing that a robot from India has driven on the Moon.

A robot only knows what it is told

This is the most important idea for children. A robot cannot guess. If you tell it "go to the kitchen", it does not know where the kitchen is. Someone must give it clear steps, one by one, in the right order. Those steps are called a **program**, and giving them is called **coding**.

EXAMPLE

Anvi, aged five, in Pune asked her toy robot to "bring me a biscuit". Nothing happened. Her father explained, "The robot does not know what a biscuit is, or where the tin is. We have to tell it every step." Anvi then spent twenty minutes "programming" her father to walk to the biscuit tin, one step at a time.

REMEMBER

Keep the words simple: robots sense, think and act, and they only follow the steps we give them.

CHAPTER 2

Sequencing games: coding without a screen

Sequencing means putting steps in the right order. It is the first skill of coding, and children can learn it without any computer. Learning coding ideas with games, cards and bodies instead of screens is called **unplugged coding**.

Game 1: The human robot

One person is the robot. The other is the programmer. The robot may only do exactly what it is told.

1. Use a few simple commands: forward, back, turn left, turn right, pick up, stop.
2. Place a "treasure", such as a soft toy, a few steps away.
3. The child gives commands, one at a time, to guide the robot to the treasure.
4. The robot follows each command exactly, even if it is silly. If the child says "forward" too many times, the robot bumps gently into the sofa.
5. Swap roles. Children love bossing an adult around, and they learn a lot from being the robot too.

TIP

Many children of four and five mix up left and right. Tie a coloured ribbon on the child's right wrist, or use cards with a picture of an arrow. There is no hurry. Left and right come with time.

Game 2: The floor grid

Draw a grid of squares on the floor with chalk, or use floor tiles. A 4 by 4 grid is enough to start.

1. Put a toy in one square as the goal.
2. Put a small figure, the "robot", in another square.
3. The child lays down arrow cards in a row to plan the path: up, up, right, right.
4. Then the child moves the robot along the arrows, one card at a time, to test the plan.
5. If the robot ends up in the wrong square, find the wrong card and swap it.

Later, add "rocks" (squares the robot must not enter) to make it harder.

Game 3: Everyday sequences

Daily routines are sequences too. Draw or print simple pictures of brushing teeth: take the brush, put on toothpaste, brush, rinse, put away. Mix them up and ask the child to put them in order.

EXAMPLE

At a school in Kanpur, a class 1 teacher acted as a "jam bread robot". The children called out instructions. When they said "put jam on the bread", she put the whole jar on top of the bread packet. The children laughed, then learnt to say "open the jar" and "use the spoon to spread a little jam on one slice". They had discovered that instructions must be clear and complete.

TRY THIS

Play the human robot game in a park. Use big steps and hops as commands. Count steps aloud together to practise numbers as well.

CHAPTER 3

Patterns and loops with beads, claps and dance

A **pattern** is something that repeats in a regular way: red, blue, red, blue. Spotting patterns is a key skill in maths and in coding. In coding, when we repeat steps, we use a **loop**. Instead of saying the same steps five times, we say "do this five times".

Beads and blocks

1. Give the child a string and beads of two colours.
2. Start a pattern: red, yellow, red, yellow. Ask, "What comes next?"
3. When that is easy, try three colours or a longer unit: red, red, blue.
4. Now introduce the loop idea. Say: "Red, blue. Repeat four times." The child makes the whole string from that short instruction.

The short instruction "red, blue, repeat four times" is a loop. It is shorter than saying all eight beads, and it is exactly how a programmer thinks.

Clap and stamp patterns

Make a sound pattern: clap, clap, stamp. Clap, clap, stamp. Ask the child to join in, then to make their own. Write it with symbols: a hand for a clap, a foot for a stamp. Now the child can "read" the pattern and play it, just like a robot reading a program.

Loop dance

Make a short dance of four moves: jump, turn, arms up, touch toes. Say "repeat three times" and dance together to music. Later, let the child invent a dance and write it as picture cards with a loop card that says "×3".

DID YOU KNOW

Indian music and dance are full of loops. A taal in Indian classical music is a rhythm cycle that repeats again and again. Children who play with rhythm are practising loops without knowing it.

Find the bug in the pattern

Make a bead string with a mistake: red, blue, red, blue, blue, blue, red. Ask the child, "Something is wrong. Can you find it?" In coding, a mistake is called a **bug**, and fixing it is called **debugging**. Finding a bug in a pattern is a fun first step.

REMEMBER

A pattern repeats. A loop is the instruction that makes something repeat, such as "do this four times".

CHAPTER 4

Simple machines with toys

Long before robots, people invented **simple machines**: basic tools that make work easier. Robots use them too, such as wheels to move and arms that work like levers. Children can explore four of them with toys and things from the kitchen.

Lever: the ruler seesaw

A **lever** is a bar that turns on a point. The point is called the **fulcrum**.

1. Place a pencil or a round marker on the table. Lay a 30 cm ruler across it to make a seesaw.
2. Put a small toy on one end. Press the other end to lift the toy.
3. Move the pencil closer to the toy. Is it easier or harder to lift now?

The child discovers that when the fulcrum is close to the load, lifting is easier. Seesaws in parks work this way.

Wheel and axle: why cars have wheels

1. Put three or four books in a shoe box and push it across the floor.
2. Now put the same books on a toy truck or a skateboard and push again.
3. Ask, "Which was easier? Why?"

Wheels roll instead of rubbing along the floor, so they make moving things much easier. The rod that holds a wheel is called the **axle**.

Ramp: the inclined plane

A ramp is a sloping surface. Scientists call it an **inclined plane**.

1. Lean a board or a big book against a pile of two books to make a ramp.
2. Let a toy car roll down. Mark where it stops.
3. Add another book to make the ramp steeper. Let the car roll again.
4. Measure the distance with footsteps or blocks. Which ramp sent the car further?

Pulley: lifting with a rope

A **pulley** uses a rope over a wheel or a rod to lift things.

1. Put a broom handle across the backs of two chairs.
2. Tie a string to a small basket. Put the string over the broom handle.
3. Put a toy in the basket and pull the free end of the string down. The basket goes up.

Talk about the bucket and rope over a village well. It is the same idea.

SAFETY

Keep strings away from necks, and never leave a young child alone with long strings or cords. Put chairs and boards on a flat floor so nothing tips over.

TRY THIS

Go on a "simple machine hunt" at home. Find a lever (a spoon lifting a tin lid), a wheel and axle (a bicycle or a toy car), a ramp (a slide in the park) and a pulley (the rope on a school flagpole).

CHAPTER 5

Building with blocks and a cardboard robot

Building is engineering for small hands. When children build, they plan, try, fail and try again. They learn about balance, shape and strength.

Building with blocks

Wooden blocks, plastic bricks or even empty matchboxes all work.

- **Tallest tower challenge:** How tall a tower can you build before it falls? Try a wide base and a narrow base. Which stands longer?
- **Bridge challenge:** Make a bridge between two piles of books that can hold a toy car.
- **Robot challenge:** Build a robot with blocks. Ask, "Where are its sensors? How does it move?"

Do not rush to help when a tower falls. Ask, "What happened? What could we change?" That is how engineers think.

The cardboard robot craft

This craft turns empty boxes into a robot friend. It takes about an hour, and can be spread over two days.

You need: a big box for the body (a shoe box), a smaller box for the head (a toothpaste box or a tea box), two kitchen-roll tubes for arms, bottle caps, aluminium foil, glue, tape, sketch pens and coloured paper.

1. Cover the boxes with foil or coloured paper.
2. Glue or tape the head box on top of the body box.
3. Tape the tubes to the sides as arms.
4. Glue bottle caps on the front as buttons and eyes.
5. Draw a control panel with sketch pens: dials, lights and a screen.
6. Give the robot a name and decide what job it does.

SAFETY

Any cutting of cardboard with a cutter or sharp scissors must be done by an adult. Children may use child-safe scissors with rounded tips. If you use a hot glue gun, an adult must hold it, and children should stay at a safe distance until the glue cools.

EXAMPLE

Reyansh, aged six, in Indore made a box robot called "Chotu Sahayak". Its job was to remind the family to switch off lights. He drew a "light sensor" on its head, made from a bottle cap. When his mother asked how it would know a light was on, he said, "The sensor sees the light and tells the brain." He had explained sense, think and act in his own words.

TIP

Keep a box of clean "junk" for crafts: boxes, tubes, caps, old buttons and ribbon. Children build more freely with materials they are allowed to cut and change.

Lighting an LED with a battery (adult-led)

A battery, a small light and two wires show a child that electricity needs a complete path, called a **circuit**. This activity is safe when an adult leads it and uses low voltage.

SAFETY

An adult must lead this activity and keep the batteries. Use only AA or AAA batteries in a battery holder. **Never use button cells or coin cells** with young children: if a child swallows one, it can cause serious burns inside the body within hours, and the child needs emergency medical help at once. Never use a wall socket, a charger or anything that plugs into the mains. Do not join the two battery wires directly to each other, because the battery gets hot.

What you need

- A battery holder for two AA cells, with wires. Two AA cells give 3 volts. A **volt** is the unit that measures how hard electricity pushes.
- One red, yellow or green **LED**. An LED is a small light that uses very little power. White and blue LEDs need more voltage and may not light on two AA cells.
- One 100 ohm resistor. A **resistor** limits the flow of electricity, so the LED is not damaged.
- Two wires with crocodile clips at both ends.

How the adult builds it

1. Look at the LED. One leg is longer. The long leg is the positive (+) leg.
2. Clip the red wire from the battery holder to one end of the resistor.
3. Clip the other end of the resistor to the long leg of the LED.
4. Clip the black wire from the battery holder to the short leg of the LED.
5. Put the cells in the holder, matching the + and – marks. The LED lights.

If it does not light, turn the LED around. An LED lets electricity flow in one direction only.

What the child does

Open one clip and the light goes out. Close it and the light comes back. Explain: "Electricity goes round in a circle. When the circle is broken, the light stops." Let the child be the one to open and close the circuit.

Conductor or not?

Leave a gap in the circuit and touch the two loose clip ends to different things: a steel spoon, a key, foil, a plastic ruler, a wooden spoon, an eraser, paper. Things that let electricity through are called **conductors**. Things that do not are called **insulators**. Most metals are conductors. Plastic, wood, rubber and paper are insulators.

DID YOU KNOW

The plastic coating on wires is an insulator. It keeps electricity inside the metal wire, where it belongs.

REMEMBER

Low voltage, AA batteries only, an adult in charge, and no button cells anywhere near young children.

CHAPTER 7

Making things move with a small motor (adult-led)

A small **motor** turns electricity into spinning movement. Toy cars, fans and robots all use motors. A small toy motor and two AA batteries are enough to make exciting projects.

SAFETY

An adult must lead this activity. Tie back long hair, and keep fingers, hair and loose clothes away from anything spinning. Switch off before touching or attaching anything to the motor. If the motor gets hot, switch it off and let it rest.

What you need

- A small DC toy motor, often sold for school projects. **DC** means the electricity flows one way, as from a battery.
- A battery holder for two AA cells, with wires. A holder with an on-off switch is best.
- A circle of card about the size of a biscuit, sketch pens, and a little tape or modelling clay.

Make a colour spinner

1. The child colours the card circle in sections, like slices of a pizza.
2. The adult makes a small hole in the centre and fixes the circle firmly to the motor shaft with a little tape or clay.
3. The adult connects the two motor wires to the battery holder wires.
4. Switch on. The circle spins, and the colours seem to mix together.

Change the direction

Switch off. Swap the two wires on the motor and switch on again. The motor now spins the other way. Children are often amazed by this. Ask them to guess what will happen before you swap.

Make a wobbly art robot

This toy moves by itself and draws as it goes.

1. Turn a paper cup upside down. Tape three sketch pens around its sides as legs, tips down and caps off.
2. The adult tapes the motor and the battery holder firmly on top of the cup.
3. The adult pushes a small piece of eraser onto the motor shaft, off to one side, so it is uneven.
4. Put the robot on a large sheet of paper and switch on. The uneven weight makes it shake, and it wobbles about drawing squiggles.

Many phones vibrate in a similar way, with a tiny motor that spins an uneven weight.

EXAMPLE

At a home in Chennai, Ishaan (aged seven) and his grandfather made a colour spinner with red, yellow and blue sections. When it spun fast, Ishaan said the colours "melted together". His grandfather explained that our eyes cannot keep up with the fast spinning, so they mix the colours.

TIP

Hold the motor down with a lump of modelling clay so it does not jump around the table when it starts.

CHAPTER 8

Robot stories and imaginative play

Children understand the world through stories. A robot story can teach sequencing, problem solving and kindness at the same time.

Tell a robot story with a grid

Make up a story about a robot who needs help. For example: "Robo-Raju has lost his way to the school. He can only move one square at a time. Can you help him?" Use the floor grid from the sequencing chapter. At each turn of the story, the child places arrow cards to move Robo-Raju past a "river" or a "sleeping dog" to reach the school.

Invent a robot character

Ask the child to imagine a robot that would help at home or at school. Use these questions:

- What is your robot's name?
- What job does it do?
- What does it sense? Does it see, hear or feel?
- How does it move: wheels, legs or wings?
- What happens if it makes a mistake?

The child can draw the robot and dictate a short story about it. Older children can make a four-picture comic.

Robot role play

Children take turns being a robot that only understands certain words. A "kitchen robot" might only understand pick up, put down, forward and turn. The other children must plan how to make it lay out plates for dinner.

EXAMPLE

A class 2 teacher in Guwahati asked each child to design a robot for their village or town. One girl drew a robot that helps her grandmother carry water. Another drew a robot that sorts plastic from food waste. The children then shared their designs in a "Robot Fair" in the classroom.

TRY THIS

At bedtime, tell a "robot story" where your child decides what the robot does next. Make mistakes in the story on purpose and let your child fix them.

CHAPTER 9

Screen time and learning from mistakes

Keeping a healthy balance with screens

Many coding apps and robot toys are made for young children. Some are good. But at this age, children learn most from real things they can touch, move and build, and from talking with you.

Health experts advise that young children spend only a short time on screens, and that sleep, active play and time with family come first. Talk to your child's doctor about what is right for your child. These habits help:

- **Unplugged first.** Use the games in this book before any app. Children who understand sequencing and loops in their bodies find coding apps much easier later.

- **Use screens together.** When your child uses a learning app, sit with them and talk about it.
- **Choose apps made for their age.** Look for apps where children create things, not just watch.
- **Keep screen-free times.** Meals and the hour before bed are good screen-free times.
- **Be a role model.** Children copy what adults do with their phones.

DID YOU KNOW

There is a free coding app called ScratchJr, made for children of about five to seven, which works on tablets. Children snap together picture blocks to make characters move. It is a good next step after unplugged games, used together with an adult.

How to talk about mistakes

In coding and robotics, things go wrong all the time. Programs have bugs. Towers fall. Circuits do not light. This is normal. Even expert engineers spend a lot of their time finding and fixing mistakes.

How we react to a child's mistake decides whether they keep trying or give up.

Instead of saying	Try saying
"That's wrong."	"Let's check it together. Where did the robot go?"
"You're so clever!"	"You kept trying until it worked. Well done!"
"Let me do it."	"What could we try next?"
"You can't do this."	"You can't do this yet."
"Never mind, forget it."	"Engineers find bugs every day. Let's be bug detectives."

Use the word **bug** for a mistake and **debugging** for fixing it. It turns a mistake into a puzzle, not a failure.

TIP

Let your child see you make mistakes too. Say, "Oops, I made a bug. Let me fix it."
Children learn that mistakes are a normal part of learning, even for grown-ups.

CHAPTER 10

Activity cards 1 to 10

These cards are ready to use. Each lists what you need, the steps and what the child learns. Choose activities that suit your child's age and mood. A short, happy session is better than a long, tired one.

Card 1: Robot Says

You need: a soft toy as the "treasure".

1. You are the robot. Your child gives commands: forward, back, turn left, turn right, stop.
2. Follow each command exactly, even if it leads you the wrong way.
3. Swap roles.

Your child learns: giving clear instructions in order.

Card 2: Grid Treasure Hunt

You need: chalk or floor tiles, a small toy, arrow cards made from paper.

1. Make a 4 by 4 grid. Put the toy in one square and the "robot" figure in another.
2. Your child lays arrow cards to plan the path, then tests it.
3. Fix any wrong cards and try again.

Your child learns: planning a sequence and debugging it.

Card 3: The Jam Bread Robot

You need: bread, jam, a blunt butter knife, a plate.

1. You are the robot. Your child tells you how to make jam bread.

2. Follow every instruction exactly as said, so missing steps cause funny results.
3. Help your child add the missing steps until it works.

Your child learns: instructions must be complete and in order.

Card 4: Morning Routine Cards

You need: five picture cards of a routine, such as getting ready for school.

1. Shuffle the cards.
2. Your child puts them in order and explains each step.
3. Ask, "What happens if we swap these two?"

Your child learns: sequences in daily life.

Card 5: Bead Loops

You need: a string or a shoelace and beads of two or three colours.

1. Say a short loop instruction: "Red, blue. Repeat four times."
2. Your child threads the whole string from that instruction.
3. Your child invents a loop for you to make.

Your child learns: patterns and loops. Watch younger children closely, as beads are a choking hazard.

Card 6: Clap and Stamp Code

You need: paper and a pencil.

1. Draw symbols: a hand for a clap, a foot for a stamp.
2. Write a pattern such as hand, hand, foot. Play it three times.
3. Your child writes a new pattern for you to play.

Your child learns: reading and writing a simple code.

Card 7: Loop Dance

You need: music and space to move.

1. Make a four-move dance together.
2. Add a loop card: "×3". Dance the moves three times.

3. Change one move and dance again.

Your child learns: loops, memory and rhythm.

Card 8: Bug Detective

You need: a bead string or a block row with one mistake in its pattern.

1. Show it and say, "There is a bug in this pattern."
2. Your child finds and fixes it.
3. Let your child hide a bug for you to find.

Your child learns: spotting and fixing mistakes calmly.

Card 9: Ruler Seesaw

You need: a 30 cm ruler, a pencil, two small toys.

1. Make a seesaw with the ruler on the pencil.
2. Lift one toy by pressing the other end.
3. Move the pencil and try again. When is lifting easiest?

Your child learns: how a lever works.

Card 10: Ramp Race

You need: a board or a big book, a few books, a toy car.

1. Make a low ramp and roll the car down. Mark where it stops.
2. Make the ramp higher and roll it again.
3. Measure each distance with footsteps.

Your child learns: slopes, measuring and comparing.

SAFETY

Keep small parts such as beads, bottle caps and buttons away from children who still put things in their mouths.

Activity cards 11 to 20

Card 11: Broomstick Pulley

You need: a broom handle, two chairs, a string, a small basket, a toy.

1. Rest the broom handle across the two chair backs.
2. Tie the basket to the string and put the string over the handle.
3. Pull down to lift the toy.

Your child learns: how a pulley helps us lift.

Card 12: Wheels Make It Easy

You need: a shoe box, a few books, a toy truck.

1. Push the box of books across the floor.
2. Put the books on the truck and push again.
3. Talk about which was easier and why.

Your child learns: wheels reduce rubbing and make moving easier.

Card 13: Block Robot

You need: building blocks of any kind.

1. Build a robot with blocks.
2. Point to its sensors, its "brain" and its moving parts.
3. Tell a story about what it does.

Your child learns: the parts of a robot, and building skills.

Card 14: Cardboard Robot Friend

You need: boxes, tubes, bottle caps, foil, glue, tape, sketch pens.

1. Cover and join the boxes to make a body and head.
2. Add arms, buttons and a drawn control panel.
3. Name the robot and decide its job.

Your child learns: design and creativity. An adult does any cutting.

Card 15: Sense and Act

You need: a group of children or family members.

1. Everyone is a robot. Agree on rules: a clap means stop, a whistle means walk, a raised hand means sit.
2. The leader makes the signals, and the robots react.
3. Take turns to be the leader.

Your child learns: robots sense a signal and then act.

Card 16: Light Up an LED (adult-led)

You need: a two-AA battery holder, a red LED, a 100 ohm resistor, crocodile clip wires.

1. The adult builds the circuit as shown in the LED chapter.
2. Your child opens and closes a clip to switch the light.
3. Talk about the circle of electricity.

Your child learns: a circuit must be complete to work.

Card 17: Conductor Hunt (adult-led)

You need: the LED circuit with a gap, and a tray of things to test.

1. Your child guesses whether each thing will light the LED.
2. The adult touches the clips to each thing.
3. Sort things into two piles: lights it up, does not.

Your child learns: conductors and insulators.

Card 18: Colour Spinner (adult-led)

You need: a small toy motor, a two-AA battery holder with a switch, a card circle, sketch pens, tape.

1. Your child colours the circle.
2. The adult fixes it to the motor and connects the wires.

3. Switch on and watch the colours mix. Swap the wires to reverse it.

Your child learns: a motor turns electricity into movement.

Card 19: Robot Story Time

You need: the floor grid, arrow cards, a toy robot figure.

1. Tell a story about a robot who needs to reach a place.
2. Add obstacles in the story, such as a river square.
3. Your child moves the robot with arrow cards at each part of the story.

Your child learns: planning, sequencing and storytelling.

Card 20: Design a Helper Robot

You need: paper, crayons or sketch pens.

1. Ask, "What job would you like a robot to do at home?"
2. Your child draws the robot and labels its sensors and moving parts.
3. Your child explains how it works and what it does if it makes a mistake.

Your child learns: imagination, problem solving and explaining ideas.

TIP

Keep a "robot diary". After each activity, your child draws one picture of what they did and you write one line of what they said. Over a few months you will see their ideas grow.

CHECK YOURSELF

Practice questions

1. In child language, what is a robot?
2. Name the three things a robot does, and compare each with a part of the human body.
3. What is sequencing, and why is it the first skill of coding?

4. What is unplugged coding?
5. Give one way to help a five-year-old who mixes up left and right.
6. In the jam bread robot game, what lesson do the children learn when the teacher follows instructions exactly?
7. What is the difference between a pattern and a loop?
8. What do coders call a mistake, and what is fixing it called?
9. In the ruler seesaw, where should the pencil be to make lifting the toy easiest?
10. Why is it easier to push books on a toy truck than in a box?
11. Name the four simple machines explored in this book.
12. Why must an adult do the cutting when making a cardboard robot?
13. Why should button cells or coin cells never be used with young children?
14. Which LED colours work best with two AA cells?
15. What does the resistor do in the LED circuit?
16. What happens to the LED when one clip is opened, and why?
17. What is a conductor? Give two examples.
18. What happens when you swap the two wires on a small DC motor?
19. Give two safety rules for activities with a spinning motor.
20. Give two good habits for balancing screen time with young children.
21. What could you say instead of "That's wrong"?
22. Why is the word "yet" useful when a child says "I can't do this"?

Answers

1. A machine that can feel what is around it, decide what to do and then move or do a job, but only in the way people have taught it.
2. Sense (like eyes, ears and skin), think (like the brain) and act (like hands and legs).
3. Sequencing is putting steps in the right order. A program is a list of steps in order, so this comes first.
4. Learning coding ideas with games, cards and body movement instead of a screen.
5. Tie a coloured ribbon on the right wrist, or use picture cards with arrows.
6. Instructions must be clear and complete, because a robot does exactly what it is told.
7. A pattern is something that repeats regularly. A loop is the instruction that makes something repeat, such as "repeat four times".
8. A bug. Fixing it is called debugging.
9. Close to the toy, which is the load.
10. Wheels roll instead of rubbing along the floor, so moving is easier.
11. The lever, the wheel and axle, the inclined plane (ramp) and the pulley.
12. Cutters and sharp scissors can cause cuts. Children should use only child-safe scissors with rounded tips.
13. If swallowed, they can cause serious burns inside the body within hours, and the child needs emergency help at once.
14. Red, yellow and green. White and blue LEDs need more voltage.
15. It limits the flow of electricity so the LED is not damaged.
16. It goes out, because the circuit is broken and electricity can no longer flow round the circle.
17. A material that lets electricity flow through it, such as a steel spoon or aluminium foil.
18. The motor spins the other way.
19. Tie back long hair and keep fingers away from spinning parts. Switch off before touching or attaching anything.
20. Any two: unplugged activities first, use screens together, choose creative apps made for their age, keep meals and bedtime screen-free, and be a role model.
21. "Let's check it together. Where did the robot go?"

22. It tells the child that they can learn it with practice. It turns "never" into "not yet".

WORD LIST

Glossary

Axle

the rod that a wheel turns on.

Bug

a mistake in a program, a pattern or a plan.

Circuit

a complete path that electricity flows around.

Coding

giving a machine a list of clear steps to follow.

Conductor

a material that lets electricity flow through it, such as most metals.

DC

direct current, electricity that flows in one direction, as from a battery.

Debugging

finding and fixing a mistake.

Fulcrum

the point that a lever turns on.

Inclined plane

a sloping surface, such as a ramp.

Insulator

a material that does not let electricity through, such as plastic or rubber.

LED

a small light that uses very little power and lets electricity flow one way only.

Lever

a bar that turns on a point to help lift or move things.

Loop

an instruction that repeats a set of steps.

Motor

a part that turns electricity into spinning movement.

Pattern

something that repeats in a regular way.

Program

a list of steps that a robot or computer follows.

Pulley

a rope over a wheel or rod, used to lift things.

Resistor

a part that limits the flow of electricity.

Robot

a machine that senses, decides and acts by following instructions.

Sensor

the part of a robot that notices light, sound, touch or other things.

Sequencing

putting steps in the right order.

Simple machine

a basic tool, such as a lever or a pulley, that makes work easier.

Unplugged coding

learning coding ideas without a computer.

Volt

the unit that measures how hard electricity pushes.



Gurukul Technicals Institute

Computer education institute in Delhi, with authorised member centres, robotics classes and science projects, working models and DIY kits.

COURSES

Computer & Office Skills · Accounting & Business Software · Programming & Web Development · Design & Digital Skills · Hardware & Networking · Robotics & Coding · Other Programmes

PROJECTS AND KITS

Ready-made school projects · DIY and STEM kits · Robotics and coding · Components and spares · Engineering projects

CONTACT

Head office: A-10, Chief Commissioner Colony, opposite Rana Pratap Bagh, Delhi 110007

Phone: 011 2721 1512 · **Mobile and WhatsApp:** +91 97116 99511

Email: engineergurukul@yahoo.co.in

Website: engineergurukul.com · **Instagram:** [@science_projects_club](https://www.instagram.com/science_projects_club)

More free ebooks for computer courses, robotics and science projects: engineergurukul.com/resources/ebooks/

Free to read, print and share. Not for sale.