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FREE EBOOK

SCIENCE PROJECTS AND KITS

Viva Questions for Science Projects

How to answer examiner questions, with sample questions for popular projects

INSIDE THIS BOOK

- What a viva is
- Preparing for a viva
- Answering well, and when you do not know
- General questions asked about every project
- ...and 6 more chapters, practice questions and a glossary

Beginner

Students presenting projects and practicals

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Viva Questions for Science Projects

Learn what a viva is, how to prepare for it and how to answer clearly, even when you do not know the answer. With the general questions asked about almost every project, sample questions and answers for twenty popular science projects, and simple advice on body language and the dos and don'ts on the day.

WHO IT IS FOR	Students presenting projects and practicals
LEVEL	Beginner
SUBJECT AREA	Science projects and kits
WHAT IS INSIDE	10 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.



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What a viva is

A **viva** is a spoken test. The word comes from the Latin *viva voce*, which means "by the living voice". After you show your project or finish a practical, an examiner asks you questions about it and you answer aloud. A viva may last two minutes or fifteen.

Vivas happen in school practical exams, in board practical exams, at science exhibitions (where the judges ask the questions) and in college. The questions change, but the idea is the same everywhere.

Why examiners ask questions

An examiner wants to find out three things:

1. Did you do the work yourself?
2. Do you understand the science behind it?
3. Can you explain it clearly?

A viva is not a trap. Most examiners want you to do well. They usually begin with easy questions to settle you, then ask harder ones to see how deep your understanding goes. A harder question is often a sign that your first answers were good.

What examiners look for

They look for	They do not need
Clear, simple explanations	Long paragraphs learnt by heart
Honest answers	Bluffing or guessing wildly
Understanding of the main idea	Every detail of every formula
A calm, polite manner	Perfect English
Knowing where the idea is used	Fancy words you cannot explain

How this book helps

The first chapters show you how to prepare, how to answer and what to do when you are stuck. The middle chapters give sample questions and answers for twenty popular projects. The last chapter covers body language and the dos and don'ts on the day.

REMEMBER

You do not need fluent English. Short, correct sentences in simple English are enough. What matters is that you understand your project and can explain it in your own words.

TIP

Do not learn the sample answers in this book word for word. Read them, understand them, and then practise saying them your own way. Examiners can tell a memorised answer from a real one within seconds.

CHAPTER 2

Preparing for a viva

Good preparation is the cure for nerves. If you know your project well, you will feel much calmer when the questions start.

Know your project inside out

Make sure you can explain each of these in a sentence or two:

- the **aim**: what you set out to do
- the **principle**: the scientific law or idea behind it
- how each part of your model works
- what you measured, and what you found
- where the idea is used in real life
- the **limitations**: what your model cannot do, or does only roughly
- what went wrong while you were making it, and how you fixed it

Make a one-page revision sheet

EXAMPLE

Neha from Bhopal made an electromagnet for her class 8 exhibition. Her revision sheet had seven short lines. Aim: to make an electromagnet and test how the number of turns changes its strength. Principle: a current in a coil makes a magnetic field, and a soft iron core makes it stronger. Result: 50 turns picked up 6 pins; 100 turns picked up 13 pins. Uses: electric bells, cranes, relays. Limitation: the cell runs down quickly. Problem faced: the wire got warm, so she used a push switch. Cost: about ₹ 90.

Know the units

Many viva questions check whether you know the unit of a quantity. Learn the ones your project uses.

Quantity	Unit	Symbol
Electric current	ampere	A
Voltage (potential difference)	volt	V
Resistance	ohm	Ω
Power	watt	W
Energy	joule	J
Force	newton	N
Pressure	pascal	Pa
Frequency	hertz	Hz

Practise aloud

Reading silently is not enough. Explain your project aloud to a parent, a friend or even a mirror. Ask someone to fire questions at you from this book. Record yourself on a phone and listen: do you say "umm" a lot, or speak too fast?

A two-week plan

1. Days 1 to 4: revise the theory from your textbook until you can explain it without notes.
2. Days 5 and 6: write down thirty questions you might be asked, using this book.
3. Days 7 to 10: practise answering them aloud, a few each day.
4. Days 11 and 12: hold a mock viva with a friend or family member acting as the examiner.
5. Days 13 and 14: check that your model works, carry spare cells, and get a good night's sleep.

TRY THIS

Write each likely question on one side of a small card and the key points of the answer on the other. Shuffle the cards and test yourself on the bus or during breaks.

CHAPTER 3

Answering well, and when you do not know

How you answer matters almost as much as what you say. A clear, short answer given calmly is better than a long, confused one.

A simple pattern: answer, reason, example

1. **Answer** the question in one sentence.
2. Give the **reason** in one or two sentences.
3. Add an **example** from daily life, if it helps.

EXAMPLE

Question: "Why did you use a soft iron core?" Answer: "Because soft iron makes the electromagnet much stronger. Soft iron becomes magnetised easily when current flows and loses its magnetism almost at once when the current stops. That is why the crane in a scrapyard can drop its load just by switching the current off."

Listen to the whole question

Do not start answering before the examiner finishes. Pause for a second or two to think. If you did not hear or understand, it is perfectly fine to say, "Sorry, could you please repeat the question?"

When you do not know the answer

Every student meets a question they cannot answer. What you do next is what the examiner notices.

Instead of	Try saying
Making up an answer	"I am not sure, but I think it may be ... because ..."
Staying silent for a long time	"I have not studied that yet. I would like to find out."
"I don't know" and nothing more	"I don't know the exact figure, but I do know that ..."
Arguing with the examiner	"Thank you, I had not thought of that."

An honest "I am not sure, but..." followed by sensible reasoning often earns credit. A confident wrong answer usually does not.

When you make a mistake

If you realise you said something wrong, correct yourself at once: "Sorry, I meant the left-hand rule, not the right-hand rule." Examiners respect a student who notices and fixes a mistake.

The "why" ladder

Examiners often follow one answer with "Why?" again and again, to see how deep your understanding goes. Practise climbing this ladder for your own project.

EXAMPLE

Rohan from Patna showed a motor. "What does a commutator do?" "It reverses the current in the coil every half turn." "Why is that needed?" "Without it, the force would push the coil back the other way after half a turn, and it would just rock." "Good. Which rule gives the direction of the force?" "Fleming's left-hand rule."

REMEMBER

One bad answer does not spoil a viva. Treat each new question as a fresh start.

CHAPTER 4

General questions asked about every project

Whatever your project, you are likely to hear some of these questions. Prepare a short answer to each before the day.

About your project

- **What is the aim of your project?** Say it in one sentence.
- **Why did you choose this topic?** Give a real reason: something you saw, a problem at home or in your area, or a chapter that interested you.
- **What is the principle behind it?** Name the law or idea, then explain it simply.
- **How does it work?** Walk through it step by step, pointing at the parts.

About the science and its uses

- **Where is this used in real life?** Give two or three examples.
- **What energy changes take place?** For example, in a wind turbine: the movement energy of the wind becomes the turning energy of the blades, which becomes electrical energy, which becomes light in the LED.
- **What are the limitations of your model?** Every model has some. Naming them shows understanding.
- **How is your model different from the real thing?** Real machines are usually bigger, stronger and more efficient, and they have safety features your model may not need.

About your work

- **What materials did you use, and why?** Explain one or two choices, such as copper wire because it conducts well.
- **What problems did you face?** Describe one real problem and how you solved it.

- **Did anyone help you?** Be honest. Saying that an adult helped with cutting or soldering is fine.
- **How much did it cost?** Give a rough total and the main items.
- **What precautions did you take?** Mention safety and accuracy.
- **How would you improve it?** One or two practical ideas.
- **What did you learn?** Something about the science, and something about making things.

EXAMPLE

Kabir from Kochi was asked what his rain alarm cost. He said: "About ! 180. The buzzer was ! 40, the battery and clip ! 60, the transistor and resistors ! 30 and the board and wire ! 50." A clear, honest answer like this shows you really built it.

TIP

Questions about limitations and improvements are where good students stand out. Think about them before the viva, not during it.

CHAPTER 5

Electricity and magnetism projects

These four projects all depend on the link between electricity and magnetism, so many of their questions overlap.

Two short words come up again and again in this chapter and the next. **DC** (direct current) flows in one direction only, like the current from a cell. **AC** (alternating current) keeps reversing its direction many times every second, like the mains supply in a house.

Electric motor

What does a motor do? It changes electrical energy into mechanical energy, the energy of movement.

What is its principle? A conductor carrying a current, placed in a magnetic field, feels a force. Fleming's left-hand rule gives the direction of that force.

What does the commutator do? In a DC motor, the split-ring commutator reverses the current in the coil every half turn, so the coil keeps turning in the same direction.

What are the main parts of a DC motor? A coil of wire called the armature, a magnet, a split-ring commutator, carbon brushes that carry current to the commutator, and an axle.

How can you make a motor turn faster? Increase the current, use more turns of wire, or use a stronger magnet.

Where are motors used? In fans, mixer-grinders, water pumps, washing machines and electric vehicles.

Electric generator

What does a generator do? It changes mechanical energy into electrical energy.

What is its principle? Electromagnetic induction: when a coil and a magnetic field move relative to each other, a voltage is produced in the coil.

Which rule gives the direction of the induced current? Fleming's right-hand rule.

How is an AC generator different from a DC generator? An AC generator uses slip rings, so its output keeps reversing. A DC generator uses a split-ring commutator, so its output flows in one direction.

How is a generator different from a motor? They have similar parts but work in opposite ways. A motor uses electricity to make movement; a generator uses movement to make electricity.

How does a bicycle dynamo work? As the wheel turns, it spins a magnet inside a coil. The changing magnetic field produces a voltage in the coil, which lights the lamp.

Transformer

What does a transformer do? It steps an alternating (AC) voltage up or down.

What is its principle? Mutual induction. A changing current in the primary coil makes a changing magnetic field in the core, and this produces a voltage in the secondary coil.

Why does it not work on DC? A steady direct current makes a steady magnetic field. Nothing changes, so no voltage is induced, apart from a brief pulse when you switch on or off.

What is the turns rule? Secondary voltage $\div$ primary voltage = secondary turns $\div$ primary turns. With 200 primary turns, 20 secondary turns and 12 V AC in, the output is about 1.2 V.

Why is the core made of thin sheets? The thin, insulated sheets, called **laminations**, reduce **eddy currents**: unwanted currents in the core that waste energy as heat.

Where are transformers used? Transformers at power substations and on electricity poles step the voltage down before it reaches homes. Many chargers and adapters also contain small transformers.

Electromagnet

What is an electromagnet? A coil of insulated wire wound on a soft iron core. It acts as a magnet only while current flows.

How can you make it stronger? Use more turns, more current, or a soft iron core.

Why soft iron and not steel? Soft iron loses its magnetism as soon as the current stops. Steel keeps some magnetism and becomes a permanent magnet.

Can you swap its north and south poles? Yes. Reverse the direction of the current, for example by turning the cell round, and the poles swap.

Where are electromagnets used? In electric bells, relays, loudspeakers, scrapyard cranes and MRI scanners.

SAFETY

If your transformer model was fed by a sealed low-voltage AC adapter, say so: "It ran from a 12 V AC adapter, never from the mains." Examiners are glad to hear that you thought about safety.

Electronics projects

These projects use small electronic parts: diodes, transistors, resistors and sensors. Know the job of each part on your board.

Rectifier

What does a rectifier do? It changes AC into DC.

Which part does the work? The **diode**, which lets current flow in one direction only.

What is the difference between half-wave and full-wave? A half-wave rectifier uses one diode and lets through only half of each AC cycle. A full-wave rectifier, such as a bridge of four diodes, uses both halves, so its output is smoother.

Why is a capacitor added? The output of a rectifier comes in bumps. The capacitor stores charge at each peak and releases it in between, which smooths the output.

Where are rectifiers used? In phone chargers and other adapters that let electronic devices, which need DC, run from an AC supply.

Logic gates

What is a logic gate? A circuit whose output is either 1 (on) or 0 (off), depending on its inputs, according to a fixed rule.

Input A	Input B	AND output	OR output
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	1

How did you show AND and OR with switches? For AND, two switches in series with an LED: both must be closed. For OR, two switches in parallel: either one works.

What does a NOT gate do? It turns 1 into 0 and 0 into 1.

What are universal gates? NAND and NOR. Any other gate can be built using only NAND gates, or only NOR gates.

LDR street light

What is an LDR? A light dependent resistor. Its resistance falls when light falls on it and rises in the dark.

How does your circuit work? In daylight the LDR's low resistance keeps the transistor off. At night its resistance rises, the transistor switches on, and the light glows.

Why do you need a transistor? The LDR cannot carry enough current to light the lamp. The transistor works as a switch controlled by a small current.

What is the advantage? Lights switch on and off by themselves, saving electricity and effort.

What is an LDR made of? Many LDRs use a material called cadmium sulphide, whose resistance changes with light.

Rain alarm

How does the sensor work? It has two sets of bare metal tracks close together. A raindrop bridges the gap and lets a small current flow.

Why does rainwater conduct? It contains dissolved substances that form charged particles called **ions**, which carry current. Pure distilled water conducts very poorly.

What does the transistor do? The tiny current through the water switches on the larger current the buzzer needs.

Why do the tracks corrode over time? The current causes slow chemical changes on wet metal. That is why sensors are cleaned or replaced.

DID YOU KNOW

A computer chip contains huge numbers of microscopic transistors working as logic gates. The AND and OR gates you built with switches follow exactly the same rules.

Earth, space, machines and light

This chapter covers five very popular exhibition models. Examiners have seen them many times, so expect deeper questions.

Solar system

How many planets are there? Eight: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

Why is Pluto no longer called a planet? In 2006 the International Astronomical Union classed it as a dwarf planet, because it has not cleared other objects from the region around its orbit.

Is your model to scale? No model on a table can be. If the Sun were a football, Earth would be about the size of a peppercorn some 24 metres away, and Neptune would be about 700 metres away.

Which planet is the hottest? Venus. Mercury is closer to the Sun, but Venus's thick carbon dioxide atmosphere traps heat.

What keeps the planets in orbit? The Sun's gravity.

How long does sunlight take to reach Earth? About 8 minutes.

Volcano

What reaction did you use? Baking soda (sodium hydrogen carbonate) and vinegar (a weak acid) react to give carbon dioxide gas, water and sodium acetate. The gas bubbles make the foam.

How is a real eruption different? Molten rock called **magma** rises from deep underground, pushed by heat and gas pressure. When it reaches the surface it is called **lava**.

What are active, dormant and extinct volcanoes? An active volcano has erupted in recent times and may erupt again. A dormant one has not erupted for a very long time but could. An extinct one is not expected to erupt again.

Is there an active volcano in India? Yes, Barren Island in the Andaman Sea.

How can you show that the gas is carbon dioxide? Bubble it through lime water, which turns milky. This is best done by a teacher in the laboratory.

Hydraulic lift

What is its principle? Pascal's law: pressure applied to a liquid in a closed system is passed on equally in all directions.

Why use a liquid and not air? A liquid hardly squashes. Air squashes easily, so the lift would feel spongy.

How does a small force lift a big load? The pressure is the same in both syringes, so the wider one pushes with more force. If its piston has four times the area, it pushes with four times the force, but moves only a quarter of the distance.

Where is this used? Car lifts at service stations, vehicle brakes, excavators and dentists' chairs.

Windmill

What energy changes happen? The movement energy of the wind turns the blades, and a generator changes that turning energy into electrical energy.

Why are real turbines on tall towers? Wind is usually faster and steadier higher above the ground.

Where are wind farms in India? There are many, especially in states such as Tamil Nadu and Gujarat.

What is a drawback of wind power? The wind does not blow steadily, so the power output goes up and down and other sources are needed as backup.

Periscope

What is its principle? Reflection of light. Two plane mirrors, parallel to each other, are each fixed at 45° to the tube.

Why 45° ? Light turns through 90° at each mirror, so it travels down the tube and then out to your eye.

Is the image upright? Yes. Each mirror swaps left and right, so the two swaps cancel out.

What are the laws of reflection? The angle of incidence equals the angle of reflection, and the incoming ray, the reflected ray and the normal all lie in the same plane.

Where are periscopes used? In submarines and armoured vehicles.

REMEMBER

For any popular model, add one thing of your own and be ready to explain it. It gives the examiner something fresh to ask about, and you will know that part best.

CHAPTER 8

Human body and plant models

Biology models are usually still models, so the questions test whether you understand how the real organ works.

Human heart

How many chambers does the heart have? Four: two upper chambers called **atria** and two lower chambers called **ventricles**.

What path does blood take? From the body to the right atrium, right ventricle, then to the lungs. Back from the lungs to the left atrium, left ventricle, then out through the aorta to the body. Blood passes through the heart twice in one round of the body, so this is called **double circulation**.

Why is the wall of the left ventricle thickest? It pumps blood to the whole body, which needs the most force.

What do the valves do? They stop blood flowing backwards. The "lub-dub" sound of a heartbeat is made by valves closing.

Arteries usually carry oxygen-rich blood. Is there an exception? Yes. The pulmonary artery carries blood that is low in oxygen from the heart to the lungs.

Kidney

What do the kidneys do? They filter the blood, removing urea, extra water and extra salts as urine.

What is a nephron? The tiny filtering unit of the kidney. Each kidney has about a million.

What path does urine take? Kidneys, ureters, urinary bladder, urethra.

What is dialysis? A treatment in which a machine filters the blood when the kidneys have failed.

Can a person live with one kidney? Yes. One healthy kidney can usually do the work of two, which is why people can donate a kidney.

Lungs

How does your bell jar model work? The balloons are the lungs, the rubber sheet is the diaphragm and the jar is the chest. Pulling the sheet down makes more space inside, the air pressure falls, and air rushes into the balloons. Pushing it up drives the air out.

Where are gases exchanged? In millions of tiny air sacs called **alveoli**. Oxygen passes into the blood and carbon dioxide passes out.

What is a limitation of the model? The jar is rigid, but the real ribs also move up and out when we breathe in.

Are the two lungs the same? No. The right lung has three lobes and the left has two, leaving room for the heart.

Photosynthesis

What is photosynthesis? The process in which green plants make glucose from carbon dioxide and water, using sunlight and chlorophyll, and give out oxygen.

What is the word equation? Carbon dioxide + water → glucose + oxygen, in the presence of sunlight and chlorophyll.

Where does it happen? Mainly in the leaves, inside tiny green bodies called chloroplasts. Carbon dioxide enters through small pores called stomata.

How do we show a leaf has made starch? The iodine test turns starch blue-black. The leaf is first boiled to soften it, then the green colour is removed by warming it in alcohol in a water bath. This is a teacher's demonstration, because alcohol catches fire easily.

TIP

For organ models, practise tracing the path with your finger as you speak: "Blood enters here, passes this valve, and leaves through here." It shows that you know the model, not just the words.

CHAPTER 9

Chemistry and environment projects

These three projects connect chemistry to daily life, so examiners like to ask where the ideas are used at home.

pH indicator

What is an indicator? A substance that changes colour in an acid or a base.

Which natural indicators did you use? Turmeric stays yellow in acids but turns red in bases. Red cabbage juice turns red or pink in acids and green or yellow in bases. China rose (hibiscus) petal solution turns dark pink in acids and green in bases.

What is the pH scale? A scale, usually shown from 0 to 14, that tells how acidic or basic a solution is. Below 7 is acidic, 7 is neutral and above 7 is basic.

Why does soap turn turmeric red? Soap solution is basic.

What is neutralisation? The reaction of an acid with a base to give a salt and water. Rubbing moist baking soda on an ant sting is an everyday example, because the sting contains an acid.

Water purifier

What does each layer do? Gravel stops large bits, coarse and fine sand trap smaller particles, charcoal holds on to some colours and smells, and cotton or cloth catches the finest bits.

Is the filtered water safe to drink? No. Germs and dissolved salts pass through. Drinking water also needs boiling, chlorination, ultraviolet treatment or a reverse osmosis filter.

What is adsorption? When substances stick to the surface of a solid, as they do on charcoal. Absorption means soaking right in, as water soaks into a sponge.

What is reverse osmosis? Water is pushed under pressure through a very fine sheet, called a membrane, that holds back most of the dissolved salts.

Solar cooker

Why is the inside black? Black surfaces absorb most of the light that falls on them and turn it into heat.

Why does it have a glass lid? Sunlight passes in through the glass, but the heat given off inside cannot easily get out. This trapping of heat is like the greenhouse effect.

Why add a mirror reflector? It sends extra sunlight into the box.

Why is there newspaper or thermocol between the inner and outer boxes? It is insulation. It slows down the escape of heat from the inner box.

What are its limitations? It works only in strong sunshine and cooks slowly.

SAFETY

A solar cooker can make food and pots very hot. Say that you used oven gloves, and that an adult was present when you tested it with food.

Body language, dos and don'ts

Examiners notice how you stand, look and speak before they hear a single answer. Good body language makes you look confident, even when you feel nervous.

Body language that helps

- Stand straight, with your feet a little apart and your weight even.
- Look at the examiner while you speak. If there are several, look at each in turn.
- Smile when you greet them.
- Keep your hands relaxed. Use them to point at the parts of your model.
- Speak clearly, a little slower than usual, and loud enough to be heard.
- Nod while you listen, to show you are following the question.

Dos and don'ts

Do	Don't
Greet politely: "Good morning, Ma'am" or "Good morning, Sir"	Interrupt the examiner
Wear a neat, clean uniform	Chew gum or fiddle with a pen
Keep your model clean and working	Read answers from a sheet
Pause, think, then answer	Rush, or answer a different question
Admit honestly when you are not sure	Make up facts or argue
Show and switch on your model	Blame your partner for anything
Thank the examiner at the end	Look at the floor or the ceiling

A short sample viva

EXAMPLE

Ananya from Jaipur showed an LDR street light. Examiner: "Tell me what your project does." Ananya: "It switches a light on when it gets dark and off when it gets light, by itself." Examiner: "How?" Ananya: "This LDR's resistance rises in the dark. Then this transistor switches on and lights the LED." Examiner: "Show me." Ananya covered the LDR with her hand, and the LED came on. Examiner: "Where would this be useful?" Ananya: "For street lights and garden lights, so nobody forgets to switch them off and electricity is saved."

Notice what Ananya did well: short answers, pointing at each part, a live demonstration and a real-life use.

Calming your nerves

Take three slow breaths before you start. Remind yourself that you know this project better than anyone else in the room. Feeling a little nervous is normal, and it often helps you stay alert.

TRY THIS

The evening before, explain your whole project to someone at home in one minute, without notes. If you can do that, you are ready.

CHECK YOURSELF

Practice questions

1. What is a viva, and what does viva voce mean?
2. Name the three things an examiner wants to find out in a viva.
3. List four things you should know about your own project before a viva.
4. What is the unit of electric current, and what is its symbol?
5. Describe the answer, reason, example pattern.
6. What could you say when you do not know an answer?

7. What should you do if you realise you have said something wrong?
8. What does a commutator do in a DC motor?
9. What is the principle of an electric generator?
10. Why does a transformer not work on DC?
11. A transformer has 400 turns on its primary and 40 on its secondary. If 12 V AC goes in, about what comes out?
12. Why is soft iron used as the core of an electromagnet?
13. What does a diode do in a rectifier?
14. Write the output of an AND gate and an OR gate when input A is 1 and input B is 0.
15. What happens to the resistance of an LDR in the dark?
16. Why does rainwater conduct electricity?
17. Why is Venus hotter than Mercury?
18. What is Pascal's law?
19. In a periscope, why is the image not swapped left to right?
20. Why is the wall of the left ventricle the thickest in the heart?
21. Is water from a model water purifier safe to drink? Explain.
22. Why is the inside of a solar cooker painted black?
23. Name four dos for the day of the viva.

ANSWER KEY

Answers

1. A spoken test in which an examiner asks you questions about your project or practical. Viva voce is Latin for "by the living voice".
2. Whether you did the work yourself, whether you understand the science, and whether you can explain it clearly.

3. Any four of: the aim, the principle, how each part works, what you measured and found, real-life uses, limitations, problems faced and how you fixed them.
4. The ampere, with the symbol A.
5. Give the answer in one sentence, then the reason in one or two sentences, then an example from daily life if it helps.
6. For example: "I am not sure, but I think ... because ...", or "I have not studied that yet; I would like to find out."
7. Correct yourself at once, politely, for example: "Sorry, I meant..."
8. It reverses the current in the coil every half turn, so the coil keeps turning in the same direction.
9. Electromagnetic induction: when a coil and a magnetic field move relative to each other, a voltage is produced in the coil.
10. Steady DC makes a steady magnetic field. Without a changing field, no voltage is induced in the secondary coil.
11. About 1.2 V, because the secondary has one tenth of the primary's turns.
12. Soft iron makes the magnet much stronger and loses its magnetism as soon as the current stops, so the electromagnet can be switched on and off.
13. It lets current flow in one direction only, which changes AC into DC.
14. AND gives 0 and OR gives 1.
15. It rises.
16. It contains dissolved substances that form ions, and the ions carry the current.
17. Venus has a thick carbon dioxide atmosphere that traps heat, while Mercury has almost no atmosphere to hold heat in.
18. Pressure applied to a liquid in a closed system is passed on equally in all directions.
19. Each of the two mirrors swaps left and right, so the two swaps cancel out.
20. It pumps blood to the whole body, which needs the most force.
21. No. A simple filter removes dirt but not germs or dissolved salts, so the water still needs proper treatment such as boiling.
22. Black absorbs most of the light falling on it and turns it into heat.
23. Any four of: greet politely; wear a neat uniform; keep the model clean and working; pause and think before answering; admit when you are not sure; show your model working; thank the examiner.

Glossary

Adsorption

the sticking of substances to the surface of a solid, such as charcoal.

Alveoli

tiny air sacs in the lungs where oxygen enters the blood and carbon dioxide leaves it.

Commutator

the part of a DC motor or generator that reverses the current in the coil every half turn.

Diode

an electronic part that lets current flow in one direction only.

Eddy currents

unwanted currents set up in a metal core by a changing magnetic field, which waste energy as heat.

Electromagnetic induction

the production of a voltage in a coil when it and a magnetic field move relative to each other.

Indicator

a substance that changes colour in an acid or a base.

Ion

an atom or group of atoms that carries an electric charge.

LDR

a light dependent resistor, whose resistance falls in light and rises in the dark.

Limitation

something a model cannot do, or does only roughly, compared with the real thing.

Logic gate

a circuit whose output is 1 or 0 depending on its inputs, according to a fixed rule.

Magma

molten rock below the Earth's surface; it is called lava when it comes out.

Mutual induction

the production of a voltage in one coil by a changing current in a nearby coil.

Nephron

the tiny filtering unit of the kidney.

Pascal's law

pressure applied to a liquid in a closed system is passed on equally in all directions.

pH scale

a scale, usually 0 to 14, showing how acidic or basic a solution is.

Principle

the scientific law or idea that explains how a project works.

Rectifier

a circuit that changes AC into DC.

Transistor

an electronic part that uses a small current to switch or control a larger one.

Viva

a spoken test in which an examiner asks questions about your work.



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