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FREE EBOOK

SCIENCE PROJECTS AND KITS

Writing a Science Project File

How to write the report, from the cover page to the bibliography

INSIDE THIS BOOK

- What a project file is
- The opening pages
- Aim, introduction and theory
- Materials and procedure
- Observations, tables and graphs
- ...and 6 more chapters, practice questions and a glossary

Beginner

Students of class 6 to 12 and teachers

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Writing a Science Project File

Learn what goes into a science project file and how to write every part of it, from the cover page, certificate and acknowledgement to the aim, procedure, observations, result and bibliography. With sample text, neat tables and graphs, labelled diagrams, tips on using your own words, two full sample outlines and a final checklist.

WHO IT IS FOR	Students of class 6 to 12 and teachers
LEVEL	Beginner
SUBJECT AREA	Science projects and kits
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.



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What a project file is

A **project file** is the written record of your science project. It tells the reader what you set out to do, how you did it, what you found and what you learnt. Your model or experiment shows your work on one day. The file keeps it for good.

Your teacher, an examiner in a practical exam or the judges at a science exhibition may read your file, often in only a few minutes. A clear, neat and honest file helps them understand your work quickly, and it often decides a good part of your marks.

What a good file shows

- That you understood the science behind your project.
- That you planned your work and followed clear steps.
- That you recorded what really happened, even when things went wrong.
- That you can explain your work in your own words.

The parts of a project file

Most science project files have these parts, in roughly this order. Your teacher may change the order or leave out a part; always follow your teacher's instructions first.

Part	What it tells the reader
Cover page	The title of the project and who made it
Certificate	A teacher confirms that you did the work
Acknowledgement	Your thanks to the people who helped
Index	The list of parts, with page numbers
Aim	What you set out to do, in one sentence
Introduction	Why the topic matters and where it is used
Theory	The science that explains your project
Materials	Everything you used, with sizes and amounts

Part	What it tells the reader
Procedure	The steps you followed, in order
Observations	What you saw and measured, often in tables
Result	What you found, stated plainly
Precautions	The care you took to get correct results safely
Sources of error	Things that may have made your results less exact
Conclusion	What your result means, and what you learnt
Bibliography	The books and websites you used

Each chapter of this book takes a few of these parts and shows you how to write them, with examples.

Two kinds of projects

A **working model** is something you build that works when you switch it on or move it, such as an electric motor or a hydraulic lift. Its file explains how you built it and the science that makes it work.

An **investigatory project** starts with a question, such as "Does warm water dissolve sugar faster than cold water?" You test the question fairly and record your results. Its file focuses on the experiment, the readings and what they show.

Both use the same parts, but a working model file gives more space to the theory and the building steps, and an investigatory file to observations, tables and graphs.

TIP

Keep a rough notebook from the first day of your project. Write the date, what you did, what went wrong and any readings. When you write the final file, almost everything you need will already be there.

REMEMBER

The file is about your project. A beautiful file that describes work you did not do is worth far less than a plain file that honestly describes your own work.

The opening pages

The first four pages of the file are the cover page, the certificate, the acknowledgement and the index. They are short, but they are the first thing a reader sees, so make them neat.

The cover page

The cover page tells the reader what the project is and who made it. Keep it clean. A clear title and your details matter far more than decoration.

A cover page usually has:

- the title of the project, in large letters
- the subject, such as Physics, Chemistry, Biology or Science
- your name, class, section and roll number
- the name of the teacher you are submitting it to, if your teacher asks for it
- the name of your school and the academic session, for example 2025–26

Choosing a good title

A good title is short and tells the reader exactly what the project is about.

Weak title	Better title
Motor	A Simple Electric Motor
My Science Project	Making Hard Water Soft with Washing Soda
Sugar	Effect of Water Temperature on How Fast Sugar Dissolves
Plants	Effect of Sunlight on the Growth of Moong Seedlings

The certificate

The **certificate** is a page where your teacher confirms that you did the project yourself, under their guidance. You write the text and leave space for the teacher to sign. Never sign it yourself. Here is an example:

EXAMPLE

This is to certify that Kavya Nair of Class 10 B has completed the project titled "A Simple Electric Motor" under my guidance during the session 2025–26. The work recorded in this file is her own. Below the text, leave space for the teacher's signature and the date, and for the principal's signature and the school stamp if your school asks for them.

The acknowledgement

The **acknowledgement** is where you thank the people who helped you. Keep it short and sincere. Many students copy the same paragraph from a senior's file, and teachers can tell. Write it in your own words and name the real help you got.

EXAMPLE

I thank my physics teacher, who explained how a motor works and checked my circuit before I tested it. I thank my father, who helped me cut the wooden base, and my friend Rahul, who lent me his magnet when mine broke. I also thank my school for letting me use the laboratory after classes.

The index

The **index** (also called the table of contents) lists every part of the file with its page number. Number every page first, then write the index last, so the page numbers are correct.

S. No.	Topic	Page No.
1	Aim	1
2	Introduction	2
3	Theory	3
4	Materials	5
5	Procedure	6

The table goes on in the same way until the bibliography.

TIP

Leave the index page blank while you work. Fill it in only when every other page is finished and numbered.

CHAPTER 3

Aim, introduction and theory

These three parts tell the reader what you wanted to do and why it matters.

The aim

The

aim says in one sentence what you set out to do. It usually starts with the word "To". A good aim is short and exact.

Weak aim	Better aim
To study motors.	To make a simple electric motor and show how it turns.
To see sugar dissolving.	To find out how the temperature of water affects the time taken by sugar to dissolve.

For an investigatory project, the aim names the thing you change and the thing you measure. In the sugar example, you change the temperature and you measure the time.

The hypothesis

An investigatory project also has a **hypothesis**. This is your sensible guess about the answer, made before you test it. A useful pattern is "If ... then ... because ...".

EXAMPLE

If the water is warmer, then the sugar will dissolve faster, because the water particles move faster and break up the sugar crystals more quickly.

It is perfectly fine if your results show that your hypothesis was wrong. Say so honestly. A wrong guess, tested fairly, is still good science.

The introduction

The **introduction** is usually half a page to one page long. It answers three questions: What is this topic? Why is it important? Where do we see it in daily life?

EXAMPLE

An electric motor is a machine that changes electrical energy into the energy of movement. Motors are all around us. The ceiling fan, the mixer-grinder, the washing machine, the water pump on the roof and the electric scooter on the road all use motors. In this project I made a very simple motor with a cell, a magnet and a coil of copper wire, to understand how these machines turn.

The theory

The **theory** explains the science that makes your project work. It is the most important part of a working model file. Include:

- the main principle or law, written in your own words
- any formula you use, with each letter explained and its unit
- a labelled diagram that shows the idea
- a short explanation that links the principle to your model

EXAMPLE

A wire carrying an electric current, placed in a magnetic field, feels a push called a force. In my motor, the current flows through the coil, the magnet below it makes the magnetic field, and the force on the coil makes it turn. The direction of the force can be found with Fleming's left-hand rule: hold the thumb, first finger and middle finger of the left hand at right angles to each other. If the first finger points along the magnetic field and the middle finger along the current, the thumb points in the direction of the force.

DID YOU KNOW

In 1821, the scientist Michael Faraday showed that a wire carrying a current could be made to move continuously around a magnet. This simple experiment led, over many years, to the motors we use today.

REMEMBER

Write the theory at the level of your own class. If you cannot explain a line of it aloud, it does not belong in your file yet. Learn it first, then write it.

CHAPTER 4

Materials and procedure

These two parts tell the reader exactly what you used and exactly what you did. Another student should be able to repeat your project just by reading them.

Writing the materials list

List every item, with its amount and any size or detail that matters. A table is the clearest way.

Item	Quantity	Details
Enamelled copper wire	About 1 metre	Thin wire with a coloured coating
Cell	1	1.5 V, size D
Ceramic magnet	1	Flat, round
Safety pins	2	Large, metal
Rubber band	1	Thick and strong
Sandpaper	1 small piece	Fine grade
Wooden base	1	About 10 cm by 8 cm

Writing just "wire" or "cell" is not enough, because the reader does not know which one or how much. Give the detail.

For an investigatory project, list the apparatus too: the beakers, the thermometer, the measuring cylinder, the stopwatch and so on, each with its size or range.

Writing the procedure

The **procedure** is the list of steps you followed, in order. Write it as numbered steps. Each step should have one main action, and should give any amounts, distances or times.

Weak step	Better step
Make a coil.	Wind the wire 25 times around a size AA cell to make a round coil. Leave about 3 cm of straight wire at each end.
Add sugar and wait.	Add one level teaspoon of sugar to 100 mL of water and start the stopwatch at once.
Stir it.	Stir gently with a glass rod at about one stir per second.

Which voice to use

Some teachers like the procedure written as instructions ("Wind the wire..."); others prefer the past tense ("The wire was wound..." or "I wound the wire..."). Either is fine if you keep to one style. Ask your teacher which they prefer.

SAFETY

If your project needed an adult's help, for example for cutting wood, using a hot glue gun, soldering or handling hot water, say so in the procedure. It shows that you planned the work safely, and it is honest.

TRY THIS

When your procedure is written, give it to a friend and ask them to read it without seeing your model. Ask them to tell you what they would do at each step. Wherever they get confused, your step needs more detail.

CHAPTER 5

Observations, tables and graphs

The **observations** are what you saw and measured during the project. In an investigatory project this is the heart of the file.

Two kinds of observations

- **Qualitative observations** describe things in words: "The water turned cloudy", "The coil turned faster".
- **Quantitative observations** are measurements with numbers and units: "The sugar took 45 seconds to dissolve".

Good files usually have both. Write down what really happened, including surprises and failures. Never change a reading to make it "look right".

Making a good table

A table makes readings easy to read and compare. Follow these rules:

1. Give the table a number and a title, such as "Table 1: Time taken by sugar to dissolve at different temperatures".
2. Write the unit in the column heading, not after every number, for example "Time (s)".
3. Take each reading at least three times. These are called **trials**.
4. Work out the **mean** (the average) of the trials.
5. Use the same number of decimal places down each column.

Table 1: Time taken by one teaspoon of sugar to dissolve in 100 mL of water (example readings)

Water temperature (°C)	Trial 1 (s)	Trial 2 (s)	Trial 3 (s)	Mean time (s)
20	62	58	60	60
30	46	44	45	45
40	35	37	36	36
50	28	27	29	28
60	21	22	20	21

EXAMPLE

To find the mean at 20 °C, add the three trials: $62 + 58 + 60 = 180$. Then divide by the number of trials: $180 \div 3 = 60$ seconds.

Drawing a graph

A graph shows how one quantity changes when another changes. Draw it on graph paper, in pencil.

1. Put the quantity you changed on the horizontal axis (the **x-axis**). Here that is the temperature.
2. Put the quantity you measured on the vertical axis (the **y-axis**). Here that is the mean time.
3. Choose a scale that uses most of the paper, for example 1 cm = 10 °C across and 1 cm = 10 s up.
4. Label both axes with the quantity and its unit.
5. Mark each point with a small, sharp cross.
6. Draw a smooth curve or a straight line that passes close to most points. Do not join the dots in a zigzag unless your teacher asks for it.
7. Write a title above the graph.

For the readings above, the curve falls from left to right, steeply at first and then more gently. This shows that warmer water dissolves sugar faster.

Bar graphs

When the thing you change is a kind or a type rather than a number (for example cotton, wool and nylon cloth), draw a **bar graph** instead. Leave equal gaps between the bars and make all the bars the same width.

TIP

Write a sentence under every table and graph that says what it shows. A reader should not have to work it out alone.

CHAPTER 6

Drawing and labelling diagrams

A clear diagram can explain in one look what takes a page of writing. Examiners often give marks for neat, correctly labelled diagrams.

Rules for a neat diagram

- Draw in pencil, with a sharp point, so you can correct mistakes.
- Make the diagram big enough, usually about half a page.
- Use simple, clean lines. Avoid heavy shading.
- Draw label lines with a ruler. They should be straight and should never cross each other.
- Write labels horizontally, so the reader does not have to turn the page.
- Line up labels neatly down one or both sides of the diagram.
- Give every diagram a number and a caption below it, such as "Fig. 1: A simple electric motor".

In many handwritten practical files, diagrams go on the blank left-hand page and the writing on the ruled right-hand page. Follow your teacher's style.

Labels for a simple motor diagram

A diagram of the simple motor in this book should show and label:

1. the coil of enamelled copper wire
2. the two safety pins that hold the coil
3. the cell that supplies the current
4. the rubber band that holds the pins to the cell
5. the magnet placed under the coil
6. the scraped ends of the wire

Circuit symbols

For electric circuits, draw a **circuit diagram** using standard symbols, not pictures of the parts. Here is what some common symbols look like.

Part	How its symbol is drawn
Cell	A long thin line and a short thick line side by side; the long line is the positive end
Battery	Two or more cell symbols joined in a row
Switch (open)	A short line tilted up away from a dot, with a gap
Bulb	A circle with a cross inside it

Part	How its symbol is drawn
Resistor	A small rectangle (some books draw a zigzag line)
Ammeter	A circle with the letter A inside
Voltmeter	A circle with the letter V inside
Connecting wire	A straight line, drawn with a ruler

Draw wires as straight lines with square corners. A neat circuit diagram looks like a rectangle, not like a tangle of string.

Photographs

Printed photographs with captions make the file lively: one of the finished model and one or two of it being built. But a photo cannot show the science inside, so it never replaces a labelled diagram.

REMEMBER

Every label must be correct. A wrong label costs more marks than a missing colour or a slightly wobbly line.

TRY THIS

Draw your diagram once on rough paper, labels and all. Check it against your textbook and your model. Only then draw it in the file.

CHAPTER 7

Result, precautions, sources of error and conclusion

These four parts show the reader what you found and how much the result can be trusted.

The result

The **result** answers your aim in one or two sentences. Give numbers where you have them. Do not explain or discuss here; just state what you found.

EXAMPLE

For the motor: "A simple electric motor was made. It turned steadily when the coil was given a gentle push, and it turned the other way when the cell was reversed." For the sugar project: "Sugar dissolved faster in warmer water. The mean time fell from 60 s at 20 °C to 21 s at 60 °C."

Precautions

Precautions are the things you did to get correct results and to stay safe. Write them as a short list.

- The enamel was scraped off the wire ends completely, so current could flow.
- The same amount of sugar and water was used in every trial.
- The thermometer was read with the eye level with the liquid.
- The circuit was disconnected after every test, so the cell did not run down or heat up.

Sources of error

Sources of error are things that may still have made your results less exact, even though you were careful. Name the real ones. Do not just write "human error"; say which human error.

- Starting and stopping the stopwatch by hand adds a small delay, called **reaction time**.
- The warm water cooled a little during each trial.
- It is hard to judge the exact moment when the last crystal disappears.
- Reading a scale from an angle gives a wrong reading. This is called **parallax error**.

The conclusion

The **conclusion** says what your result means. It is a short paragraph that:

- says whether your hypothesis was supported
- links the result to the theory

- mentions a real-life use of what you found
- says what you would improve next time

EXAMPLE

"My results support my hypothesis. Sugar dissolves faster in warmer water because the faster-moving water particles break up the crystals more quickly. This is why tea sweetens quickly when it is hot. Next time I would use a temperature probe and a magnetic stirrer to make my readings more exact."

TIP

Never invent a result. If your model did not work, say what happened, what you think went wrong and how you would fix it. Examiners respect honesty and good reasoning.

CHAPTER 8

Your own words, sources and the bibliography

Everything in your file should be written in your own words, and every book or website you used should be named at the end. These two habits are what make a file honest.

Why you must not copy

Copying someone else's words and passing them off as your own is called **plagiarism**. It is a form of cheating. It also harms you:

- Teachers read many files and quickly notice copied text.
- You cannot explain copied work when you are asked questions.
- It is unfair to students who did the work themselves.

How to write in your own words

1. Read the textbook page or website carefully until you understand it.
2. Close the book or the screen.
3. Explain the idea aloud, as if to a younger brother or sister.
4. Write down what you said, in short sentences.

5. Open the source again and check that your facts and numbers are correct.

EXAMPLE

A textbook-style sentence might read: "Electromagnetic induction is the generation of an induced electromotive force in a conductor due to a change in the magnetic flux linked with it." In your own words: "When a magnet moves near a coil of wire, a voltage is made in the coil. If the coil is part of a circuit, a current flows. This is called electromagnetic induction."

Quoting

Sometimes you want to use a famous line or an exact definition. Then put it inside quotation marks and name the source next to it. Keep quotations short and rare. Most of the file should be your own writing.

Chatbots and AI tools

If you use a chatbot or another AI tool, first ask your teacher whether it is allowed. Never paste its text into your file as your own. AI tools sometimes give wrong facts very confidently, so check every fact in your textbook.

Writing the bibliography

The **bibliography** is the list of books, websites and other sources you used. Arrange them in alphabetical order of the author's surname, or of the website's name when there is no author.

For a book, give the author, the year, the title, the publisher and the city. For a website, give the author or organisation, the title of the page, the name of the website, the full web address copied exactly, and the date you read it.

EXAMPLE

These two entries are made up, to show the pattern. A book: Sharma, R. (2020). Easy Physics for Class 10. Bright Path Publishers, New Delhi. A website: Ghosh, A. "How a Bicycle Dynamo Works". Young Scientist Corner. (Then write the full web address.) Visited on 14 August 2025.

In a handwritten file, underline book titles, because you cannot write in italics.

DID YOU KNOW

Online encyclopedias can be a good starting point, but anyone can edit them. Always check important facts in your textbook or another reliable book before you use them.

CHAPTER 9

Handwritten or printed: making the file neat

Some teachers want a handwritten file. Others accept a printed one. A few want handwritten text with printed photographs. Ask your teacher before you start, because rewriting a whole file is painful.

	Handwritten	Printed
Good points	Shows your own effort; no printer needed; diagrams are easy to add	Easy to correct and rearrange; looks uniform; easy to add photos and graphs
Weak points	Mistakes are hard to fix; takes longer	Needs a computer and printer; tempting to copy and paste text
Best for	School practical files where the teacher asks for it	Exhibition reports and longer projects, where allowed

Tips for a handwritten file

- Use a blue or black pen for text, and a pencil for diagrams and graphs.
- Write headings slightly larger, and underline them with a ruler.
- Leave a margin on the left of each page.
- Write on one side of each sheet, or follow your teacher's left-page and right-page style.
- If you make a mistake, draw one neat line through it. Do not scribble over it or use too much correction fluid.

Tips for a printed file

- Use one simple font throughout. Size 12 suits the text, and size 14 to 16 suits headings.
- Use line spacing of about 1.5, so the text is easy to read.

- Keep margins of about 2.5 cm on all sides.
- Add page numbers at the bottom.
- Run the spell-check, then read every page yourself, because spell-check misses words that are spelt correctly but used wrongly, such as "there" and "their".

Binding and covers

A simple file folder or spiral binding works well. Avoid glitter, stickers and heavy decoration; they can make a file look less serious, and they do not earn marks.

A writing plan

EXAMPLE

Arjun from Lucknow had ten days to finish his file. Days 1 and 2: write the aim, introduction and theory from his rough notebook. Day 3: materials and procedure. Days 4 and 5: tables and graphs. Day 6: diagrams. Day 7: result, precautions, errors and conclusion. Day 8: bibliography and the opening pages. Day 9: number the pages and write the index. Day 10: a final read and the checklist at the end of this book. He spent ! 60 on graph paper, a file folder and printing two photographs.

TIP

Write the file while the project is fresh. A week after testing, you will have forgotten half the details.

CHAPTER 10

Sample outline: a simple electric motor

Here is a full outline for a working model file. Use it to see how the parts fit together, then write your own file in your own words.

Opening pages

The cover ("A Simple Electric Motor", Physics, Kavya Nair, Class 10 B, Roll No. 17, the session), the certificate and acknowledgement as in the chapter on opening pages, and the index, filled in last.

Aim

To make a simple electric motor using a cell, a magnet and a coil of copper wire, and to study what changes its direction of turning.

Introduction

A short paragraph on what a motor does (changes electrical energy into movement) and where motors are used at home, in industry and in transport.

Theory

- A current-carrying wire in a magnetic field feels a force.
- Fleming's left-hand rule gives the direction of the force.
- In a real motor, a part called a **commutator** reverses the current every half turn, so the coil keeps turning the same way.
- In this simple motor, one end of the wire is scraped only on one side. The current flows for half of each turn and stops for the other half. The coil keeps turning because of its own momentum, so the scraped end does the job of a simple commutator.
- A labelled diagram of the model.

Materials

The table from the chapter on materials and procedure.

Procedure

1. Wind the enamelled wire 25 times around a size AA cell. Slide the coil off and wrap each loose end twice around the coil to hold it together. Leave about 3 cm of straight wire on each side as an axle.
2. Scrape the coating off one axle end completely, all the way round, using sandpaper.
3. Hold the coil upright, like a wheel standing on the table, and scrape the other axle end only on its top half. Leave the bottom half coated.
4. Lay a D cell on its side on the wooden base. Fix one safety pin to each end of the cell with a thick rubber band, so the pins stand upright with their eyes at the top.
5. Place the magnet on top of the cell, midway between the pins.
6. Rest the axle ends in the eyes of the two safety pins, so the coil sits just above the magnet without touching it.

7. Give the coil a gentle push. It should keep turning.
8. Disconnect the coil after each test so the cell does not heat up.

Observations

Change made	What happened
No push given	The coil sometimes did not start by itself
Gentle push given	The coil turned steadily
Cell turned round	The coil turned the other way
Magnet turned over	The coil turned the other way
Magnet moved further away	The coil turned slowly or stopped

Result, precautions, errors and conclusion

- **Result:** the motor turned steadily, and its direction reversed when either the current or the magnet was reversed.
- **Precautions:** the wire ends were scraped cleanly, the coil was balanced, and the circuit was disconnected after each test.
- **Sources of error:** an unbalanced coil, uneven scraping, a weakening cell and friction at the safety pins.
- **Conclusion:** the direction of the force depends on the directions of both the current and the magnetic field, as Fleming's left-hand rule predicts. Fans and pumps use the same principle, with many more turns of wire and a proper commutator.

Bibliography

Your textbook and any other sources you used, in the pattern from the bibliography chapter.

SAFETY

The wire and the cell can become warm if the coil is left connected and not turning. Never connect the coil to a wall socket, and never use more than one or two cells for this model.

Sample outline: an investigatory project, and a final checklist

This outline is for an investigatory project. It uses the sugar readings from the chapter on observations.

Title and aim

- **Title:** Effect of Water Temperature on How Fast Sugar Dissolves.
- **Aim:** To find out how the temperature of water affects the time taken by sugar to dissolve.
- **Hypothesis:** If the water is warmer, the sugar will dissolve faster, because warmer water particles move faster.

Variables

A fair test changes only one thing at a time. The things that can change are called **variables**.

Kind of variable	Meaning	In this project
Independent variable	The one thing you change on purpose	Water temperature
Dependent variable	The thing you measure	Time taken to dissolve
Controlled variables	Things you keep the same	Amount of sugar, amount of water, type of sugar, stirring speed, size of beaker

Materials and procedure

- **Materials:** five 250 mL beakers, a 100 mL measuring cylinder, a thermometer, a stopwatch, a teaspoon, a glass rod, sugar, and water at five temperatures. An adult prepares the warm water.
- **Procedure:** measure 100 mL of water at 20 °C, add one level teaspoon of sugar, start the stopwatch, stir at about one stir per second, and stop the watch when no crystals can be seen. Repeat three times at each temperature: 20, 30, 40, 50 and 60 °C.

Observations and graph

Table 1 from the observations chapter, followed by the graph of mean time against temperature, with a sentence underneath: "The time taken falls as the temperature rises."

Result, precautions, errors and conclusion

- **Result:** the mean time fell from 60 s at 20 °C to 21 s at 60 °C.
- **Precautions:** same amount of sugar each time, same stirring speed, thermometer read at eye level.
- **Sources of error:** reaction time with the stopwatch, cooling of warm water during a trial, judging the end point.
- **Conclusion:** the hypothesis was supported. This explains why sugar dissolves quickly in hot tea and slowly in cold sherbet.

SAFETY

Water at 50 or 60 °C can scald. An adult should heat and pour it, and you should stand the beaker on a firm, flat table.

The final checklist

Before you hand in your file, go through this list and tick each item.

- The cover page has the title, subject, your name, class, section and roll number.
- The certificate has space for your teacher's signature, and you have not signed it yourself.
- The acknowledgement is short, true and in your own words.
- Every page is numbered, and the index matches the page numbers.
- The aim is one clear sentence.
- The theory is in your own words, and you can explain every line aloud.
- The materials list gives amounts and details.
- The procedure has numbered steps that a friend could follow.
- Every table has a number, a title and units in the headings.
- Every graph has a title, labelled axes with units and a sensible scale.
- Every diagram is in pencil, with straight label lines that do not cross.
- The result answers the aim.

- Precautions and sources of error are real and specific.
- The conclusion links the result to the theory and to daily life.
- The bibliography lists every source in the correct pattern.
- You have read the whole file once, slowly, for spelling and sense.

REMEMBER

A file does not need to be long to be good. It needs to be clear, correct, honest and neat.

CHECK YOURSELF

Practice questions

1. What is a project file, and who might read it?
2. Name the four opening pages of a project file.
3. Why should you never sign the certificate yourself?
4. What word does an aim usually start with?
5. What is a hypothesis? Give the useful three-part pattern for writing one.
6. What three questions should the introduction answer?
7. Name four things the theory section should include.
8. Why is "wire" not a good entry in a materials list?
9. What is the difference between a qualitative and a quantitative observation?
10. Priya's three trials were 48 s, 52 s and 50 s. What is the mean?
11. Which quantity goes on the x-axis of a graph, and which on the y-axis?
12. When should you draw a bar graph instead of a line graph?
13. Give four rules for labelling a diagram.
14. What is the difference between a precaution and a source of error?
15. What is parallax error?
16. What is plagiarism, and why does it harm the student who does it?

17. Give the five steps for writing in your own words.
18. What details should a book entry in a bibliography include?
19. In the simple motor, why is one end of the wire scraped only on one side?
20. In the sugar project, name the independent, dependent and two controlled variables.

ANSWER KEY

Answers

1. It is the written record of a science project: what was done, how, what was found and what was learnt. A teacher, an examiner or exhibition judges might read it.
2. The cover page, the certificate, the acknowledgement and the index.
3. The certificate is the teacher's confirmation that you did the work, so only the teacher can sign it.
4. "To".
5. A sensible guess about the answer, made before testing. Pattern: "If ... then ... because ...".
6. What is the topic? Why is it important? Where do we see it in daily life?
7. The main principle in your own words, any formula with its letters and units explained, a labelled diagram, and an explanation linking the principle to the model.
8. It does not say which wire or how much. Give the type, the amount and any size that matters.
9. A qualitative observation describes something in words; a quantitative observation is a measurement with a number and a unit.
10. $48 + 52 + 50 = 150$, and $150 \div 3 = 50$ seconds.
11. The quantity you change goes on the x-axis; the quantity you measure goes on the y-axis.
12. When the thing you change is a kind or a type, such as kinds of cloth, rather than a number.
13. Any four of: draw label lines with a ruler; never let them cross; write labels horizontally; line labels up neatly; make every label correct; add a figure number and caption.
14. A precaution is something you did to avoid a problem. A source of error is something that may still have affected the result.
15. A wrong reading caused by looking at a scale from an angle instead of straight on.

16. Plagiarism is passing off someone else's words or work as your own. It harms the student because teachers notice it, and the student cannot explain the work when questioned.
17. Read until you understand; close the source; explain the idea aloud; write down what you said in short sentences; check facts against the source.
18. The author, the year, the title, the publisher and the city.
19. So that current flows for only half of each turn. This stops the coil being pushed backwards in the other half, and its momentum carries it round, so the scraped end acts as a simple commutator.
20. Independent: water temperature.
Dependent: time taken to dissolve.
Controlled: any two of the amount of sugar, the amount of water, the type of sugar, the stirring speed and the beaker size.

WORD LIST

Glossary

Acknowledgement

a short page thanking the people who helped with the project.

Aim

one sentence saying what the project set out to do.

Bibliography

the list of books, websites and other sources used, at the end of the file.

Certificate

a page on which a teacher confirms that the student did the project.

Circuit diagram

a drawing of an electric circuit that uses standard symbols instead of pictures.

Commutator

the part of a motor that reverses the current every half turn so the coil keeps turning the same way.

Conclusion

a short paragraph explaining what the result means and what was learnt.

Controlled variable

something kept the same in every trial so the test is fair.

Dependent variable

the quantity that is measured in an experiment.

Hypothesis

a sensible guess about the answer, made before testing it.

Independent variable

the one quantity that is changed on purpose in an experiment.

Index

the list of parts of the file with their page numbers; also called the table of contents.

Investigatory project

a project that starts with a question and answers it with fair tests and readings.

Mean

the average of a set of readings, found by adding them and dividing by how many there are.

Parallax error

a wrong reading caused by looking at a scale from an angle.

Plagiarism

passing off someone else's words or work as your own.

Precaution

something done during the project to get correct results and to stay safe.

Source of error

something that may have made the results less exact despite care.



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