Investigating Science

HSC · 2017 SYLLABUS · STUDENT GUIDE

Where the marks are: HSC Investigating Science 2027

What the eight HSC papers from 2019 to 2026 show, and how to use it in your revision

48% of all marks came from questions mainly on **11 dot points**. They are Priorities 1 and 2 in this guide.	**~28** marks in each paper asked you to **design or judge an investigation** (19–40 per paper).	**2** questions worth **7–9 marks** in every paper so far. Practise writing long answers.	**8/8** papers asked about at least one of the **six named investigations**, such as Marshall and Warren's.

How to use this guide

1. **Work through the priorities in order.** Priority 1 has been examined in every paper, so start there.
2. **Tick a box when you have earned it.** Answer a past HSC question on the dot point, then check your answer against the marking guidelines.
3. **Take what you know into new settings.** Papers use investigations you have not seen, such as lizards catching flies (2024 Q27). The variables, controls and sample still matter in the same way.

Priority 1 · Examined in all eight papers

	Dot point	You should be able to	Papers
☐	**Designing a practical investigation** M6.IQ1.DP1	Write a method in steps for temperature and reaction rate, a gas law, or speed and distance. Say what you measure and with what, what you keep the same, how many repeats, and one safety precaution with its reason. Remember that a shorter reaction time means a higher rate.	**8/8**
☐	**Research, devices and world health** M8.IQ3.DP3	Explain how one surgical device affects human wellbeing and how one surgical procedure has affected world health. Link water treatment and vaccination programs to less disease. Check whether the question asks about a device or a procedure.	**8/8**
☐	**The named scientists: aims, methods, data** M5.IQ2.DP1	For Marshall and Warren, Eratosthenes, Doppler and Priestley, explain what they wanted to find out, what data they collected and how well the data answered the question. For Priestley, suggest controls and improvements and justify them.	**8/8**
☐	**Events and the public image of science** M8.IQ1.DP1	Know a case study for each of nuclear meltdowns, the smallpox vaccine, flight and damming rivers. Explain how each changed what the public thought of science. If the question gives you information, use it as well as your case study (2023 Q33).	**8/8**
☐	**Technology, theories, laws and models** M6.IQ2.DP1	Explain how a technology gave new evidence: X-ray diffraction and the structure of DNA, radioactivity and atomic theory, the Large Hadron Collider and the Higgs boson, computer simulations and Earth's history.	**8/8**

Try this one: 2026 Q35, Eratosthenes (6 marks)

The question asked for his method and a labelled diagram. Draw the Earth with Syene and Alexandria, parallel rays of sunlight, the well at Syene (Sun directly overhead) and the pole and its shadow at Alexandria. Mark the angle between the pole and the ray. Then explain: that angle is the same fraction of 360° as the distance between the cities is of Earth's circumference. So circumference = distance × 360° ÷ angle.

Priority 2 · Examined in seven of the eight papers

Dot point	You should be able to	Papers
☐ **Investigation design** M5.IQ3.DP1	Identify the independent, dependent and controlled variables and explain why each was chosen. Justify the sample size. Judge whether the investigation is ethical.	**7/8**
☐ **Testing a claim** M7.IQ1.DP1	Use the numbers to decide whether results support a claim. In 2025 Q31a plants gained 10%, so the claimed 20% was not supported.	**7/8**
☐ **What started the research** M5.IQ1.DP1	Explain what led Marshall and Warren (ulcers), van Helmont (plant growth) and Spencer (microwaves) to investigate.	**7/8**
☐ **Correlation vs causation** M7.IQ3.DP1	Say what the data show, then argue whether one thing causes the other. In 2026 Q30, closer basketball games had longer final minutes (correlation) and more stoppages (a possible cause).	**7/8**
☐ **Measuring devices and error** M6.IQ1.DP3	Read a scale correctly. Tell errors apart: in 2025 Q35, readings always 2 g too high are a systematic error, and points scattered around the line are random error.	**7/8**
☐ **Pseudoscience** M7.IQ4.DP6	Explain why astrology, numerology and iridology are pseudoscience and how scientific-sounding words make them persuasive.	**7/8**

Priority 3 · The rest of the top 20

Dot point	You should be able to	Papers
☐ **Theories leading to technologies** M6.IQ2.DP2	Link a theory or law to a technology it made possible, such as radioactivity and radiotherapy, or Newton's laws and buildings on rollers that resist earthquakes (2026 Q32).	**6/8**
☐ **Governments, corporations and research** M8.IQ3.DP4	Explain, with an example, how government and company funding decides which research gets done.	**6/8**
☐ **Validity** M5.IQ3.DP4	Decide whether an experiment really tests what it set out to test, and explain how a control helps.	**6/8**
☐ **Conflicts of interest** M7.IQ4.DP4	Explain, with an example, why research a company pays for should be treated with caution.	**4/8**
☐ **Drawing conclusions** M5.IQ3.DP3	State the conclusion the data support, then suggest changes to the method and justify them. 2024 Q27c asked for three.	**5/8**
☐ **Aboriginal and Torres Strait Islander Peoples' plant knowledge** M6.IQ2.DP3	Give examples of plants used as medicines and materials. Describe one benefit-sharing partnership and what each side gains.	**5/8**
☐ **Recording and graphing data** M5.IQ3.DP2	Draw a graph with labelled axes, units and an even scale. Add a line of best fit, straight or curved.	**4/8**
☐ **Peer review** M7.IQ5.DP4	Explain how peer review catches flaws before publication and how that helps science advance. Give an example.	**4/8**
☐ **Placebos and blind trials** M7.IQ2.DP1	Justify a placebo, a double-blind design and a control group for a trial (2024 Q35).	**5/8**

Be ready for your own investigation and for one you have never seen

Marks for designing, running and evaluating an investigation turn up in several questions in every paper. 2023 Q35a asked for the claim you tested in class and the steps you followed, so revise your own practical work too.

Graphs and calculations. Every paper had a calculation and seven of the eight had a graph to plot or sketch. Show your working.

Don't get caught out

watch this space

These are in the syllabus but have never, or hardly ever, been asked. A few minutes on each is enough.

Never asked directly	What to know
☐ **Working alone or in a team** M5.IQ3.DP1	Be able to justify the choice. Try this: two readings are needed at the same moment. Would you work alone or with a partner, and why?
☐ **Good and bad consequences of using your findings** M5.IQ3.DP3	For a conclusion from an investigation, give one benefit and one harm that could follow if people acted on it.
Hardly asked	
☐ **Justifying your choice of materials** M5.IQ3.DP1	The syllabus lists availability, cost and familiarity. Try this: for a cooling curve, would you choose a temperature probe or a glass thermometer, and why?
☐ **The Hawthorne effect and the 1991 HRT study** M7.IQ3.DP1	Only in multiple choice so far. Hawthorne: people can change their behaviour when they know they are being observed. HRT: the 1991 study did not take the women's socioeconomic status into account.
☐ **Iridology** M7.IQ4.DP6	Only in multiple choice so far. In 2019 Q8 iridologists' diagnoses were no better than guessing. Be ready to write a few sentences on why it is a pseudoscience.
☐ **Computer simulations of Earth's history** M6.IQ2.DP1	Two multiple-choice questions so far. Know that computer simulations help scientists reconstruct how the tectonic plates moved in the past.
☐ **Fake science journals** M7.IQ5.DP5	2023 Q27 asked why so many papers are published in them. Also be able to explain how they damage public trust in science.
☐ **A scientist who falsified results** M7.IQ5.DP1	Asked once (2020 Q23a). Know one case by name: what the scientist did and how the fraud was uncovered.
☐ **A trusted brand's halo effect** M7.IQ4.DP5	Halo effect questions so far used a famous person. The syllabus also covers brands: explain why people might believe a trusted brand's claim about a new product without evidence.

What markers reward

- **Be specific.** Markers often asked for this. Name the safety measure, the example or the case study.
- **Answer every part of the question.** 2021 Q33c asked for two reasons and for further improvements. Underline each instruction before you start.
- **Use what you are given.** Quote values from the graph or table, or a claim from the text. In 2026 Q27 you had to judge both sources.
- **Link, don't list.** Say how the evidence leads to your conclusion.

Get these pairs right

- **Aim and hypothesis.** An aim says what you want to find out. A hypothesis is a prediction you can test.
- **Law and theory.** A law describes what happens. A theory explains why.
- **Accuracy, reliability, validity.** Accurate: close to the true value. Reliable: repeats agree. Valid: the experiment tests what it was meant to test.
- **Rate and time.** A shorter time means a higher rate.
- **Device and procedure.** A surgical device is a piece of equipment. A procedure is the operation.
- **Halo and Hawthorne.** Halo: trusting a claim because of who makes it. Hawthorne: behaving differently because you are being observed.

Keep the whole course in view

These priorities are a guide to where marks have been, not a promise. When we built this list from earlier papers only and checked it against the next paper (2022–26), its top 15 dot points covered 43–60 of the 100 marks. Don’t bank on a topic being “due”: one missing from the last paper came back less often (52%) than one that appeared (69%). The rest of the marks came from elsewhere, so revise all four modules.

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