Exercise walk-through

1.3
Areas of knowledge: the natural and human sciences

International Baccalaureate · IB Diploma · Theory of Knowledge

The essay on a prescribed title

- Unpack: an expert is a person with training who is trusted by a community; "important" can mean useful, or necessary.
- Natural sciences: peer review by experts catches mistakes before results are accepted.
- **Counterclaim**: experts rejected Marshall's evidence for years; in the end the evidence, not the experts' opinion, decided.

Sources for this lesson

- International Baccalaureate, *__Theory of Knowledge__ guide* (first assessment 2022), including the specimen prescribed titles and the 35 __exhibition__ prompts.
- International Astronomical Union, Resolution B5, "Definition of a Planet in the Solar System" (24 August 2006).
- B. Marshall and J. R. Warren, "Unidentified curved bacilli in the stomach of patients with gastritis and peptic ulceration", *The Lancet* (16 June 1984), and the Nobel Prize in Physiology or Medicine 2005.

Key terms

- **Knowledge question**: an open, general question about knowledge itself, not about the subject matter.
- **Perspective**: the point of view, shaped by language, culture, education and interests, from which a knower sees.
- **Confirmation bias**: noticing evidence that supports what we already believe and ignoring the rest.

Exercises 2.1·2.2

2.1 Explain what Popper meant by **falsifiability**. [2]

2.2 In a 2015 project, 100 psychology studies were repeated and about 36 gave statistically significant results again. Calculate the percentage that did **not**, and explain what this suggests about knowledge in the human sciences. [3]



dark: replicated

light: not

Exercises 2.1·2.2

2.1 Explain what Popper meant by **falsifiability**. [2]

2.1

a claim is scientific only if some possible observation could show it is false; e.g. “all swans are white” can be falsified by one black swan; “everything happens for a reason” cannot

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2.2 In a 2015 project, 100 psychology studies were repeated and about 36 gave statistically significant results again. Calculate the percentage that did **not**, and explain what this suggests about knowledge in the human sciences. [3]



2.2

$100 - 36 = \mathbf{64}\,\%$; many published results may depend on small samples, chance or publication bias; knowledge in the human sciences should be treated as provisional and checked by replication

Exercises 2.3·2.4

2.3 Explain Kuhn's idea of a **paradigm shift**, with an example. [4]

2.4 Compare the methods of the natural and human sciences, and evaluate whether the human sciences are "less scientific". [6]

Exercises 2.3·2.4

2.3 Explain Kuhn's idea of a **paradigm shift**, with an example. [4]

2.3

a paradigm is the shared framework of theories and methods of a science; anomalies build up that the paradigm cannot explain; a new framework replaces it, changing what scientists see as problems and evidence; example, e.g. from an Earth-centred to a Sun-centred model; from Newton to Einstein

2.4 Compare the methods of the natural and human sciences, and evaluate whether the human sciences are "less scientific". [6]

2.4

natural sciences: controlled experiments, repeatable conditions; human sciences: surveys, observation, statistics, natural experiments; problems in human sciences: observer effect, ethics, culture; natural sciences also have limits, e.g. cosmology cannot run experiments on the universe; "scientific" may mean method and openness to testing, not certainty; a reasoned judgement

Exercise 3.1

3.1 *(Essay-style.)* "In the natural sciences, the aim is certainty; in the human sciences, the aim is understanding." Discuss. [10]



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3.1

Mark with the TOK markbands (out of 10): [9-10] excellent: clear, focused, convincing links, well-chosen examples, implications explored; [7-8] good: focused, mostly clear links, relevant examples; [5-6] satisfactory: some focus, links partly explained; [3-4] basic: limited links, description more than analysis; [1-2] rudimentary. Points that may be included: understanding of the claim; natural sciences: knowledge is provisional, not certain (Popper, Kuhn); example from the natural sciences; human sciences: interpretation and meaning matter, but they also seek prediction (economics, psychology); example from the human sciences; a conclusion: both seek reliable explanation; the claim draws too sharp a line

Exercise 3.2

3.2 Explain **two** ethical limits on producing knowledge in the human sciences. [5]

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informed consent: participants must agree knowing the risks; example, e.g. no secret experiments on people; avoiding harm: some experiments cannot be done, e.g. raising children in isolation; so some questions are studied only indirectly; ethics committees decide what is allowed