Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

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

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

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

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

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

3.2

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

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