1.4 Areas of knowledge: history, the arts and mathematics

Name: _____ Class: _____ Date: _____ **Total: 30 marks**

KEY WORDS history • hindsight • the arts • mathematics • axiom • proof • interpretation

Objective

Study three more **areas of knowledge**: **history** (knowledge of a past we cannot observe), **the arts** (knowledge through creation and interpretation) and **mathematics** (knowledge by proof).

You must be able to:

- explain how historians produce knowledge from sources
- explain the role of interpretation and hindsight in history
- explain whether the arts produce knowledge
- explain proof, axioms and certainty in mathematics
- compare how certain each area can be

1 Key knowledge and worked examples

History

The past cannot be observed or repeated; historians use **sources** and **interpretation**. Problems: sources are incomplete and biased; **hindsight** shapes what seems important; "history is written by the winners", although modern historians recover the views of the defeated and of ordinary people.

The arts

The arts may give knowledge of **experience**: what war felt like (Picasso's *Guernica*, 1937, after the bombing of Guernica), what another life is like (a novel). Questions: Is this knowledge, or only feeling? Is interpretation free, or limited by the work and its context?

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■ Mathematics

Mathematics proves **theorems** from **axioms** (starting assumptions) by deduction. A proof gives a very high level of certainty *within the system*. Euclid's fifth (parallel) postulate could be replaced to give **non-Euclidean geometries**, which later proved useful in Einstein's general relativity. Kurt Gödel (1931) showed that any consistent system rich enough for arithmetic contains true statements it cannot prove.

Worked proof. The sum of two even numbers is even: $2a + 2b = 2(a + b)$, which is even. This is certain for all whole numbers a, b, unlike any number of measurements in science.

2 Practice

2.1 Explain why **hindsight** can be both a help and a problem for historians. [2]

2.2 Prove that the sum of two **odd** numbers is even, and explain why this proof is more certain than a scientific law. [3]



$7 + 5 = 12$: pairs with none left

2.3 Explain **two** reasons why two historians can disagree about the same event. [4]

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2.4 Evaluate the claim that the arts give us **knowledge**, not just feelings. Use **one** work of art. [6]

3 Exam-style questions

3.1 *(Essay-style.)* "Mathematics gives certainty; history gives only interpretation." Discuss. [10]

axioms → proof

sources → interpretation

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3.2 Explain why the discovery of **non-Euclidean geometry** raises a knowledge question about mathematics. [5]

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