

Exercise walk-through

The Scientific Revolution ■ 4.2

eXercise

You must be able to

- state what changed about how nature was investigated
- explain the role of observation, experiment and mathematics
- describe the conflict with established authority
- state what did not change

Method — What changed

Authority for a claim about nature shifted from inherited texts to reproducible observation and mathematical demonstration. The change is in the standard of proof, not only in the conclusions.

Method — Method

Controlled observation isolates a factor; experiment produces the conditions rather than waiting for them; mathematics states the regularity and permits prediction. All three together make a claim testable by others.

Method — Conflict with authority

Where a finding contradicted an established reading of scripture or of Aristotle, the question became who decides. Institutional authorities and investigators both understood this, which is why some findings were contested far beyond their content.

Method — What did not change

Most investigators remained religious and saw their work as describing an ordered creation. The revolution was in method and authority, not in belief.

Practice 2.1 ■ 2 marks

State what changed about the standard of proof.

Solution 2.1

Method: What changed

Worked steps

authority shifted from inherited texts **B1** to reproducible observation and mathematical demonstration **B1**.

Practice 2.2 ■ 2 marks

Explain what experiment adds to observation.

Solution 2.2

Method: Method

Worked steps

experiment produces the conditions rather than waiting for them **B1**, so a factor can be isolated and varied deliberately **B1**.

Practice 2.3 ■ 1 mark

A finding contradicts an established reading of an ancient authority.

- (a) State the underlying question at issue.
- (b) State why the dispute exceeded the finding's content.

Solution 2.3

Method: Conflict with authority

Worked steps

(a) who decides what is true about nature **B1**. (b) the answer determines authority over all future findings, not only this one **B1**.

Exam-style 3.1 ■ 1 mark

Mathematics contributed to natural philosophy by

- A** replacing observation
- B** stating regularities and permitting prediction
- C** ending experiment
- D** confirming texts

Solution 3.1

- A replacing observation
- B stating regularities and permitting prediction** 
- C ending experiment
- D confirming texts

Worked steps

B. regularity and prediction are what mathematics supplies.

Exam-style 3.2 ■ 1 mark

Most investigators of the period were

- A** opposed to religion
- B** religious, seeing their work as describing an ordered creation
- C** indifferent to method
- D** classical scholars only

Solution 3.2

- A** opposed to religion
- B** religious, seeing their work as describing an ordered creation 
- C** indifferent to method
- D** classical scholars only

Worked steps

B. method changed; belief largely did not.

Exam-style 3.3 ■ 1 mark

A claim is accepted after it is reproduced by others.

- (a) State the standard being applied.
- (b) Explain how it differs from the older standard.

Solution 3.3

Worked steps

(a) reproducibility by independent investigators **B1**. (b) the older standard rested on the authority of a text or its interpreter **B1**, which no amount of independent observation could override **B1**.