

Solutions

2.1

: Thomson, electron, 1897.: Chadwick, neutron, 1932.

2.2

: physics for the speed question.: biology for plant growth. Fields can overlap; naming them supplies no experimental result.

2.3

each: electron is attributed to Thomson, not Chadwick; 1911 refers to Rutherford's atomic-structure publication, not Chadwick's electron discovery; award dates and discovery/publication dates must not be assumed identical.

2.4

: model is a representation/explanation.: observation is a recorded measurement or event used as evidence.: publication does not remove the need to test predictions, check methods or revise explanations.

3.1

each: plant growth is primarily a biological question; physical light measurement can inform it; chemical processes can also matter; a field label is not a measured result; newer ideas need evidence rather than automatic acceptance; models can change when evidence challenges their explanations while retaining useful tested predictions.

3.2

Local analytic rubric, 8 ×: correct electron attribution and year; correct 1911 event; correct neutron year; separate awards from discoveries; distinguish model from observation; explain evidence-led revision; recognise overlapping fields; avoid treating a field label as a result; coherent truthful 80–110 word response. Example: “Thomson identified the electron in 1897. Rutherford's 1911 analysis concerned atomic structure and drew on scattering measurements, including other researchers' work. Chadwick established evidence for the neutron in 1932. These event dates should not be replaced with prize dates. A model represents a system and helps explain or predict observations; publication does not make it immune to testing. New evidence can justify revision, while useful tested ideas may remain valuable. Scientific fields also overlap. A plant-growth investigation is biological, but measuring its light conditions may use physics. Naming a field does not answer the investigation.”