

Solutions

Authored self-check guidance: accept equivalent correct methods and supported interpretations. The points check reasoning, not an official grade.

2.1 C – Temperature differs while runtime is fixed, isolating the competing dependence. A measures nothing; B confounds runtime and temperature; D makes the same prediction under both models and does not separate them.

Correct response linked to the given case.

2.2 D – A shared prediction is not discriminating evidence. A and B each treat a shared prediction as unique support; C rejects models despite a result both predict.

Correct response linked to the given case.

2.3 constant – Otherwise runtime and temperature effects could be confounded.

Correct response linked to the given case.

2.4 False – Other models may share the prediction or fit the evidence.

Correct response linked to the given case.

3.1 P predicts the same final temperature because it says material is irrelevant. Q predicts B lower than A. The observed 31°C versus 34°C conflicts with P under matched conditions and agrees with Q's direction. Calibration supports a meaningful difference, but variability and manufacture still require investigation.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence. Accurate conditions, checks or qualification.

3.2 No; both predict the trend. Compare A and B of equal thickness while holding starting temperature, runtime, power, fit and room conditions constant. Repeated matched trials should measure uncertainty. The separating variable is material, not the names of the models.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence. Accurate conditions, checks or qualification.

3.3 It satisfies $\text{cost} \leq 5$ and $\text{final temperature} \leq 35$ in the stated tests. Without a matched A result it does not itself separate P and Q, and design feasibility is distinct from explaining the mechanism. Further durability and variation checks remain appropriate.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence. Accurate conditions, checks or qualification.