

## CODE MANUAL

### Origin

- *Undergraduate*: Students enrolled in a physics-related university program before attending their first lecture.
  - *School*: Secondary school students in grades 7 or 8.
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### CK (Content Knowledge)

Content knowledge, measured as person ability on a Rasch scale.

Assessed using the 2T-SEC Test.

The instrument consists of 25 two-tier items in multiple-choice format.

Each item is scored 1 if correct, and 0 if incorrect.

A paired-scoring model is applied:

- In the first tier, students answer a content question.
  - In the second tier, they choose an appropriate justification.  
An item is scored as correct (1) only if both tiers are answered correctly.  
In all other cases, it is scored as 0.
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### Group

Participants with *origin* == "*school*" were divided into two groups (A and B), each receiving a different set of items.

Participants with *origin* == "*undergraduate*" received all items.

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### Items 1a – 25b

Responses to the multiple-choice items.

The suffix “*a*” refers to Tier 1 (question), and “*b*” refers to Tier 2 (justification) of the same item.