Use Case Example: Applying Flexible Partial Credit in a Health Sciences Quiz

Instructor's Goal:

Dr. Evans is creating a quiz for his clinical assessment module. He wants to test students on the common symptoms of a myocardial infarction (heart attack). He knows that while there are several correct answers, some symptoms are more definitive or critical to recognise than others. He wants to reward students who identify the primary symptoms heavily, give some credit for identifying secondary (but still correct) symptoms, and even offer a tiny bit of credit for an answer that is incorrect but demonstrates plausible clinical reasoning. Finally, he wants to penalise pure guessing.

The Question (Multiple Answer):

"A patient presents with symptoms that could indicate a myocardial infarction. According to the latest guidelines, which of the following are common symptoms? (Select all that apply)"

The Answer Options & Grading Strategy:

Dr. Evans sets up his grading using the new flexible partial credit system. He wants the total score for all correct answers to be over 100% to ensure any student who selects all the right options gets full credit.

- **A. Chest pain or pressure: [Correct]**
  - **Credit: +70%**
  - **Reasoning:** This is the most critical and classic symptom. Dr. Evans wants to award the most credit for this correct answer.
- **B. Shortness of breath: [Correct]**
  - **Credit: +40%**
  - **Reasoning:** A very common and important secondary symptom. A student who knows this understands more than just the basics.
- **C. Nausea or lightheadedness: [Correct]**
  - **Credit: +20%**
  - **Reasoning:** This is also a correct symptom, but often less specific or overlooked. Recognising it shows a deeper level of knowledge.
- **D. Sudden, severe headache: [Incorrect]**
  - **Credit: +10%**
  - **Reasoning:** This is an incorrect answer for a heart attack but is a primary symptom of a stroke or aneurysm. Dr. Evans decides to award a small amount of positive credit because a student choosing this is at least thinking critically about serious cardiovascular events, even if they've confused the specific condition. **This is a key benefit of the new system.**
- **E. Foot cramp: [Incorrect]**
  - **Credit: -30%**

    - **Reasoning:** This answer is entirely unrelated and indicates the student is likely guessing. Dr. Evans applies a negative value to discourage this.

Grading Scenarios:

Here is how different students would be scored based on their selections:

- **Student 1 (Excellent Knowledge):** Selects A, B, and C.
    - **Calculation:** 70% + 40% + 20% = 130%.
    - **Final Score: 100%**. The student demonstrated full knowledge and receives the maximum score for the question.
- **Student 2 (Good Foundational Knowledge):** Selects only A.
    - **Calculation:** 70%
    - **Final Score: 70%**. The student correctly identified the most critical symptom.
- **Student 3 (Partial but Flawed Knowledge):** Selects A and D.
    - **Calculation:** 70% (for Chest pain) + 10% (for Headache) = 80%.
    - **Final Score: 80%**. The system rewards the student for what they knew correctly and also acknowledges their (incorrect but plausible) critical thinking, giving them a better score than if they had only selected A.
- **Student 4 (A Confused Guesser):** Selects B and E.
    - **Calculation:** 40% (for Shortness of breath) - 30% (for Foot cramp) = 10%.
    - **Final Score: 10%**. The negative marking correctly adjusts their score downwards to reflect that one of their answers was a pure guess.

Summary of Benefits Shown in this Use Case:

- **Nuanced Assessment:** Dr. Evans was able to assign weight to answers based on their clinical importance, not just a simple correct/incorrect binary.
- **Rewarding Partial Knowledge:** The system allows for acknowledging students who are thinking along the right lines, even if their final answer isn't perfect (as seen with the +10% for the "Headache" option).
- **Flexibility Beyond 100%:** By setting the total value of correct answers to 130%, Dr. Evans ensured that students who knew all correct answers were fully rewarded without having to meticulously make the numbers add up to exactly 100.
- **Deterring Guessing:** The use of negative percentages for clearly incorrect answers provides a fair way to penalise random guessing.