Question Types – Calculated Formula

A Calculated Formula question contains a formula, the variables of which can be set to change for each user. The variable range is created by specifying a minimum value and a maximum value for each variable. Answer sets are randomly generated. The correct answer can be a specific value or a range of values. Partial credit may be granted for answers falling in a range.

Adding a calculated question to a test is a three step process:

1. Create the question and formula
2. Define the values for the variables.
3. Confirm the variables and answers.

Create the Question and Formula

The question is the information presented to students. The formula is the mathematical expression used to find the answer. Be sure to enclose variables in square brackets.

1. Open the Test Canvas for an assessment.
2. Select Calculated Formula from the Create Question drop-down list.
3. Enter the information that will display to students in the Question Text box. Surround any variables with square brackets, for example, [x]. The value for this variable will be populated based on the formula. In the example [x] + [y] = z, [x] and [y] will be replaced by values when shown to students. Students would be asked to define z.

3. Variables should be composed of alphabets, digits (0-9), periods (.), underscores(_), and hyphens(-). All other occurrences of the opening rectangular brace ("[") character should be preceded by the back-slash (\") character. Variable names must be unique and cannot be reused.
4. Define the formula used to answer the question in the Formula box. For example, \( x + y \). Operations are chosen from the buttons across the top of the Formula box.

5. Set the Answer Range. This defines which submitted answers will be marked correct. If the exact value must be entered, enter 0 and select Numeric from the drop-down list. If the answer can vary, enter a value and select Numeric or Percent. Numeric will mark every answer as correct that falls within a range of plus or minus the Answer Range from the exact answer. Percent will mark every answer as correct that falls within a percentage of plus or minus the Answer Range from the exact answer.

6. Check the Units Required box if correct answers must include the correct unit of measurement, for example, seconds or grams. Enter the correct unit of measurement and choose if the unit of measurement is case sensitive. Enter a percentage in the Unit Points Percentage. The unit of measurement will account for that percentage of total credit. Define partial credit for answers that fall outside the correct Answer Range. When finished with section two questions, click Continue to proceed.

Define the Variables

1. For each variable, set a minimum and a maximum value.

2. For each variable, select a decimal place using the drop-down list that appears in the Decimal Places column.
3. Under the **Answer Sets Options**, select the **Decimal** places for answer from the drop-down list. Users must provide the correct answer to this decimal place.

   ![Answer Sets Options](image)

4. Enter the number of different **Answer Sets**. The **Answer Sets** will be randomized so that different students will be presented with a different set of variables.

5. Click **Continue** to proceed.

**Confirm the Variables**

The last step in the process displays the **Answer Sets** in a table. For each set, each variable and the answer are displayed. Make any changes or remove any unwanted answer sets and click **Calculate**. Below the **Answer Sets** are the standard options for adding feedback and metadata to questions.

![Edit Answer Sets](image)