



## LMS Online Quiz: Simple Calculated Question

## LMS Quiz: Simple Calculated Question

A calculated question is a mathematical equation with placeholders for values that will be pulled randomly from a dataset when a student takes the quiz. For example, if you wanted to create a large number of multiplication problems to drill your students, you could create a question with two placeholders and a multiplication sign such as  $\{a\} * \{b\}$ . When a student takes the test, LMS will randomly select values for a and b.

As a first example let's create a question asking for the surface of a rectangle. Here are the quick steps we will go over in detail:

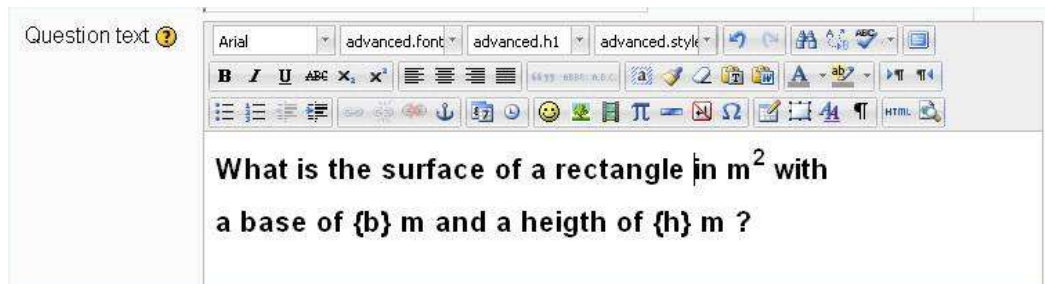
- Create the question content with variables shown in { }
- Enter the formula using the variables and set the tolerance
- Determine the range of the generated set of variables that will appear in the question content
- Review the generated set of question contents
- Correct Formula Syntax

### Initiating the creation process

Go to the Question bank, select "create a new question" and in the pop-up window select the Simple calculated. The Simple calculated question interface will appear. Give a name to your question in the title.

### The question text

Fill the question text (note that the **{param}** names can be chosen at will).



Fill the Correct Answer Formula using the **{param}** names used in the question text. This formula must contain at least the wildcards that appear in the question text. Be sure to use the same place-holders so LMS can substitute the same values. Correct answer formula syntax is discussed at the end of document.

|                         |   |
|-------------------------|---|
| Correct Answer Formula= | <input data-bbox="641 1543 1237 1585" type="text" value="{b}*{h}"/> |
| Grade                   | <input data-bbox="641 1591 820 1633" type="text" value="100 %"/>    |
| Tolerance ±             | <input data-bbox="641 1640 906 1682" type="text" value="0.01"/>     |
| Tolerance Type          | <input data-bbox="641 1688 787 1730" type="text" value="Relative"/> |
| Correct answer shows    | <input data-bbox="641 1736 706 1778" type="text" value="2"/>        |
| Format                  | <input data-bbox="641 1785 885 1827" type="text" value="decimals"/> |

### Other answer and response parameters

1. Set the default question grade (i.e. the maximum number of marks for this question). This should be a percentage of the total marks available. For example, you could give 100% for a correct answer, and 50% for an answer that is nearly right. One of the answers must have a 100% grade. You will set the Grade to 100%, as this is the only answer in this question.
2. Determine the tolerance for error that you will accept in the answer. The tolerance and tolerance type combine to give a range of acceptable scores. So, if tolerance =  $t$ , correct answer =  $x$  and the difference between the user's answer and the correct answer is  $dx$ , then the tolerance types are as follows:
  - a. Nominal - mark correct if  $dx \leq t$
  - b. Relative - mark correct if  $dx / x \leq t$
3. The next 2 settings, "Correct answer shows" and "Format" determine the precision of the answer. Use these to select the number of significant figures or decimal places you want in the correct answer.

### Find the {param} in the formula

In simple calculated only the {param} that are in the formula will be used.

In the question text, the {param} that are in the formula will appear with their numerical values i.e. 6.7.

Any other {enclosed text} will appear as is i.e. {enclosed text}.

The wild cards {x..} will be substituted by a numerical value from the generated values

Find the wild cards {x..} present in the correct answer formulas

### Click on the button

On reload the two {b} and {h} will be displayed.

### Set the minimum and maximum values

Here the {b} range has been set to a 15-20 range and the {h} range has been set to a 5-10 range as we want a rectangle with a larger base than height.

Find the wild cards {x.} present in the correct answer formulas

**cards parameters used to generate the values**

Param {b}  
Range of Values  -   
Decimal Places

Param {h}  
Range of Values  -   
Decimal Places

new set(s) of wild card(s) values

set(s) of wild card(s) values

You must add at least one set of wild card(s) values before you can save this question.

**Select the number of sets to generate (here 10) and to display (here 2)**

Just to illustrate that you can control the number of values displayed which is useful if you create 100 sets.

Also note the (red) warning that a valid question needs at least one set of {wild card} values. You will not be allowed to save the question if you don't do the next step.

**Click on the generate button**

Generate | 10 | new set(s) of wild card(s) values

Display | 2 | set(s) of wild card(s) values

**Wild card(s) values**

\* Hide Advanced

\* Update the wild card(s) values

Wild card {b}: 18.1

Wild card {h}: 7.6

**Set 10** {b}\*{h} 18.1\*7.6 = 137.56  
 Min: 136.1844---Max: 138.9356  
 Correct answer : 137.56 inside limits of true value 137.56

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Wild card {b}: 15.6

Wild card {h}: 6.4

**Set 9** {b}\*{h} 15.6\*6.4 = 99.84  
 Min: 98.84159999999999---Max: 100.8384  
 Correct answer : 99.84 inside limits of true value 99.84

Note the sets are shown in reverse order so the number indicates how many sets were created.

The two sets illustrate that the variability defined by the Min and Max values.

Note that the formula result is analyzed and the tolerance limit (here 1% relative) is shown

The correct response that will be shown to the student is also shown.

The 2 decimals were defined as the default values defined as the last parameter under the Correct formula.

**Click on the Save button**


**Test your first Simple calculated question**

On the question bank click on the preview icon. Enter the result you have calculated yourself or click on the Fill with Correct button.

The values should be identical...

**Preview rectangle example**

**1**  
Marks: --/1.00


 **What is the surface of a rectangle in  $m^2$  with a base of 17.5 m and a height of 5.8 m ?**

Answer:

Click on the submit button

**Preview rectangle example**

**1**  
Marks: 1.00/1.00

 **What is the surface of a rectangle in  $m^2$  with a base of 17.5 m and a height of 5.8 m ?**

Answer:  ✓

**Correct**

Marks for this submission: 1.00/1.00.

**Correct answer formula syntax:**

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DO NOT PUT THE = sign in the formula.

- You can have more than one answer formula and applied a specific grading value to each of them as long as there is at least one 100% correct answer formula.
- As a general rule, write these formulas like you would in a calculator e.g.  $3 + 5 * \sin(3/{x})$  A notable exception is exponentiation, where  $x^3$  cannot be entered as  ${x}^3$ , but instead should be entered as  $\text{power}(x, 3)$ .
- Each function's placeholders and other arguments should be in parentheses (brackets). For example, if you want students to calculate the sine of one angle and cosine of two times of another angle, you would enter  $\sin({a}) + \cos({b}*2)$ .
- It's usually better to have too many parentheses (brackets) than too few. The server won't care, and the more specific you are about what you mean, the more likely it will like your complex formulas.
- There is no implicit multiplication. To you, the human editor, "5(23)" or "5x" may seem perfectly obvious. To the server doing the math, it's crazy talk and won't be understood. Always use the "\*" for multiplication.
- Any special mathematical function must have parentheses around its values. Take the sine function in the first bullet point for instance. Notice that the  $3/x$  is wrapped in parentheses (brackets)--this is so the server can understand it properly. Without those parentheses, the server won't know if you mean "(sin 3) / x" or "sin (3 / x)" and will reject the entire formula accordingly.

#### Available functions

Calculated questions can use more than simple arithmetic operators. The following functions are allowed:

| Function | Explanation  |
|----------|--|
| abs      | Absolute value   |
| acos     | Arc cosine -- in radians!!! Convert your degree measurement to radians before you take the acos of it.                                   |
| acosh    | Inverse hyperbolic cosine -- in radians!!! Convert your degree measurement to radians before you take the acosh of it.                   |
| asin     | Arc sine -- in radians!!! Convert your degree measurement to radians before you take the asin of it.                                     |
| asinh    | Inverse hyperbolic sine -- in radians!!! Convert your degree measurement to radians before you take the asinh of it.                     |
| atan2    | Arc tangent of two variables -- pass in two values like (x, y), and you'll get the $\text{atan}(y/x)$ , adjusted to the proper quadrant. |
| atan     | Arc tangent -- in radians!!! Convert your degree measurement to radians before you take the atan of it.                                  |
| atanh    | Inverse hyperbolic tangent   |
| bindec   | Binary to decimal  |

|                                     |   |
|-------------------------------------|---|
| ceil                                | Round fractions up  |
| cos                                 | Cosine -- in radians!!! Convert your degree measurement to radians before you take the cos of it.                     |
| cosh                                | Hyperbolic cosine -- in radians!!! Convert your degree measurement to radians before you take the cosh of it.         |
| decbin                              | Decimal to binary   |
| decoct                              | Decimal to octal  |
| deg2rad                             | Converts the number in degrees to the radian equivalent   |
| exp                                 | Calculates the exponent of e  |
| expm1                               | Returns $\exp(\text{number}) - 1$ , computed in a way that is accurate even when the value of number is close to zero |
| floor                               | Round fractions down  |
| fmod                                | Returns the floating-point modulus of two numbers - i.e. the remainder when the first is divided by the second.       |
| is_finite                           | Finds whether a value is a legal finite number  |
| is_infinite                         | Finds whether a value is infinite   |
| is_nan                              | Finds whether a value is not a number   |
| log10                               | Base-10 logarithm   |
| log1p                               | Returns $\log(1 + \text{number})$ , computed in a way that is accurate even when the value of number is close to zero |
| log                                 | Natural logarithm ( $\ln$ )   |
| max                                 | Find highest value  |
| min                                 | Find lowest value   |
| octdec                              | Octal to decimal  |
| pi                                  | Get value of pi   |
| pow (numberToRaise, NumberRaisedTo) | Exponential expression  |



|         |  |
|---------|--|
| rad2deg | Converts the radian number to the equivalent number in degrees   |
| rand    | Generate a random integer  |
| round   | Rounds a float   |
| sin     | Sine -- in radians!!! Convert your degree measurement to radians before you take the sin of it.                |
| sinh    | Hyperbolic sine -- in radians!!! Convert your degree measurement to radians before you take the sinh of it.    |
| sqrt    | Square root  |
| tan     | Tangent -- in radians!!! Convert your degree measurement to radians before you take the tan of it.             |
| tanh    | Hyperbolic tangent -- in radians!!! Convert your degree measurement to radians before you take the tanh of it. |

#### Predefined constants

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Actually there is NO Predefined constant that is allowed other than  $\pi()$  as a function without parameter.