

## CalcPad – Writing a Problem

Task Tracker users of The Calculator Pad have access to an easy-to-use **Problem Builder** than can be used to write their own problems. Such problems can be added to modified problem sets or even form the basis of a user's own problem set.

### Accessing the Problem Builder

The **Problem Builder** can be accessed in one of two ways.

1. The **Problem Builder** can be accessed from the CalcPad Problem Library. The Problem Library is the holding place for all problems that you have created. You can navigate to the library by tapping on the **CalcPad Problem Library** button found on any Class page.



Once there, you will find a searchable list of all problems you have written. Above the list is a **New Problem** button. Tap on this button to open the **Problem Builder**.



2. The **Problem Builder** can also be accessed when you add a problem to an existing problem set. Problems can be added by tapping on the **+** button (for add new problem) located across the header of any individual problem on a problem set. When tapped, you will be prompted with a choice - to create a blank problem (meaning a new problem) or to select an existing problem. If you tap **Create Blank Problem**, the **Problem Builder** will be opened and you can begin writing a new problem.



Are you sure?

×

Do you want to add a blank problem or select an existing one?

Cancel

Create Blank Problem

Select Existing Problem

### Writing a New Problem

Once the **Problem Builder** is open, you can begin to write your problem. Every problem has at least one part. Think of a part as being a question with an answer blank and an answer. Some problems are multi-part problems with several questions, answer blanks, and answers. The process of writing a problem (single part or multi-part) involves filling in a form for the problem and a form for each of the parts of the problem. Here's the steps.

#### Step 1: Enter and format the text of the problem.

If the problem already exists in MS Word or a Google Doc, just copy and paste it into the **Problem Text** area. Otherwise type it into the **Problem Text** area yourself. We suggest entering the problem with actual numbers. Later you will create variables and replace the numbers with variable names. Use the WYSIWIG pallet to add formatting – bold-face, italics, color, subscripts or superscripts. You can even add a link to an external URL to include an image. There are several additional fields that you can use to provide a helpful hint (**Help Text**), links to online resources relevant to the problem, search terms (**Tags**) for finding the problem in your Library, and a **Difficulty** rating. See screenshot.

Assignment Builder >> Problem Builder

Save Problem Back to Assignment Builder Preview Problem

Problem Name:

Problem Text:

WYSIWYG formatting tools

Consider the free-body diagram shown at the right. The values of the individual forces acting upon a 2.35-kg object are:

$F_{\text{grav}} = F_{\text{norm}} = 23.0 \text{ N}$

$F_{\text{tens}} = 35.5 \text{ N}$

$F_{\text{frict}} = 10.8 \text{ N}$

Determine the horizontal acceleration of the object. (Enter a - answer if the direction is leftward.)

Image URL:

Align Image: Above Below Middle Left Right

Image Size: Default Small Medium Large

Parts:

a. Part Text

Equation:

Answer Label: Units Label:

Help Text:

Help Text

Links: Add Help Link

Tags: Select Tags...

Difficulty: Select Difficulty

Independent Variables + Add

Name	Range Min	Range Max	Increment
Variable	Exclusion Min	Exclusion Max	

Exclusions + Add

Variable	Exclusion Min	Exclusion Max
Dependent Variables + Add		

Name Calculation Precision

Enter the text of the problem here.

Add an image via its URL

Add metadata (Help text, help links, search tags, difficulty ratings) if desired.

## Step 2: Create and name variables.

Add variables using the **+ Add** button. Give the variable a meaningful name (one *word*). Set a range for each variable. Set an increment to identify the number of possible values within the range. For instance, a range from 1 to 9 with an increment of 1 will allow for 9 possible values for that variable. A range from 1 to 9 with an increment of 0.1 will allow for 90 possible values for that variable. The increment also determines the amount of precision in the numerical value. An increment of 0.1 means that the numerical value that is randomly selected will be expressed to the first decimal place. And an increment of 0.01 or even 0.10 means that the numerical value will be expressed to the second decimal place. **Dependent Variables** are calculated from **Independent Variables**. For instance, a variable named PE could be calculated from the variables [mass] and [height] using a formula of [mass]\*9.8\*[height]. The **Precision** represents the number of decimal places.

Independent Variables + Add - Remove

Name

Fupdown

Ftens

Ffrict

m

Step 2

Create and name variables for the problem. This insures that every student gets a problem with different numerical values.

For each value, set a range and an increment.

Ranges + Add - Remove

Variable	Range Min	Range Max	Increment
Fupdown	18	27	0.1
Ftens	32	38	0.1
Ffrict	13	15	0.1
m	2.1	2.5	0.01

The increment determines how many values can be selected within the range and the amount of precision to which the values are expressed.

Exclusions + Add

Variable	Exclusion Min	Exclusion Max
Dependent Variables + Add		

Name Calculation Precision

### Step 3: Replace Numerical Values with Variables

Select the numerical values in the problem and replace them with a variable using the **Variables** drop-down menu. Once done, the numerical value is replaced with the variable's name enclosed in brackets. When the problem is delivered to students, a numerical value will be selected from within the range you have defined in **Step 2**. This means each student will have different numerical values. Not all numerical values need to be replaced by variable values; but we recommend at least one variable in order for different students to have different problems with different answers. Note that the variable **[g]** is present for every problem. **[g]** is the gravitational field constant and its value is set on your **Account** page in the **Profile Settings** area.

**Problem Text:**

Consider the free-body diagram shown at the right. The values of the forces acting upon a **[m]** kg object are:

$F_{\text{grav}} = F_{\text{norm}} = \text{[Fupdown]} \text{ N}$

$F_{\text{tens}} = \text{[Ftens]} \text{ N}$

$F_{\text{frict}} = 10.8 \text{ N}$

Determine the horizontal acceleration of the object. (Enter a - answer if the direction is leftward.)

**Variables** dropdown menu:

- Fupdown
- Ftens
- Ffrict
- m
- g

**Step 3**

Use a drop-down menu to replace the numerical values in the original problem with the variable. When the problem is delivered to student, a random # is placed in the problem in place of the variable name.

### Step 4: Set Up the Part(s)

Problems will have at least one part with an answer blank preceded by an **Answer Label** and followed by a **Units Label**. An equation must be written that shows how the variables can be used to determine the answer. Observe the **Parts** section in the **Problem Builder**. It is initially empty; you will have to edit it. Tap the pencil button to open the **Parts Builder** and to edit the parts. Tap the **+** button to add additional parts. The **Equation** field holds the equation that Task Tracker uses to evaluate your students' answers. It must be expressed in terms of the variables used in the problem. Our interactive **Equation Builder** makes this a surprisingly easy task. You can type directly into the **Equation** field or tap on the buttons in the interactive **Equation Builder** displayed below the **Equation** field. You should also identify an **Answer Label** and a **Units Label**. These will display in

Assignment Builder >> Problem Builder >> Part Builder

Save Problem Back to Problem Builder Preview Problem

**Part Text:**

Part Text

Our interactive Equation Builder makes it very easy to enter an equation for the answer. Select variables from the pull-down menu.

**Equation:**

$((\text{[Ftens]} - \text{[Ffrict]}) /$

Equation Builder buttons:

- $x^n$ ,  $x^2$ ,  $|x|$ , 7, 8, 9,  $\div$ , BS
- $\sqrt{\quad}$ ,  $\sqrt[n]{\quad}$ ,  $\pi$ , 4, 5, 6,  $\times$ , C
- Sin, Cos, Tan, 1, 2, 3,  $-$
- $\sin^{-1}$ ,  $\cos^{-1}$ ,  $\tan^{-1}$ , 0,  $.$ , (,  $+$ , Deg
- Log,  $10^x$ , Space,  $\leftarrow$ ,  $\rightarrow$ ,  $)$ , Variables

**Answer Label:** Acceleration

**Units Label:** m/s/s

Multiple Choice: ☐ Yes ☒ No

Scientific Notation: ☐ Yes ☒ No

**Variables** dropdown menu:

- Fupdown
- Ftens
- Ffrict
- m
- g

**Step 4**

The answer field can be preceded by a label and followed by a unit.

the students' view of the problem. Finally, you can enable the **Scientific Notation** option if you anticipate the answer being really large or really small. When you do, students have the option of using or not using the scientific notation field.

### Step 5: Add Multiple Parts ... If Desired

Multi-part problems are easy to make. You can add a part by tapping the **+** button in the **Problem Builder** or by tapping on the **Add Part** button across the top of the **Part Builder**. When a new part is added, you can add text for the part in the **Part Text** field (optional). You should also add an **Equation**, an **Answer Label**, and a **Units Label**.

### Step 6: Save – Preview - Edit

We always recommend previewing and testing the problem. First tap the **Save Problem** button. Then tap on the **Preview Problem** button. Make sure its appearance and its answer(s) are just as intended. Be sure to check the answer using the **Submit** button. If adjustments need to be made, return to the **Problem Builder** or the **Part Builder** as needed to make your edits. Save and test again in the **Problem Previewer**.

Assignment Builder >> Problem Builder >> Part Builder >> Problem Preview

[Back to Problem Builder](#) [Back to Part Builder](#) Use the Submit button to check your work.

**1. Example** **Step 6**

Consider the free-body diagram shown at the right. The values of the individual forces acting upon a 2.22-kg object are:

$F_{\text{grav}} = F_{\text{norm}} = 26.9 \text{ N}$   
 $F_{\text{tens}} = 36.0 \text{ N}$   
 $F_{\text{frict}} = 14.5 \text{ N}$

Determine the horizontal acceleration of the object. (Enter a - answer if the direction is leftward.)

**Dataway!**  
(Green checks are the new trophy.)

**The default tolerance for student answers is 2%. Teachers can easily change this on a per-assignment basis.**

**Teachers can set the # of allowed attempts and even ID a penalty % that kicks in after a threshold # of attempts.**

**Tapping Info shows past answer attempts.**

a. Determine the net force experienced by the object. (Enter a - answer if the direction is leftward.)

Net Force  N ☒ Calculated Answer: 21.5  
 Min Answer: 21.07  
 Max Answer: 21.93

b. Determine the horizontal acceleration of the object. (Enter a - answer if the direction is leftward.)

Acceleration  m/s/s ☒ Calculated Answer: 9.684684684684684684684685  
 Min Answer: 9.490990990990990990990991  
 Max Answer: 9.878378378378378378378379

Free-body diagram showing forces on a square object:  $F_{\text{norm}}$  (up),  $F_{\text{grav}}$  (down),  $F_{\text{tens}}$  (right),  $F_{\text{frict}}$  (left).

Info Attempts: 1/∞ Submit

Info Attempts: 1/∞ Submit

Writing problems for your own students that include random numbers isn't rocket science. And it doesn't even involve the use of computer code. Our interactive Problem Builder makes the task easy as  $\pi$ .