

# Custom Question Builder Tutorial

---

## Introduction

## CONTACT INFORMATION

### General Information

MyMathLab: [www.mymathlab.com](http://www.mymathlab.com)

MyStatLab: [www.mystatlab.com](http://www.mystatlab.com)

MathXL: [www.mathxl.com](http://www.mathxl.com)

MyMathTest: [www.mymathtest.com](http://www.mymathtest.com)

### Customer Technical Support for Educators

(888) 695-6577

MyMathLab and MyStatLab: [www.mymathlab.com/contactus.html](http://www.mymathlab.com/contactus.html)

MathXL: [www.mathxl.com/support/contactus.htm](http://www.mathxl.com/support/contactus.htm)

MyMathTest: <http://www.mymathtest.com/support/mmt/contactus.htm>

\*\* Custom Question Builder support is not provided by Tech support.

### Customer Technical Support for Students

MyMathLab and MyStatLab: [www.mymathlab.com/contactus.html](http://www.mymathlab.com/contactus.html)

MathXL: [www.mathxl.com/support/contactus.htm](http://www.mathxl.com/support/contactus.htm)

MyMathTest: <http://www.mymathtest.com/support/mmt/contactus.htm>

## TRADEMARK NOTICES

MyMathLab, CourseCompass, and MathXL are either trademarks or registered trademarks of Pearson Education, Inc.

ActiveX, Microsoft, and Windows are either trademarks or registered trademarks of Microsoft Corporation in the United States and other countries. Adobe and Acrobat are registered trademarks of Adobe Systems Incorporated. America Online and AOL are registered trademarks of America Online, Inc. Macintosh and QuickTime are trademarks of Apple Computer, Inc., registered in the U.S. and other countries. Macromedia Flash is a trademark of Macromedia, Inc. in the United States and/or other countries. Netscape and Netscape Navigator are registered trademarks of Netscape Communications Corporation in the United States and other countries. RealPlayer and RealOne are either trademarks or registered trademarks of RealNetworks, Inc. Virtual Machine for Java is a trademark of Sun Microsystems, Inc. in the U.S. or other countries. All other trademarks are the property of their respective owners.

### Copyright

Copyright © 2015 Pearson Education, Inc. Publishing as Pearson Addison-Wesley and Pearson Prentice Hall.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher. Printed in the United States of America.

## TABLE OF CONTENTS

<b>About the Custom Question Builder</b>	<b>4</b>
<b>Lesson 1 – Learn about the Custom Question Builder</b>	<b>5</b>
<b>Lesson 2 – Get Started with the Custom Question Builder</b>	<b>9</b>
<b>Lesson 3 – Copy a Custom Question</b>	<b>11</b>
Copy from the publisher question bank	11
Copy from the CQB sample question bank	12
Copy from another instructor's question bank	13
Copy from your custom question bank	14
<b>Lesson 4 – Navigate in the Custom Question Builder Window</b>	<b>15</b>
Question-and-answer area	16
Menus	16
Toolbars	17
Algorithmic value options	18
Math objects	18
Student Interactions	19
Math palette	19
<b>Lesson 5 – Edit and Save a Custom Question</b>	<b>20</b>
<b>Lesson 6 – Add a Custom Question to an Assignment</b>	<b>27</b>
<b>Lesson 7 – Create a Static Question</b>	<b>29</b>
Example 7A – Short answer, static, syllabus question	29
Example 7B – Short answer, static, multi-part "show your work" question	33
<b>Lesson 8 – Create an Algorithmic Question</b>	<b>36</b>
Example 8A – Short answer, algorithmic, application question	36
Example 8B – Short answer, algorithmic, skills question	41
<b>Lesson 9 – Create an Essay Question</b>	<b>44</b>
Example 9A – Essay answer, algorithmic, conceptual question	44
Example 9B – Essay answer, static, "show your work" question	47
<b>Lesson 10 – Create a Multiple-Choice Question</b>	<b>50</b>
Example 10A – Multiple-choice answer, static, syllabus question	50
Example 10B – Multiple-choice answer, algorithmic, conceptual question	53

## ABOUT THE CUSTOM QUESTION BUILDER

The Custom Question Builder (CQB) is a powerful tool available in MyMathLab, MyStatLab, MathXL, and MyMathTest that allows you to create your own custom questions for a wide variety of mathematical and statistical topics. You can create custom questions with either static values or algorithmically generated values that regenerate each time a student works the question. The Custom Question Builder lets you create short answer, multiple-choice, true/false, or essay questions, and your questions can include number lines, graphs, pie charts, bar charts, and figures.

In addition to creating your own custom questions from scratch, you can also copy and edit questions from another textbook, from the sample question bank, or from another instructor. You can also use the CQB to edit publisher-provided questions. After you have created your questions, you can then add them into your online homework, quizzes, or tests in MyMathLab, MyStatLab, and MathXL, or in your online tests in MyMathTest.

The lessons in this tutorial assume that you are already comfortable using MyMathLab, MyStatLab, MathXL, or MyMathTest. Each lesson in this tutorial builds cumulatively on the previous lesson.

You can create up to 1000 questions using the CQB. If you need to create more questions, you can either delete or archive some of your older questions or contact Customer Technical Support to increase your limit. Custom questions you have used in assignments cannot be deleted; however, you can archive outdated questions. Archived questions do not appear in your question pool and cannot be added to assignments, but will remain in any existing assignments where they are used.

Only instructors can create custom questions and use the questions in their courses. Section instructors cannot create or use custom questions when:

- They are teaching in a course taught by another instructor.
- They are section instructors teaching member sections.

Custom questions reside in the coordinator's account. All edits must be made there. The copy/edit function will be missing for coordinator assignments in the member course.

### Technical Requirements

The CQB works on both Macs and PC and you can use standard browsers, such as Firefox or Internet Explorer. Because the CQB is a Flash-based application, your browser needs the latest version of the Adobe Flash Player. Questions authored in the CQB will work on any supported device, but you must create your questions on a device that supports Flash (a PC or laptop).

To install Flash and any other components you need to work online, you should run the Browser Check for your course. In many courses, the Browser Check is available from the course Home Page. If your browser does not have the latest version of the Flash Player, you are prompted to install it the first time you access the Custom Question Builder.

### Online Help

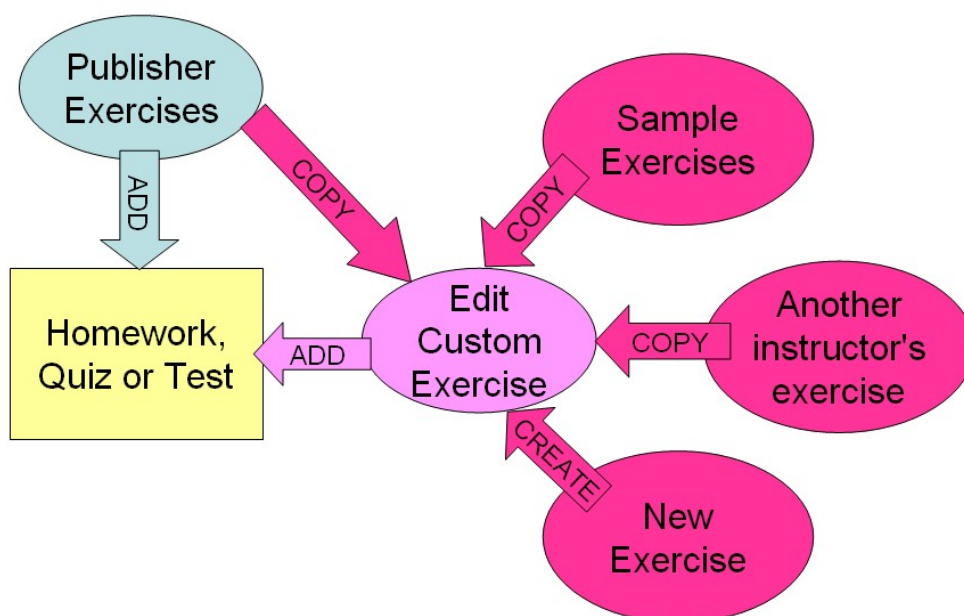
You can view the CQB online help file by clicking the Help icon in your MyMathLab or MyStatLab course. In MathXL or MyMathTest, click the Help link at the top right of the program window. This will open up a Help page with links to the online help file as well as information about tours and training and additional support options. Click the link for the Custom Question Builder Help in the Search Online Help section to view the CQB online help file.

## LESSON 1 – LEARN ABOUT THE CUSTOM QUESTION BUILDER

There are four ways you can choose to create a custom question. Refer to the lessons listed in the table below for detailed directions on each method.

Custom Question Creation Method	Lessons
Copy a publisher question.	3 and 5
Copy a sample question.	3 and 5
Copy another instructor's question.	3 and 5
Start with a new question.	7, 8, 9, 10

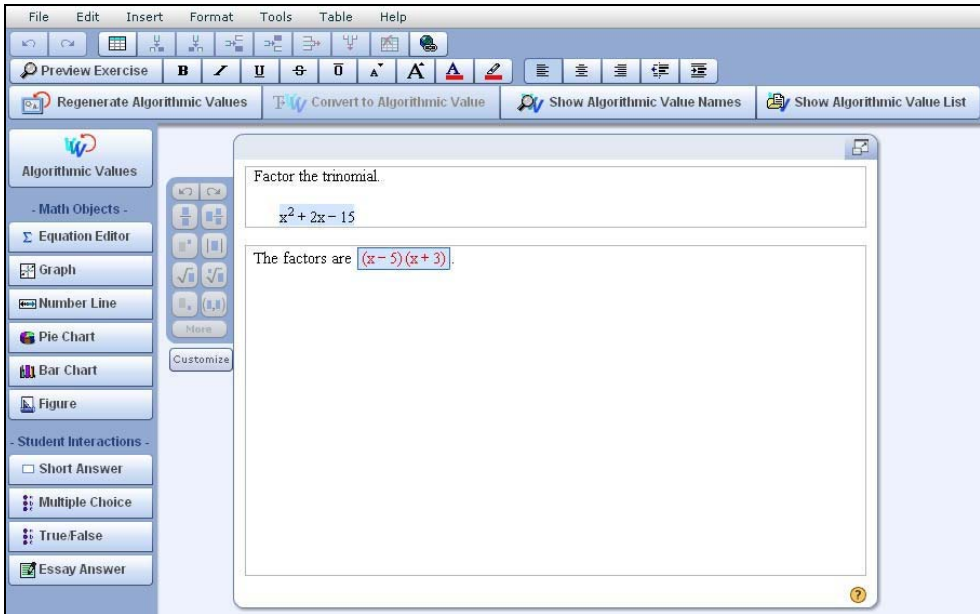
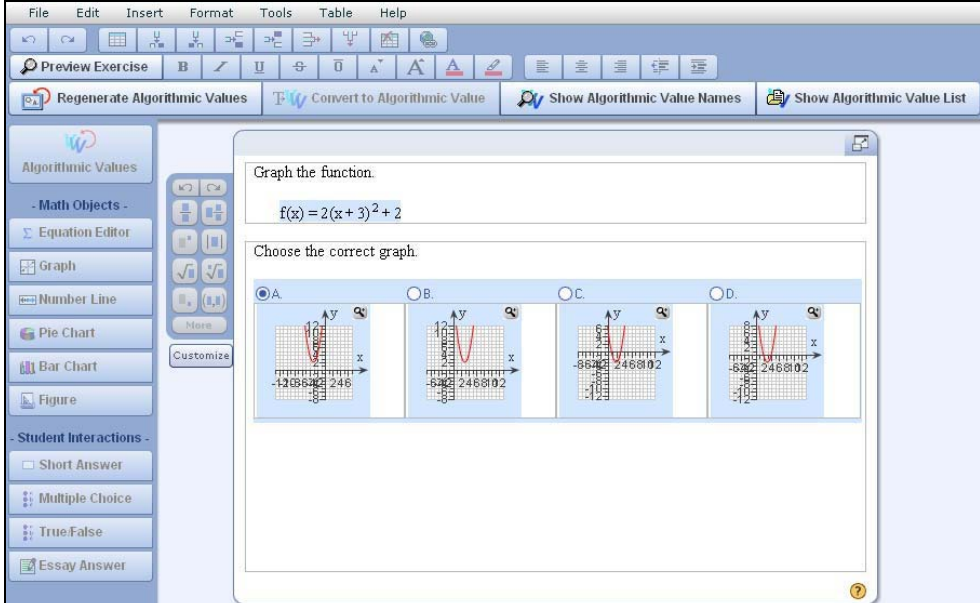
Regardless of which method you choose to begin with, you can edit the question as needed. The diagram below illustrates the interrelationships among the four methods.

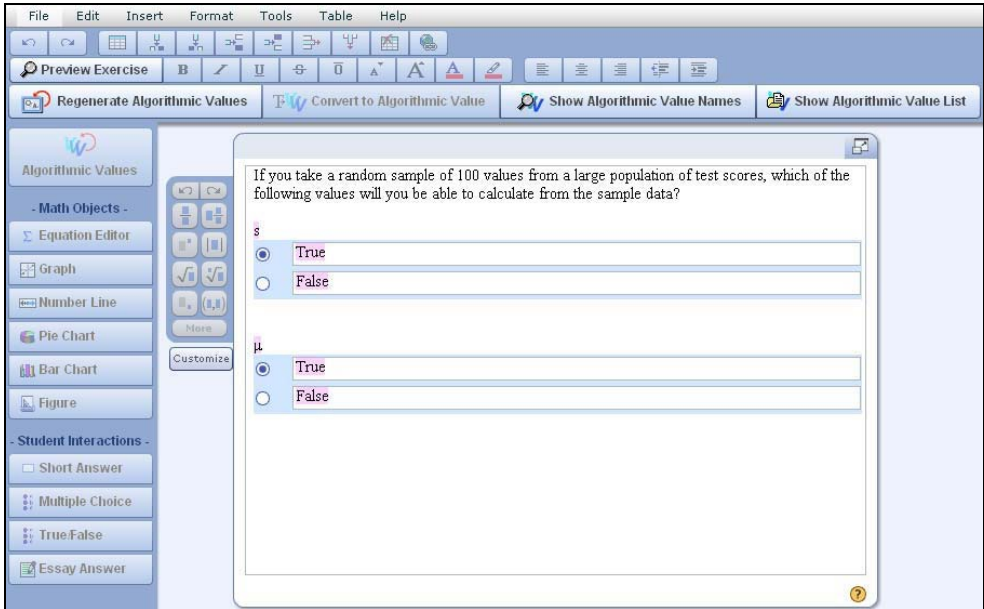
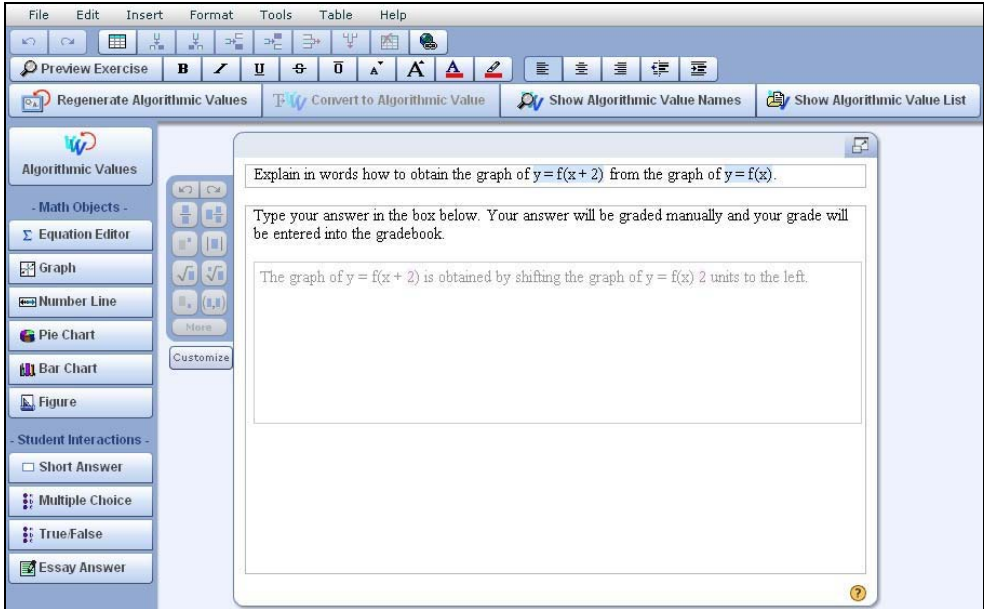


Your custom question can be written as a static or algorithmic question. Static questions do not change when the question is displayed in an assignment, and all students will see the same values in the question. Algorithmic questions, on the other hand, are designed to randomly generate values each time the question is displayed in an assignment. Each student should see a different version of the question. The algorithms are defined by the question writer, and follow the constraints set for each algorithmic value.

In addition, each custom question can have one or more types of student answer input if you combine multiple choice for example, with essay input. The available answer input types are listed in the following table, along with an example illustrating the answer input. The screenshots show the custom question in the Custom Question Builder editor window.

Keep in mind you can import up to 20 questions from other texts into an assignment. This allows you to retain learning aids. These 20 questions can be drawn from a combination of texts as well.

Student Answer Input	Description	Lessons
Short answer	<p>Students enter the exact answer in text, numerical, or symbolic format.</p> 	7, 8
Multiple-choice	<p>Students choose their answer from a list of 3 or more choices.</p> 	10

Student Answer Input	Description	Lessons
True-False	<p>Students choose their answer from a list of 2 choices.</p> 	10
Essay	<p>Students type their answers using text or mathematical expressions in a free-format answer box. Instructors review the students' answers and manually assign a grade. <b>Essay questions can only be included in quizzes and tests and cannot be mixed with other types of answer input.</b></p> 	9

## LESSON 2 – GET STARTED WITH THE CUSTOM QUESTION BUILDER

In this lesson, you will learn how to open the Custom Question Builder and navigate in the program. Note that only instructors can access the Custom Question Builder. Section instructors cannot create custom questions unless they are given full access as an instructor for a course.

### 1. Log in to MyMathLab, MyStatLab, MathXL, or MyMathTest.

Open your browser and log in as an instructor to MyMathLab, MyStatLab, MathXL, or MyMathTest.

### 2. Open the Assignment Manager or Test Manager.

Enter any course in MyMathLab, MyStatLab, or MathXL, and navigate to the **Assignment Manager**. In MyMathTest, enter any program and navigate to the **Test Manager**.

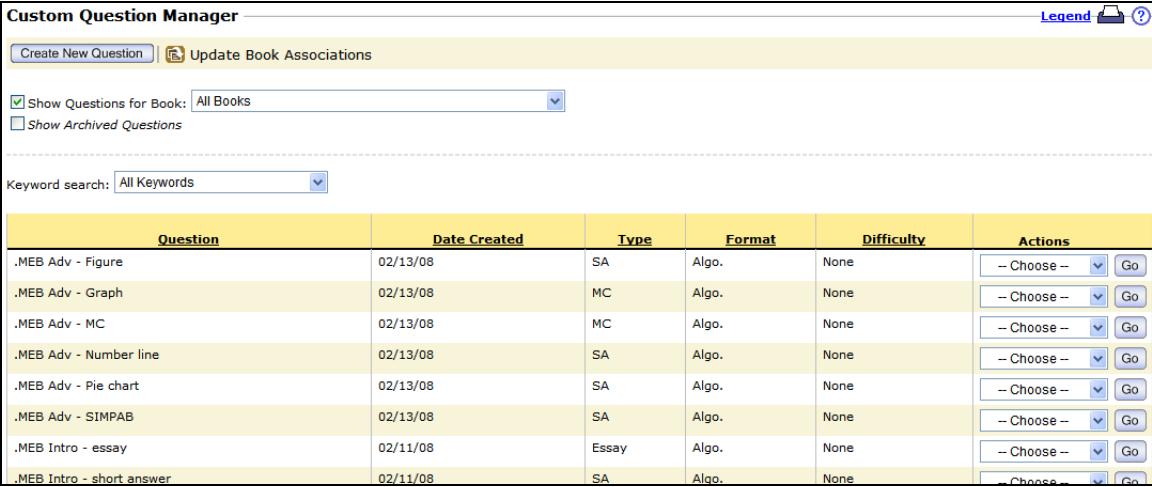
### 3. Open the Custom Question Builder.

In the Assignment Manager, click the **Create Assignment** button and select **Create Custom Question**. If you are in the MyMathTest Test Manager, click the **Create Test** button and select **Create Custom Question**. Alternatively, select **Manage Custom Questions** from the More Assignment Tools dropdown list.

*Note: If the Create Custom Question option is not available, this means that you are not an instructor for the course. Select another course to access the Create Custom Question option. If you do not have any other courses, consult with your math coordinator to see if you can obtain an instructor account.*

### 4. View the Custom Question Manager.

The Custom Question Manager lists all of the custom questions that are in your database. Questions are initially ordered alphabetically by question title but you can change the sort order by clicking on the column name.



Question	Date Created	Type	Format	Difficulty	Actions
.MEB Adv - Figure	02/13/08	SA	Algo.	None	-- Choose -- Go
.MEB Adv - Graph	02/13/08	MC	Algo.	None	-- Choose -- Go
.MEB Adv - MC	02/13/08	MC	Algo.	None	-- Choose -- Go
.MEB Adv - Number line	02/13/08	SA	Algo.	None	-- Choose -- Go
.MEB Adv - Pie chart	02/13/08	SA	Algo.	None	-- Choose -- Go
.MEB Adv - SIMPAB	02/13/08	SA	Algo.	None	-- Choose -- Go
.MEB Intro - essay	02/11/08	Essay	Algo.	None	-- Choose -- Go
.MEB Intro - short answer	02/11/08	SA	Algo.	None	-- Choose -- Go

### 5. Filter the list of questions.

*Note: If there are no questions listed in your Custom Question Manager, you can return to this lesson to practice the filtering later when you do have questions in your list.*

In the Custom Question Manager, you can filter your question by book or keyword. When you save a question (see Lesson 5) you have the option of associating the question with the content in a textbook. This allows you to organize your questions by textbook. In addition, if you associate the custom question to an objective in the textbook, your students' performance on the question in a homework assignment, quiz or test can be used to update their Study



Plan in the course that uses this textbook. To filter the question list by book, check the box to **Show Questions for Book** and then select the desired book from the dropdown list.

*Note: The book dropdown list includes all textbooks that you have used to create a course or program.*

You can also assign one or more keywords to your custom question. This allows you to filter the question list by keyword and also provides you with additional properties to search for your question when you are adding custom questions to an assignment. To filter a list by keyword, select the desired keyword from the **Keyword search** dropdown list. This list includes all keywords that have been associated with one or more custom questions. You will learn how to add additional keywords in Lesson 5.

#### 6. Perform further actions on a custom question.

From the Actions dropdown list for a custom question, you can perform additional actions on the question. Refer to the lessons listed in the table below for detailed directions on each action.

Action	Description	Lesson
Preview	Allows you to view the question in a preview window. In the preview window, you can preview the other questions in your list, and copy a question directly into the Edit Custom Question window.	5
Edit	Opens the question in the Edit Custom Question window.	5
Copy	Allows you to copy the question directly into the Edit Custom Question window.	3
Print	Allows you to print the question.	--
Show/Edit Properties	Allows you to edit the name, textbook associations and additional properties for the question.	--
Delete	Deletes the question. If the question has been used in an assignment, you cannot delete it, but must archive it instead.	--
List Assignments	Shows you the list of assignments where you have used the question.	--

#### 7. View the online help file.

Click the Help link at the top right of the Custom Question Manager window. This will open up a Help page with links to the online help file as well as information about tours and training and additional support options. Click the link for Custom Question Builder Help in the Online Help Options section to view the online help file.

## LESSON 3 – COPY A CUSTOM QUESTION

There are four sources of questions you can copy from:

- Publisher question bank
- Custom Question Builder sample question bank
- Another instructor's question bank
- Your custom question bank

Regardless of the source, when you copy a question, the original question is unchanged; instead, a copy of the question is saved in your instructor account and you can edit the copy as desired.

### Copy from the publisher question bank

You can select a question from the question bank associated with any online course you have created.

*Note: If you choose to copy and edit a question from the publisher question bank, the learning aids usually associated with that question (such as Help Me Solve This, View an Example, videos, or animations) will not be available. In addition, any multi-step questions will be unrolled and presented in one screen.*

#### 1. Navigate to the Custom Question Manager.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager.

#### 2. Create a new question.

In the Custom Question Manager window, click the **Create New Question** button.

#### 3. Select a copy option.

In Step 1 of the Create Custom Question wizard, select the first option to **Copy and edit a question from your online course**. Click **Next** to continue.

#### 4. Filter the list of available questions.

The Choose Question step contains dropdown lists which you use to filter the question database. The questions available for your selection are displayed in the Available Questions box. Note that the Book dropdown list includes all textbooks or testbanks that you have used to create a course or program.

Use the dropdown lists to select a book, chapter, section, and objective. The list of Available Questions shows you the question ID for each question. The question ID identifies the chapter, section, and objective from the corresponding question in the textbook. The online question will be an algorithmic version of the textbook question.

The screenshot shows the 'Create Custom Question' wizard with three steps: 1 Start, 2 Choose Question (active), and 3 Create/Edit Question. Under 'Choose Question', there are four dropdown menus: 'Book' (Bittering: Elementary Algebra, Concepts and Applications, 8e), 'Chapter' (2. Equations, Inequalities, and Problem Solving), 'Section' (Section 2.1: Solving Equations), and 'Objective' (Solve equations using the multiplication principle.). There is a checkbox for 'Show additional test bank questions' which is unchecked. Below these is a text box with instructions: 'To copy and edit a question, select the question name in the list below and click **Next**, or click **Preview** to preview the question before making your selection.' Below the text box is a list box titled 'Available Questions' containing a list of question IDs: 2.1.35, 2.1.37, 2.1.39, 2.1.41, 2.1.43, 2.1.45, 2.1.47, 2.1.49, 2.1.51, 2.1.53, 2.1.56, and 2.1.57. At the bottom of the list box is a 'Preview' button. At the very bottom of the wizard are three buttons: 'Cancel', 'Back', and 'Next'.

Number format: 1,234.56 Languages: en-us

Graph the line  $-3y - 4x = 0$ . Give the domain and range.

Use the graphing tool to graph the equation.

Click to enlarge graph

What is the domain? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. The domain is .

(Type your answer in interval notation.)

☐ B. The domain is .

(Use a comma to separate answers as needed.)

What is the range? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. The range is .

(Use a comma to separate answers as needed.)

☐ B. The range is .

(Type your answer in interval notation.)

To pop up your graph, click the Click to enlarge graph button.

All parts showing

Clear All Check Answer

Print

*there are only three dropdown lists (Book, Chapter, Section), and the question IDs are given for your convenience only and do not correspond to questions in any textbook.*

**Always be careful** when editing publisher questions, because the custom question builder strips the publisher question of some of the original functionality. This is true even if you are just doing a copy and save. In particular, be very careful with publisher questions that require the student to graph. Some of the graphing problems will cause errors in assignments not allowing students to move onto the next problem. **Two very important tips** to remember for all custom questions and particularly any copy and saved publisher questions: 1) always preview the questions before saving, and 2) preview any assignment in which you have placed custom questions.

If you are copying and editing a question with multiple answers, such as a statistics or graphing question, the answer parts will no longer be released one at a time as they were programmed. Instead, the entire problem will appear at once, as shown above.

##### 5. Preview a question.

Select a question in the Available Questions list, and click the **Preview** button. In the Preview Question window, you can practice entering an answer and generating a similar question. You can also preview other questions in the Available Questions list by clicking the **Previous Item** or **Next Item** button.

##### 6. Copy the question.

In the Preview Question window, click the **Copy and Edit** button.

*Note: If you are in the Choose Question step, select the question in the Available Questions list and click the Next button.*

A copy of the question is opened in the Edit Custom Question window. In Lesson 4, you will learn how to navigate in this editor window. Refer to Lesson 5 for detailed directions on editing and saving the question.

## Copy from the CQB sample question bank

The Custom Question Builder comes with its own sample question bank that is unassociated with any textbook and includes questions from arithmetic through trigonometry. Sample questions do not have any learning aids associated with them.

*Note: The sample question bank is not available in MyMathTest.*

### 1. Navigate to the Custom Question Manager.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager.

### 2. Create a new question.

In the Custom Question Manager window, click the **Create New Question** button.

### 3. Select a copy option.

In Step 1 of the Create Custom Question wizard, select the second option to **Copy and edit a question from the sample question bank**. Click **Next** to continue.

### 4. Filter the list of available questions.

The Choose Question window contains dropdown lists which you use to filter the question database. The questions available for your selection are displayed in the Sample Questions box. Use the dropdown lists to select a book type, topic, subtopic, and objective. The list of Sample Questions shows you the title for each question.

<b>Book Type</b>	Basic Math Topics
<b>Topic</b>	Whole Numbers
<b>Subtopic</b>	Writing Numbers
<b>Objective</b>	Convert between standard notation and word name

-----

To copy and edit a question, select the question name in the list below and click **Next**, or click **Preview** to preview the question before making your selection.

**Sample Questions**

Convert from standard notation to word name
Convert from word name to standard notation

**5. Preview a question.**

Select a question in the Sample Questions list, and click the **Preview** button. In the Preview Question window, you can practice entering an answer and generating a similar question. You can also preview other questions in the Sample Questions list by clicking the **Previous Item** or **Next Item** button.

**6. Copy the question.**

In the Preview Question window, click the **Copy and Edit** button.

*Note: If you are in the Choose Question window, select the question in the Sample Questions list and click the Next button.*

A copy of the question is opened in the Edit Custom Question window. In Lesson 4, you will learn how to navigate in the editor window. Refer to Lesson 5 for detailed directions on editing and saving the question.

### Copy from another instructor's question bank

You also have the option of copying a question created by another instructor. You will need the instructor's login name for the program that the question was created in, as well as the titles of the questions you want to copy.

*Note: You can copy custom questions created by another instructor in MyMathLab, MyStatLab, MathXL, or MyMathTest regardless of which of these programs you are logged in to.*

**1. Navigate to the Custom Question Manager.**

Follow the steps in Lesson 2 to navigate to the Custom Question Manager.

**2. Create a new question.**

In the Custom Question Manager window, click the **Create New Question** button.

**3. Select a copy option.**

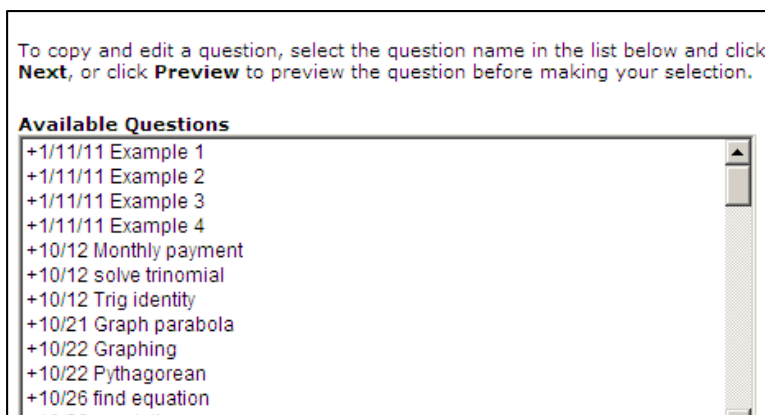
Select the fourth option to **Copy and edit a question from another instructor's account with this login** and type the instructor's login name in the box. Click **Next** to continue.

*Note: You can only copy questions marked "Allow other instructors to copy and edit this question" by the author. Refer to Lesson 5 for details on how to change this question setting.*

**4. Filter the list of available questions.**

The Choose Question window shows you the list of questions available for copying from the instructor's question database. The list of Available Questions shows you the title for each question.

*Note: The Custom Question Builder automatically adds a plus sign as a prefix to the title of each custom question.*



Select a question in the Available Questions list, and click the **Preview** button. In the Preview Question window, you can practice entering an answer and generating a similar question. You can also preview other questions in the Available Questions list by clicking the **Previous Item** or **Next Item** button.

**6. Copy the question.**

In the Preview Question window, click the **Copy and Edit** button.

*Note: If you are in the Choose Question window, select the question in the Available Questions list and click the Next button.*

A copy of the question is opened in the Edit Custom Question window. In Lesson 4, you will learn how to navigate in the editor window. Refer to Lesson 5 for detailed directions on editing and saving the question.

### Copy from your custom question bank

Lastly, you can copy one of your existing custom questions from your question database. As with the other copying methods, the original custom question is not altered and you can edit the copy and save it as a new question.

**1. Navigate to the Custom Question Manager.**

Follow the steps in Lesson 2 to navigate to the Custom Question Manager.

**2. Preview a question.**

In the Custom Question Manager window, select **Preview** from the Actions dropdown list to the right of the question you want to copy. Click the **Go** button to preview the question. In the Preview Question window, you can practice entering an answer and generating a similar question. You can also preview other questions in your question database by clicking the **Previous Item** or **Next Item** button.

**3. Copy the question.**

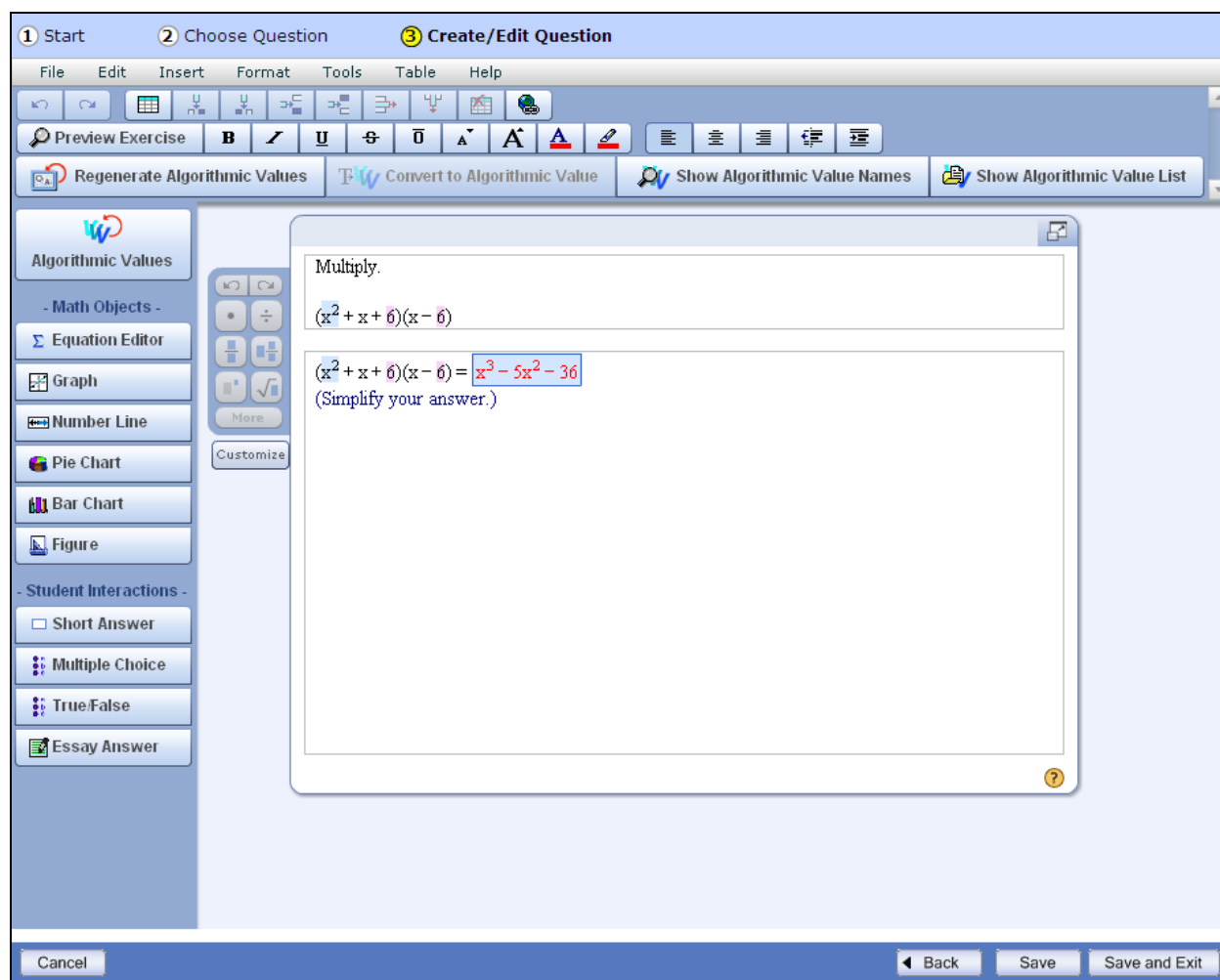
In the Preview Question window, click the **Copy and Edit** button.

*Note: If you are in the Custom Question Manager window, select the Copy button from the Actions dropdown list to the right of the question you want to copy and click the Go button.*

A copy of the question is opened in the Edit Custom Question window. In Lesson 4, you will learn how to navigate in the editor window. Refer to Lesson 5 for detailed directions on editing and saving the question. If, however, your **question is already in an assignment**, and you wish to update the question, use the EDIT option, not copy/edit.

## LESSON 4 – NAVIGATE IN THE CUSTOM QUESTION BUILDER WINDOW

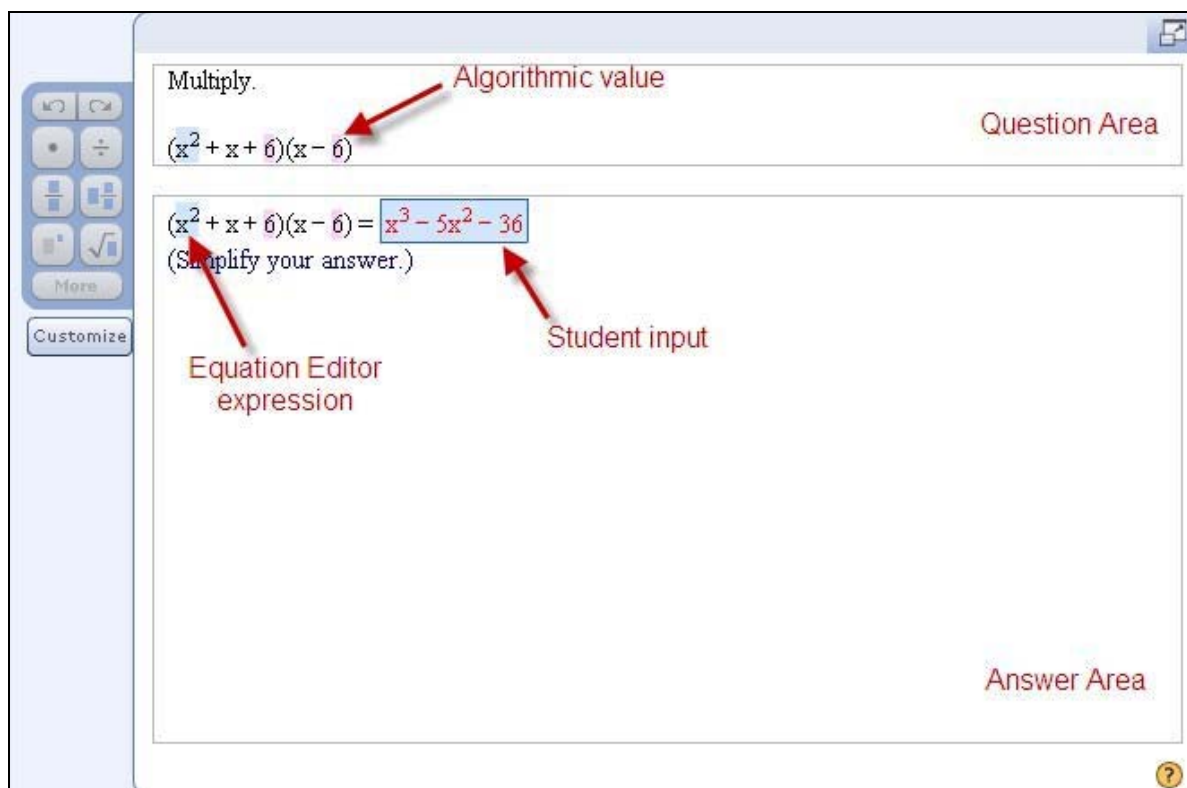
If you have completed Lesson 3, you should have a question open in the Custom Question Builder window. If not, you can return to Lesson 3 to copy a question. You should see a window similar to the one shown below.



The Custom Question Builder window contains all the controls you need to customize your question. From this window, you can create and edit algorithmic values, insert graphical objects, build complex mathematical expressions, and format your question and answer. In this lesson, you will explore the features and tools available in the CQB window. Refer to the indicated lessons in the tables for more information on each feature.

## Question-and-answer area

The question-and-answer area is where you enter your problem and specify how students must answer it. In the Custom Question Builder window, the question-and-answer area is the area with the white background. In the question-and-answer area, algorithmic values are highlighted in lavender and expressions created using the Equation Editor are highlighted in blue. The area where students enter the answer is outlined in blue.



*Note: Depending on the layout chosen for the question, the question and answer area may be merged into one area, or the question area may be located to the left with the answer area to the right.*

## Menus






The menus in the Custom Question Builder window include both the standard options found in most applications (for example, new save, undo) and options specific to the Custom Question Builder. In this lesson, we will describe only the specific Custom Question Builder options.

The Custom Question Builder includes the following menu items:

File	Edit	Insert	Format	Tools	Table	Help
------	------	--------	--------	-------	-------	------

Menu item	Toolbar button	Description	Lesson
File >> New	None	Creates a new custom question. If you are currently editing a custom question, you will be prompted to save the question first.	3, 7



File >> Preview Exercise		Opens the Preview window where you can view the question as your students will see it.	5
Insert >> Horizontal Line	None	Inserts a horizontal line in either the question area or the answer area.	--
Insert >> Picture	None	Opens a file browser where you can navigate to an image and add it to either the question area or the answer area.	Advanced 8
Insert >> Symbol	None	Opens the Symbols window, where you can choose Greek letters, operators, and other symbols to insert in your question.	9
Insert >> Weblink		Opens the Insert a Weblink window, where you enter a URL and link description to insert in your question.	10
Tools >> Regenerate Algorithmic Values		Generates new values for algorithmic variables in your questions	5, 8
Tools >> Preview Exercise		Opens the Preview window where you can view the question as your students will see it.	5
Tools >> Show Algorithmic Value Names		Displays the variable name for algorithmic values in the question-and-answer area.	5, 8, 10
Tools >> Customize Palette	None	Opens the Edit Tool Palette window, where you can choose what buttons to display to students on questions that display the math palette.	9
Help >> Help	None	Opens the online instructor help file.	--
Help >> Tutorials	None	Opens this Custom Question Builder tutorial.	--

## Toolbars

The toolbars in the Custom Question Builder window include both the standard options found in most applications (for example, save, insert table, format characters and paragraphs) and options specific to the Custom Question Builder. The Custom Question Builder options (Preview Question, Insert Weblink) are described in the table above under the Menus section.

The Custom Question Builder includes the following toolbar items:








## Algorithmic value options

The Custom Question Builder algorithmic values toolbar contains the options you need to work with algorithmic values. Algorithmic values are variable values that are regenerated each time a student works on a question.



The Custom Question Builder includes the following algorithmic values buttons:







Toolbar button	Description	Lesson
 <b>Regenerate Algorithmic Values</b>	Recalculates all the algorithmic values in your question. The recalculated values are shown in the question-and-answer area.	5, 8
 <b>Convert to Algorithmic Value</b>	Opens the Edit Algorithmic Value window, where you can change static values to algorithmic values.	--
 <b>Show Algorithmic Value Names</b>	Displays the variable names of your algorithmic values. Click the button again to return to the values view.	5, 8
 <b>Show Algorithmic Value List</b>	Opens the Algorithmic Values List window, where you can add and edit the algorithmic values in your question.	5, 8
 <b>Algorithmic Values</b>	Opens a pop-up window that allows you to add new algorithmic values, manage/view algorithmic values, or select from a list of algorithmic values to insert into your question.	8

## Math objects

The Math Objects section of the Custom Question Builder window lets you insert mathematical expressions and graphical elements into your questions.





Math object	Description	Lesson
 <b>Equation Editor</b>	Opens the Equation Editor, where you can create expressions that include mathematical notation, symbols, and other special characters.	7, 8
 <b>Graph</b>	Opens the Edit Graph window, where you can define a Cartesian graph to include in your question. Your graph can incorporate functions, parametric equations, linear equations, and data points (ordered pairs).	Advanced 6

 <b>Number Line</b>	Opens the Edit Number Line window, where you can define the properties of a number line to include in your question. You can plot intervals or points on your number lines.	Advanced 7
 <b>Pie Chart</b>	Opens the Edit Pie Chart window, where you can create a pie chart to include in your question.	Advanced 9
 <b>Bar Chart</b>	Opens the Edit Bar Chart window, where you can create a bar chart to include in your question. You can create both horizontal and vertical bars.	Advanced 9
 <b>Figure</b>	Opens the Figure Editor, where you can import graphics or use the drawing tools palette to create figures.	Advanced 8

## Student Interactions

The Student Interactions toolbar lets you specify the format of answers in your question.

*Note: Your cursor must be in the answer section of the question-and-answer area in order to access the buttons in the Student Interactions toolbar.*

Answer option	Description	Lesson
 <b>Short Answer</b>	Opens the Edit Answer Definition window, where you can specify the acceptable forms of the correct answer and choose how strictly you want the player to evaluate student answers.	7, 8
 <b>Multiple Choice</b>	Inserts a multiple-choice template, initially with four choices in the answer section. You can enter the correct answer and distractor answers, define the behavior of the choices, and change the number of choices.	10
 <b>True/False</b>	Inserts a True/False template. You can specify the correct answer and define the behavior of the choices.	10
 <b>Essay Answer</b>	Opens the Edit Essay Answer window, where you can provide a sample answer your students can see when they review a quiz or test that includes this essay question.	9

## Math palette

The math palette contains math symbols and notation that your students may need to enter their answers to the question. Students click a button in the palette to insert the object into their answer. Most publisher-provided questions display eight buttons on the palette, with a **More** option so that students can access more buttons. When you are designing your question, you can specify what buttons appear on the math palette. The math palette appears automatically in mathematics and statistics courses.

Refer to Lesson 9 for more information on customizing the math palette.



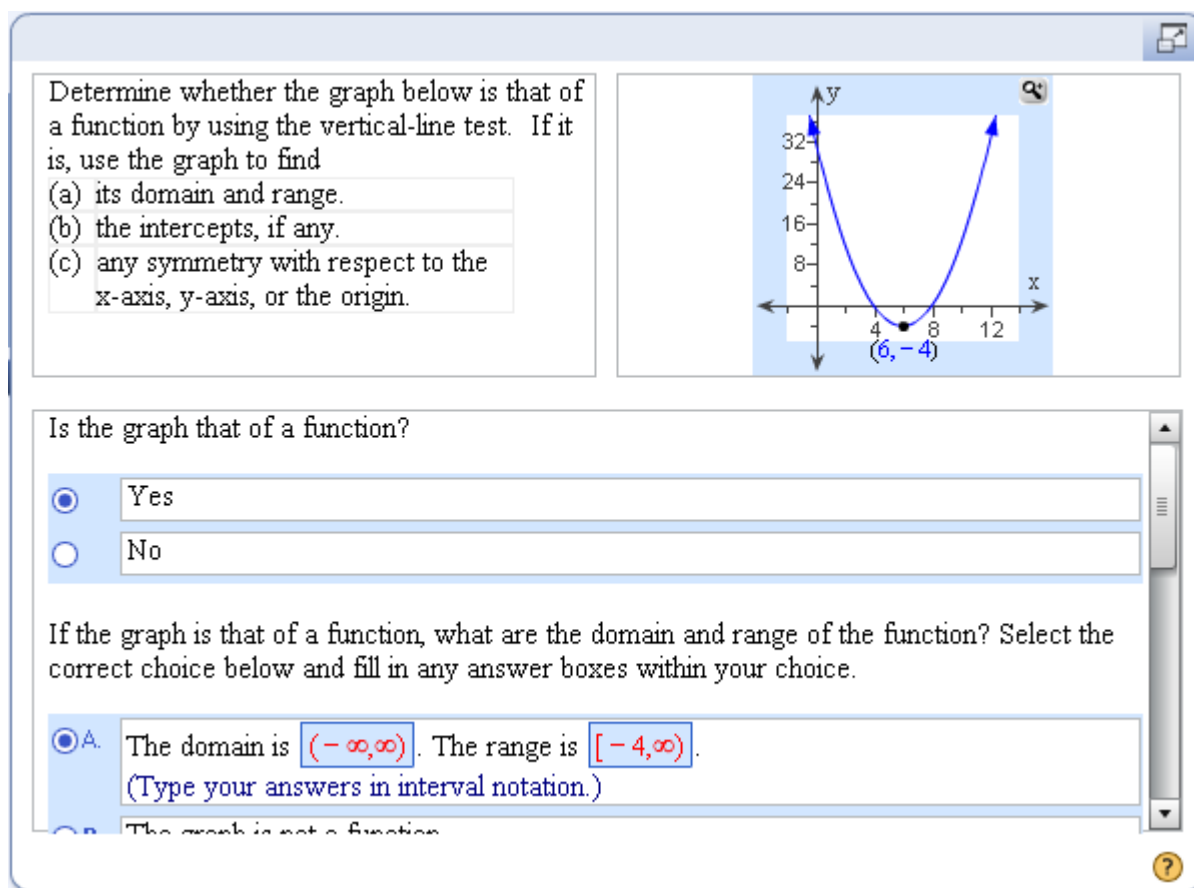
## LESSON 5 – EDIT AND SAVE A CUSTOM QUESTION

In Lesson 3, you learned how to copy a custom question from the online database. In this lesson, you will learn how to edit the question and save it to your custom question database. The example used for this lesson is taken from the Sullivan, College Algebra, 8e textbook and is question 3.2.21. The original question has 3 parts and you will learn how to edit the question text, remove an answer part, edit an answer part, and edit some of the algorithms.

### 1. Copy the custom question.

Follow the steps in Lesson 3 to copy the question from the publisher question bank. You can either copy the question used in this lesson (Sullivan, College Algebra, 8e, question 3.2.21) or copy another question with similar characteristics. If you choose to copy the question used in this lesson, you may need to first create a course from the Sullivan, College Algebra, 8e textbook.

*Note: If you are in MyMathTest, you will need to copy a question from one of the MyMathTest testbanks or sample questions.*



Determine whether the graph below is that of a function by using the vertical-line test. If it is, use the graph to find

- (a) its domain and range.
- (b) the intercepts, if any.
- (c) any symmetry with respect to the x-axis, y-axis, or the origin.

Is the graph that of a function?

☒ Yes

☐ No

If the graph is that of a function, what are the domain and range of the function? Select the correct choice below and fill in any answer boxes within your choice.

☒ A. The domain is  $(-\infty, \infty)$ . The range is  $[-4, \infty)$ .  
(Type your answers in interval notation.)

☐ B. The graph is not a function.

### 2. Remove an answer part.

For this lesson, you will remove the last answer part of this question and not ask students to determine the symmetry of the function. In the question area, delete the text for part c. In the answer area, scroll down till you see the text related to part c and delete all of this text. Be sure to check/modify the answer feedback as needed to be sure the responses will make sense to students.

*Note: When you remove answer parts from a custom question, be sure to review and edit the entire question for consistency.*

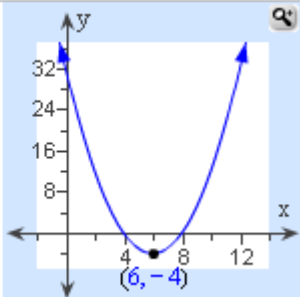
### 3. Edit the question text.

Next, you will edit part b in the original question so that students will be asked to only enter the x-intercepts. Edit the question text for part b, as shown below.

Determine whether the graph below is that of a function by using the vertical-line test. If it is, use the graph to find

(a) its domain and range.

(b) the intercepts, if any.



Now you need to edit the answer for part b. Scroll down in the answer area till you see the part that asks students to enter the intercepts. Edit the sentence "What are the intercepts?" to "What are the x-intercepts, if any?", since you will be asking students to only enter the x-intercepts in this part.

What are the x-intercepts, if any? Select the correct choice below and fill in any answer boxes within your choice.

☒ A.   
(Type an ordered pair. Use a comma to separate answers as needed.)

☐ B. There are no intercepts.

☐ C. The graph is not a function.

### 3. Edit an answer part.

Next, you need to edit the student input box so that the program will only look for the two x-intercepts and not the y-intercept. Double-click in the student input box. Click on Step 2 in the **Edit Answer Definition** window. In the **Define Answers** window, place your cursor in the third line in the Value list, right-click and select Delete to remove this line.

**Edit Answer Definition**

Instructions

Step 1. Select A Rule

Step 2. Define Answers

Step 3. Set Options

Step 4. Edit Feedback

**Define Answers**

**Step a.** [Create algorithmic values](#) to simplify your answer as necessary.

**Step b.** Use these values to enter your answer in the list below.

Enter additional answer forms on separate lines. Use the context menu to enter math functions, symbols, or insert algorithmic values.

**Create Algorithmic Value**

Value
{~xint1,0}
{~xint2,0}
{0,~yint}

Delete this line

*Note: There are 4 steps in the Edit Answer Definition window, and for this lesson you will only focus on Step 2. Refer to Lesson 7 for a more detailed discussion of this window.*

Click **Save** to save your changes and exit this window. The bottom part of the answer area should look like this.

☒ A. The domain is  $(-\infty, \infty)$ . The range is  $[-1, \infty)$ .  
(Type your answers in interval notation.)

☐ B. The graph is not a function.

What are the x-intercepts, if any? Select the correct choice below and fill in any answer boxes within your choice.

☒ A.  $(-1, 0), (-3, 0)$   
(Type an ordered pair. Use a comma to separate answers as needed.)

#### 4. Edit the algorithms.

Depending on the question, some of the algorithms may be editable. In this lesson, you will learn how to edit some of the simpler algorithms. Once you have worked through the rest of the lessons in this tutorial and the Custom Question Builder – Advanced tutorial, you should be able to understand and edit the more complicated algorithms.

Click the **Show Algorithmic Value Names** button so that you can see what algorithms were used to write the question. Scroll down to the bottom part of the answer area, and you will see the following algorithm values used in the student input boxes for the domain, range and x-intercepts:

☒ A. The domain is  $"(-\infty, \infty)"$ . The range is  $"[~dy, \infty)"$ .  
(Type your answers in interval notation.)





☐ B. The graph is not a function.

What are the x-intercepts, if any? Select the correct choice below and fill in any answer boxes within your choice.

☒ A.  $(~xint1, 0), (~xint2, 0)$   
(Type an ordered pair. Use a comma to separate answers as needed.)

Compare this screenshot with the one previously shown. Notice that algorithmic values are prefixed with the tilde symbol (~). You will see that the algorithmic value, ~dy, represents the lower limit of the range, and the algorithmic values, ~xint1 and ~xint2, represent the x-intercepts.

Click the **Show Algorithmic Values List** button. You will see a list of all the algorithmic values defined for this question, including the type of algorithmic value, format, constraints, and value, as shown in the following screenshot.

Algorithmic Values List							
					Regenerate algorithmic values		
	Name	Type	Format	Constraints	Link ID	Value	Authoring Notes
<a href="#">Edit</a>	dx	Integer	#	$>=-6, <=6, <>0$		-2	
<a href="#">Edit</a>	dy	Integer	#	$\in [-1, -4, -9]$ $?(\sim dx = -4), \in [-1, -9]$ $?(\sim dx = -2 \text{ OR } \sim dx = 2), \in [-1, -9]$ $?(\sim dx = -3 \text{ OR } \sim dx = 3), \in [-1, -4]$ $?(\sim dx = -1 \text{ OR } \sim dx = 1), \in [-4, -9]$		-1	
<a href="#">Edit</a>	Gheight	Integer	#	$= \sim Gy_{max} - \sim Gy_{min}$		11	
<a href="#">Edit</a>	Gwidth	Integer	#	$= \sim Gx_{max} - \sim Gx_{min}$		8	

For this question,  $\sim dx$  is defined as an integer constrained to be between the values of -6 and 6 and not equal to 0. Scroll down until you see the algorithmic values,  $\sim x_{int1}$  and  $\sim x_{int2}$ .

<a href="#">Edit</a>	dyquick	Integer	#	$= \text{ifthen}(\text{MOD}(\sim y_{int}, 1) = 0 \text{ and } \dots$		1	
<a href="#">Edit</a>	xint1	Integer	#	$= @rt(\sim dy) + \sim dx$		-1	
<a href="#">Edit</a>	xint2	Integer	#	$= -@rt(\sim dy) + \sim dx$		-3	
<a href="#">Edit</a>	yint	Integer	#	$= (\sim dx)^2 + \sim dy$		3	

One of the x-intercepts is defined as the square root of  $\sim dy$  added to  $\sim dx$ , and the other x-intercept is defined as the negative square root of  $\sim dy$  added to  $\sim dx$ . From these definitions, you can deduce that the ordered pair  $(\sim dx, \sim dy)$  represents the coordinates of the vertex of the parabola.

*Tip: Be sure to edit, preview, check, and save your work frequently. Try to not do too many edits at a time!*

For this lesson, you will edit the constraints for  $\sim dx$ . In the Algorithmic Values List window, click the Edit link to the left of  $\sim dx$ . In the **Edit Algorithmic Value** window, the constraints for  $\sim dx$  are given in the middle of the window, as shown in the following screenshot.

Edit Algorithmic Values

Constraints

Options

Algorithmic Value Name

dx

Select Type of Algorithmic Value

Select the type of algorithmic value you wish to create

☒ Integer

☐ Text or Symbol

☐ Decimal

☐ Algebraic or Numeric Expression

List Values or Set Up Constraints

To define a constraint, select a relational operator and enter a constraint value, using multiple rows for multiple values. Use the context menu to insert functions, symbols, or other algorithmic values.

Relational Operator	Constraint Value (One Constraint per row. Use quotes around text.)
$\neq$	0
$\geq$	-6
$\leq$	6
<select>	

$\sim dx$  represents the x-intercept of the vertex and you will change the range of possible values so that the vertex is restricted between -4 and 4. To do this, highlight the constraint value of -6 and change it to -4. Similarly, highlight the constraint value of 6 and change it to 4. Click Save when done.

*Note: In the Algorithmic Values List window, notice that  $\sim dy$  is defined as one of the values, -1, -4, -9, and there are additional constraints prefixed with the ? symbol. Any constraints that are prefixed with the ? symbol are usually not editable by instructors. If you open up the Edit Algorithmic Value window for  $\sim dy$ , you will see that this window will only display constraints that can be edited. Use caution if editing these constraints.*

## 5. Test the algorithms.

In the Algorithmic Values List window, click the **Regenerate Algorithmic Values** button. Notice that the values for each algorithmic value are updated each time you click the button. Do this several times to check that there are no error messages for any of the algorithmic values. If you do see an error message, you will need to edit one or more of the algorithmic values to fix the error.

Click **Close** to dismiss the Algorithmic Values List window. In the editor, click the **Show Algorithmic Values Names** button, if necessary, to display values instead of algorithmic value names in the question. Next, click the **Regenerate Algorithmic Values** button several times to check that there are no mathematical errors in the question.

## 6. Preview the question.

Click the **Preview Exercise** button to view the question as your students will see it.

Determine whether the graph below is that of a function by using the vertical-line test. If it is, use the graph to find

- its domain and range.
- the intercepts, if any.

Is the graph that of a function?

☐ Yes
 ☐ No

If the graph is that of a function, what are the domain and range of the function? Select the correct choice below and fill in any answer boxes within your choice.

☐ A. The domain is . The range is .  
 (Type your answers in interval notation.)

Click to select and enter your answer(s), then click Check Answer.

All parts showing

Clear All Check Answer



Test your question in the following ways:

- Enter an incorrect answer and view the feedback given.
- Enter a correct answer in various formats to see what formats are accepted.
- Generate a similar question.

When you are satisfied with your testing of the question, close the Preview window to return to the editor.

## 7. Save the question.

In the editor, click the **Save and Exit** button to save the question and exit the editor. In the Choose Settings window, enter a name for the question. Use a descriptive name so that you can easily find the question in your Custom Question Manager.

**Choose Settings** [Legend](#)

**Name** (required)

---

**Textbook Content Association** (optional) [Add](#)

Textbook associations will cause this question to affect your students' Study Plans when it is used on a test and will help you search for the question when you are creating an assignment.

**Current Associations**

Sullivan: College Algebra, 8e Section 3.2 Obtain Information from or about the Graph of a Function	<a href="#">Edit</a> <a href="#">Remove</a>
---	--

---

**Additional Properties** (optional)

The information that you provide below will be used to organize your custom questions, and provide search criteria when you are creating an assignment.

**Keywords** domain, function, graphing [Change...](#)

**Difficulty**

**Type**

**Format**

---

**Other** (optional)

**Description**

**Sharing** ☐ Allow other instructors to copy and edit this question

Because you copied this question from the publisher question bank, it is already associated with the textbook from which this question was copied. You can edit or remove this association, or add an additional textbook association. You can also update the text if you went to a newer edition and want your custom question to be linked with it.

*Note: You can associate a question with more than one textbook. You can also add a custom question to an assignment in any course using any textbook regardless of the textbook association.*

*Tip: It is **highly recommended** that you add a textbook association for each custom question you create or copy. This will make it easier for you to find the custom question when you are creating an assignment, and the textbook association will enable the question to affect your students' Study Plans when you use the question in an assignment that updates the Study Plan.*

In the additional properties section, you can add information to help you organize your list of custom questions. For this lesson, you will practice adding several keywords for this question. Click the **Change** link to the right of the Keywords line. In the Assign Keywords window, any keywords that you have already used are listed. Check the box to the left of the keyword you want to use. Add a new keyword, "domain", by typing it in the box below the list of Available Keywords and clicking the Add button. In the same way, add the keywords "function" and "graphing". Click **OK** to associate these keywords with your question.

To allow other instructors to copy your question, check the box for Sharing in the Other section. Click **OK** to finish saving the question.

Your new custom question will be listed in the Custom Question Manager in alphabetical order. Refer to Lesson 2 for directions on how to filter the list of questions or to perform further actions on the question.

## LESSON 6 – ADD A CUSTOM QUESTION TO AN ASSIGNMENT

Now that you have at least one custom question in your database, you will learn how to add the question to an assignment. Custom questions can be added to homework assignments, quizzes, or tests in MyMathLab, MyStatLab, or MathXL, and to tests in MyMathTest. You can include custom questions along with publisher questions in the same assignment. In this lesson, you will learn how to add a custom question to a test. The steps for adding a custom question to a homework assignment or quiz are similar.

*Note: Remember that learning aids are not available in your custom questions, so if you add the question to a homework assignment, your students will not have access to learning aids such as the Help Me Solve This or View An Example screens.*

### 1. Create a new test.

In the Assignment Manager in MyMathLab, MyStatLab, or MathXL, click the **Create Assignment** button and select **Create Test**. In MyMathTest, go to the Test Manager, click the **Create Test** button and select **Create Test**.

*Note: You can add a custom question to any of your courses, regardless of the textbook you may have associated the question with. However, if you add the question to a course that uses a different textbook, the question will not affect your students' Study Plans or personalized homework assignments.*

### 2. Enter a name for the test.

In Step 1 of the New Test wizard, enter a name for the test. Click **Next** to continue.

### 3. Locate the custom question.

In Step 2, filter the question database by chapter, section, and objective. If you saved the example custom question from Lesson 5 and you are in the course that uses the Sullivan, College Algebra, 8e textbook, you should be able to find it in your list of available questions by selecting Chapter 3, Section 2. The custom question should be at the top of the list, prefixed by a + sign, as shown below.

The screenshot shows the 'Add/Remove Content' step of the New Test wizard. The 'Question Source' section on the right has 'Show custom questions (+) for this book' checked. The 'Available Questions' list on the left shows 17 items, with '+ (3.2) CQB Intro 5' at the top, highlighted by a red arrow. The 'My Selections' table on the right is empty. The 'Add' button is visible below the list.

1 Start			2 Add/Remove Content		3 Choose Settings	
<b>Name</b> Test 3						
<b>Book</b> Sullivan: College Algebra, 8e						
<b>Chapter</b> 3. Functions and Their Graphs						
<b>Section</b> Section 3.2: The Graph of a Function						
<b>Objective</b> All Objectives						
<b>Availability</b> All questions						
<b>Question Source</b>						
<input checked="" type="checkbox"/> Show publisher questions						
<input type="checkbox"/> Show additional test bank questions						
<input checked="" type="checkbox"/> Show custom questions (+) for this book						
<input type="checkbox"/> Show other custom questions <a href="#">Refine Selection ...</a>						
<a href="#">(+)</a> <a href="#">Create my own questions</a>						
<b>Available Questions 17</b>						
<input type="checkbox"/> Question ID						
<input type="checkbox"/> + (3.2) CQB Intro 5						
<input type="checkbox"/> 3.2.9						
<input type="checkbox"/> 3.2.17						
<input type="checkbox"/> 3.2.19						
<input type="checkbox"/> 3.2.21						
<input type="checkbox"/> 3.2.23						
<input type="button" value="Add"/>						
<input type="button" value="Remove"/>						
<b>My Selections (0)</b>						
<input type="checkbox"/> Question ID						
<a href="#">Pooling options</a>						
<a href="#">View question details</a>						
<b>Questions on test: 0</b>						
<b>Points on test: 0</b>						
Choose questions on the left and click Add to include them in this assignment.						

If you did not associate the custom question to this textbook, you will need to check box to "Show other custom questions". Refine the selection as needed to locate the custom question.

**4. Add the custom question to the test.**

Check the box to the left of the custom question and click the **Add** button to add the question to your test. Add additional questions to the test as desired, then click **Next** to continue.

*Note: If you are only adding custom questions to an assignment and not including any publisher questions, at least one of your custom questions must be associated to a chapter of the textbook.*

**5. Choose the test settings.**

In Step 3, you can choose the desired settings for your test.

*Note: For more details about choosing test settings, refer to the tutorials for MyMathLab, MathXL, or MyMathTest.*

**6. Save the test.**

Click **Save** or **Save & Assign** to save the test.

## LESSON 7 – CREATE A STATIC QUESTION

In this lesson, you will learn how to create a custom question from scratch. Both examples used for this lesson are static, which means that the values in the question do not change. In the next lesson you will learn how to create an algorithmic question where the values do change each time the question is displayed to the students.

Here are the steps you should follow when creating a custom question from scratch.

- Design the question
- Create a new question
- Enter the question
- Test the question
- Save the question

*Note: If you are creating a long question, you may want to save the question as you are developing it.*

### Example 7A – Short answer, static, syllabus question

The first example will be a syllabus question. This type of question can be used at the beginning of the term to verify that your students have read and understand your syllabus policies.

#### 1. Design the question.

For this lesson, you want to write a question to check that students know that the final exam counts as 25% of the course average. The question you want to ask is:

"The final exam counts as\_\_\_\_% of the course average. Type your answer as a whole number, without the percent symbol."

Students would enter their answer in the blank and the program will evaluate their answer.

#### 2. Create a new question.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager, and click the **Create New Question** button. In Step 1 of the Create Custom Question window, select the option to "Start with an empty template", and then click **Next** to continue. In Step 2, select the Full Screen layout, and then click **Next** to go to the editor.

The screenshot shows a window titled "Create Custom Question" with three tabs: "1 Start", "2 Choose Layout", and "3 Create/Edit Question". The "2 Choose Layout" tab is active. Below the tabs, a message states: "Once you have selected a layout for your question, you may not change it." There are three layout options shown as boxes: the first shows "Q:" and "A:" stacked vertically; the second shows "Q:" and "A:" side-by-side; the third shows "Q:" and "A:" side-by-side with separate input fields. Below these boxes are three radio buttons: "Full Screen" (selected), "Top / Bottom", and "Left / Right".

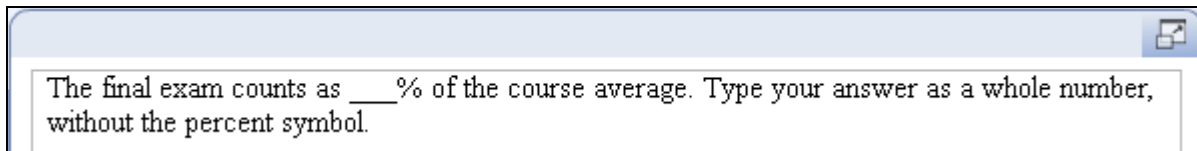
Tip: Review the layouts as the format for your question and answer. After you have chosen a layout, you cannot change the format of the problem.

- **Full Screen** layout lets you integrate the student answer with your question. If scrolling is necessary, the question and answer areas will scroll together.

- **Top/Bottom** layout puts the question in the top window; the student enters the answer in the bottom window. If scrolling is necessary, the question and answer areas will scroll separately.
- **Left/Right** layout puts the question area on the left and the answer area on the right. This format is useful for questions with lengthy questions and for questions that include graphs, charts, or figures. If scrolling is necessary, the question and answer areas will scroll separately.

### 3. Enter the question.

Replace the words "Problem Statement and Interaction Area" from the question-and-answer area with the following.



The final exam counts as \_\_\_\_% of the course average. Type your answer as a whole number, without the percent symbol.

You need an answer box in place of the blank so that students have a place to type in their answer. Delete the blank and place your cursor in front of the % symbol. In the Student Interactions toolbar, click the **Short Answer** button. Creating a short answer is a 4-step process.

In Step 1, select the answer rule "Specify a subset of equivalent answers to accept", and then select "Accept integer or decimal equivalents only." Answer rules are used to determine what equivalent forms of the correct answer will be accepted as correct, and the rule you choose will restrict the accepted forms to integers and decimal only.

**Edit Answer Definition**

**Select an Answer Rule**

Select an answer rule from the list below. Answer rules are used to determine what equivalent forms of the correct answer will be accepted as correct.

- ☐ Accept **any** unsimplified or simplified equivalent answers. [See examples](#)
- ☐ Accept only the **exact** answer you define. [See examples](#)
- ☒ Specify a subset of equivalent answers to accept
  - [Answer is single numeric value](#)
  - ☒ Accept integer or decimal equivalents only. [See examples](#)

*Answer is a numeric value or an ordered pair with numeric coordinates*

In Step 2, enter the number 25 in the first row of the Value column.

In Step 3, accept the default options. Notice you can modify the answer values, numeric tolerance, number of decimal places, and more.

**Edit Answer Definition**

**Answer Acceptance Options**

Use options below to specify additional answer acceptance criteria.

Currently selected answer rule:  
Accept integer or decimal equivalents only.

**Comma-Formatting**

Comma(or space)-formatted numbers are:

- ☒ Optional
- ☐ Not Allowed
- ☐ Required

**Text-Matching**

- ☒ Ignore Spaces
- ☒ Ignore Case

**Numeric Comparison**

Tolerance  
+ / -

**Answer Display Options**

Specify student input and correct answer formatting options below.

**Function Formatting**

- ☒ Use math style (e, i, and math functions convert to special notation)

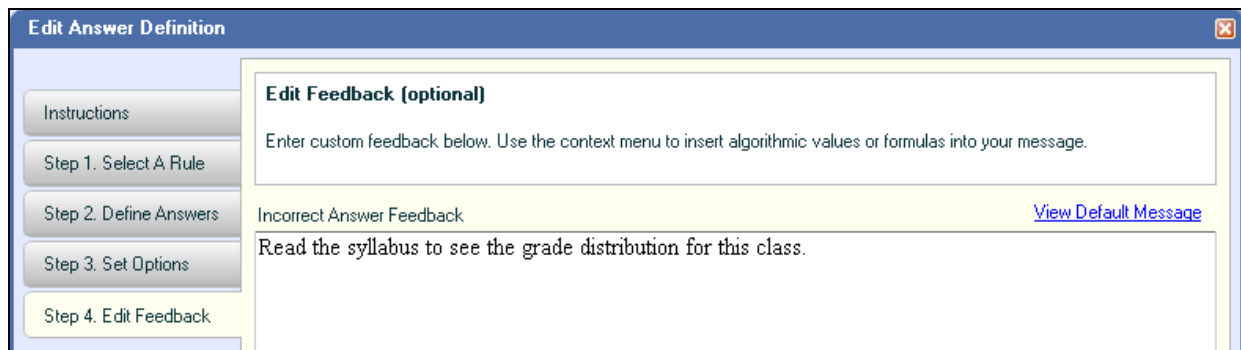
**Correct Answer Format**

Number of decimal places:

- ☒ Show trailing zeros

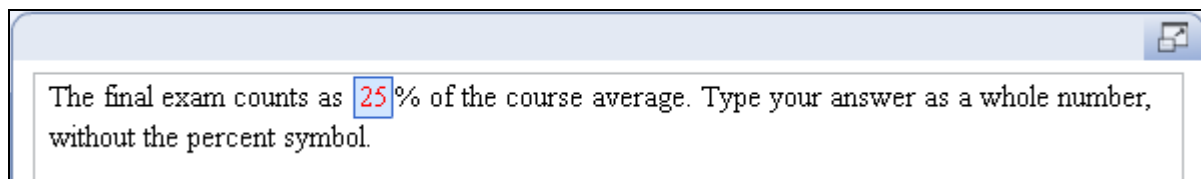
**Save** **Cancel** **Help**

In Step 4, you can enter customized feedback for incorrect and correct answers. For this lesson, type the sentence "Read the syllabus to see the grade distribution for this class." in the Incorrect Answer Feedback box.



The screenshot shows a software window titled "Edit Answer Definition". On the left is a sidebar with five buttons: "Instructions", "Step 1. Select A Rule", "Step 2. Define Answers", "Step 3. Set Options", and "Step 4. Edit Feedback". The "Step 4. Edit Feedback" button is highlighted in yellow. The main area of the window is titled "Edit Feedback (optional)" and contains the instruction "Enter custom feedback below. Use the context menu to insert algorithmic values or formulas into your message." Below this, there are two text input fields. The first field is labeled "Incorrect Answer Feedback" and contains the text "Read the syllabus to see the grade distribution for this class." To the right of this field is a blue link that says "View Default Message".

Click Save to confirm your choices. The program puts a blue-outlined box before the % symbol. In the editor, this box is filled with the answer. In the student preview window, this box will be empty and students will type their answer in the box.



The screenshot shows a student preview window with a light blue header and a small icon in the top right corner. The main text area contains the question: "The final exam counts as 25% of the course average. Type your answer as a whole number, without the percent symbol." The number "25" is enclosed in a blue-outlined box.

#### 4. Test the question.

Since this is a static question, there are no algorithms and you do not need to regenerate algorithmic values to test the question. You should, however, check the spelling in the question and make sure that the answer you entered is the correct answer.

Preview the question and practice entering the correct answer as well as incorrect answers to view the feedback. Also enter the correct answer in various formats to see what formats are accepted.



Number format: 1,234.56 Languages: en-us

The final exam counts as  % of the course average. Type your answer as a whole number, without the percent symbol.

Calculator interface with buttons for basic operations, fractions, square roots, and a "More" button.

### 5. Save the question.

Click the **Save and Exit** button to save the question and exit the editor.

## Example 7B – Short answer, static, multi-part "show your work" question

The second example will demonstrate how you can create a custom question to require students to show their steps when solving a problem.

### 1. Design the question.

In this example, you will ask students to complete the steps for solving a linear equation. You will start with the equation  $2x + 9 = 15$  and write out the steps partially, requiring students to enter the correct values in the blanks. Here is how the question will look like:

Solve the equation:  $2x + 9 = 15$

Complete each of the following steps by entering the correct values in the answer boxes.

$$2x + 9 = 15$$

$$2x + 9 - \quad = 15 - \quad$$

$$2x = \quad$$


$$x = \quad$$

### 2. Create a new question.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager, and click the **Create New Question** button. In Step 1 of the Create Custom Question window, select the option to "Start with an empty template", and then click **Next** to continue. In Step 2, select the Top/Bottom layout, and then click **Next** to go to the editor.

### 3. Enter the question.

Replace the words "Problem Statement Area" from the question area with the statement

"Solve the equation:". Press Enter twice, then click the Increase Indent icon, , in the formatting toolbar.

You will use the Equation Editor to enter the equation, as this gives us better control over the spacing between terms. Click the **Equation Editor** button in the Math Objects toolbar. In the Equation Editor, type the equation  $2x+9=15$ . Notice that the editor automatically spaces the terms correctly. Click **OK** to exit the equation editor and place the equation in the question. The equation is highlighted in blue to show that it is an Equation Editor object.

Solve the equation:

$2x + 9 = 15$

Replace the words "Interaction Area" in the answer area with the directions to the student "Complete each of the following steps by entering the correct values in the answer boxes." Press Enter twice. For the first line of the solution, type the equation using the Equation Editor.

Complete each of the following steps by entering the correct values in the answer boxes.

$2x + 9 = 15$

For the second line of the solution, type the beginning part " $2x + 9 -$ " using the Equation Editor. Next, you need to enter an answer box in place of the blank. Click the **Short Answer** button in the Student Interactions toolbar. As you did in the first example for this lesson, you will select the answer rule "Accept integer or decimal equivalents only." in step 1, and enter the answer as 9 in step 2. For this answer, you will not change any setting in steps 3 or 4.

For the right side of this line, use the Equation Editor to enter " $= 15 -$ " and then enter another Short Answer student interaction for the blank.

Complete each of the following steps by entering the correct values in the answer boxes.

$2x + 9 = 15$   
 $2x + 9 - 9 = 15 - 9$

In a similar way, enter the third and fourth lines of the solution, using the Equation Editor and Short Answer student interaction as needed.

Complete each of the following steps by entering the correct values in the answer boxes.

$2x + 9 = 15$   
 $2x + 9 - 9 = 15 - 9$   
 $2x = 6$   
 $x = 3$

Lastly, you can "dress up" the question by adding text before each step, as shown below.

Complete each of the following steps by entering the correct values in the answer boxes.

$$2x + 9 = 15$$

Move the constant term to the right side of the equation.

$$2x + 9 - 9 = 15 - 9$$

Simplify each side of the equation.


$$2x = 6$$

Divide both sides of the equation by the coefficient of x.

$$x = 3$$

#### 4. Test the question.

As with the first example in this lesson, check the spelling in the question and make sure that the steps are mathematically correct. Preview the question and practice entering the correct answer in each part as well as entering incorrect answers for some of the parts. Try entering the correct answers in various formats as well. Dismiss the preview window when done.



Solve the equation:

$$2x + 9 = 15$$

---

Complete each of the following steps by entering the correct values in the answer boxes.

$$2x + 9 = 15$$

Move the constant term to the right side of the equation.

$$2x + 9 - \square = 15 - \square$$

Simplify each side of the equation.

$$2x = \square$$

Divide both sides of the equation by the coefficient of x.

$$x = \square$$

*Note: The program will display all of the answer parts at once. Students will need to enter their answers for all parts before the program will check their answers.*

#### 5. Save the question.

Click the **Save and Exit** button to save the question and exit the editor. Don't forget to add one or more textbook associations and keywords to your question in the Choose Settings window. Refer to Lesson 5 for more details.

# LESSON 8 – CREATE AN ALGORITHMIC QUESTION

Now that you know how to create a static question from scratch, you will learn how to create algorithms so that the values in the question will change each time the question is displayed.

Here are the steps you should follow when creating an algorithmic custom question from scratch. Note that these are the same steps that you followed in Lesson 7 but with the addition of the step for entering the algorithms.

- Design the question
- Create a new question
- **Enter the algorithms**
- Enter the question
- Test the question
- Save the question

*Tip: If you are creating a long question, save the question as you are developing it.*

## Example 8A – Short answer, algorithmic, application question

The first example will be an application problem. Students will solve the problem offline and only enter their final answer.

### 1. Design the question.

The question that you will use as the model is shown on the right. To make this question algorithmic, you will define algorithmic values for the numbers highlighted, as follows:

There were 18 cookies in Magan’s cookie jar. While she was busy in another room, her children ate some of the cookies. Magan bought three dozen cookies and added them to the jar. At that point she had 49 cookies in the jar. How many cookies did her children eat?

Name	Definition	Constraints
~start	number of cookies originally in the jar	integer between (and including) 15 and 25
~buy	number of dozen of cookies bought by Magan	integer between (and including) 2 and 5
~end	number of cookies in the jar at the end	integer between (and including) 40 and 50

You need one additional algorithmic value, ~eaten, to represent the number of cookies eaten by the children. This value is calculated from the other three values, per this equation:

$$\# \text{ cookies remaining} = \# \text{ original cookies} - \# \text{ cookies eaten} + \# \text{ cookies added}$$

Using algorithmic values, the equation is:

$$\sim\text{end} = \sim\text{start} - \sim\text{eaten} + 12 * \sim\text{buy}$$

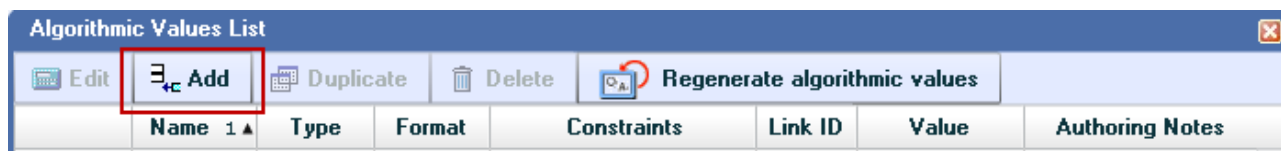
Solving for ~eaten, you get  $\sim\text{eaten} = \sim\text{start} + 12 * \sim\text{buy} - \sim\text{end}$ . Given the range of values for the other algorithmic values, it is possible that ~eaten would be a negative number or a large number. Since you want a reasonable value for ~eaten, you will constrain the value to be between (and including) 3 and 15.

## 2. Create a new question.

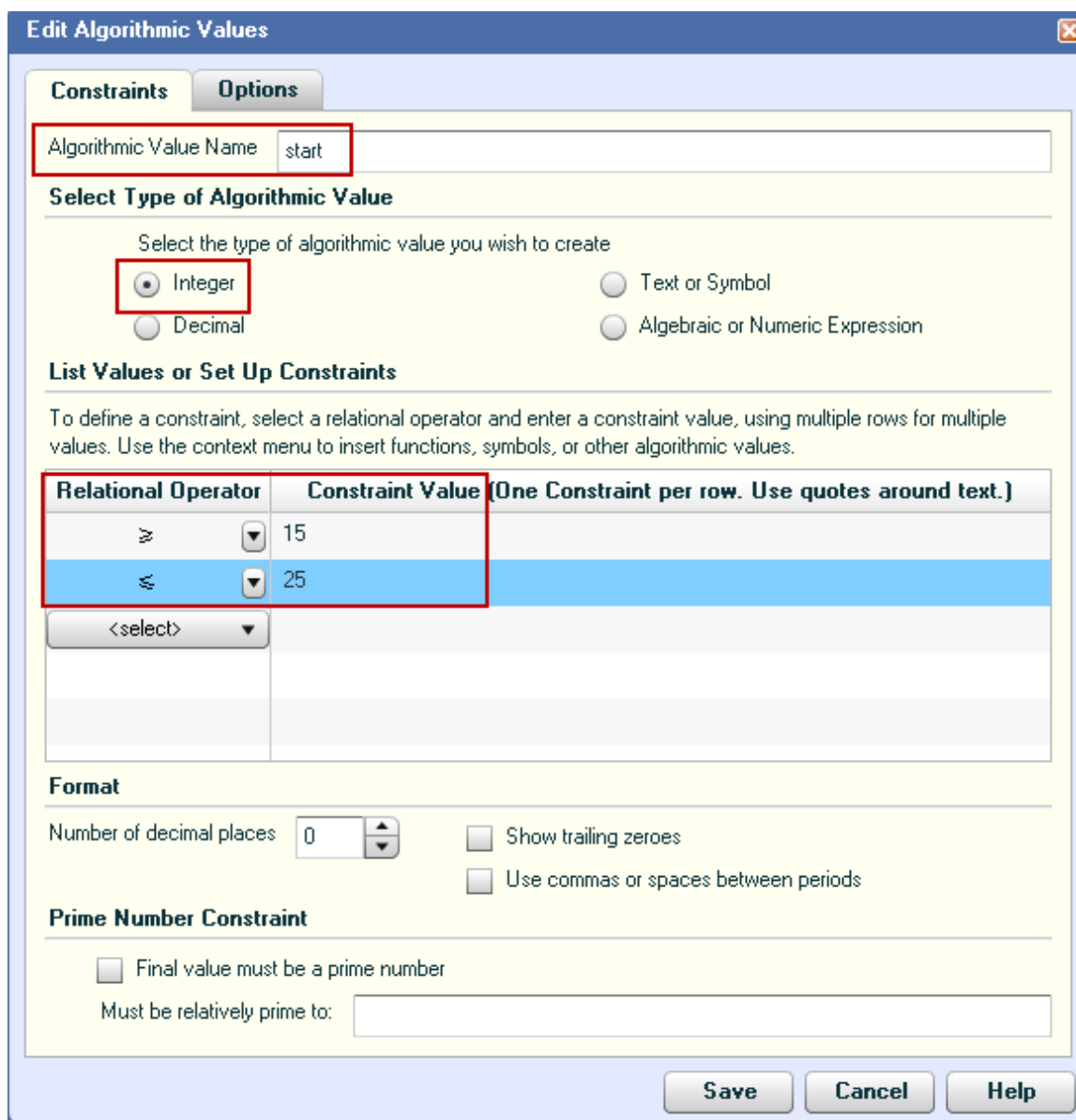
Follow the steps in Lesson 2 to navigate to the Custom Question Manager. Create a new question by starting with a new template and choosing the Top/Bottom layout.

## 3. Enter the algorithms.

Before entering the question, you will define the algorithms that will be used in the question. Click the **Show Algorithmic Values List** button in the Algorithmic Values toolbar to open up the Algorithmic Values List window. In the Algorithmic Values List window, click the **Add** button in the toolbar to bring up the Edit Algorithmic Value window.



Enter the name, type, and constraints for the algorithmic value ~start, as shown below. Remember to omit the ~ symbol when entering the algorithmic value name.



**Constraints** **Options**

Algorithmic Value Name:

**Select Type of Algorithmic Value**

Select the type of algorithmic value you wish to create

☒ Integer ☐ Text or Symbol

☐ Decimal ☐ Algebraic or Numeric Expression

**List Values or Set Up Constraints**

To define a constraint, select a relational operator and enter a constraint value, using multiple rows for multiple values. Use the context menu to insert functions, symbols, or other algorithmic values.

Relational Operator	Constraint Value (One Constraint per row. Use quotes around text.)
≥	15
≤	25
<select>	

**Format**

Number of decimal places:  ☐ Show trailing zeroes

☐ Use commas or spaces between periods

**Prime Number Constraint**






☒ Final value must be a prime number

Must be relatively prime to:

**Save** **Cancel** **Help**

*Note: The algorithmic value name field is not case-sensitive.*

Click **Save** to create this algorithmic value. Enter the algorithmic values, ~buy and ~end, in the same way. Your Algorithmic Values List should look like this.






Algorithmic Values List							
 Edit	 Add	 Duplicate	 Delete	 Regenerate algorithmic values			
	Name 1 ▲	Type	Format	Constraints	Link ID	Value	Authoring Notes
<a href="#">Edit</a>	buy	Integer	-	>=2, <=5		5	
<a href="#">Edit</a>	end	Integer	-	>=40, <=50		44	
<a href="#">Edit</a>	start	Integer	-	>=15, <=25		18	

*Note: The numbers in the Value column may be different from what you see in the screenshot. These numbers are randomly generated by the program based on the constraints you defined for each algorithmic value.*

The last algorithmic value, ~eaten, is entered differently since it is defined with a formula. Add a new algorithmic value, and in the Edit Algorithmic Value window, enter the formula, ~start+12\*~buy-~end in the Constraint Value box. Also enter the constraints so that ~eaten is between (and including) 3 and 15. Your list of constraints for ~eaten should be as shown below.

Relational Operator	Constraint Value (One Constraint per row. Use quotes around text.)
= 	~start+12*~buy-~end
>= 	3
<= 	15

Now that you have entered all of the algorithmic values, it is a good idea to type in a brief annotation in the Authoring Notes column for each algorithmic value, as shown below.

Algorithmic Values List							
 Edit	 Add	 Duplicate	 Delete	 Regenerate algorithmic values			
	Name 1 ▲	Type	Format	Constraints	Link ID	Value	Authoring Notes
<a href="#">Edit</a>	buy	Integer	-	>=2, <=5		3	# of cookies bought
<a href="#">Edit</a>	eaten	Integer	-	>=3, <=15, =~start+12*~buy-...		9	# of cookies eaten
<a href="#">Edit</a>	end	Integer	-	>=40, <=50		48	# of cookies remaining at the end
<a href="#">Edit</a>	start	Integer	-	>=15, <=25		21	# of cookies at the start

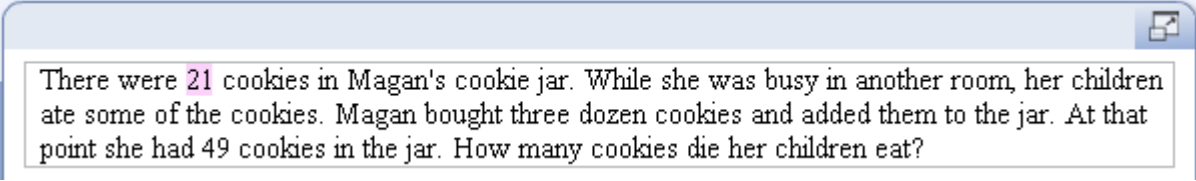
#### 4. Enter the question.

Now that the algorithms are all entered, you are ready to enter the question. In the editor, replace the words "Problem Statement Area" from the question area with the word problem, including the actual numbers in the original problem.

Next, you will convert each of the numbers to algorithmic values. Highlight the number 18 in the problem and click the **Algorithmic Values** button above the Math Objects toolbar. Select the algorithmic

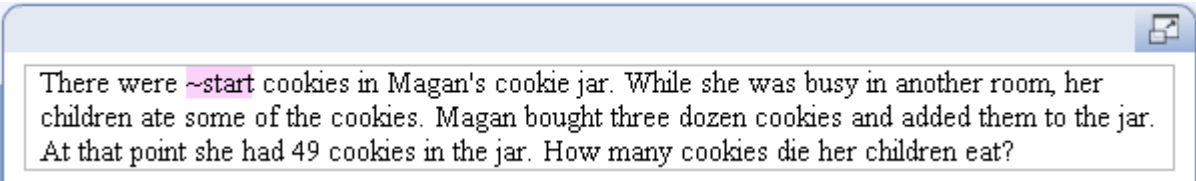


value, ~start, from the list. The program will replace the number 18 with this algorithmic value and you will see the current value of ~start highlighted in lavender.



There were 21 cookies in Magan's cookie jar. While she was busy in another room, her children ate some of the cookies. Magan bought three dozen cookies and added them to the jar. At that point she had 49 cookies in the jar. How many cookies die her children eat?

Click the **Show Algorithmic Value Names** button to display the variable name.

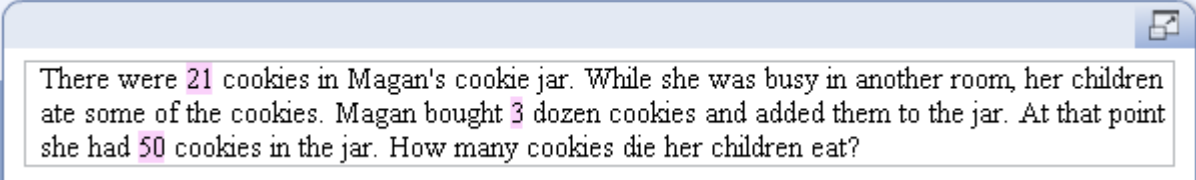


There were ~start cookies in Magan's cookie jar. While she was busy in another room, her children ate some of the cookies. Magan bought three dozen cookies and added them to the jar. At that point she had 49 cookies in the jar. How many cookies die her children eat?

Click the **Show Algorithmic Value Names** button again to return to the values view.

In the same way, convert the text "three" to the algorithmic value ~buy. For this example, you will use the numerical value instead of the spelled out number. Refer to the Custom Question Builder – Advanced tutorial to learn how to use lists to replace the number with the spelling of the number.

Lastly, convert the number 49 to the algorithmic value ~end. Your problem should now look like this.

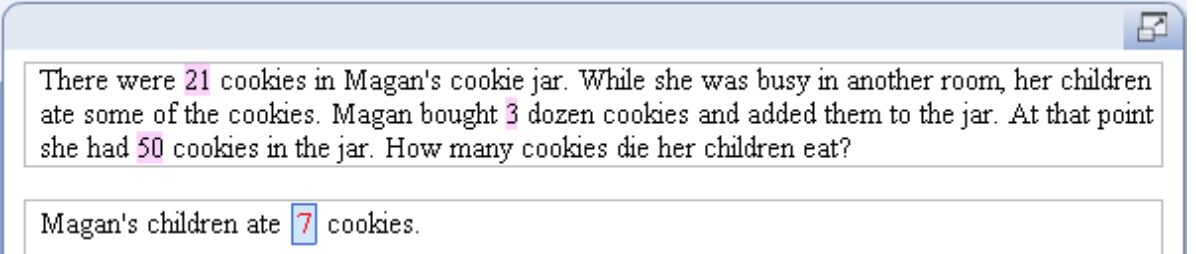


There were 21 cookies in Magan's cookie jar. While she was busy in another room, her children ate some of the cookies. Magan bought 3 dozen cookies and added them to the jar. At that point she had 50 cookies in the jar. How many cookies die her children eat?

Replace the words "Interaction Area" in the answer area with the text "Magan's children ate \_\_\_\_ cookies." Highlight the blank and click the **Short Answer** button in the Student Interactions toolbar. Complete the steps in the Edit Answer Definition window as follows:

- Step 1 – Select the answer rule "Accept integer or decimal equivalents only."
- Step 2 – Enter the algorithmic value, ~eaten, in the first line of the Value column.
- Step 3 – Do not change any settings.
- Step 4 – Enter customized feedback if desired.

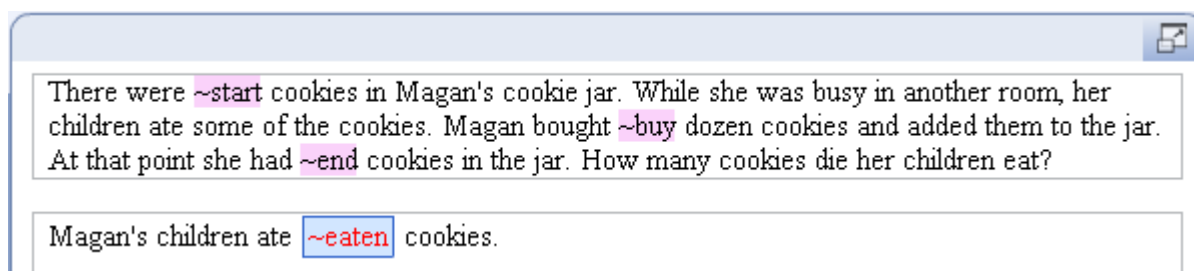
Your question should now look like this.



There were 21 cookies in Magan's cookie jar. While she was busy in another room, her children ate some of the cookies. Magan bought 3 dozen cookies and added them to the jar. At that point she had 50 cookies in the jar. How many cookies die her children eat?

Magan's children ate 7 cookies.

Click the **Show Algorithmic Value Names** button in the Algorithmic Values toolbar to display the algorithmic value names.



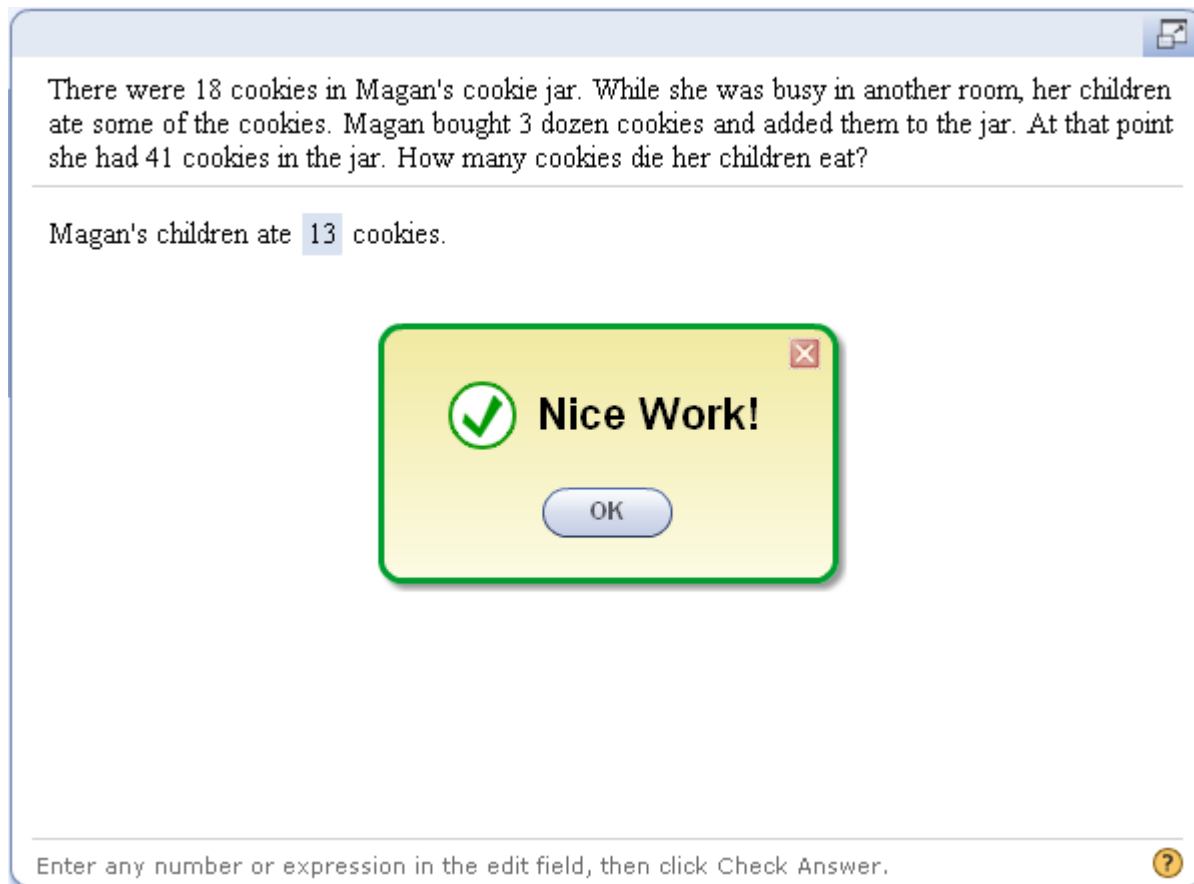
There were ~start cookies in Magan's cookie jar. While she was busy in another room, her children ate some of the cookies. Magan bought ~buy dozen cookies and added them to the jar. At that point she had ~end cookies in the jar. How many cookies die her children eat?

Magan's children ate ~eaten cookies.

Click the **Show Algorithmic Value Names** button again to return to the values view.


**5. Test the question.**

Check the spelling in the question and also check that the arithmetic calculations are correct. Click the **Regenerate Algorithmic Values** button in the Algorithmic Values toolbar several times and verify that your algorithms are working correctly. Preview the question and practice entering the correct answer.



There were 18 cookies in Magan's cookie jar. While she was busy in another room, her children ate some of the cookies. Magan bought 3 dozen cookies and added them to the jar. At that point she had 41 cookies in the jar. How many cookies die her children eat?

Magan's children ate 13 cookies.

 **Nice Work!**

OK

Enter any number or expression in the edit field, then click Check Answer.

**Tip: Remember to save your work periodically!**

**6. Save the question.**

Click the **Save and Exit** button to save the question and exit the editor. Don't forget to add one or more textbook associations and keywords to your question in the Choose Settings window. Refer to Lesson 5 for more details.



## Example 8B – Short answer, algorithmic, skills question

The second example in this lesson will show you how to create an algebraic skills question.

### 1. Design the question.

The question that you will use as the model is shown on the right. To make this question algorithmic, you will define algorithmic values for the coefficient of  $y$ , the constant term in the equation, and the two solutions to the equation. You start by defining the solutions to be distinct integers. Then, you will define the coefficient of  $y$  and the constant term from the two solutions. Here is the list of algorithmic values that you will define.

*Solve each equation, and check your solutions.*

$$15. y^2 + 3y + 2 = 0$$

Name	Definition	Constraints
~ans1	one solution to the quadratic equation	integer between (and including) -1 and -9
~ans2	the other solution to the quadratic equation	integer between (and including) -1 and -9, but not equal to ~ans1
~coeff	coefficient of $y$ in the quadratic equation	equal to the opposite of the sum of the two solutions
~const	constant term in the quadratic equation	equal to the product of the two solutions.

### 2. Create a new question.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager. Create a new question by starting with a new template and choosing the Top/Bottom layout.

### 3. Enter the algorithms.

Follow the steps in the first example in this lesson to enter the algorithms. Click the **Show Algorithmic Values List** button in the Algorithmic Values toolbar and then click **Add** in the Algorithmic Values List window. Define each algorithmic value using the constraints given in the table in the Design step. For ~ans2, don't forget to add the constraint so that the two solutions will not be identical. Here is the constraint list for ~ans2:

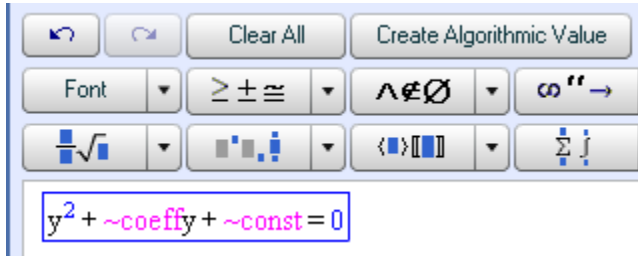
Relational Operator	Constraint Value (One Constraint per row. Use quotes around text.)
$\neq$	~ans1
$\leq$	-9
$\geq$	-1

After you have defined all of the algorithmic values, type in brief annotations for each value, as shown below.

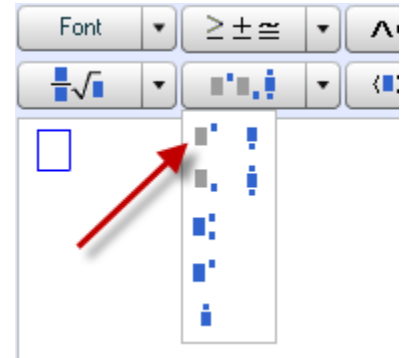
Algorithmic Values List							
					Regenerate algorithmic values		
	Name	Type	Format	Constraints	Link ID	Value	Authoring Notes
<a href="#">Edit</a>	ans1	Integer	-	$>=-9, <=-1$		-2	one solution to the equ...
<a href="#">Edit</a>	ans2	Integer	-	$>=-9, <=-1, <>~ans1$		-9	other solution to the eq...
<a href="#">Edit</a>	coeff	Integer	-	$=-(~ans1+~ans2)$		11	coefficient of $y$ in the eq...
<a href="#">Edit</a>	const	Integer	-	$=~ans1*~ans2$		42	constant term in the eq...


#### 4. Enter the question.

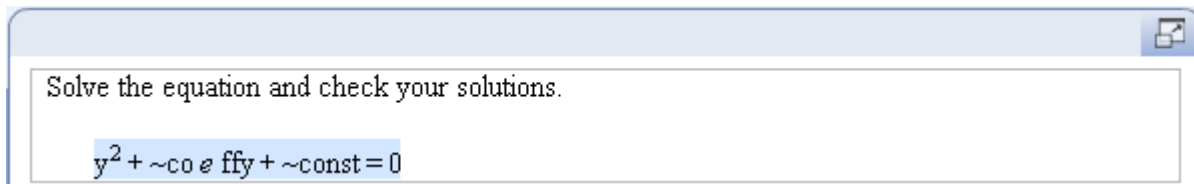
Replace the words "Problem Statement Area" in the editor with the directions for the problem in the question area. Place your cursor where you want to enter the equation and click the **Equation Editor** button in the Math Objects toolbar. The equation you will enter looks like this:



To enter the exponent of 2, click the **"Superscripts, subscripts"** button and select the superscript template, as shown on the right.



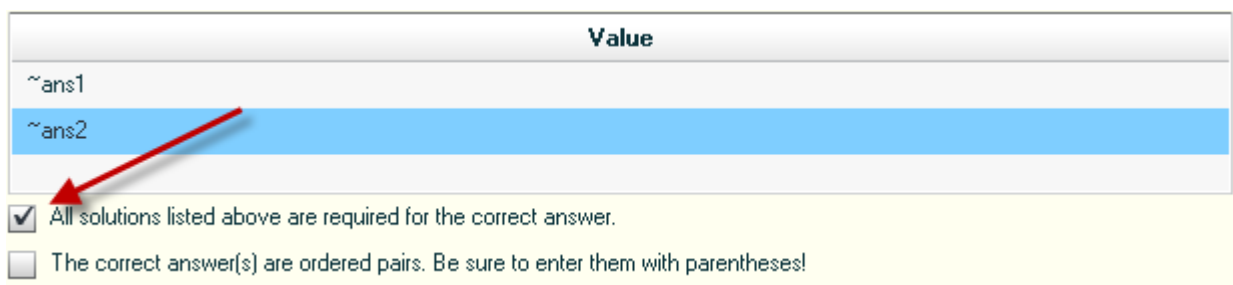
To enter each algorithmic value, click the **Insert Algorithmic Value** button, , and select the item you wish to enter. Notice that algorithmic values are displayed in lavender in the equation editor. Click **OK** to insert the equation into your question. Click the **Show Algorithmic Value Names** button to display the algorithmic value names.



*Note: By default, the equation editor displays math functions, such as  $e$ , in special notation. If you want to turn off this conversion, edit the equation and uncheck the "Use Math style" box at the top of the Equation Editor window.*

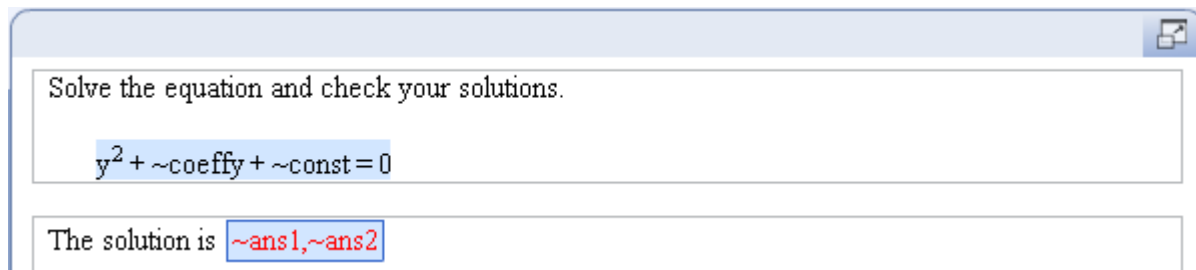
Next, replace the words "Student Interaction Area" with the prompt for the solution in the answer area. Place your cursor where you want the student interaction box and click the **Short Answer** button in the Student Interactions toolbar. Complete the steps in the Edit Answer Definition window as follows:

- Step 1 – Select the answer rule "Accept integer or decimal equivalents only."
- Step 2 – Enter the algorithmic value, `~ans1`, in the first line of the Value column, and `~ans2` in the second line. Check the box for "All solutions listed above are required for the correct answer. The program will accept the answers in either order."



- Step 3 – Do not change any settings.
- Step 4 – Enter customized feedback if desired.

Your question should now look like this.

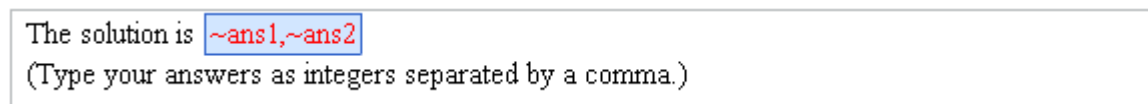


Solve the equation and check your solutions.

$$y^2 + \sim\text{coeffy} + \sim\text{const} = 0$$

The solution is  $\sim\text{ans1}, \sim\text{ans2}$

Since the program will expect students to enter the answers separated by a comma, you should enter directions to the student, as shown below.



The solution is  $\sim\text{ans1}, \sim\text{ans2}$   
 (Type your answers as integers separated by a comma.)

We will review additional features of answer formatting in the CQB advanced course.

## 5. Test the question.

As before, check the spelling in the question and also check that the solution to the equation is correct. Click the **Regenerate Algorithmic Values** button in the Algorithmic Values toolbar several times and verify that your algorithms are working correctly. Preview the question and practice entering the solutions. Also practice entering the solutions in varying order to see if the program correctly evaluates the answer regardless of the order.



Solve the equation and check your solutions.

$$y^2 + 12y + 27 = 0$$

The solution is  $-3, -9$   
 (Type your answers as integers separated by a comma.)


**Good job!**

OK

## 6. Save the question.

Click the **Save and Exit** button to save the question and exit the editor. Don't forget to add one or more textbook associations and keywords to your question in the Choose Settings window. Refer to Lesson 5 for more details.

## LESSON 9 – CREATE AN ESSAY QUESTION

In this lesson, you will learn how to create an essay question where students can type their answers using text or mathematical expressions in a free-format answer box. Essay questions are not graded by the program and the instructor will need to manually review the question and assign a grade. Essay answer choices cannot be mixed with any other answer choices in a multi-part question. Remember that essay questions can only be added to quizzes and tests, and cannot be used in a homework assignment.

As before, you will use these steps when creating the question.

- Design the question
- Create a new question
- Enter the algorithms
- Enter the question
- Test the question
- Save the question

*Note: If you are creating a long question, save the question as you are developing it.*

### Example 9A – Essay answer, algorithmic, conceptual question

For the first example, we will illustrate how to use an essay question to test students' understanding of graph transformations. Instead of asking students to draw the graph, you will ask them to describe how to use transformations to draw the graph.

#### 1. Design the question.

You will model part (c) of the question shown on the right. To make the question algorithmic, you will define algorithmic values for the horizontal shift and the vertical shift, as follows:

1. Predict how the graph of each equation will appear compared to the graph of  $f(x) = x^2$ .

(a)  $y = (x + 4)^2$                       (b)  $y = x^2 - 3$

(c)  $y = (x - 5)^2 + 3$

Name	Definition	Constraints
~horiz	horizontal shift	integer between (and including) 1 and 9
~vert	vertical shift	integer between (and including) 1 and 9, not equal to the horizontal shift

For this lesson, you will restrict the horizontal and vertical shifts to positive integers so that the values are displayed correctly. Refer to the Custom Question Builder – Advanced tutorial to learn how to modify the display of mathematical expressions so that you can use negative values for the shifts.

#### 2. Create a new question.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager. Create a new question by starting with a new template and choosing the Full Screen layout.

#### 3. Enter the algorithms.

Click the **Show Algorithmic Values List** button in the Algorithmic Values toolbar and then click **Add** in the Algorithmic Values List window. Define each algorithmic value using the constraints given in the table shown above in the Design step. Your Algorithmic Values List should look like this when you are done:

Algorithmic Values List							
Edit	Add	Duplicate	Delete	Regenerate algorithmic values			
	Name 1 ▲	Type	Format	Constraints	Link ID	Value	Authoring Notes
<a href="#">Edit</a>	horiz	Integer	-	>=1, <=9		3	horizontal shift
<a href="#">Edit</a>	vert	Integer	-	>=1, <=9, <>~horiz		9	vertical shift

#### 4. Enter the question.

Replace the words "Problem Statement and Interaction Area" in the editor with the directions for the problem, using the equation editor to enter the function, as shown below.

Predict how the graph of the equation will appear compared to the graph of  $f(x) = x^2$ .

Next, use the equation editor to enter the equation. Substitute the algorithmic values ~horiz and ~vert in place of the numerical values for the shifts in the equation.

$$y = (x - \sim\text{horiz})^2 + \sim\text{vert}$$

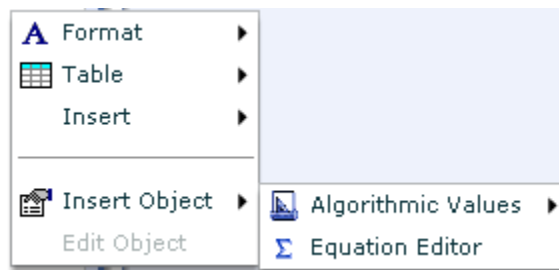
Enter directions to the student so that they know how to enter their answer.

Predict how the graph of the equation will appear compared to the graph of  $f(x) = x^2$ .

$y = (x - 3)^2 + 9$

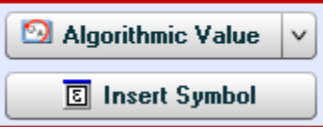
Type your answer in the box below. Your answer will be graded manually and your grade will be entered into the gradebook.

Next, you will put in the essay box for students to type their answer. Place your cursor on a new line and click the **Essay Answer** button in the Student Interactions toolbar. In the Edit Essay Answer window, enter a sample answer that students will see when they review the question. With the cursor in the answer box, you can right-click to get a popup menu. In the menu, click **Editing Options** to add or insert algorithmic values or to open up the Equation Editor to enter mathematical expressions. You can also enter algorithmic values and symbols by clicking the appropriate button to the left of the sample answer box. Click **OK** when done.



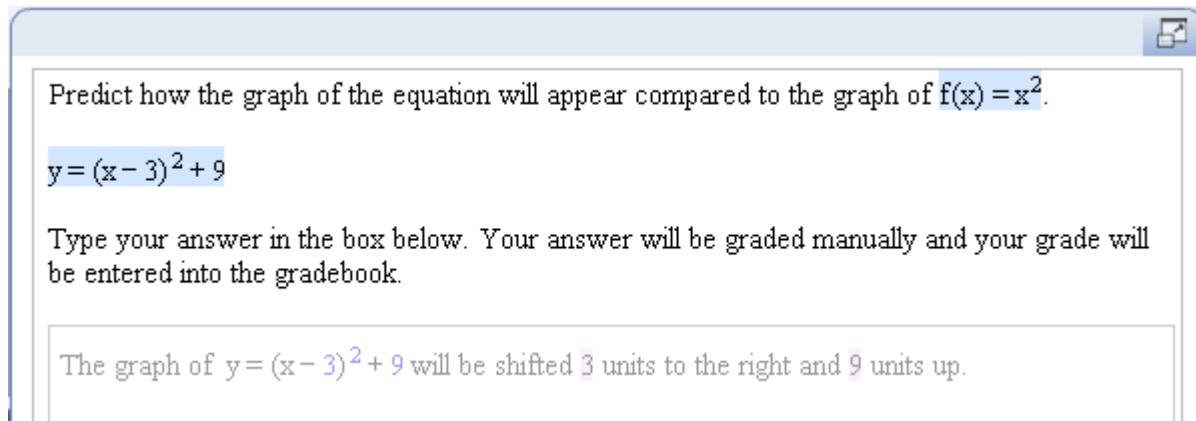
### Sample Answer

The sample answer will be available to your students when they are reviewing their test.



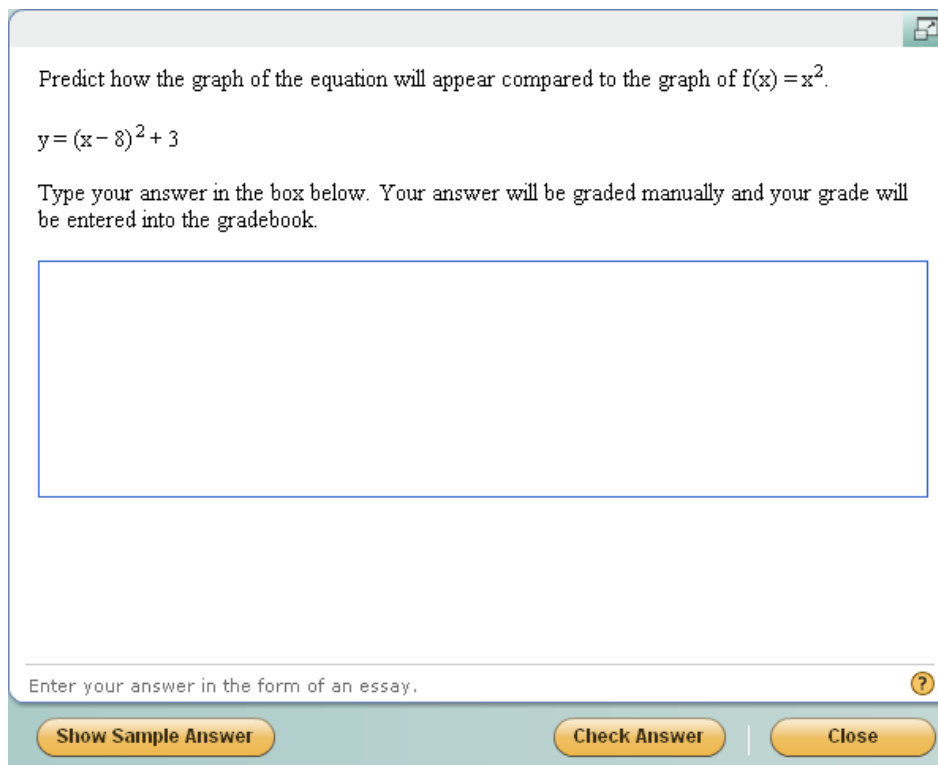
The graph of  $y = (x - 3)^2 + 9$  will be shifted 3 units to the right and 9 units up.

Here's how the completed question should look.

A screenshot of a software window showing a math question. The question text is 'Predict how the graph of the equation will appear compared to the graph of  $f(x) = x^2$ .' Below this, the equation  $y = (x - 3)^2 + 9$  is displayed. A text box contains the instruction 'Type your answer in the box below. Your answer will be graded manually and your grade will be entered into the gradebook.' Below the text box, a sample answer is shown: 'The graph of  $y = (x - 3)^2 + 9$  will be shifted 3 units to the right and 9 units up.'

### 5. Test the question.

Check the spelling and grammar for the question. In addition, click the **Regenerate Algorithmic Values** button in the Algorithmic Values toolbar several times to verify that the values in your sample answer are consistent with the values in the equation. Preview the question and practice entering the correct answer. Notice that the program will not evaluate your answer. You can view your sample answer by clicking the **Show Sample Answer** button in the preview window.

A screenshot of a software window for testing a question. The question text is 'Predict how the graph of the equation will appear compared to the graph of  $f(x) = x^2$ .' Below this, the equation  $y = (x - 8)^2 + 3$  is displayed. A text box contains the instruction 'Type your answer in the box below. Your answer will be graded manually and your grade will be entered into the gradebook.' Below the text box is a large empty rectangular box for the answer. At the bottom of the window, there is a text input field with the placeholder 'Enter your answer in the form of an essay.' and a question mark icon. Below this are three buttons: 'Show Sample Answer', 'Check Answer', and 'Close'.

## 6. Save the question.

Click the **Save and Exit** button to save the question and exit the editor. Don't forget to add one or more textbook associations and keywords to your question in the Choose Settings window. Refer to Lesson 5 for more details.

### Example 9B – Essay answer, static, "show your work" question

In Lesson 7, you created a question that required students to show their steps to solve an equation. Each step of the solution was designed so that students could enter the correct value and the program would evaluate each answer. In this example, you will learn how to create a question which requires students to show their work by typing out each step on their own. You will use an essay answer to accomplish this goal.

## 1. Design the question.

You will model question 9 from the question set shown on the right, and require students to write out all steps in their solution. Since you will be grading this question manually, it may be more convenient to create a static question so that the values in each solution step remain the same.

*Exercises 9–38: Solve the inequality symbolically. Express the solution set in set-builder or interval notation.*

9.  $2x + 6 \geq 10$

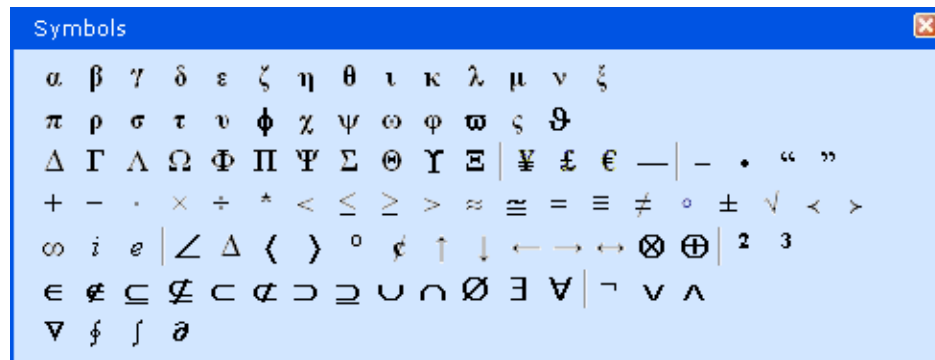
10.  $-4x - 3 < 5$

## 2. Create a new question.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager. Create a new question by starting with a new template and choosing the Full Screen layout.

## 3. Enter the question.

Replace the words "Problem Statement and Interaction Area" in the editor with the directions for the problem, including directions to the student on how to enter their answer. From the Insert menu, select **Insert Symbol** to pull up the Symbols palette (shown below) from which you can enter the inequality and infinity symbols.



Use the Equation Editor to enter the inequality. Here's how your question should look like once you are done.





Solve the inequality symbolically. Show your steps clearly. Express the solution set in set-builder or interval notation. Use the symbol palette to enter the  $\leq$ ,  $\geq$ , or  $\infty$  symbols.

$$2x + 6 \geq 10$$

Type your answer in the box below. Your answer will be graded manually and your grade will be entered into the gradebook.

Enter your answer in the form of an essay.

[Show Sample Answer](#) [Check Answer](#) [Close](#)

5. **Save the question.**

Click the **Save and Exit** button to save the question and exit the editor. Don't forget to add one or more textbook associations and keywords to your question in the Choose Settings window. Refer to Lesson 5 for more details.

## LESSON 10 – CREATE A MULTIPLE-CHOICE QUESTION

The last lesson in this introductory tutorial will show you how to create custom questions which have multiple-choice answers. Students select their answer from a list of 2 or more answer choices. You will also learn how to add a true-false answer, which will have 2 answer choices and is a special case of the multiple-choice answer. Multiple-choice and true-false answers can be mixed with short answers in a multi-part question.

### Example 10A – Multiple-choice answer, static, syllabus question

The first example with multiple-choice and true-false answers is a question that illustrates how to include a weblink in the problem statement.

#### 1. Design the question.

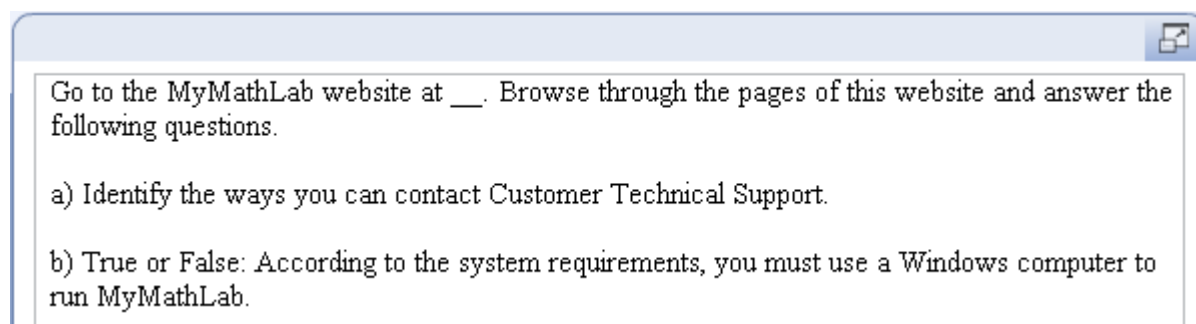
For this lesson, you want to write a question that checks that students have read the information on a website. You will include a link to the MyMathLab website and ask students to identify the ways they can contact Customer Technical Support. Students will choose the correct answer from a list of five choices. In addition, you will ask students to answer a True/False question to test their knowledge of the system requirements for using MyMathLab.

#### 2. Create a new question.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager. Create a new question by starting with a new template and choosing the Full Screen layout.

#### 3. Enter the question.

Replace the words "Problem Statement and Interaction Area" in the editor with the problem statements as shown below.



Go to the MyMathLab website at \_\_\_\_\_. Browse through the pages of this website and answer the following questions.

a) Identify the ways you can contact Customer Technical Support.

b) True or False: According to the system requirements, you must use a Windows computer to run MyMathLab.

You will now enter the weblink in place of the blank in the first sentence. Highlight the blank and select **Weblink** from the Insert menu. In the Edit a Weblink window, enter the Link URL and the Link description as shown below. You can add links to any website.



**Edit a Weblink**

Enter values for tag attributes

Link URL:

Link description:

OK Cancel

*Note: You can also click the Weblink icon in the formatting toolbar to insert a weblink.*

Click **OK** to dismiss the window. The weblink is displayed as a blue hyperlink. Clicking on this link in the student view will open up the website in a new browser window.



Next, you will insert a multiple-choice answer below the problem statement for part a). Put your cursor where you want to locate the grid and click the **Multiple-choice** button in the Student Interactions toolbar. The multiple-choice grid is inserted and initially has 4 answer choices.

A screenshot of a multiple-choice question grid. The text inside the grid reads: "Go to the MyMathLab website at <http://www.mymathlab.com>. Browse through the pages of this website and answer the following questions." Below this, the question is: "a) Identify the ways you can contact Customer Technical Support." There are four answer choices, each with a radio button and a text input field: "A. [input field]", "B. [input field]", "C. [input field]", and "D. [input field]". The radio button for choice A is selected.

The radio button next to answer choice A is highlighted to indicate that this is the correct answer. When you include the question in an assignment, the location of the correct answer is shuffled randomly. Therefore, you can safely leave the correct answer choice at A without compromising the security of the question. If you want to change the location of the correct answer, click the radio button next to the desired correct answer.

Click anywhere in the grid to view the Multiple Choice Options window. From this window, you can specify the location of the correct answer, lock an answer choice in place, rearrange answer choices, insert additional answer choices, delete answer choices, or customize the feedback and settings.

A screenshot of the "Multiple Choice Options" window. It has a blue header bar with the title "Multiple Choice Options". Below the header, it says "Choice A is:" followed by two checkboxes: "the correct answer" (which is checked) and "locked in place" (which is unchecked). To the right of these checkboxes are two buttons: "Manage Choices" with a dropdown arrow, and "Feedback and Settings".

For this example, you want five answer choices. In the Multiple Choice Options window, click the **Manage Choices** button and select **Insert Choice Below**. Then enter the answer choices as shown in the next screenshot.

<input checked="" type="radio"/> A.	Search the knowledge base.
<input type="radio"/> B.	Live chat.
<input type="radio"/> C.	Email a question.
<input type="radio"/> D.	All of the above.
<input type="radio"/> E.	None of the above.

You want answer choice D to be locked in place, so put your cursor in answer choice D and check the "**locked in place**" box in the Multiple Choice Options window. Notice that the letter D in the multiple-choice grid is boldfaced to indicate that this choice is locked in place.

<input type="radio"/> C.	Email a question.
<b><input type="radio"/> D.</b>	All of the above.
<input type="radio"/> E.	None of the above.

**Multiple Choice Options**

**Choice D is:**

☐ the correct answer ☒ locked in place Man...

In the same way, lock answer choice E. Lastly, select D as the correct answer choice. Your multiple-choice answer should now look like this.

<input type="radio"/> A.	Search the knowledge base.
<input type="radio"/> B.	Live chat.
<input type="radio"/> C.	Email a question.
<input checked="" type="radio"/> D.	All of the above.
<input type="radio"/> E.	None of the above.

Next, you will insert a True/False answer below the problem statement for part b). Put your cursor where you want to locate the grid and click the **True/False** button in the Student Interactions toolbar. The true-false answer is inserted with both answer choices filled in.

b) True or False: According to the system requirements, you must use a Windows computer to run MyMathLab.

<input checked="" type="radio"/>	True
<input type="radio"/>	False

The answer to part b) is false, so click the radio button next to False to indicate that this is the correct answer. In the Multiple Choice Options window, notice that each choice is locked in place. You can change this setting by unchecking the "locked in place" box in the Multiple Choice Options window.

☐ True  
☒ False

Multiple Choice Options

The second choice is:

☒ the correct answer
 ☒ locked in place

Manage Choices ▼
 Feedback and Settings

#### 4. Test the question.

Check the spelling and grammar for the question. Since this is a static question, you do not need to check any algorithms. Preview the question and practice selecting the correct answer in each part. Also practice selecting an incorrect answer for one part and a correct answer for the second part to see how the program handles this situation.

Go to the MyMathLab website at <http://www.mymathlab.com>. Browse through the pages of this website and answer the following questions.

a) Identify the ways you can contact Customer Technical Support.

☒ A. Live chat.  
☐ B. Search the knowledge base.  
☐ C. Email a question.  
☐ D. All of the above.  
☐ E. None of the above.

b) True or False: According to the system requirements, you must use a Windows computer to run MyMathLab.

☐ True  
☐ False

#### 5. Save the question.

Click the **Save and Exit** button to save the question and exit the editor. Don't forget to add one or more textbook associations and keywords to your question in the Choose Settings window. Refer to Lesson 5 for more details.

### Example 10B – Multiple-choice answer, algorithmic, conceptual question

The last example in this introductory tutorial will show you how to create a conceptual question to check students' understanding of the slopes of perpendicular lines.

#### 1. Design the question.

You will create an algorithmic question that asks students to identify the slope of a perpendicular line. The equations of the lines will be defined as follows.

First line:  $y = \sim\text{slope1} * x + \sim\text{int1}$

Second line:  $y = mx - \sim\text{int2}$

Students will be asked to pick the correct value for  $m$ , given that the two lines are perpendicular. The correct answer choice will be given as a fraction  $-1/\sim\text{slope1}$ , and the three answer distractors will be  $\sim\text{slope1}$ ,  $-\sim\text{slope1}$ , and  $1/\sim\text{slope1}$ . Here are the constraints for the algorithmic values.






Name	Definition	Constraints
$\sim\text{slope1}$	slope of first line	integer between (and including) 2 and 9
$\sim\text{int1}$	y-intercept of first line	integer between (and including) 1 and 9
$\sim\text{int2}$	y-intercept of second line	integer between (and including) 1 and 9

## 2. Create a new question.

Follow the steps in Lesson 2 to navigate to the Custom Question Manager. Create a new question by starting with a new template and choosing the Top/Bottom layout.

## 3. Enter the algorithms.

Click the **Show Algorithmic Values List** button in the Algorithmic Values toolbar and then click **Add** in the Algorithmic Values List window. Define each algorithmic value using the constraints given in the table shown above in the Design step. Your Algorithmic Values List should look like this when you are done:

Algorithmic Values List							
				 Regenerate algorithmic values			
	Name 1 ▲	Type	Format	Constraints	Link ID	Value	Authoring Notes
<a href="#">Edit</a>	int1	Integer	-	$\geq 1, \leq 9$		8	y-intercept of first line
<a href="#">Edit</a>	int2	Integer	-	$\geq 1, \leq 9$		4	y-intercept of second line
<a href="#">Edit</a>	slope1	Integer	-	$\geq 2, \leq 9$		3	slope of first line

## 4. Enter the question.

Replace the words "Problem Statement Area" in the question area with the problem statement, using the equation editor to enter the two equations, as shown below.

The lines  $y = 3x + 8$  and  $y = mx - 4$  are perpendicular if  $m$  is equal to \_\_\_\_.

Click **Show Algorithmic Value Names** to view the algorithmic values in each equation.

The lines  $y = \sim\text{slope1}x + \sim\text{int1}$  and  $y = mx - \sim\text{int2}$  are perpendicular if  $m$  is equal to \_\_\_\_.

In the answer area, delete the words "Interaction Area" and click the **Multiple-choice** button in the Student Interactions toolbar to insert a multiple-choice grid with 4 answer choices.

You will enter the correct answer in A. Put your cursor in answer choice A and then click the **Equation Editor** button. In the Equation Editor, type a negative sign and then click the **Fractions, roots, abs** template button and select the fraction template. Type the number 1 in the numerator of the template. Move your cursor to the denominator and click the **Insert Algorithmic Value** button to select the algorithmic value  $\sim\text{slope1}$ . Click **OK** to insert the fraction into the multiple-choice grid.

For answer choices B and C, use the Algorithmic Values button to enter  $\sim\text{slope}1$  and  $-\sim\text{slope}1$  respectively. For answer choice D, enter the fraction  $1/\sim\text{slope}1$  using the Equation Editor. Your answer choices should look like this:

<input checked="" type="radio"/> A.	$-\frac{1}{\sim\text{slope}1}$
<input type="radio"/> B.	$\sim\text{slope}1$
<input type="radio"/> C.	$-\sim\text{slope}1$
<input type="radio"/> D.	$\frac{1}{\sim\text{slope}1}$

**5. Test the question.**

Check the spelling and grammar for the question. Regenerate values to check that the algorithms are working as expected. Preview the question and practice selecting the correct answer. Also practice selecting an incorrect answer to see how the program handles this situation.

The lines  $y = 7x + 5$  and  $y = mx - 7$  are perpendicular if  $m$  is equal to \_\_\_\_.

---

☐ A.  $-\frac{1}{7}$

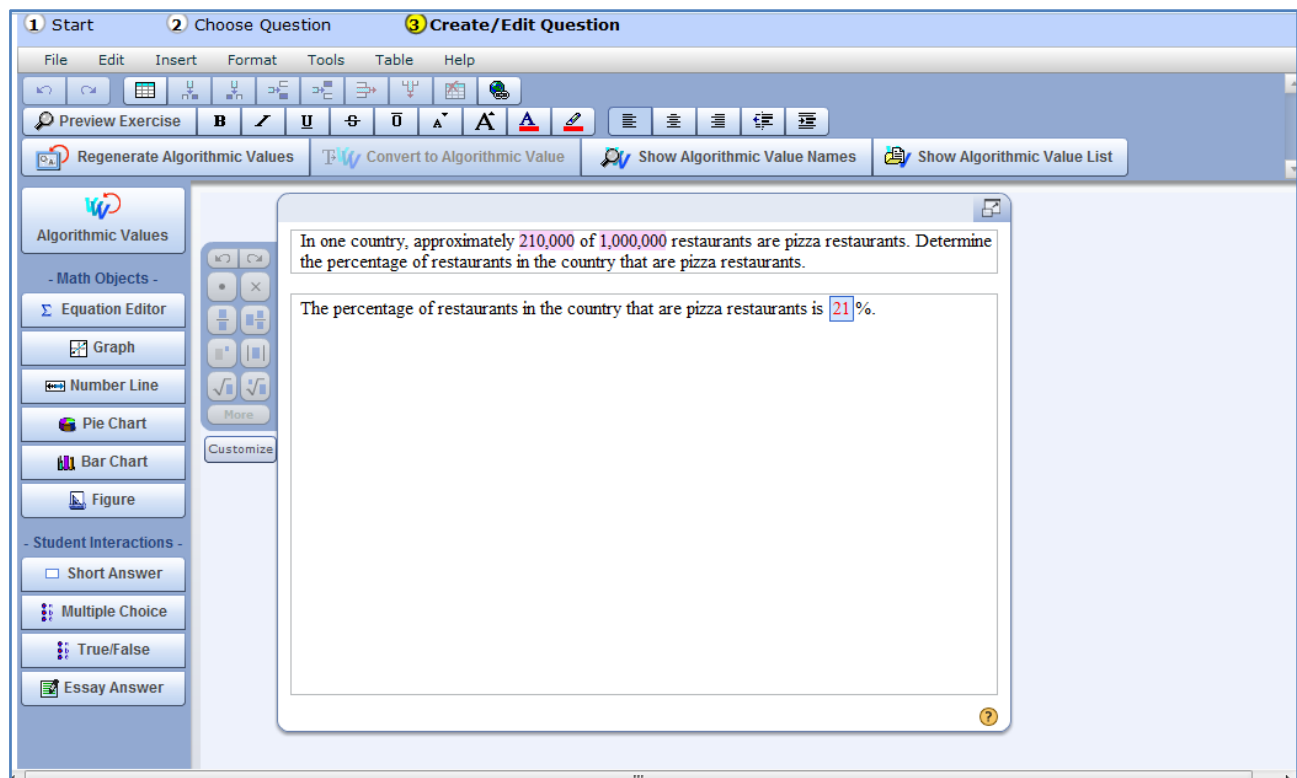
☐ B.  $\frac{1}{7}$

☐ C.  $7$

☐ D.  $-7$

**6. Save the question.**

Click the **Save and Exit** button to save the question and exit the editor. Don't forget to add one or more textbook associations and keywords to your question in the Choose Settings window. Refer to Lesson 5 for more details.



Note: You can also add a multiple choice answer, for example, to this question. Let's assume you want students to not only answer the percentage, but to then identify the correct equation. You can simply click to add a Multiple Choice option to follow the short answer portion. The essay option cannot be used with other answer types.

