

# **An Introduction to the WorldWideTestbank™ Online Homework and Assessment System**

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**2010 - 2011**

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Online Homework and Assessment System  
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## Executive Summary

### *Overview*

Designed for custom integration into any CMS or platform and capable of providing unparalleled instructor-level customization, the WorldWideTestbank™ algorithm engine powers the authoring, reuse, organization, delivery and automatic grading of online homework and assessment content for a variety of disciplines.

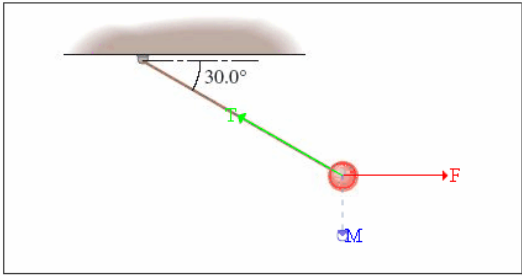
The WorldWideTestbank Authoring Interface enables authors to create new questions easily – including the use of algorithmic variables – as well as the ability to reuse existing content by importing from other question banks and content types. Use the WorldWideTestbank™ Workflow Editor to organize and customize homework and assessments – define which help features (e.g. hint, solution) should be enabled and customize the grading precision using our evaluation tolerance settings.

WorldWideTestbank answer types include automatically graded, free response as well as other standard answer types. There are no custom installations or third party downloads required, and WorldWideTestbank supports all popular browsers on both Windows and Macintosh platforms.

1 out of 3 attempts

A 2.0 kg ball tied to a string fixed to a ceiling is pulled to one side by a horizontal force  $F$ . Just before the ball is released an allowed to swing back and fourth,

- how large is the force  $F$  holding the ball in position and
- what is the tension  $T$  on the string?
- Draw the forces  $F$ ,  $T$  and  $M$  acting on the ball at that moment, where  $M$  is the gravity.



☐  $\rightarrow F$   N  °  
☐  $\rightarrow T$   N  °  
☒  $\rightarrow M$   N  °

Figure 1. WorldWideTestbank engages students with algorithmic homework and empowers instructors to create automatic, custom-graded assessments.

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The WorldWideTestbank online homework and assessment system is a mature, market-leading and powerful platform for the creation, organization, delivery and grading of online homework and assessment content.

This document provides an introduction to some of the advantages of the system, a description of its components, and an overview of the subject areas for which WorldWideTestbank authoring templates currently exist.

***Advantages of WorldWideTestbank***

**Integration with Homework Management Solutions**

The WorldWideTestbank is easily integrated into any homework management solution and features robust and flexible assessment content to meet the needs of all courses.

The WorldWideTestbank is integrated, for example, for use within Blackboard™ via their ADL-certified SCORM Content Player Building Block and within McGraw-Hill Higher Education's MathZone homework management system.

The content can be authored so that it is book-specific, or instructors can create their own WorldWideTestbank questions (from scratch or by importing static questions from WebCT™, Blackboard™, or Brownstone Diploma and others). Then custom assignments can be built by selecting WorldWideTestbank questions from the textbook or from the instructor's own custom library of questions.

Practice exercises and quizzes are automatically placed into the appropriate section and chapter of the text, allowing students to always be able to access them for self-paced practice and for the instructor to be able to assign them as homework. Assignments are automatically graded and recorded with details in the grade book.

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Advantages over Competing Products

The WorldWideTestbank offers a series of features that are not collectively available in competing products, including:

- \* Instructors can create their own questions via the authoring interface, which has both a simple and complex mode, allowing both novices and experts to use the system to their fullest capabilities.
- \* Instructors can edit any question available in the WorldWideTestbank library (creating their own custom copy of that question) to change the wording of the question or the randomization range of any variables.
- \* Complete support for algorithmic and static questions, including the ability for an instructor to import test banks from Brownstone Diploma, WebCT, or Blackboard.
- \* Users load the WorldWideTestbank viewer into their browser only once per session, and then only need to load time template files to complete their assignments. All of the algorithmic processing is done on the client machine, making the WorldWideTestbank online homework and assessment system the most scalable product on the market.
- \* NetTutor® tutors are able to support any WorldWideTestbank question.
- \* Unparalleled, professor controlled, evaluation tolerance options.
- \* Answer types such as user input tools and answer palettes that minimize dependency on multiple-choice type questions for auto-graded assessment.

## WorldWideTestbank™ System Components

The system consists of five core components:

- \* **Metadata Manager**, a component that allows meaningful metadata to be attached to both imported and native WorldWideTestbank content.
- \* **Authoring Interface**, where instructors or content developers can create new (or edit existing) question templates.
- \* **Workflow Editor**, which allows publishers and institutions to create “canned” assignments, as well as allowing faculty end users to create customized assignments.
- \* **Viewer**, which displays the selected templates to the student.
- \* **Bernoulli™ Engine** – the algorithmic engine that powers template randomization and interaction (including automatic grading and tolerance allowance)

### *Metadata Manager*

A template can track and define many key pieces of metadata, including: the template title, description, text-specific details (author, title, edition, copyright year, learning objectives, chapter and section numbers and titles, etc.), answer type, difficulty level, iterations level (the level of “randomness” of the template), based on value (reference to the source of the template), and external link.

The WorldWideTestbank system has a variety of answer types. Some are listed below (and development of new types is ongoing).

- \* Answer Palette – Discipline-specific, open response entry palette
- \* Multipart Answer – Fill-in-the-Blank, Drop Down, Answer Palette, User Input Tools, all in a single template, with optional dependence and user input tools.
- \* Fill-in-the-Blank – Adds pre- and post-text around a numeric response
- \* Numeric – Integer or Real Number
- \* Multiple Select – Select the correct answer(s)
- \* Multiple Choice & Drop Down – One correct option with distracters
- \* True/False & Yes/No

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The metadata makes it easy for instructors to select the types of questions that they want to include in their assignments based on search criteria like:

- \* Where did the question come from in the book?
- \* How easy (or hard) will the students find this question?
- \* For a quick pop quiz, where are the true/false or yes/no questions?

The screenshot displays the 'Describe Question' tab of the WorldWideTestbank Authoring Interface. At the top, there are buttons for 'Instruction Manual', 'Close', and 'Save'. Below these are three tabs: 'Describe Question' (selected), 'Edit Question', and 'Preview Question'. The main form contains the following fields:

- Title:** Placeholder Values (required)
- Description:** Putting Digits of a Number in Columns
- Answer Type:** Multiple Choice
- Subject:** Algebra
- Difficulty level:** 3
- Iterations level:** R10

Below the main form is a 'Close Advanced Options' button. The advanced options section includes:

- Title:** Prealgebra: Mathematics of a Variable World
- Author(s):** Bach
- Copyright Year:** 2006
- Edition:** 3
- ISBN:** 0072969105
- Chapter:** 1. Working With Whole Numbers
- Section:** 1.1. Whole Numbers and Place Values, Reading Tables
- Learning Objective:** 1.1.2::Large Whole Numbers and Place Value
- Based on:** 1.1 Example 1
- Page:** (empty field)
- Spell check:** ☒ on preview
- HTML:** ☒ check tags on preview
- Tolerance:** +1E-4
- Distracters:** Display all choices at a time
- AP:** Use answer palette with maximum nesting level 2
- External Link:** www.link-systems.com
- Followup IDs:** (empty field)

**Figure 2. The WorldWideTestbank Authoring Interface – Describe Question tab**

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## ***Authoring Interface***

The Authoring Interface allows the user to create new (or edit existing) question templates. A template includes a question and answer, with optional hint and solution, and can be static or include randomized variables. The interface includes three tabs – LSI Metadata Manager (Describe Question) detailed above, Edit Question, and Preview Question.

### Edit Question

In addition to creating/modifying the question and answer, the system can provide instructions, work out the full solution, and give a hint. Special characters and images are available, and HTML can be used, although it is not necessary.

An instructor can create a static question in the “Simple” view. This is ideal for instructors who do not want to randomize their questions, but who do want write their own.

An instructor can use the advanced views to define variables that, when randomized, produce an algorithmic template. An instructor can also choose to edit an existing question to customize the values to suit their needs.

The screenshot shows the 'Edit Question' tab of the WorldWideTestbank Authoring Interface. The interface has a top navigation bar with 'Describe Question', 'Edit Question' (selected), and 'Preview Question' tabs. Below the tabs is an 'Insert' toolbar with icons for image, text, formula, and other elements. The main content area is divided into several sections:

- Instructions:** A text area for providing instructions to the student.
- Question(s) and Answer(s):** A text area containing the question and answer. The question is: "distance from Daytona Beach to Detroit is approximately V5 mi, how far is it from Daytona to Atlanta? Round your answer to the nearest mile." The answer is: "The distance from Daytona to Atlanta is V6 miles." The variables V5 and V6 are defined in the Variables section.
- Solution:** A text area containing the solution to the question. The solution is: "Let V0 = the distance from Daytona to Atlanta. V0 = (V3\*V4)/(V5) V0 = V6" (Note: the original image has some formatting issues in the solution text).
- Hint:** A text area for providing a hint to the student.
- Variables:** A list of variables (V0 through V10) with their respective values. V0 is defined as "S\* $\pi$ ". V1 is "[5,15]". V2 is "[20,30]". V3 is "E\*dimproper('V1','V2','n')". V4 is "E\*dimproper('V1','V2','d')". V5 is "[1000,1200]". V6 is "(V3\*V5/V4)". V7 through V10 are empty.
- Answer Palette:** A keypad for entering the answer. The answer is "V0".

**Figure 3. The WorldWideTestbank Authoring Interface – Edit Question tab**

The Authoring Interface includes a tool that annotates images. This lets an instructor write on their image over-and-over again without having to update the actual image! Examples for use include changing the circuit values for an Engineering problem or changing the dollar amounts on a statement of cash flow for an Accounting problem.



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Preview Question

All templates can be previewed for review in the WorldWideTestbank Viewer before posting live. The Viewer will function as the student sees it, so interacting with the “Show Me” and “Your Turn” question types, for example, would be as the student experiences them.

The screenshot displays the 'Preview Question' tab in the WorldWideTestbank Authoring Interface. At the top, there are tabs for 'Instruction Manual', 'Describe Question', 'Edit Question', and 'Preview Question'. The 'Preview Question' tab is active. Below the tabs, there are 'Close' and 'Save' buttons. The main area shows a question template with the text: 'The process whereby autotrophs transform light energy into stored chemical energy is called: (select)'. A dropdown menu is open, showing the following options: '(select)', 'anaerobic respiration', 'chemiosmosis', 'aerobic respiration', and 'photosynthesis'. To the right of the dropdown menu is a small checkbox. Below the dropdown menu is a calculator interface with a display showing '- select -' and various mathematical and scientific symbols. At the bottom of the interface, there are buttons for 'Question', 'Check Answer', 'Show Me', 'Your Turn', 'Hint', 'Print', and 'Help'.

**Figure 4. The WorldWideTestbank Authoring Interface – Preview Question tab**

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### ***Workflow Editor***

A workflow is a series of templates grouped together as an assignment. The Workflow Editor (WFE) allows an instructor to create and define new, or edit existing, workflows. Instructors can then assign these workflows as online assessments or print them out for in-class or take-home worksheets or quizzes.

The screenshot shows the Workflow Editor (WFE) interface. At the top are five buttons: "New Activity", "New Question Template", "Import", "Help", and "Save". Below these are two main columns. The left column contains several dropdown menus: "Bank:" (set to "FB Demo"), "Chapter:" (set to "12. Preliminaries"), "Section:" (set to "1. The Real Numbers and the Cartesian Plane"), and "Learning Objective:" (set to "Solving Linear Systems Using Augmented Matrices"). Below these is a "Questions:" section with a "List by..." dropdown (set to "Select") and a "Legend" link. A list of questions is shown, with "(P)(R) 3.6 Section Exercise 19" selected. The right column contains an "Activity Name:" field (set to "Chapter 12 Exam"), an "Activity Type:" dropdown (set to "Test"), and a "6 Questions in Activity" section with a "Legend" link. A list of questions is shown, with "(P)(R) 0.1 Section Exercise 15" selected. At the bottom are several buttons: "View", "Add >", "< Remove", "Down", "Up", "Print", and "Edit".

Figure

**5. WorldWideTestbank Workflow Editor (WFE)**

### Workflow Activity Type

The WFE has a Workflow Type Editor (WFTE), which allows the instructor to choose an existing workflow type or create his or her own custom workflow types.

This gives the instructor control over how the questions are presented to the student – sets the types of extra “help” features that are displayed for student access – like Hint, Your Turn, etc. For example, a workflow type set to be an exam might include Hint but not the Your Turn.

The instructor can also control the number of retries per question. Instructors may determine that a template with “X” number of iterations may have the option to try another (and set a maximum number of retries), or deactivate the student’s ability to try another question of the same type completely.

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Workflow Display and Tolerance Settings

The WFE has a Display and Evaluation Tolerance Editor (DETE), which allows the instructor to select display options and evaluation tolerance settings.

Instructors can choose to display numbers in the questions with or without commas, and they can control the acceptable student answers. These can be turned on or off individually, or set as a group (from no tolerance to high tolerance).

Some examples of evaluation/tolerance options are:

- \* Equivalent Decimal and Scientific Notation ( $0.123 = 1.23 \times 10^{-1}$ )
- \* Variable with Coefficient of 1 or -1 ( $x = 1x$  or  $-x = -1x$ )
- \* Equivalent Fractions ( $\frac{1}{2} = \frac{4}{8}$  or  $\frac{3}{2} = \frac{6}{4}$ )
- \* Fractions as Equivalent Decimals ( $\frac{1}{8} = 0.125$ )
- \* Capitalization Acceptance Restriction ( $Mg \neq mg$ )
- \* Symbolic and Numeric Equivalence ( $c = 3.0 \times 10^8 \text{ m/s}$ )
- \* Radian and Degree Equivalence ( $2\pi = 360^\circ$ )
- \* Unit Equivalence ( $1\text{km} = 1000 \text{ m}$ )

Printing a Workflow

Instructors can print custom assignments to use for in-class or take-home worksheets or quizzes.

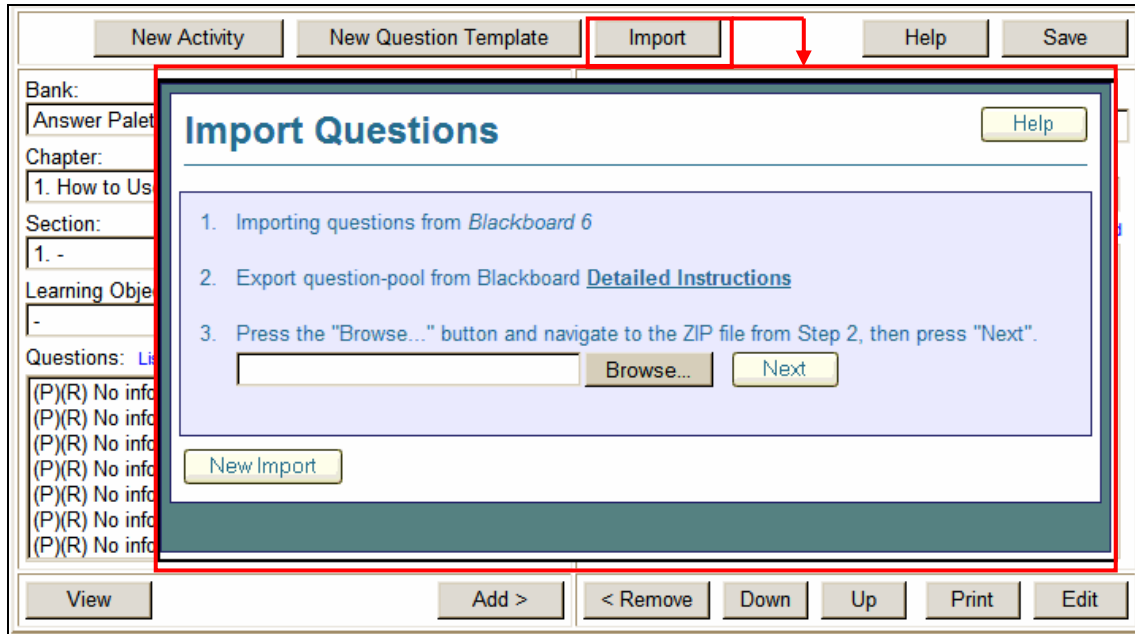
These printouts use the algorithmic templates that the instructor sees in the WorldWideTestbank interface. With the algorithms in place, the instructor can choose to get different versions of the printout with the same *types* of questions (so students have comparable tests with different values). The answer keys can also be printed, and each version will be marked with its version to match it to the right answers.

Once the instructor has put together the questions they want on the print out, they can set the format of the pages – the number of questions per page and the amount of space in-between problems (so students have enough room to work out their solutions).

Importing Static Templates from Popular Course Management Systems

The WFE includes a simple process for importing static questions from WebCT text file, Blackboard 5.5 & 6, or Diploma.

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**Figure 6. WorldWideTestbank Workflow Editor – Import**

The interface walks instructors through the process of exporting their questions from the existing WebCT, Blackboard, or Diploma course that they are using and importing them into WorldWideTestbank system. The process is step-by-step and simple.

Once the questions are in the system, they are accessible in the instructor's Custom Library of templates and can be edited just like any other WorldWideTestbank template. The instructor can then assign them for online assessment or use them in their printouts.

### ***WorldWideTestbank Viewer***

The WorldWideTestbank Viewer displays the template to the student. The Viewer includes a variety problem delivery mechanism, which creates "access instances" to the problems under various "rules and restrictions" as defined by the workflow type.

#### Hint

Each problem template can have a hint option. The hint is static, in the form of an image of a sample iteration of the template or textual guidance.

#### Link to Text

The template can have a link to the PDF of the section of the text.

#### Link to External Content

The template can have a link to external content, which is a link to an offsite URL.

#### More Practice

If the template has been authored such that it has a Your Turn, the More Practice feature opens the Your Turn in a new window. The student sees the option to "Try Another" so that they may work through the same problem type multiple times then go back to the question.

### **Confidential Information**

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### Print

The current view of the template may be printed. For example, if a student is in “Show Me”, they can print the solution.

### Show Me

Each problem template can have a “Show Me” option. This feature works out the *specific* randomly generated problem in the solution. Once the student has seen the answer, they may opt to “Try Another” and a newly randomized problem will be displayed.

**Question 1 of 4****Show Me**

**Elemental phosphorus occurs as tetratomic molecules, P<sub>4</sub>. What mass of chlorine gas is needed to react completely with 455 g of phosphorus to form phosphorus pentachloride?**

**APPROACH**  
Write the balanced equation by first writing the formulas for the reactants and products. Reactants: the formula for phosphorus is given as P<sub>4</sub>, and the formula for chlorine gas is Cl<sub>2</sub> (chlorine occurs as a diatomic molecule). Products: the name phosphorus pentachloride indicates one phosphorus atom and five chlorine atoms to give the formula PCl<sub>5</sub>. Convert the mass of phosphorus to moles, use the mole ratio from the balanced chemical equation, and finally use the molar mass of chlorine to get the mass of chlorine.

**Solution**  
Formulas give the equation:  $\text{Cl}_2 + \text{P}_4 \rightarrow \text{PCl}_5$   
Balancing the equation:  $10\text{Cl}_2 + \text{P}_4 \rightarrow 4\text{PCl}_5$   
$$\text{grams Cl}_2 = (455 \text{ g P}_4) \left( \frac{1 \text{ mol P}_4}{123.88 \text{ g P}_4} \right) \left( \frac{10 \text{ mol Cl}_2}{1 \text{ mol P}_4} \right) \left( \frac{70.90 \text{ g Cl}_2}{1 \text{ mol Cl}_2} \right) =$$
$$2604 \text{ g Cl}_2$$

QuestionTry AnotherShow MeYour Turn

HintPrintHelpNext ▶

Figure 7. WorldWideTestbank Viewer – Show Me

### Your Turn

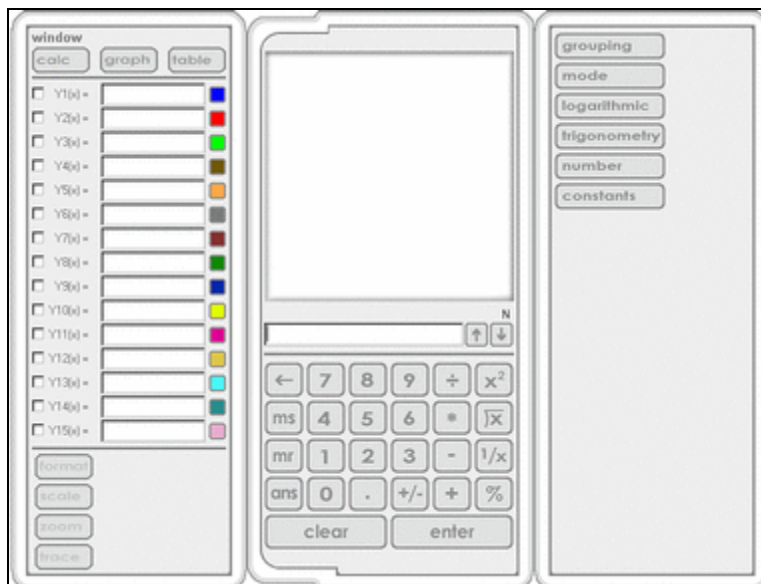
Each problem template can have a “Your Turn” option. This feature separates the full solution into steps, some prompting the student to enter part/all of the *next step*. Each correct answer would induce the next step to be entered, where as each incorrect answer would be followed by a prompt to try again, with the solution for that step available at anytime.



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NetCalculator™

Students may have access to the integrated NetCalculator™ fully functional scientific calculator, which provides modes for elementary and scientific calculations and graphing capabilities.



**Figure 9. NetCalculator™**

## WorldWideTestbank™ Content

The WorldWideTestbank online homework and assessment system allows for the creation of virtually unlimited homework and test questions "on the fly," allowing students to view various solution options.

Each template defines a problem type and randomized variables can be chosen each time the template is displayed, allowing for a significant number of problem variations. The distracters can be calculated by building into the problem templates common mistakes in calculating answers for that particular problem type.

Each template, based on the problem type, creates from several hundred to several hundred thousand unique problems. A typical problem may have from 3 to 5 (up to 40) randomized variables, each with a fixed range of Real Numbers or Integers. For example, a 3-variable problem, with each variable set to one decimal place, and each variable set from -40 to 40, would create 64 MILLION unique problem iterations!

1 out of 3 attempts

Write the equation in slope intercept form.

$y - 3 = 2x$  is

Plot the line on the graph provided.

☒  $\leftrightarrow y = 2x + 3$

Calculator interface showing various mathematical functions and symbols.

Question Check Answer Show Me Your Turn Hint Print Help

Figure 10: Example of WorldWideTestbank Content



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***Accounting, Business, and Economics***

The WorldWideTestbank system allows powerful and accurate question authoring in several “B&E” subject areas, including Accounting, Business Statistics, Economics, Finance, Marketing, Management, CIT, and Law.

1 out of 3 attempts

Sally Cook, Lin Xi, and Ken Schwartz form the CXS Partnership by making capital contributions of \$186,000, \$341,000, and \$93,000, respectively. They predict annual partnership net income of \$120,000 and are considering the following alternative plans of sharing income and loss: (a) equally; (b) in the ratio of their capital investments; or (c) salary allowances of \$30,000 to Cook, \$20,000 to Xi, and \$90,000 to Schwartz; interest allowances of 10% on their capital investments; and the balance shared equally. Prepare a statement of partners' equity showing the allocation of income to the partners assuming the partners agree to use plan (c), that earned income is \$60,100, and that Cook, Xi, and Schwartz withdraw \$20,000, \$33,000, and \$20,000 respectively, at year-end? Express all negative numbers on the statement sheet in parenthesis, if necessary.

CXS PARTNERSHIP Statement of Partners' Equity For Year Ended December 31				
	Cook	Xi	Schwartz	Total
Beginning capital balances	\$ 0	\$ 0	\$ 0	\$ 0
Plus				
Investments by owners	186000	341000	93000	620000
Net Income				
Salary allowance	30000	20000	90000	
Interest allowances	18600	34100	9300	
Balance allocated equally	(47300)	(47300)	(47300)	
Total net income				
Total				
Less partner withdrawals				
Ending capital balance	\$	\$	\$	\$

[Question](#) [Check Answer](#) [Show Me](#) [Your Turn](#)  
[Hint](#) [Print](#) [Help](#)

Figure 11. WorldWideTestbank for Accounting, Business, and Economics

Key functions/features for these topics include:

- \* **Multipart answer type** for randomized business documents, like cost sheets and financial statements, plus support for financial statements.
- \* **Annotated image tool** adds variable labels onto static documents and images.
- \* **Open response answer palettes** allow students to “build up” their answers – cutting down on multiple-choice answers.

### Mathematics and Statistics

The WorldWideTestbank system allows powerful and accurate question authoring in several mathematics subject areas, including Basic Math, Algebra, Calculus, and Statistics.

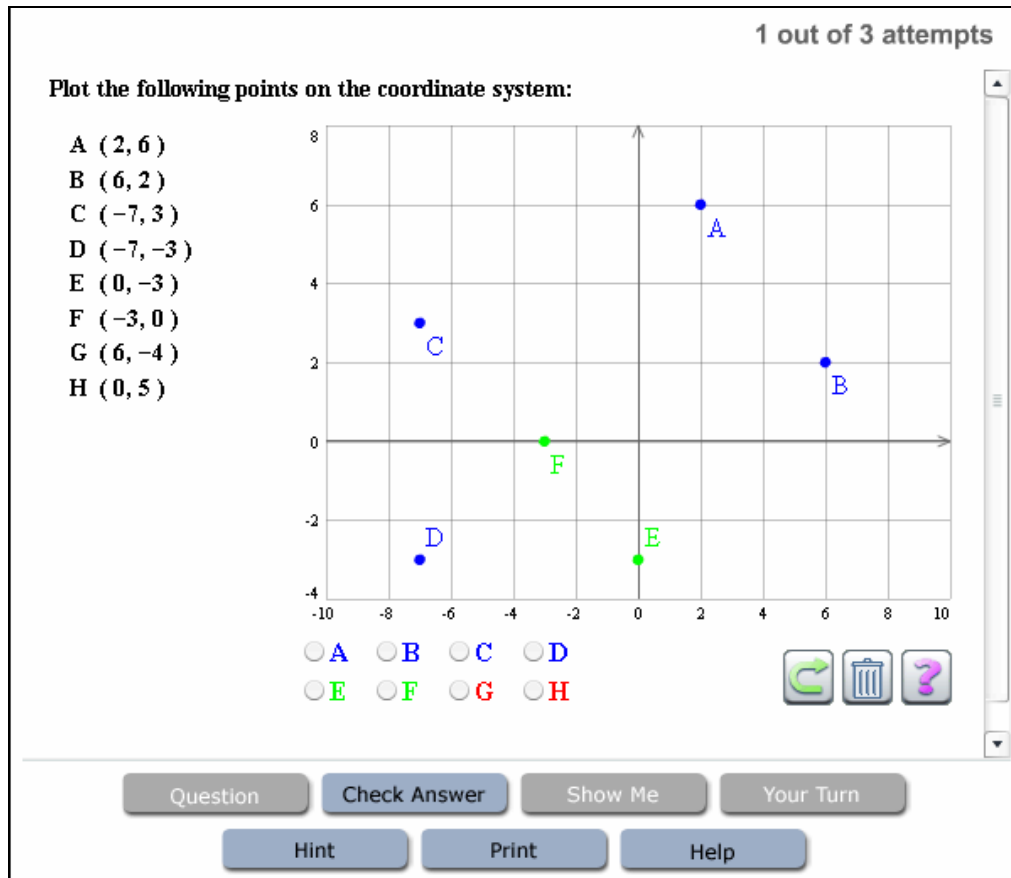


Figure 12. WorldWideTestbank for Mathematics and Statistics

Key functions/features for these topics include:





- \* **Open response answer palettes** allow students to “build up” their answers – cutting down on multiple-choice answers.
- \* Randomized graphs and coordinate systems can be displayed with the **graphing calculator**.
- \* **Plot Point and Draw Line user input tools** allow students draw their answer on an interactive grid.
- \* Images can have variable labels with the **annotated image tool** – giving students a visual representation of application problems like comparing the ratio of the height of a man to the height of a tree.




### Sciences and Engineering

The WorldWideTestbank system also allows powerful and accurate question authoring in Life Sciences, Physics and Engineering.

1 out of 3 attempts

Given the following:  
The green car weighs 14,000 N.  
The red car has a mass of 1,900 N.  
The blue car weighs 17,000 N.  
The yellow car has a mass of 990,000 g.  
Rank the cars in increasing order of weight.

				Least		Greatest	
							
							

Question Check Answer Show Me Your Turn  
Hint Print Help

Figure 13. WorldWideTestbank for Sciences and Engineering

Key functions/features for these topics include:

- \* **Units answer type** allows students to enter numeric values with the corresponding unit.
- \* The **Free-Body Diagram** user input tool allows students to draw their FBD.
- \* The **Drag-and-Drop** user input tool allows students to rank, order, or categorize their answer.
- \* Engineering, Life Sciences, and Physics-specific **open response answer palettes**; include features such as rotational and oriented angles, reaction arrows, Greek letters, and common constants used in Physics.
- \* The **annotated image tool** can be used to add variables onto electrical circuits.
- \* A **multipart answer type with its dependent option** allows for questions to include responses that depend on question parts being worked on in order, such as finding a velocity, then finding acceleration.

## Minimum System Requirements

### *Server Requirements*

#### Unix Server

- \* Linux RedHat 6.2, Solaris 2.5, or other supported Unix servers
- \* 64 MB RAM, 20 MB Hard Disk space
- \* Apache 1.3, Perl 5.005
- \* MySQL 4, 5 or Oracle
- \* aspell (optional) 3.2

### *End-User Requirements*

#### Microsoft Windows Client

- \* Windows XP, Vista
- \* 56K bps or faster modem, ISDN, DSL, Cable or LAN connection
- \* Internet Explorer 6, 7; Netscape 8.1, 9; Firefox 2.0, 3.0; Safari 3.2
- \* Flash Player 9

#### Macintosh Client

- \* Mac OS 10.4, Mac OS 10.5
- \* 56K bps or faster modem, ISDN, DSL, Cable or LAN connection
- \* Netscape 8.1, 9; Firefox 2.0, 3.0; Safari 2.0, 3.2
- \* Flash Player 9

## About Link-Systems International, Inc.

### *LSI Mission Statement*

Link-Systems International is the leader in providing integrated technology and service solutions to educators in order to improve the quality of education and training, ensure student success and retention, and provide affordable education to students, workers, and their families.

### *Our Company*

Link-Systems International, Incorporated (LSI) is a privately held, technology services and content development company that has been dedicated to student success and student retention in K-12 Education, Higher Education, and Workforce Development Education since 1995.

Our core technologies include a very flexible online tutoring/teaching platform, an online grade book, an online algorithm engine with metadata and workflow capabilities, and an online business intelligence/data mining technology designed to provide real-time alerts regarding student/school/teacher performance, attendance, and other metrics.

Our core services include content development, consulting, and online tutoring through our NetTutor® brand.

Our customers include K-12 publishers, higher education publishers, virtual high schools, higher education institutions, technology companies, and Joint Programs dedicated to providing online educational content to members of Organized Labor and their families.

We are located in Tampa, Florida, a few miles from the University of South Florida. Along with the Moffitt Cancer Center -- one of the premier medical research institutions in the United States -- USF has excellent Engineering, Computer Science and Mathematics programs which provide LSI much of our human capital.

Launched in 1995, LSI has created several unique and powerful technologies, which facilitate the sharing of content over the Internet. We specialize in mathematics, technical and scientific content, the most critical types of online content with respect to student success, and the most difficult to share online.

Today, LSI is recognized by a variety of publishers and educational institutions not only for its high-quality work and dedication to meeting commitments, but also for its unique ability to develop digital strategies that are custom tailored to the needs of its customers.

**An Introduction to the WorldWideTestbank™  
Online Homework and Assessment System  
2010 - 2011**

Our partners and customers have come to value and trust LSI because we are the only company that offers a complete suite of interoperable solutions that address the entire life cycle of the student, with an overt focus on the bottom line: Student Success and Student Retention. That student life cycle includes:

- \* Online Assessment and Placement
- \* Content Authoring
- \* Content Recovery, Content Management and Metadata Management
- \* Online Teaching, Collaboration, and Tutoring
- \* Online Homework and Testing
- \* Online Grade book Technologies
- \* Online Real-Time Performance Monitoring and Intervention

Through a relationship with LSI, educators acquire the ability to construct a complete, holistic approach to Student Success and Student Retention.

***Our Team***

Vincent T. Forese, President, Chief Executive Officer  
Dr. Yanmu Zhou, Senior Vice President, Chief Technology Officer  
Dr. Emil Moskona, Senior Vice President, Chief Operating Officer  
Dr. Milena Moskova, Vice President, Research and Development  
William K. Barter, Vice President, Business Development  
Robert Andersen, Director, Content Services  
Chris Boisclair, Director, International Sales  
Joseph Bower, Director, Operations  
Trey Bruns, Director, Sales  
Tom Forese, Director, Academic Partnerships  
Dr. David Kephart, Director Online Tutoring  
Richard T. Meade, Director, Market Development

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***Our Customers***

A Partial list of the various schools and companies we work with.

**Business Customers:**

- |  |   |
|--|---|
| * Association of Joint Labor/Management Educational Programs | * Los Angeles Department of Water and Power |
| * Communication Workers of America                           | * Nurture New York Nature                   |
| * Earth Pledge   | * Qwest Communications                      |
| * International Brotherhood of Electrical Workers            | * United Steel Workers of America           |
|  | * Verizon, Inc.                             |

**Publishing Customers:**

- |                            |                             |
|----------------------------|-----------------------------|
| * Bedford, Freeman & Worth | * Key College Publishing    |
| * Cengage Learning         | * McDougal Littell, Inc.    |
| * Houghton Mifflin Company | * The McGraw-Hill Companies |
| * John Wiley and Sons      | * Pearson Education         |

**Academic Customers:**

- |  |                                     |
|--|-------------------------------------|
| * American Intercontinental University | * Pima Community College            |
| * Ashford University                   | * Rockwood School District          |
| * Arizona Western College              | * San Diego Community College       |
| * California State University          | * San Diego Mesa College            |
| * Central Piedmont Community College   | * SUNY – Cortland                   |
| * Chattahoochee Technical College      | * SUNY – Delhi                      |
| * Chattanooga State University         | * Texas Tech University             |
| * College Board                        | * Union County College              |
| * CCS Web Academy                      | * University of Arkansas            |
| * Cumberland County Schools            | * University of Canterbury          |
| * Delgado Community College            | * University of Central Florida     |
| * Fanshawe College                     | * University of Colorado-Denver     |
| * Florida Virtual School               | * University of Georgia             |
| * Georgia Virtual School               | * University of Idaho               |
| * Independence University              | * University of New Orleans         |
| * Johns Hopkins University             | * University of Phoenix             |
| * Kaplan University                    | * University of Wisconsin-Milwaukee |
| * Keiser University                    | * Utah Valley University            |
| * Limestone College                    | * Weber State University            |
| * Mississippi Virtual Public School    | * Youngstown State University       |
| * Mount San Antonio College            |                                     |

**Platform Customers**

- |                     |                        |
|---------------------|------------------------|
| * AcademicOne       | * Pearson eCollege     |
| * Blackboard        | * Embanet              |
| * Content on Demand | * JonesKnowledge, Inc. |