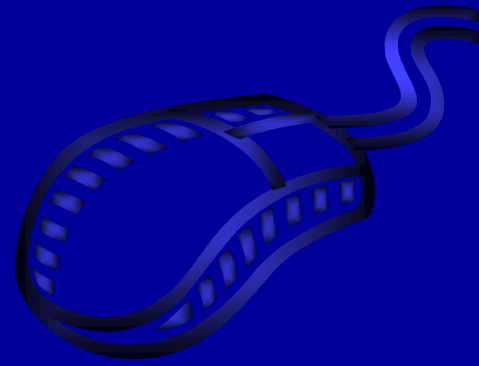


And Now For Something
Completely Different...



Selected Novel Test Item Formats for Computerized Assessment

April L. Zenisky

University of Massachusetts at Amherst

February 2005



Testing and computer technology



- Use of computer technology in many aspects of assessment is often a matter of course

Development

Analysis

Reporting

Scoring

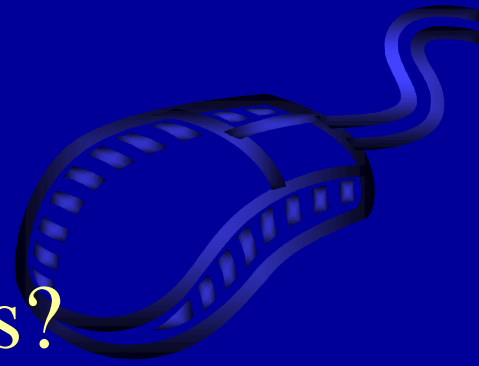
and increasingly, Administration



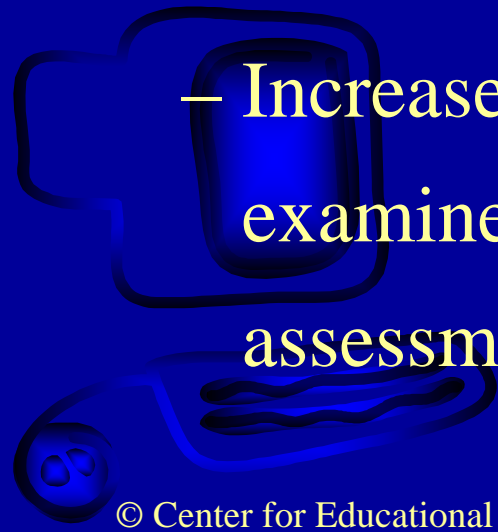
Technology and CBT

- CBT as a medium for giving tests is maturing
 - Away from static linear forms
 - Increased interest in taking advantage of graphical, video, and audio capabilities
- Reconsideration of what examinee responses could look like (Bennett, 1998)
 - Goal: enhancing measurement information

Novel item types



- Why develop or use new item types?
 - Potential for greater alignment of test items with construct(s) of interest
 - For example, NBME's Step 3 Computer-Based Case Simulations (CCS); also, the AICPA's new CPA Exam
 - Increased interest among test developers and examinees in more “active” or “engaging” assessment methods




Focus for today

- A framework for thinking about items and item types in computer-based testing
- Lots of examples
- Issues and research needs



Purposes



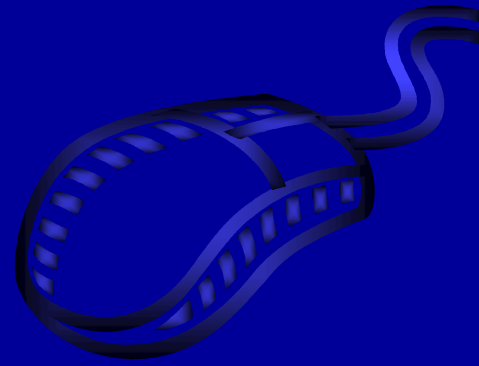
- Introduce the possibilities that are out there for computerized testing
 - Think about tests and test items in terms of information value
 - What do different item types bring to measuring a construct?
 - Talk about the state of research and identify needs
- 

Caveat to the Presentation

- No skeptics allowed (until later)



What is a test item?

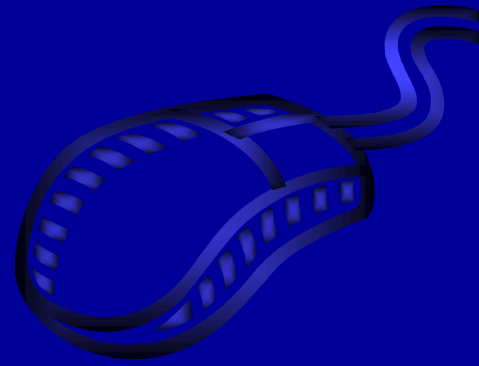


- From Osterlind (1990):

“...a unit of measurement with a stimulus and prescriptive form for answering; (...) it is intended to yield a response from an examinee from which performance in some psychological construct may be inferred”



What is a test item?



- The first part of a test item is the *stem*
 - This is where a question is asked or a task to be completed is laid out
 - Must be explicitly clear to examinees what they need to do

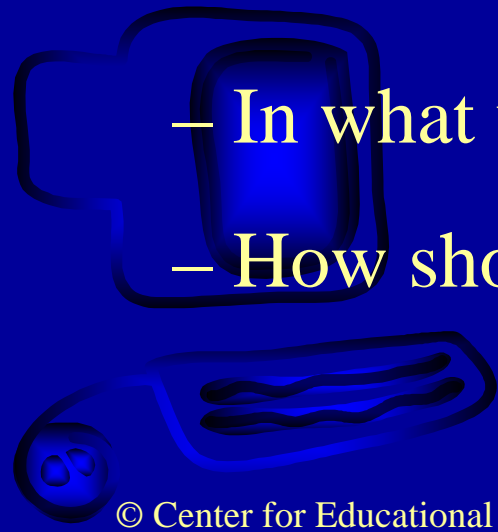
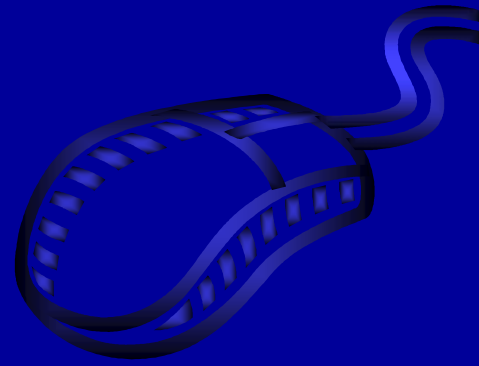


What is a test item?

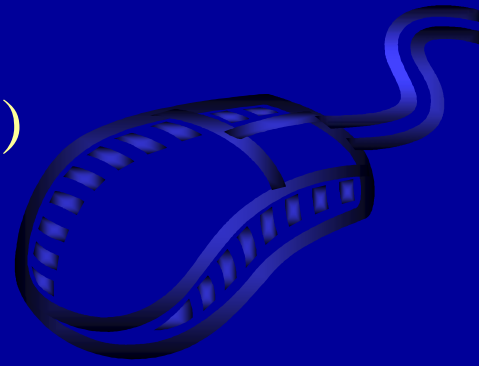
- The second part of a test item is the *response*, where students answer as directed in the stem
- Can take many forms
 - Selected or constructed response
 - More constrained to less constrained

Response actions

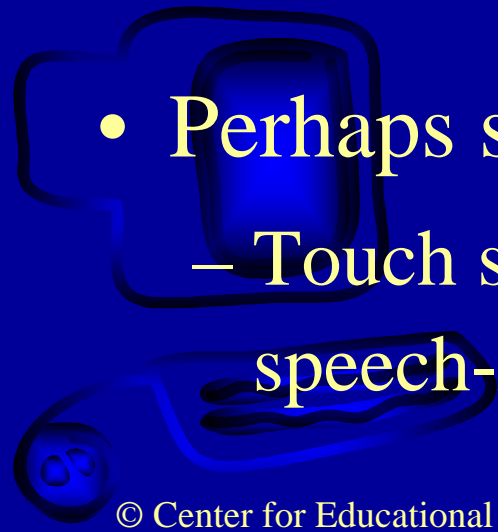
- Parshall, Davey, & Pashley (2000)
 - What should examinees know and be able to do relative to a specified construct?
 - What kind of information should be gathered from examinees?
 - In what ways can that information be represented?
 - How should it be entered into the computer?



Response actions (cont.)



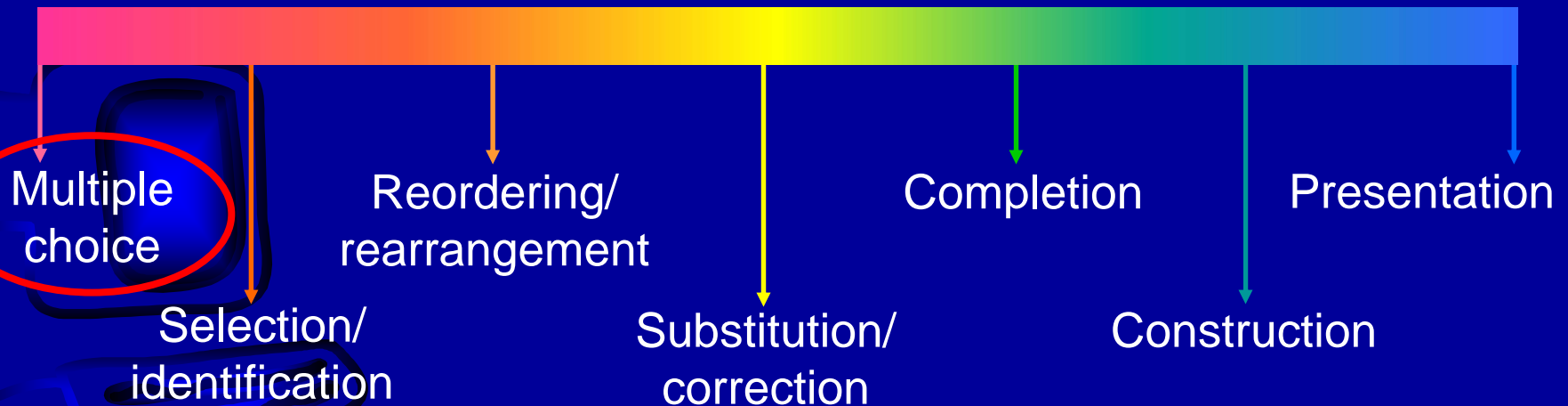
- In CBT, these commonly include:
 - Typing response via keyboard
 - Using mouse to drag-and-drop onscreen items
 - Drawing/illustrating concepts with onscreen tools
 - Clicking on screen with mouse
- Perhaps someday, with more research:
 - Touch screens, light pens, joysticks, trackballs, speech-recognition software



Conceptualizing Item Types



- Continuum from Bennett, Ward, Rock, and LaHart (1990)
 - Provides organizing framework for identifying specific cognitive skills and fundamental nature of assessment tasks (in CBT or otherwise)



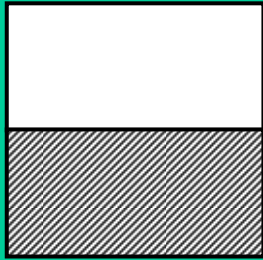
Multiple-choice



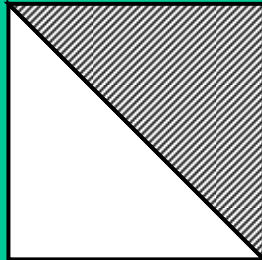
- Choose an answer from a small set of response options
- Perception that MC items only assess recall
 - The research is equivocal (Martinez, 1999)
 - Is it a limitation of the format itself?
 - Or is there a need to provide better guidance to item writers (coach writers with exemplars of MC items that do get at higher-order thinking skills)?



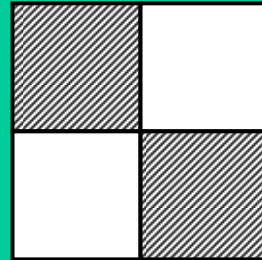
Multiple-choice (Example 1)



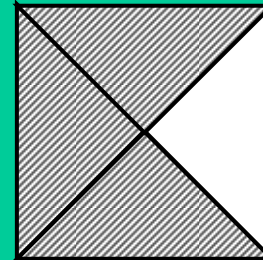
A



B



C



D

Which of the four pictures above shows $\frac{3}{4}$?
(Choose one answer.)

1. A
2. B
3. C
4. D

Variation on Multiple-Choice: AICPA

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Drop-down Selections

Numeric and Monetary Inputs

Formula Answers

Written Communication

Forms Completion

Multiple Choice / Multiple Select

AUTHORITATIVE LITERATURE

Formula Answers

Continue by clicking on one of the formulas as indicated below.

Testlet 2 of 5 Time Remaining 4 hours 0 minutes

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Directions Situation Cost Method Amt To Rept COGS Invent Costs Form 1065 Communication Research1

Determine the amount at which inventory should be reported in the financial statements by completing the table below. In cells B6 and B7 enter the values you calculate for floor and ceiling, respectively. For cells B9 and B11, double-click in the cells and select from the list provided the formulas that will correctly calculate the market value and the amount at which to report, respectively. Be sure a value appears in each of the shaded cells to complete this problem.

	A	B
1	Original Cost	\$ 8.20
2	Replacement cost	\$ 8.00
3	Net realizable value	\$ 8.80
4	Profit percentage	6.56%
5		
6	Ceiling	\$ 8.80
7	Floor	\$ 8.22
8		
9	Market	\$ 8.22
10		
11	Amount at which to report	\$ 8.20

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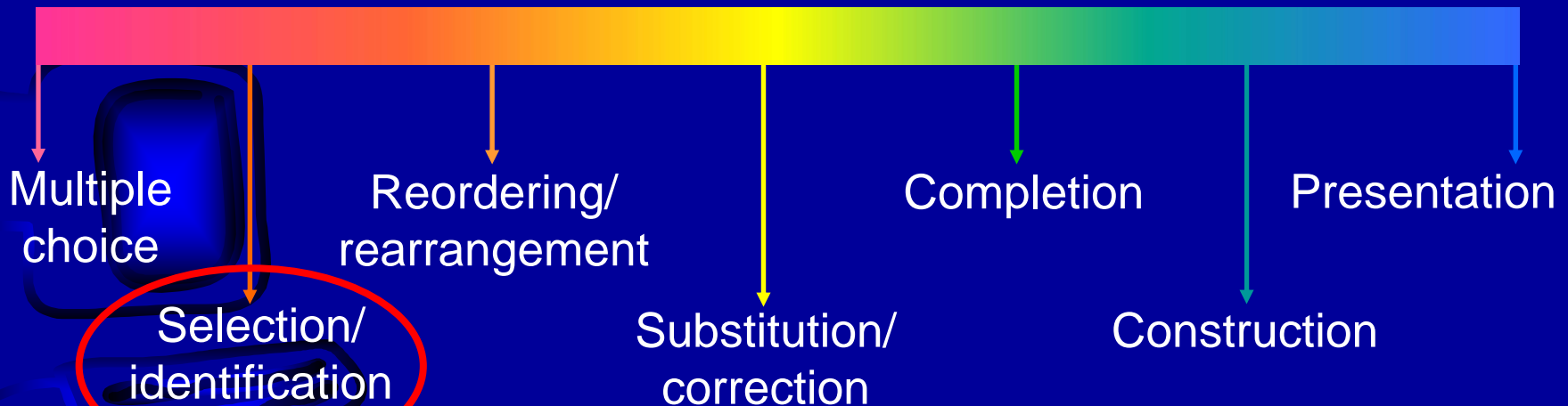
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EXIT HOME

Conceptualizing Item Types




- Continuum from Bennett, Ward, Rock, and LaHart (1990)
 - Provides organizing framework for identifying specific cognitive skills and fundamental nature of assessment tasks (in CBT or otherwise)



Selection/identification



- Similar to MC in that examinees choose a response from presented alternatives
 - Number of possible choices is typically large enough to limit possible effects of guessing
 - Some conceptual examples include multiple selection, matching, and cloze elide
- 

Multiple Selection: AICPA

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Multiple Choice / Multiple Select **START OVER** **PLAY** **PAUSE**

Sales commissions has been selected as the second answer. Once you have chosen the maximum number of answers, all other boxes become gray.

Testlet 2 of 5 Time Remaining 4 hours 0 minutes

Copy Paste Calculator Sheet Standards Help Split Done

Directions Situation Cost Method Amt To Repl COGS Invent Costs Form 1065 Communic Review Letter

From the following costs, select two that should be part of inventory costs by clicking the box beside the option. Only two costs can be selected at a time.

- ☒ Production costs
- ☐ Excessive spoilage costs
- ☐ Selling expenses
- ☐ Acquisition costs
- ☒ Sales commissions
- ☐ Re-handling charges

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Multiple Selection: AICPA

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Drop-down Selections

Numeric and Monetary Inputs

Formula Answers

Written Communication

Forms Completion

Multiple Choice / Multiple Select

AUTHORITATIVE LITERATURE

Drop-down Selections

Good! You have properly selected an item from the drop-down list.

Financial Accounting and Reporting Section Time Remaining 4 hours 0 minutes Calculator Sheet Standards Help Unsplit Done

Directions Situation Costing Amt to Report COGS Invent Costs Form 970 Communication Research

For each of the method descriptions in the table below, identify the inventory costing method described by double-clicking on a shaded area in the table and selecting the appropriate name of the costing method from the list provided.

Method description	Method Name
Method results in recognized cost flows associated with actual physical flow	
Calculation of ending inventory is determined by applying a specific price index to inventory layers.	FIFO
Calculation of ending inventory is determined by applying a specific price index to broad inventory pools.	
During inflationary periods, method results in matching of cost of goods sold based on earlier, lower acquisition costs with current revenue on the income statement.	
During inflationary periods, method results in matching most recently incurred inventory costs with current revenue on the income statement.	
Calculation of inventory is the same under use of periodic and perpetual inventory systems.	

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Highlighting Text

(Carey, 2001; Walker & Crandall, 1999)



“Examinee ability estimates are not group-dependent. Ability estimates obtained from different sets of items will be the same (except for measurement errors), and item parameter estimates obtained in different groups of examinees will be the same (except for sampling errors). In item response theory, item and ability parameters are said to be *invariant*. The property of invariance of item and ability parameters is obtained by incorporating information about the items into the ability-estimation process and by incorporating information about the examinees’ abilities into the item-parameter estimation process.”

[From: Hambleton, R.K., Swaminathan, H., & Rogers, H. J. (1991). *Fundamentals of item response theory*. Newbury Park, NJ: Sage.]

Click on the sentence in the paragraph to the left that *best* describes the practical meaning of the property of invariance.

(Place the pointer on the sentence you wish to highlight, and click to select it.)



Help



Previous



Next

Multiple Selection



Marco has \$7.00 to spend on his lunch. Click on a drink, a sandwich, and a side that Marco could have for lunch so that the price of the three items adds up to \$7.00 or less.

Drinks		Sandwiches		Sides	
\$1.25	Milk	\$3.75	Veggie	\$1.50	Chips
\$.95	Tea	\$4.50	Turkey	\$1.00	Cookies
\$1.50	Soda	\$4.75	Roast Beef	\$1.75	Rice
\$1.25	Juice	\$5.00	Pastrami	\$1.50	Green Salad
\$.95	Coffee	\$4.75	Ham	\$1.50	Fruit Salad

Analyzing Situations

(Ackerman, Evans, Park, Tamassia, & Turner, 1999)

00:59 ETS CBT Demonstration - Section 1: Sample Items 3 of 14

Beginning

Refer to the following situation.

A 42-year-old male presents with a complaint of frequent right ankle sprain. He complains of numbness and paresthesia on the bottom and lateral side of his right foot. His medical history is noncontributory. Pertinent findings from muscle testing, physical examination, and peripheral nerve testing are provided below.

Muscle Testing Results	R	L
Tibialis anterior	+5/5	5/5
Extensor digitorum longus	5/5	5/5
Extensor hallucis longus	+5/5	5/5
Peroneus longus	+2/5	5/5
Peroneus brevis	+2/5	+5/5
Gastrocnemius	+3/5	+5/5
Soleus	+2/5	+5/5
Quadriceps	+5/5	+5/5
Adductor (hip)	+5/5	+5/5
Abductor (hip)	+5/5	+5/5
Iliopsoas (hip flexors)	+5/5	+5/5
Gluteus maximus and minimus (hip extension)	+2/5	+5/5

Complete the following chart, noting with a check the findings that should be anticipated when upper motor neuron lesions are present. In the chart below, **U** stands for Unaffected, **I** stands for Increased, and **D** stands for Decreased. (Click on the box where you want the check to appear.)

	Upper Motor Neuron Lesions		
	U	I	D
Muscle Tone		✓	
Muscle Stretch Reflexes	✓		

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Specifying Relationships

(Fitzgerald, 2001)

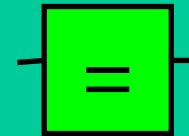
For each pair of fractions listed below, decide if the quantities are equal or if they are not equal.

Use the symbols below to replace the question mark in each pair with the correct relationship.

$$\frac{3}{6} \quad = \quad \frac{1}{2}$$

$$\frac{1}{3} \quad ? \quad \frac{4}{6}$$

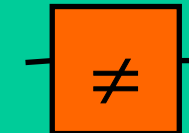
Drag this symbol to show that the fractions are equal



$$\frac{4}{5} \quad ? \quad \frac{7}{8}$$

$$\frac{2}{8} \quad ? \quad \frac{1}{4}$$

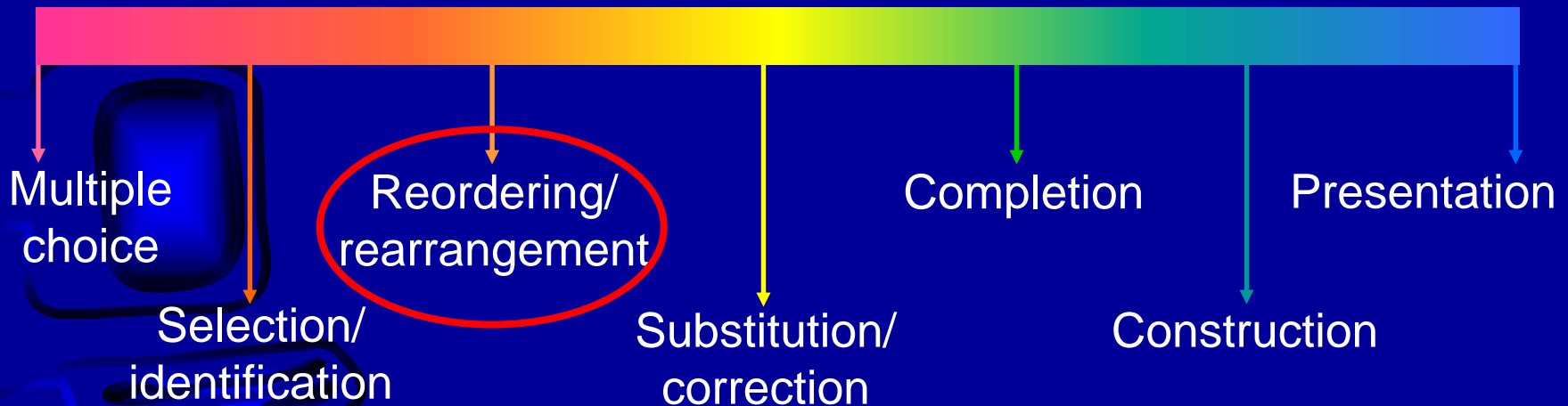
Drag this symbol to show that the fractions are not equal



Conceptualizing Item Types

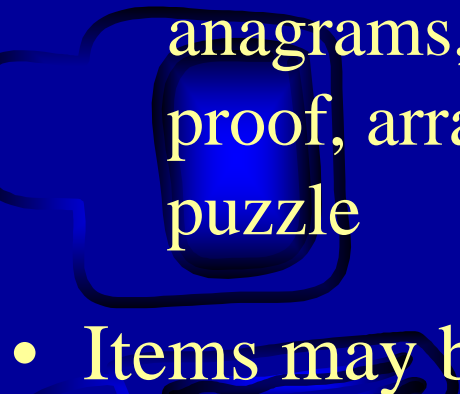


- Continuum from Bennett, Ward, Rock, and LaHart (1990)
 - Provides organizing framework for identifying specific cognitive skills and fundamental nature of assessment tasks (in CBT or otherwise)



Reordering/rearrangement



- Responses still chosen from stimulus array (presented alternatives/items)
 - Task is to place items in correct sequence (or an alternative)
 - Conceptual examples: Ordering sentences, constructing anagrams, arranging mathematical expressions to form a proof, arranging pictures in sequence, putting together a puzzle
 - Items may be words, number, pictures, symbols...
- 

Ordering Information

(Fitzgerald, 2001; Walker & Crandall, 1999)

The two-parameter logistic model was fit to five items, and the item parameter estimates for each item are listed in the table below.

Item	a-param	b-param
Item 1	0.45	-0.53
Item 2	1.07	0.09
Item 3	0.84	0.89
Item 4	0.79	0.27
Item 5	1.20	-0.78

Task:

Rank order the five items from the table in terms of their difficulties from hardest to easiest by dragging the item number to the answer box below.

Answer Box

Hard



Easy

1. Item 3

2. Item 4

3. Item 2

4. Item 1

5. Item 5

DONE

Ordering Information

(Microsoft, n.d.)

00:59 ETS CBT Demonstration - Section 1: Sample Items 6 of 14

Beginning

Most insects undergo several distinct changes in form during their development from egg to adult; such a series is called 'metamorphosis.' Each new stage, or 'molt,' occurs when the insect sheds and replaces its outer covering. Some insects, such as grasshoppers, undergo gradual, or 'incomplete,' metamorphosis, with each molt resulting in a more adult-like appearance. Other insects, such as butterflies, moths, beetles, and flies, undergo 'complete' metamorphosis. In complete metamorphosis, the insect passes through four stages of development: (1) egg, (2) larva, (3) pupa, and (4) adult.

The larva is segmented and wormlike. In the case of a butterfly or a moth, the larva takes the form of a caterpillar. The insect eats, often voraciously, during the larva stage.

After a period of feeding and rapid growth, the larva enters the pupa stage. In the pupa stage, the insect encloses itself in a case, or cocoon, and does not

Below are labeled illustrations of the three stages of a moth's metamorphosis. Illustrate the life cycle of the moth by moving the appropriate illustrations to their correct locations outside the circle. The labeled illustration of the first stage, eggs, has already been entered. (Place the pointer on the illustration you wish to move and click. Then place the pointer on the location where you want the illustration to appear and click.)

Test Quit Time Review Mark Erase Calc ? Help Prev Next

Select-and-Classify

(Microsoft, n.d.)



Some of the number sentences below are adding two numbers together, and some are subtracting one number from the other.

For each number sentence, decide if it is addition or subtraction, click on it, and drag it to the appropriate box.

$5+6=11$

$4-2=2$

$5-1=4$

$9+4=13$

$1+5=6$

$12-7=5$

$3+7=10$

$3-2=1$

$14-9=5$

$2+6=8$

Addition

$5+6=11$

Subtraction

$12-7=5$

$4-2=2$

Select-and-Place

(Fitzgerald, 2001; Microsoft, 1999)

House numbers on Memorial Drive go west to east. Odd numbered houses are on one side of Memorial Drive, and even-numbered houses are on the other.

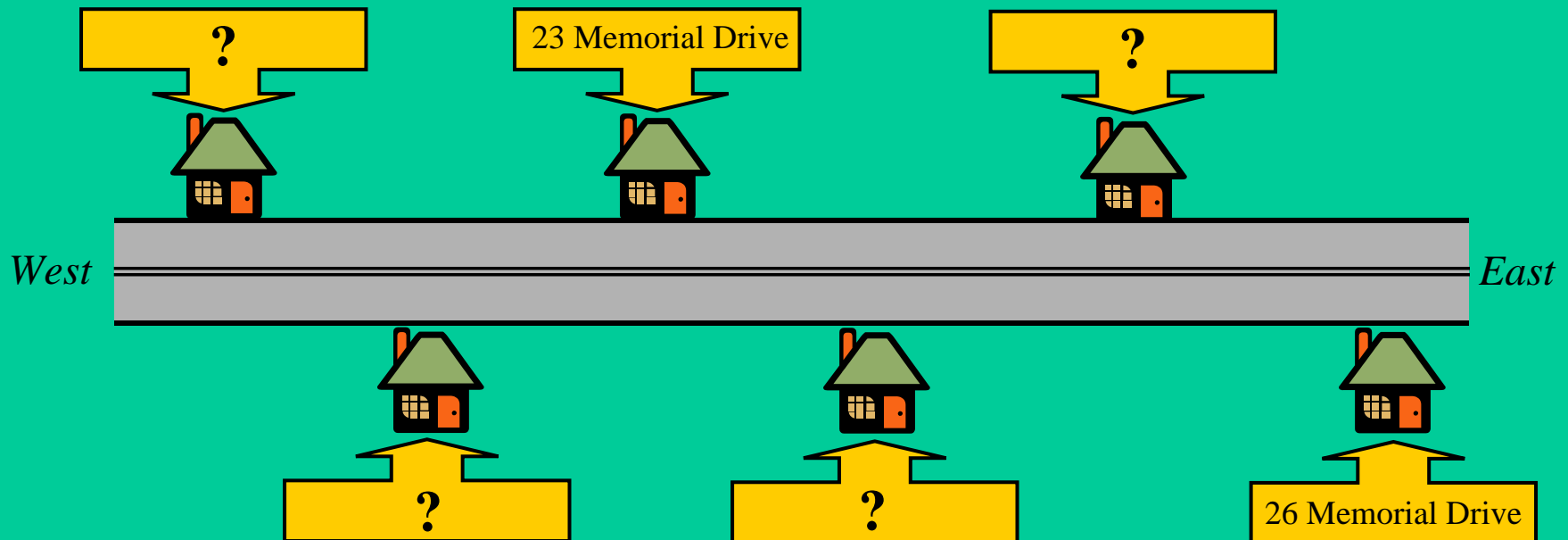
For each address in the table, determine which address corresponds to each house, and drag the address to the appropriate house.

22 Memorial Drive

24 Memorial Drive

21 Memorial Drive

25 Memorial Drive



Inserting Text

(Taylor, Jamieson, Eignor, & Kirsch, 1998)

00:59 ETS CBT Demonstration - Section 1: Sample Items 5 of 14

Beginning

These questions are based on the passage below.

■ In the eighteenth century, earthenware and stoneware were widely used in the American colonies for the storage and preservation of food.

■ The Edgefield stoneware factory in South Carolina employed both Anglo-American potters and African American slave laborers. ■ The latter were apparently involved in every aspect of stoneware production, from digging, hauling, and preparing the clay to shaping it, baking it, and transporting it to market for sale. ■

■ Unique stoneware forms have been attributed to the African American potters in the Edgefield factory. **For example, both styles feature the use of porcelain inserts for eyes and teeth.**

They produced unusual sculpted vessels that consisted of a conventional jug or vase onto which facial features were modeled in applied clay. ■

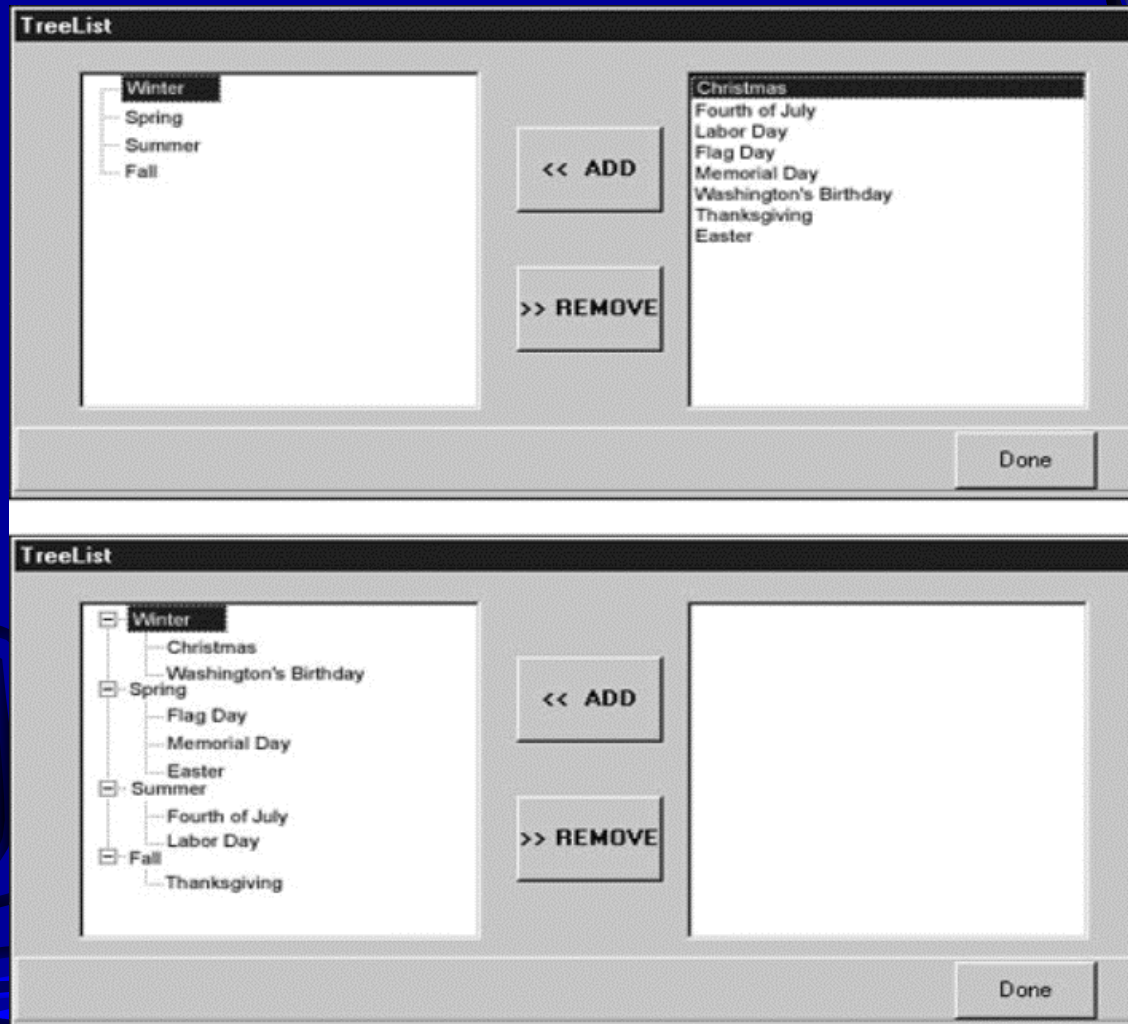
Some scholars have compared the Edgefield 'face vessels' to African wood carvings made by the Kongo people of Central Africa. ■ They point to similarities between the two styles of facial representation. ■ In fact, since the majority of South Carolina's African Americans (or their

Suppose the sentence below had originally been part of the passage. Place the sentence in the passage where it could logically serve as a specific example of a general observation reported in the preceding sentence. (To add the text to the passage, click on the box at the place you select.)

For example, both styles feature the use of porcelain inserts for eyes and teeth.

Test Quit Time Review Mark Erase Calc ? Help Prev Next

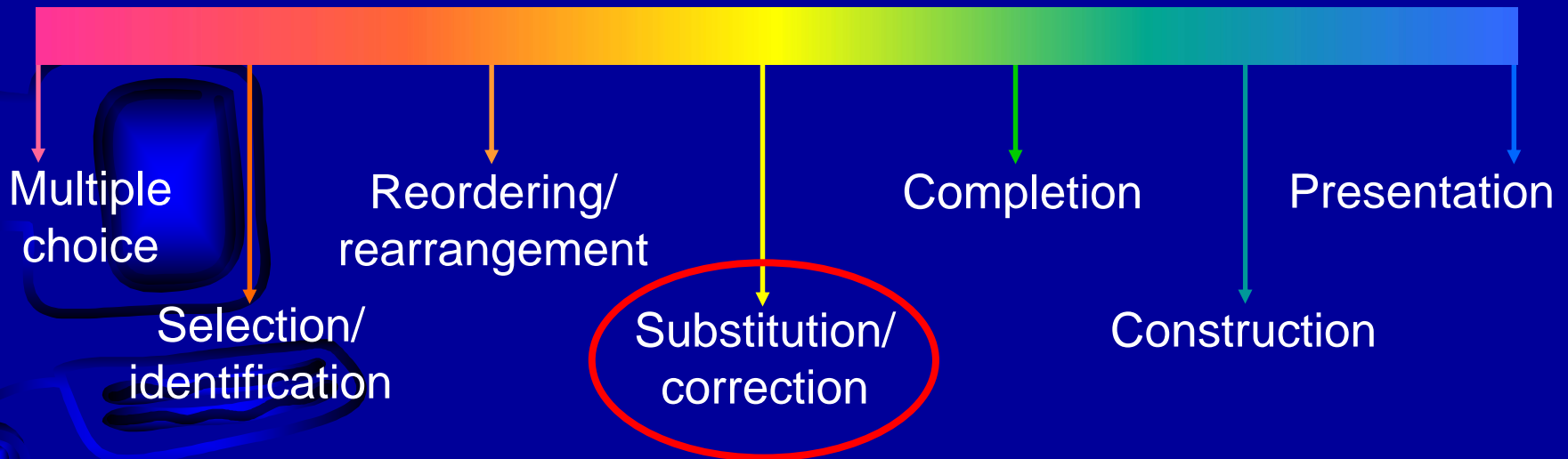
Create-a-Tree (Fitzgerald, 2001; Walker & Crandall, 1999)



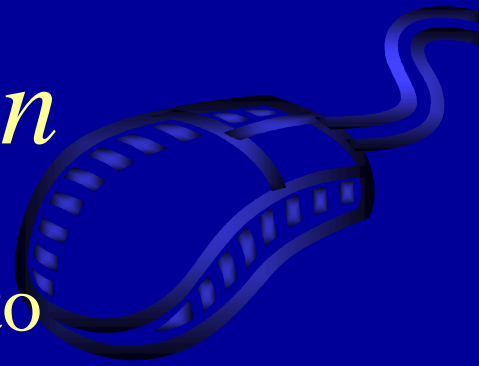
Conceptualizing Item Types



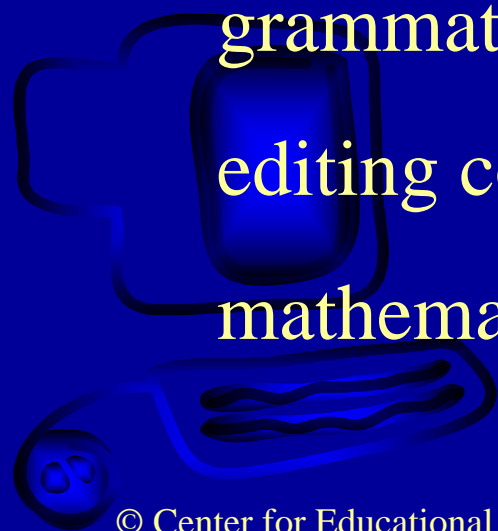
- Continuum from Bennett, Ward, Rock, and LaHart (1990)
 - Provides organizing framework for identifying specific cognitive skills and fundamental nature of assessment tasks (in CBT or otherwise)



Substitution/correction



- Examinees must replace (as opposed to reordering/rearranging) what is presented to them with a correct alternative
- Conceptual examples: Correcting spelling, fixing grammatical errors, substituting appropriate words, editing computer programs, formulating mathematical expressions



Formulating Mathematical Expressions

The equation for the two-parameter logistic IRT model is:

$$P_i(\theta) = \frac{e^{Da_i(\theta-b_i)}}{1 + e^{Da_i(\theta-b_i)}}$$

Using the equation tool below, change the equation given above to correctly represent the mathematical expression for the three-parameter logistic IRT model. (Your answer will appear in the 'My Answer' box after closing Equation Master.)

Equation Master...

Next Item »»»➔

My Answer

$$P_i(\theta) = c_i + (1 - c_i) \frac{e^{Da_i(\theta-b_i)}}{1 + e^{Da_i(\theta-b_i)}}$$

Highlighting Text

(Carey, 2001; Walker & Crandall, 1999)



Directions: Click on the one value in the number sentence below that must be changed in order for the number sentence to be correct.

$$3+2+5 = 5+2+9 = 10$$



This is one way to allow students to demonstrate understanding of the commutative property of addition

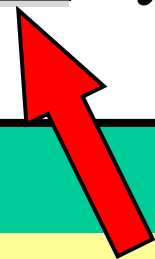
Highlighting Text

(Carey, 2001; Walker & Crandall, 1999)



Directions: Click on the underlined item in the sentence below that must be changed in order for the sentence to be correct.

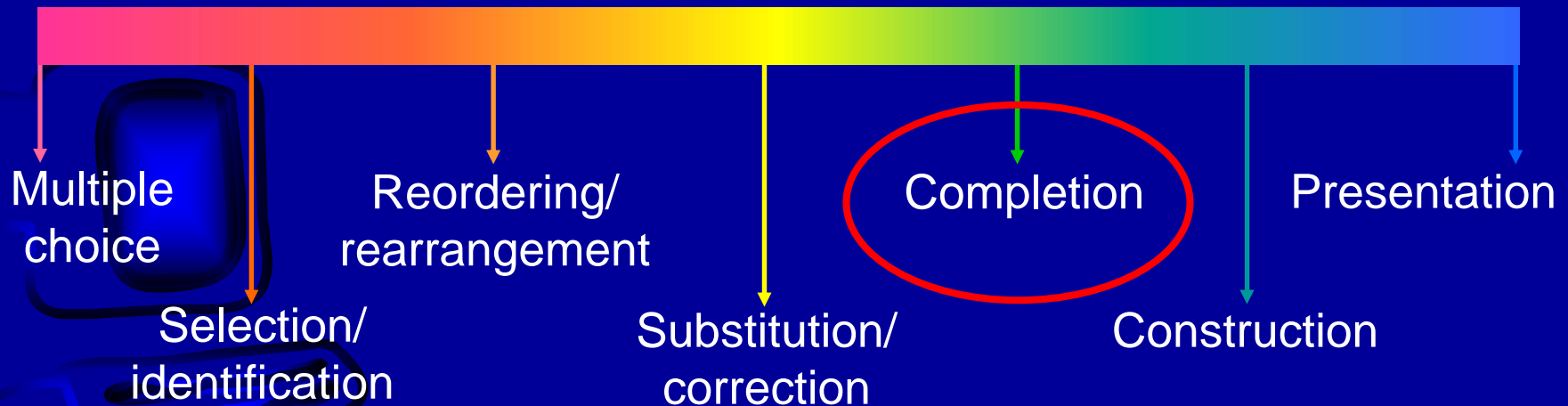
To find the mean of a list of numbers, you should add all of the numbers and subtract by the number of elements in the list.



Clearly, this should read 'divide'

Conceptualizing Item Types

- Continuum from Bennett, Ward, Rock, and LaHart (1990)
 - Provides organizing framework for identifying specific cognitive skills and fundamental nature of assessment tasks (in CBT or otherwise)



Completion

- Task is to respond correctly to an incomplete stimulus
- Conceptual examples: Cloze items, sentence completion, mathematical problems with single response, grid-in, short answer

Completion: AICPA

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Forms Completion
Multiple Choice / Multiple Select
AUTHORITATIVE LITERATURE

Numeric and Monetary Inputs

Good! You have properly entered the correct number.

Testlet 2 of 5 Time Remaining 4 hours 0 minutes Copy Paste Calculator Sheet Standards Help Split Done

Directions Situation Cost Method Amt To Rept COGS Invent Costs Form 1065 Communication Research 1

Determine the amount at which inventory should be reported in the financial statements by completing the table below. In cells B6 and B7 enter the values you calculate for floor and ceiling, respectively. For cells B9 and B11, double-click in the cells and select from the list provided the formulas that will correctly calculate the market value and the amount at which to report, respectively. Be sure a value appears in each of the shaded cells to complete this problem.

	A	B
1	Original Cost	\$ 8.20
2	Replacement cost	\$ 8.00
3	Net realizable value	\$ 8.80
4	Profit percentage	6.56%
5		
6	Ceiling	\$ 8.80
7	Floor	\$ 8.22
8		
9	Market	
10		
11	Amount at which to report	

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Completion: AICPA

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The Uniform CPA Examination Uniform CPA Examination Tutorial Simulations

EXAM INFORMATION
COMMON TOOLS
MULTIPLE CHOICE QUESTIONS
SIMULATIONS
General Functionality
Response Types
Spreadsheet Responses
Written Communication
Forms Completion
Multiple Choice / Multiple Select
AUTHORITATIVE LITERATURE

Forms Completion

Fill out the form on the screen. Start by selecting box 1a in the form below.

Testlet 2 of 5 Time Remaining 4 hours 0 minutes

Copy Paste Calculator Sheet Standards Help Split Done

Directions Situation Cost Method Amt To Rept COGS Invent Costs Form 1065 Communic Review Letter

A1

1065 U.S. Return of Partnership Income OMB No. 1545-0099

Form Department of the Treasury Internal Revenue Service For calendar year 2002, or tax year beginning 2002, and ending 2002. See separate instructions.

A Principal business activity Use the IRS label, Other, print or type. Name of partnership York Company, LLC

B Principal product or service Widgets Number, street, and room or suite no. If a P.O. box, see page 14 of the instructions. 1210 Industry Blvd

C Business code number xxxxxxxxxx City or town, state, and ZIP code New York, NY 10011

D Employer identification number xx-xxxxxx

E Date business started 09/01/1999

F Total assets (see page 14 of the instructions) \$ 57,280,000

G Check applicable boxes: (1) ☐ Initial return (2) ☐ Final return (3) ☐ Name change (4) ☐ Address change (5) ☐ Amended return

H Check accounting method: (1) ☐ Cash (2) ☒ Accrual (3) ☐ Other (specify) _____

I Number of Schedules K-1. Attach one for each person who was a partner at any time during the tax year _____

Caution: Include only trade or business income and expenses on lines 1a through 22 below. See the instructions for more information.

Income	1a Gross receipts or sales	1a			
	b Less returns and allowances	1b		1c	
	2 Cost of goods sold (Schedule A, line 8)	2			
	3 Gross profit. Subtract line 2 from line 1c.	3			
	4 Ordinary income (loss) from other partnerships, estates, and trusts (attach schedule)	4			
	5 Net farm profit (loss) (attach Schedule F (Form 1040))	5			
6 Net gain (loss) from Form 4797, Part II, line 18.	6				

RETURN TO GUIDED TOUR

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Free-Response Mathematics

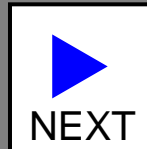
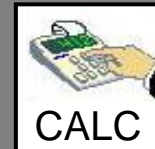
(Braswell & Kupin, 1993)



Scores on two items for five examinees are given below. Complete the table by computing the classical item difficulty for each of the items and typing it into the highlighted boxes provided.

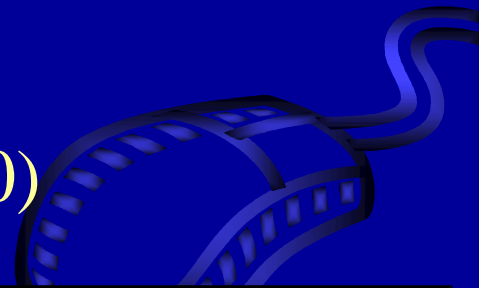
(You may use the calculator tool as needed.)

Examinees	Item 1	Item 2
1	0	1
2	1	1
3	1	1
4	0	0
5	1	1
	Difficulty: 0.60	Difficulty: 0.80



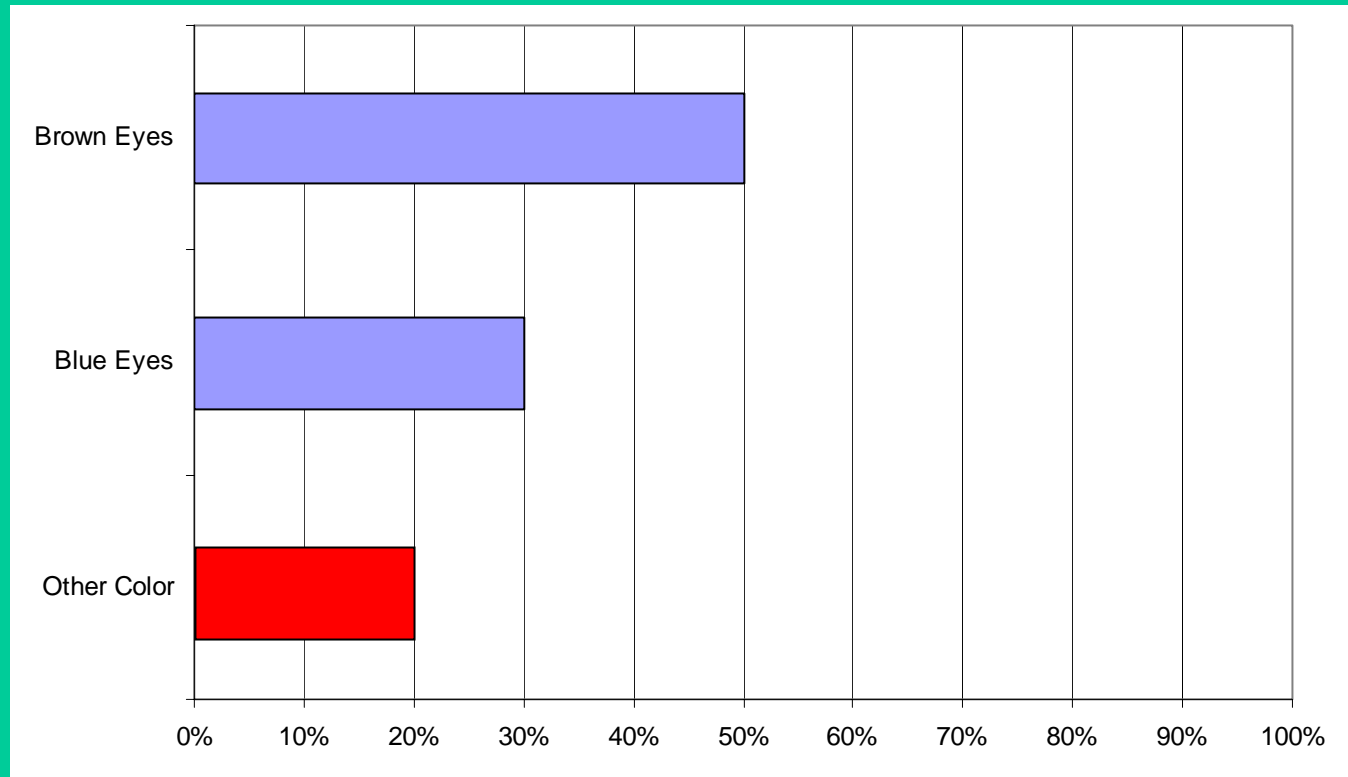
Graphical Modeling

(Bennett, Morley, & Quardt, 2000)



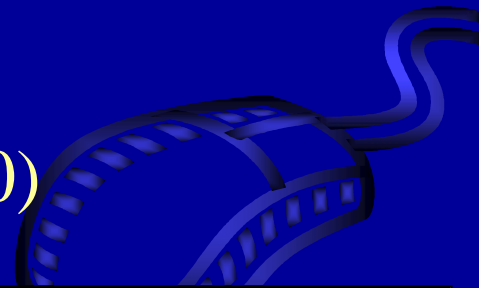
Directions: Use the information in the table below to finish the bar chart. Drag the bar labeled 'Other Color' to show the percent of people in that category.

Eye Color	Percent
Brown Eyes	50%
Blue Eyes	30%
Other Color	20%

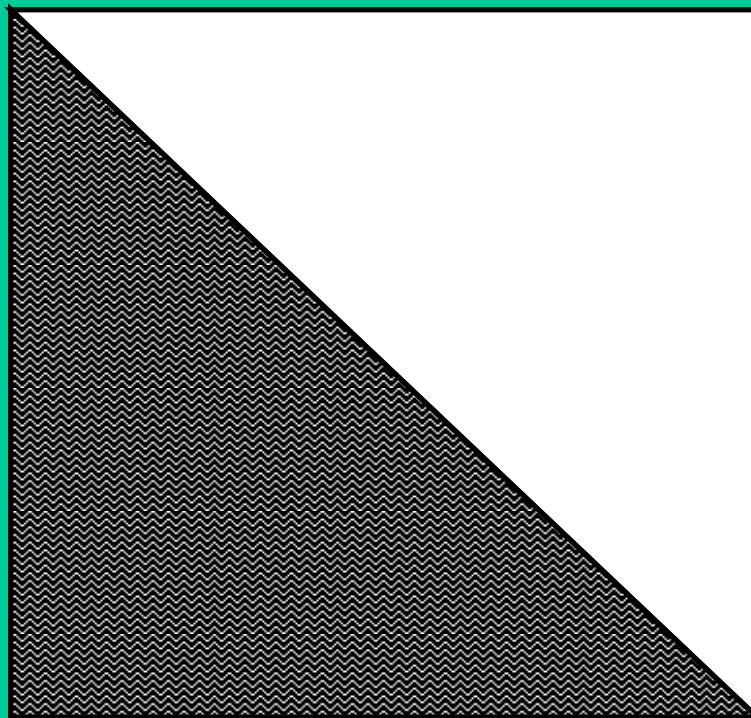


Graphical Modeling

(Bennett, Morley, & Quardt, 2000)



Directions: Shade the area of the figure below to show 50% shaded.



Formulating Hypotheses

(Bennett & Rock, 1995)

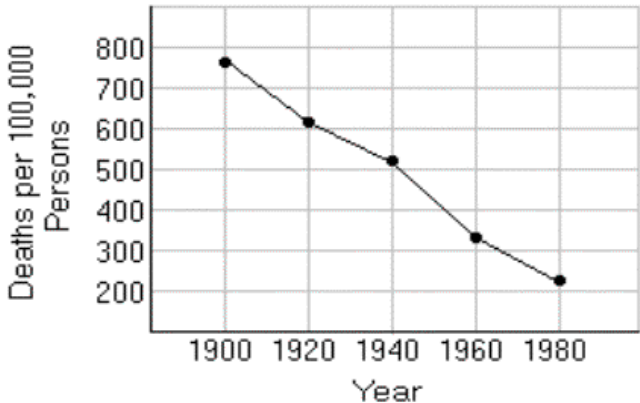
00:57

ETS CBT Demonstration - Section 1: Sample Items

14 of 16

Disease in Alcadia

Declining Rate of Death From Infectious Diseases in Alcadia



Year	Deaths per 100,000 Persons
1900	780
1920	620
1940	520
1960	350
1980	250

According to the graph above, the rate of death (per 100,000 people) from infectious diseases in Alcadia declined steadily from 1900 to 1980.

The death rate from infectious disease declined because ...

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.

EditSave

... because ...

TestQuitTimeReviewMarkEraseCalc

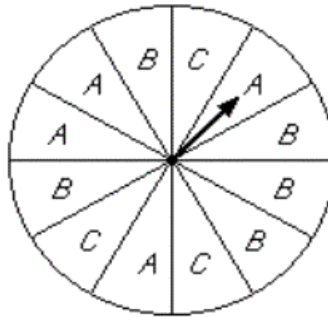
HelpPrevNext

Numerical Equations (ETS, 2000)

00:58

ETS CBT Demonstration - Section 1: Sample Items

8 of 14



The dial is divided into equal-sized sections. What is the probability the spinner will stop on one of the A sections if the spinner stops randomly on a section when spun?

Express your answer as a fraction in lowest terms.

2
<hr/>
1

Click on a box, then type in a number. Backspace to erase.

Test	Time	Review	Mark	Erase	Calc
Quit					

?	←	→
Help	Prev	Next

Multiple Numerical Response

(Mills, n.d.)



Miriam is in a play at her middle school, and Miriam's mother wants to buy tickets so that the family can go to the play. Miriam's mother needs to buy tickets for

- Herself
- Miriam's great-grandmother and great-grandfather
- Miriam's two little sisters

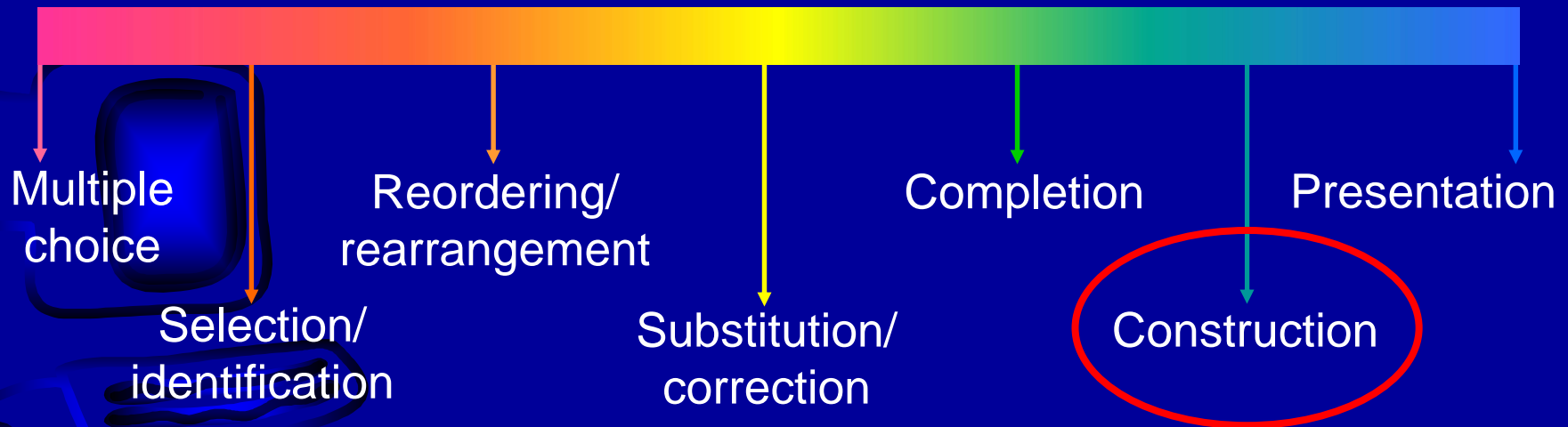
Complete the ticket request form below.

How much will it cost for Miriam's family to go to the play?

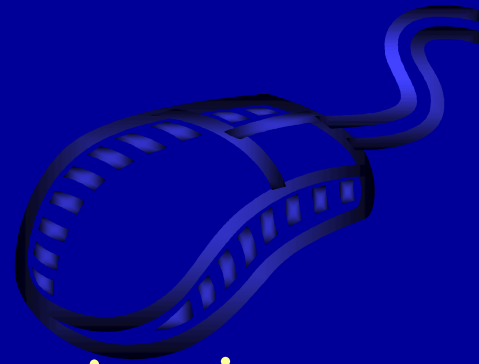
<i>White Brook Middle School Spring Play</i>	
<i># of tickets</i>	<i>Amount</i>
<u>1</u> adults at \$4.00 per ticket.....	<u>\$4.00</u>
<u>2</u> children at \$1.50 per ticket.....	<u>\$3.00</u>
<u>2</u> senior citizens (55+) at \$2.00 per ticket.....	<u>\$4.00</u>
<i>Total Amount</i> <u>\$11.00</u>	

Conceptualizing Item Types

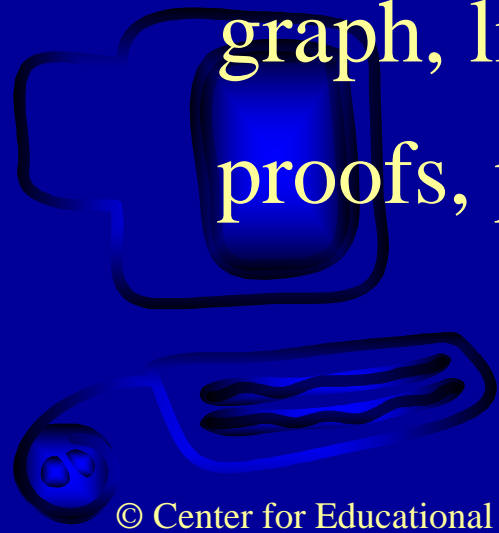
- Continuum from Bennett, Ward, Rock, and LaHart (1990)
 - Provides organizing framework for identifying specific cognitive skills and fundamental nature of assessment tasks (in CBT or otherwise)



Construction



- In contrast to completion, *construction* items require the entire unit to be constructed
- Conceptual examples: Drawing a complete graph, listing items, essays, mathematical proofs, portfolios, research paper



Computer-based essay



In the space provided,
please write an essay addressing the topic given below.

“The earliest known evidence of testing dates back to Chinese employment testing thousands of years ago. Today, we are talking about computer-based testing and the Internet. Briefly (yet completely) describe three of the major developments in measurement practice that have taken place in history.”

As educational and psychological tests have found new uses in aspects of everyday life, such tests have evolved in many interesting and exciting ways from their earliest beginnings. Three critical advances that have particularly changed measurement practices include (1) the test development efforts related to the Army Alpha tests during the World War I era, (2) the theoretical innovations associated with the conceptualization of item response theory, and (3), the introduction of the computer as a mechanism for delivering tests and recording examinee responses. In this essay, I will detail how such changes have impacted...



Cut

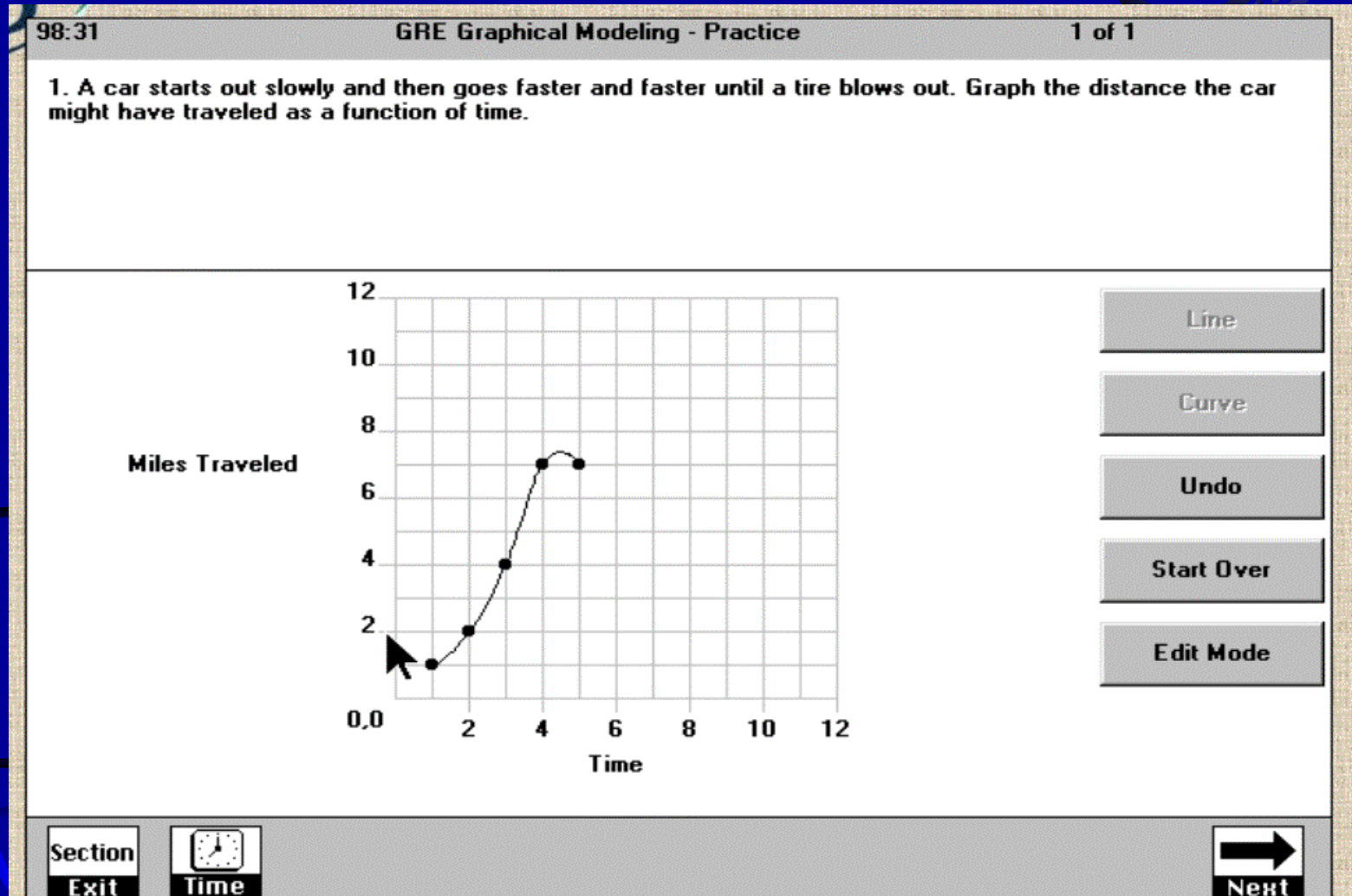
Paste

Undo

Submit

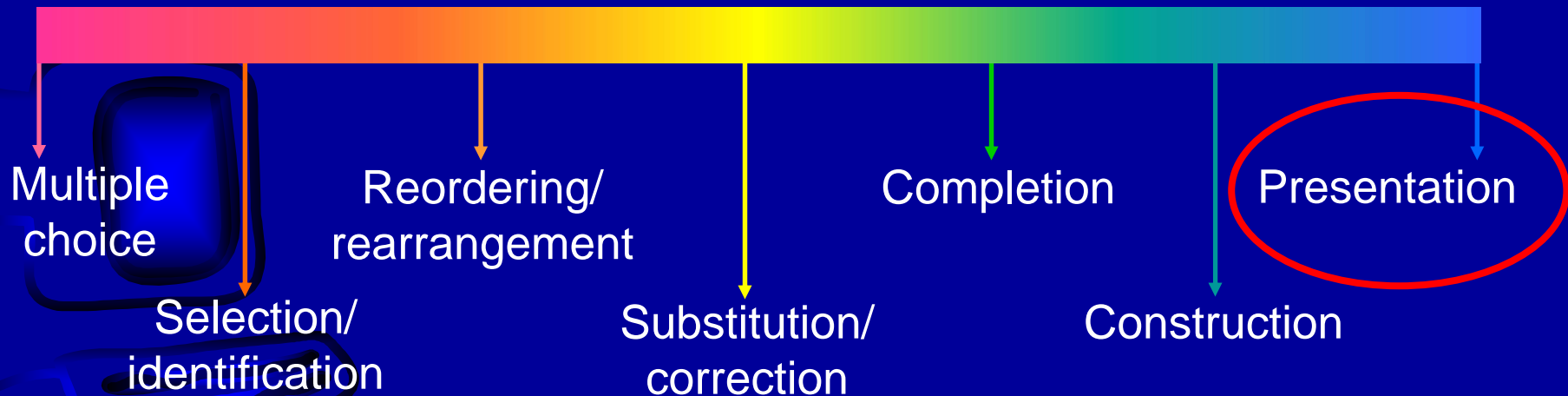
Graphical Modeling

(Bennett, Morley, & Quardt, 2000)



Conceptualizing Item Types

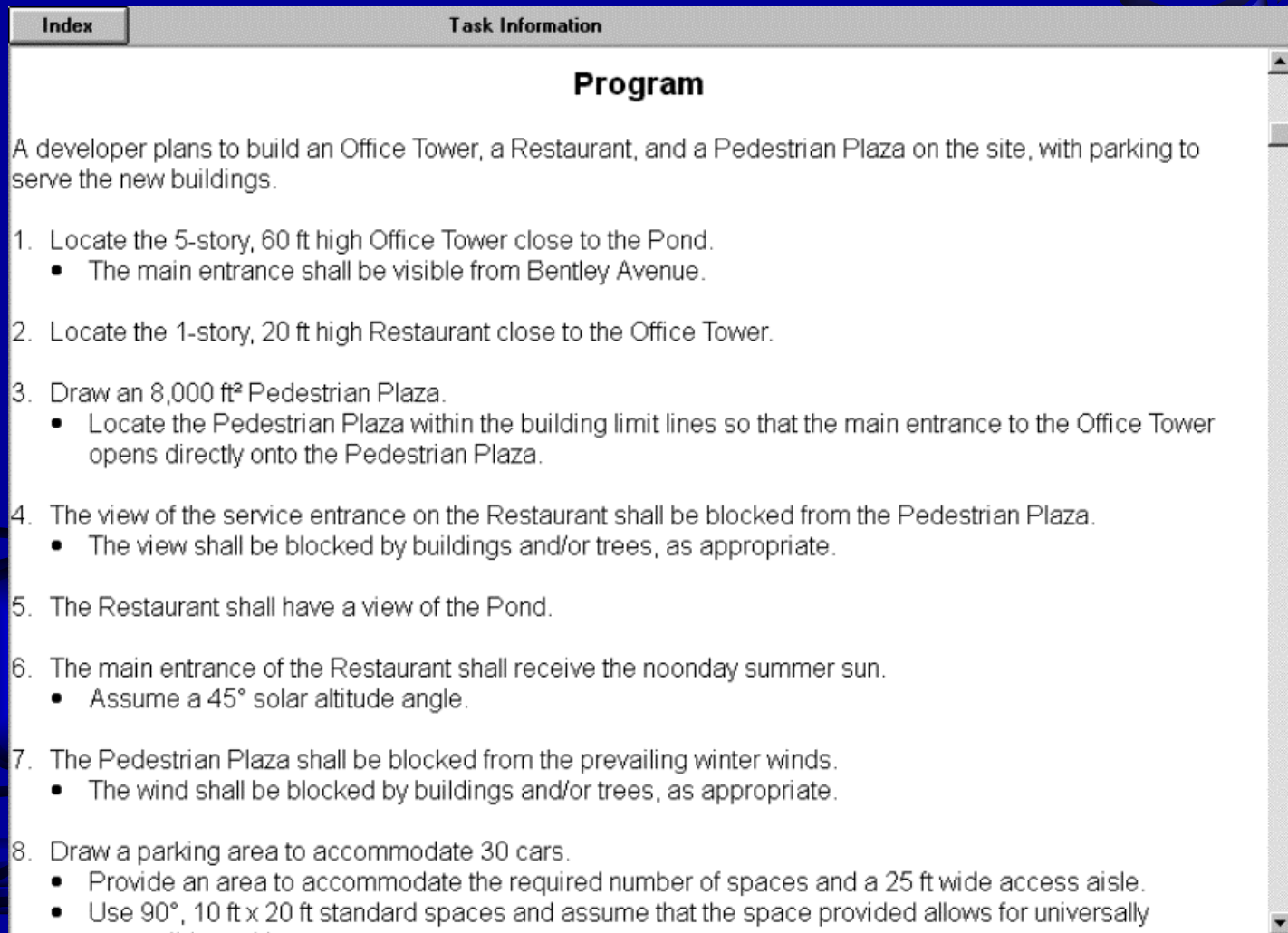
- Continuum from Bennett, Ward, Rock, and LaHart (1990)
 - Provides organizing framework for identifying specific cognitive skills and fundamental nature of assessment tasks (in CBT or otherwise)



Presentation

- Physical presentation or performance delivered under real or simulated conditions in which the object is in some substantial part the manner of performance and not simply its result
- Conceptual examples: performance assessments like laboratory experiments, demonstrations, exhibition, oral presentation, simulations

Site Planning Vignettes (Bejar, 1991)



The screenshot shows a software window with a title bar containing 'Index' and 'Task Information'. The main content area is titled 'Program' and contains a list of eight tasks for site planning. The tasks are numbered 1 through 8, with some having sub-points indicated by bullet points.

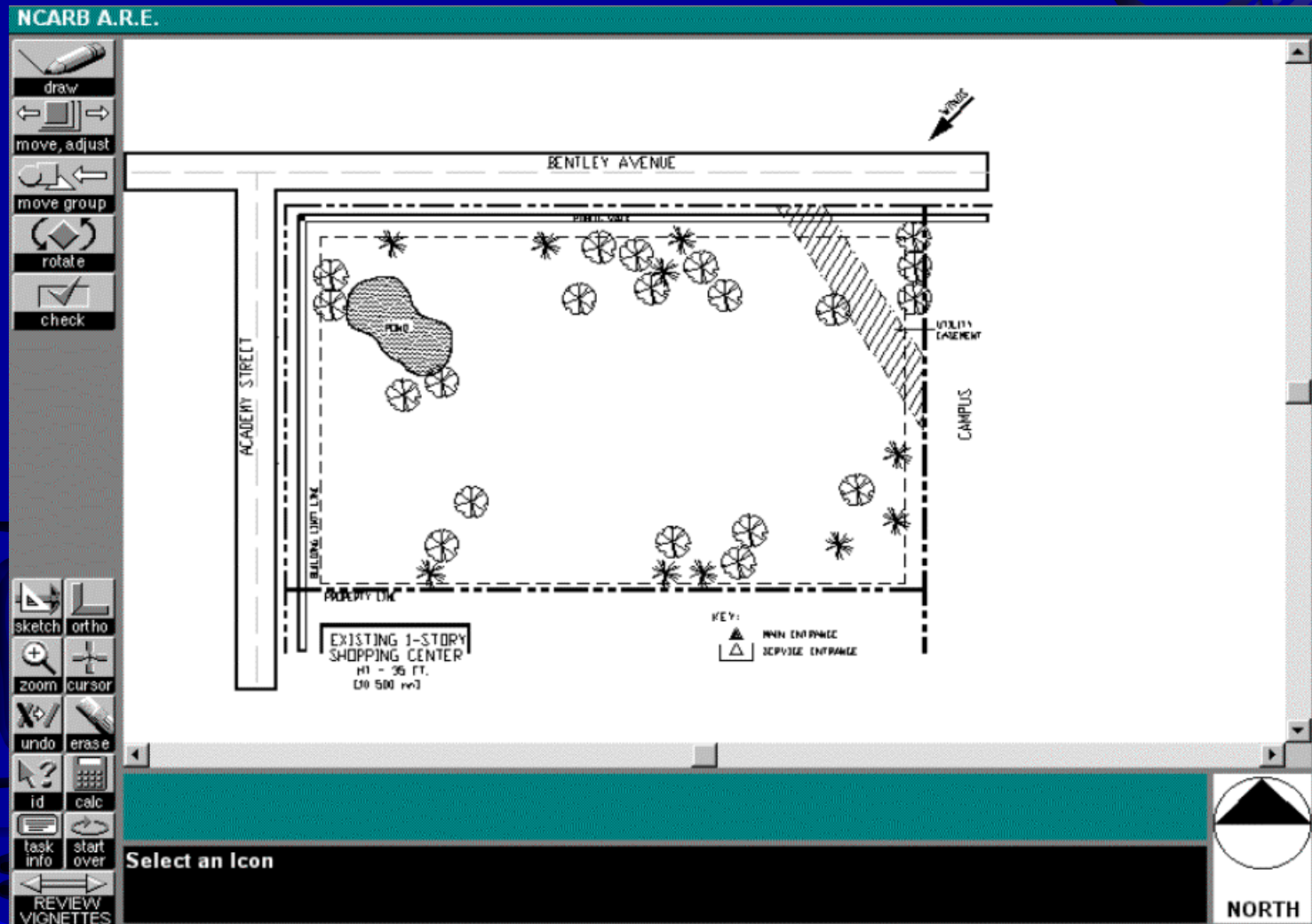
Index **Task Information**

Program

A developer plans to build an Office Tower, a Restaurant, and a Pedestrian Plaza on the site, with parking to serve the new buildings.

1. Locate the 5-story, 60 ft high Office Tower close to the Pond.
 - The main entrance shall be visible from Bentley Avenue.
2. Locate the 1-story, 20 ft high Restaurant close to the Office Tower.
3. Draw an 8,000 ft² Pedestrian Plaza.
 - Locate the Pedestrian Plaza within the building limit lines so that the main entrance to the Office Tower opens directly onto the Pedestrian Plaza.
4. The view of the service entrance on the Restaurant shall be blocked from the Pedestrian Plaza.
 - The view shall be blocked by buildings and/or trees, as appropriate.
5. The Restaurant shall have a view of the Pond.
6. The main entrance of the Restaurant shall receive the noonday summer sun.
 - Assume a 45° solar altitude angle.
7. The Pedestrian Plaza shall be blocked from the prevailing winter winds.
 - The wind shall be blocked by buildings and/or trees, as appropriate.
8. Draw a parking area to accommodate 30 cars.
 - Provide an area to accommodate the required number of spaces and a 25 ft wide access aisle.
 - Use 90°, 10 ft x 20 ft standard spaces and assume that the space provided allows for universally

Site Planning Vignettes (Bejar, 1991)



Dynamic Problem Solving Simulation

(Clauser, et al., 1997)

The screenshot displays a software interface for a medical simulation. At the top, there is a menu bar with 'File' and 'Help'. Below the menu bar are four main action buttons: 'Interval Hx or PE' (with a stethoscope icon), 'Write Orders or Review Chart' (with a clipboard icon), 'Obtain Results or See Patient Later' (with a clock icon and text 'Day 1 @ 16:00 (Wed)'), and 'Change Location' (with a red cross icon and text 'Emergency department'). The main content area is titled 'Initial history' and contains the following text:

Initial history
Reason(s) for Visit:
Chest pain; respiratory distress

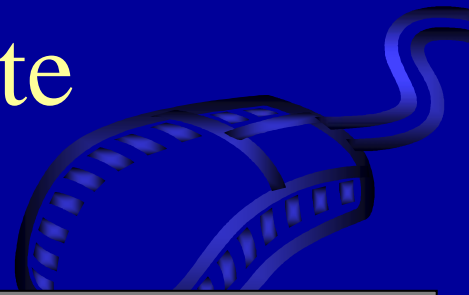
History of Present Illness:
The patient, a 65-year-old accountant, was brought to the emergency department by ambulance from the trucking company where he works. Oxygen was administered during transport. About 10 minutes before arrival, he developed excruciating, sharp pain in the right side of his chest and marked respiratory distress. The pain increases with respiration. He is unable to answer questions. A coworker who accompanied the patient to the hospital says that this never happened before, but the patient has had emphysema and asthma for years.

All other history unobtainable.

An 'OK' button is located at the bottom center of the window.

Problem Solving Vignette

(e.g., Microsoft, NCARB)



You have been hired as a psychometrician for a major testing company. For your first assignment, you are asked to evaluate the fit of the three-parameter logistic model to some dichotomous test data and report your results to a senior research scientist.

Use the clickable tools below to work through the problem.

When you are finished, click NEXT.

Background
Information



Look at
Data



Choose
Analyses



Examine
Results

Item	Score	Item	Score	Item	Score
1	1	20	0	39	1
2	0	21	1	40	0
3	1	22	1	41	1
4	0	23	0	42	1
5	1	24	1	43	0
6	0	25	0	44	1
7	1	26	1	45	0
8	0	27	0	46	1
9	1	28	1	47	0
10	0	29	0	48	1

Graphs
and Tables



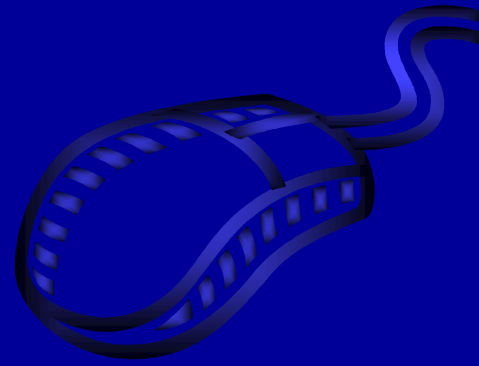
Type Up
Findings



Time Remaining: 00:05:25

? Help

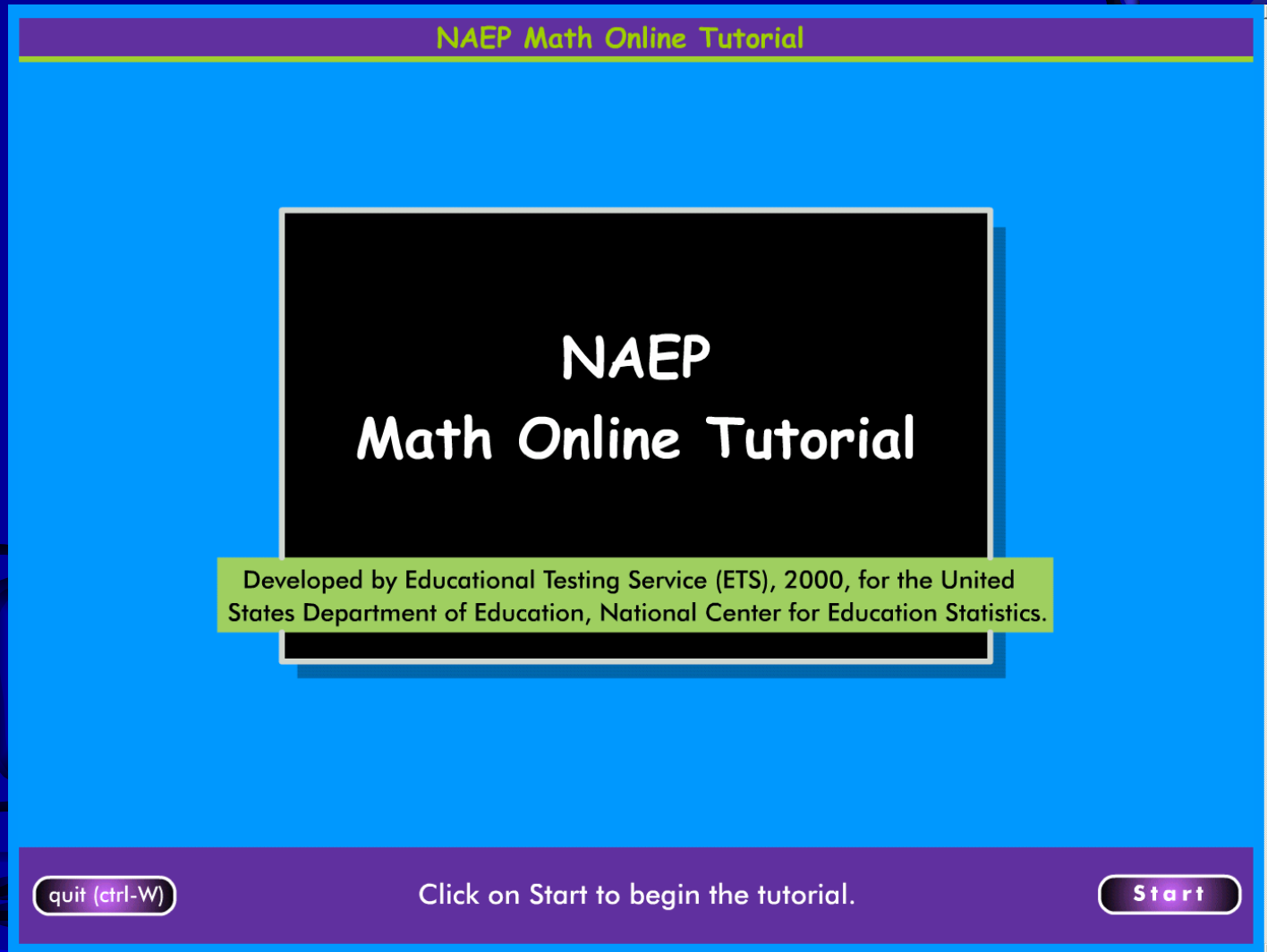
► Next



The Need for Tutorials



Technology-Based Assessment Tutorial



Practicing for a CBT

NAEP Math Online Tutorial

✓ Scrolling - Quiz

Directions: Scroll down until you can see "Line 9."

Line 4
Line 5
Line 6
Line 7
Line 8
Line 9

Yeah, Baby!

quit (ctrl-W)

Click on Go On to continue.

Go On

Using the Keyboard

NAEP Math Online Tutorial

✓ Typing Quiz - Part 2

Directions:

Change the sentence below to read: Max is a **very** happy dog.
Work as quickly as you can. You will have 2 minutes.

Max is a happy dog.

quit (ctrl-W)

When you are finished, click on Go On.

Go On

Intro to Formats

NAEP Math Online Tutorial

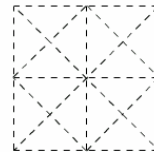
Click on a choice

When you are answering test questions, most of the time you will click on an oval or words next to the oval.



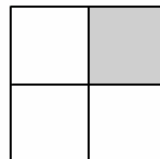
Washington, D.C.

Sometimes you will be asked to click on a line.



← The line you click on will darken. To erase it, click on the line segment again.

Sometimes you will be asked to click on a box.



← The box you click on will darken or will be marked with an X. To erase it, click on the box again.

quit (ctrl-W)

Click on Go On to continue.

Go On

Multiple Response Directions

NAEP Math Online Tutorial

Type a short answer

Directions: Practice typing any word or number into the boxes.
Click on Go On when you are ready to continue.

Answer:

Explanation

It's the answer to life, the universe, and everything.

quit (ctrl-W)

Click Go On to continue.

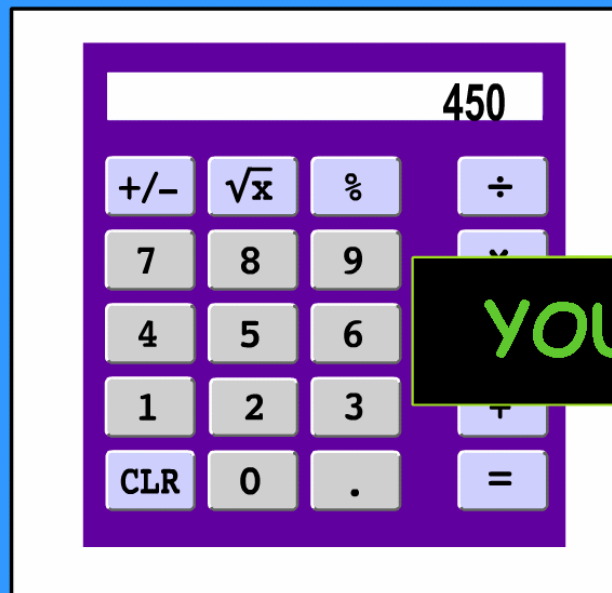
Go On

Using the Calculator Online

✓ Using the Calculator - Quiz

Directions: Use the calculator to solve this problem

$$12 \times 37.5 =$$



YOU RULE!

quit (ctrl-W)

Click on Go On to continue.

Go On

Other Reference Materials: AICPA

Uniform CPA Examination Tutorial - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print AutoFill Options dissertation defense

Address http://www.cpa-exam.org/tutorial/section_05.html Go

The Uniform CPA Examination

Uniform CPA Examination Tutorial

Authoritative Literature

Authoritative Literature

Simulations will include an online search as a required task. You will receive access to the appropriate accounting literature database during the exam. Depending on the section, you will be directed to Accounting Standards, Auditing Standards or Tax Code.

The exam may not use the most current version of Literature. You are to use the version provided to answer the research question.

- [General Functionality](#) - how to use the tools available across search and answer types
- [Search Topics](#) - how to find relevant documents and information using different search methods
- [Review Letter Item Type](#) - how to answer questions requiring a Review Letter.
- [Tax Citation Item Type](#) - how to answer questions requiring a Tax Citation
- [Accounting and Reporting Item Type](#) - how to answer questions requiring a paragraph for Accounting and Reporting.

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Spell-Check: AICPA

Uniform CPA Examination Tutorial - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Copy Paste

Address http://www.cpa-exam.org/tutorial/section_04_02_02.html Go

Google dissertation defense Search Web 8 blocked AutoFill Options dissertation defense

The Uniform CPA Examination

Uniform CPA Examination Tutorial
Simulations

EXAM INFORMATION
COMMON TOOLS
MULTIPLE CHOICE QUESTIONS
SIMULATIONS

General Functionality
Response Types
Spreadsheet Responses
Written Communication
Forms Completion
Multiple Choice / Multiple Select

AUTHORITATIVE LITERATURE

Written Communication **START OVER** **PLAY** **PAUSE**

When the spell checker finds a word it does not recognize, the "Check Spelling" popup appears, offering you a choice of new ways to spell the word. If you know that the word in question is spelled correctly, or none of the offerings are correct, click the "Ignore" button to continue the spelling check. (Clicking the "Ignore All" button will keep the spell checker from questioning other instances of this word in your communication.)

Testlet 2 of 5 Time Remaining 4 hours 0 minutes

Copy Paste Calculator Sheet Standards Help Split Done

Directions Situation Cost Method Asset To Book COGS Inventory Cost Exam Written Communication View Letter

In a brief communication, explain the advantages of the dollar-value LIFO method.

REMINDER: You must use the word processor to write your response. For writing skill questions, you must express them in your own words. Do not use abbreviated phrases.

Check Spelling

Not in dictionary: sample

Change To: sample

Suggestions: sample, simple, sampled, sampler, samples, temple, assemble, simpler, simples, simplex

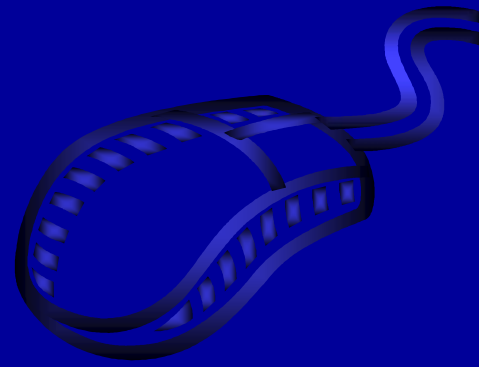
Ignore Ignore All Change All Change Cancel

To: M
Subject: Advantages of Dollar-value LIFO

Dollar-value LIFO differs from the sample LIFO method in that

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EXIT HOME



Conclusions and Research Needs




To check out new assessments online:

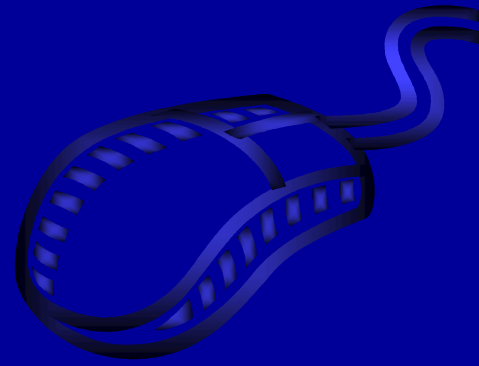
- www.microsoft.com - (Search for “exam demos”)
 - Hot area, active screen, drag and drop, build list and reorder, create a tree, testlet exam format, and simulation question types
- http://www.cpa-exam.org/lrc/exam_tutorial.html
 - Tutorials and sample tests
- <http://www.ncarb.org/are/index.html>
 - Tutorials and practice software
- <http://www.nces.ed.gov/nationsreportcard/studies/tbaproject.asp>
 - Overview of computerization with NAEP
- <http://134.68.49.185/pegdemo/>
 - Submit essay for automated scoring

Testing and Technologies



- Greater use of computerized innovations in CBT has potential to
 - Substantially increase types of skills, abilities, and processes that can be measured
 - Amplify relevance of test tasks to construct
 - Facilitate data collection, management, and scoring
- 

Some Issues



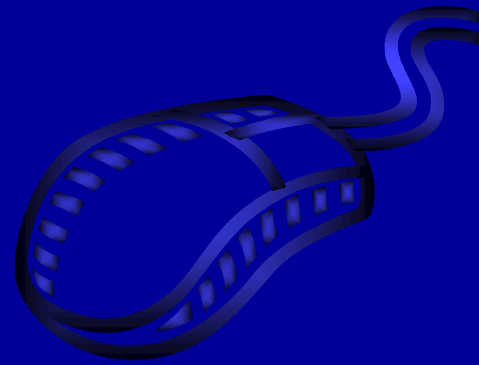
- Obligations of test developers
 - 1) Construct such tests using appropriate levels of technology given the examinee population and the construct of interest
 - 2) Explain tasks adequately and unambiguously, both in preparation materials and in pre-test tutorials
- Development costs can be substantial
 - Creating and maintaining item pool



Some Issues

- Scoring innovative items can be complex
- For example, the AICPA
 - Dimensionality
 - Inter-correlations among items
 - Local item dependence within and across tasks
 - Scoring rules
 - Measurement opportunities: Dichotomous or sum up and score polytomously? Or score conjunctively?



Automated Scoring



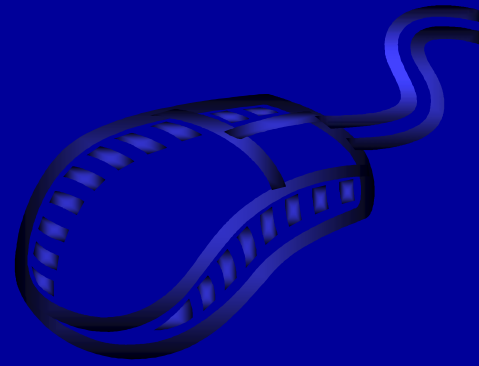
- Why use automated scoring?
 - To implement many of the more novel item types, scoring methods are necessary that can handle responses unique to each examinee in structure and/or nature
 - Not rigid or mechanical application of limited, explicit criteria to examinee responses
- However, any scoring rules should be carefully reviewed...

Example: ETS *Math On-Line*

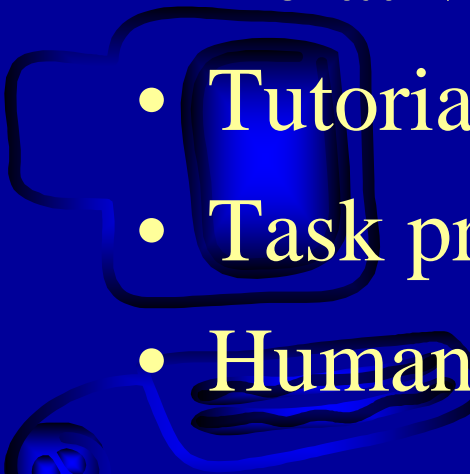


- *Math On-Line* is CBT tryout of NAEP
 - Sample problem (Gr. 4): Cut a paper tube, what shape is the flattened piece of paper?
 - Respond with text AND/OR draw shape
 - **W I D E** variation in answers observed
 - Spelling, Mismatched answers, odd responses
 - Answers depended on perspective
 - Key consideration: level of constraint in constructed-response
- 
- 

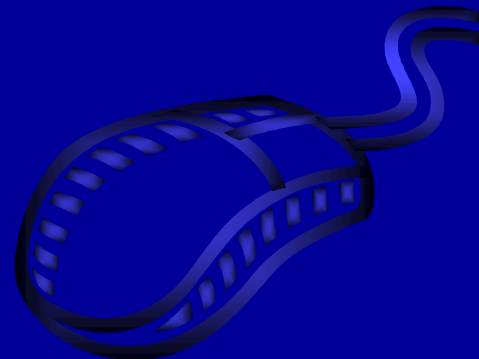
Research Needs



- Pick an area of validity
 - This kind of information on item types in literature is sparse in general; it's possible that in some cases such evidence may be proprietary
- Task specificity (Linn & Burton, 1994)
- Relative complexity/simplicity of interface
- Tutorials and task intricacy
- Task presentation variables
- Human factors (including disabilities)



Research Needs



- Potential losses in score validity
 - Selection of scoring algorithm, consistency and generalizability of results
 - “Gaming” of automated scoring systems
 - More studies like Powers, Burstein, Chodorow, Fowles, & Kukich (2001)
- Dimensionality issues
 - Many emerging constructs are multidimensional
 - Multidimensional IRT
 - Dichotomous and Polytomous

Conclusions

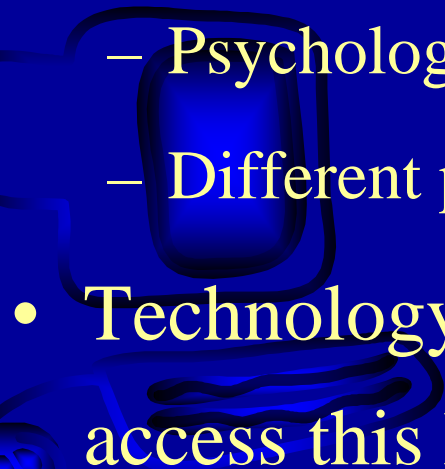
- Increased use of computers in testing mirrors escalation of technology in everyday life
- Examinees support opportunity to demonstrate knowledge and skills in ways relevant to and/or analogous to how they use those abilities

Some Cautions

- (This is where the skeptics can come back)
- With research, technology can be a tool for better measurement *in some cases and for some constructs*
- Ultimately, CBT and computer innovations should be integrated with (demonstrable) measurement benefits as the goal

Information has value!



- Information gathered via a test can function differently and provide different benefits (Pearson & Garavaglia, 1997)
 - Decision confidence and measurement precision
 - Novelty (elaboration of new construct or construct dimension)
 - Psychological information (rather than purely statistical)
 - Different perspective on construct
 - Technology used with purpose can permit test users to access this kind of information
- 

Potential Constructs



- While recall of facts remains important, there are many possible additional constructs and skills valued depending on context....

Research	Critical Reasoning	Motivation	Teamwork
Leadership	Communication	Analysis	Languages
Information Technology	Judgment	Learning Ability	Organization

Expert Systems Analysis



- Expert systems are programs designed to emulate scoring behaviors of humans

- *PROUST*; also *MICROPROUST*

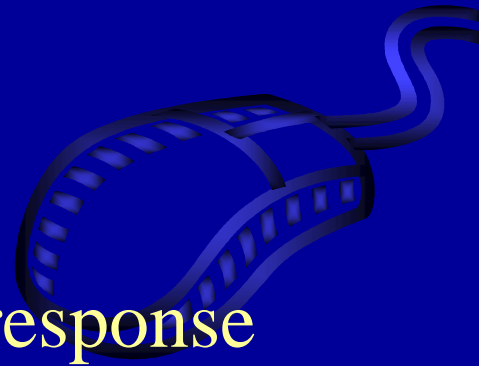
- (Braun, Bennett, Frye, & Soloway, 1990)

- *GIDE*

- (Martinez & Bennett, 1992; Bennett & Sebrechts, 1996)

- These methods generally less able to provide diagnostic information
- 

Mental modeling



- Elements of examinee's constructed response compared to all possible variations via features extraction analysis programs
 - Mimics scoring of committees; requires consideration of how experienced experts evaluate solutions

(Williamson, et al, 1999)

- Architectural Registration Examination; National Board of Medical Examiners' Step 3 CCS

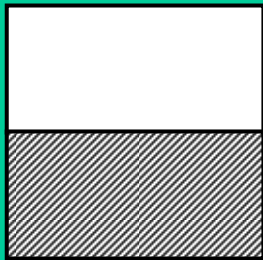


Multiple-choice (Example 2)

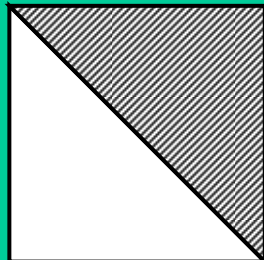
Which of the four pictures below shows $\frac{3}{4}$?

(Click on the letter of one answer.)

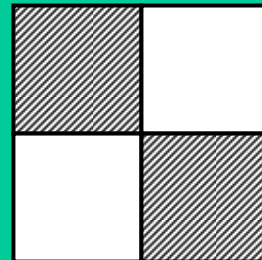
A



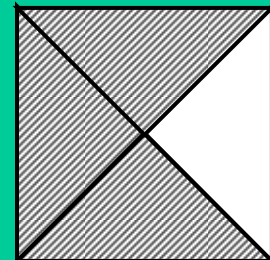
B



C

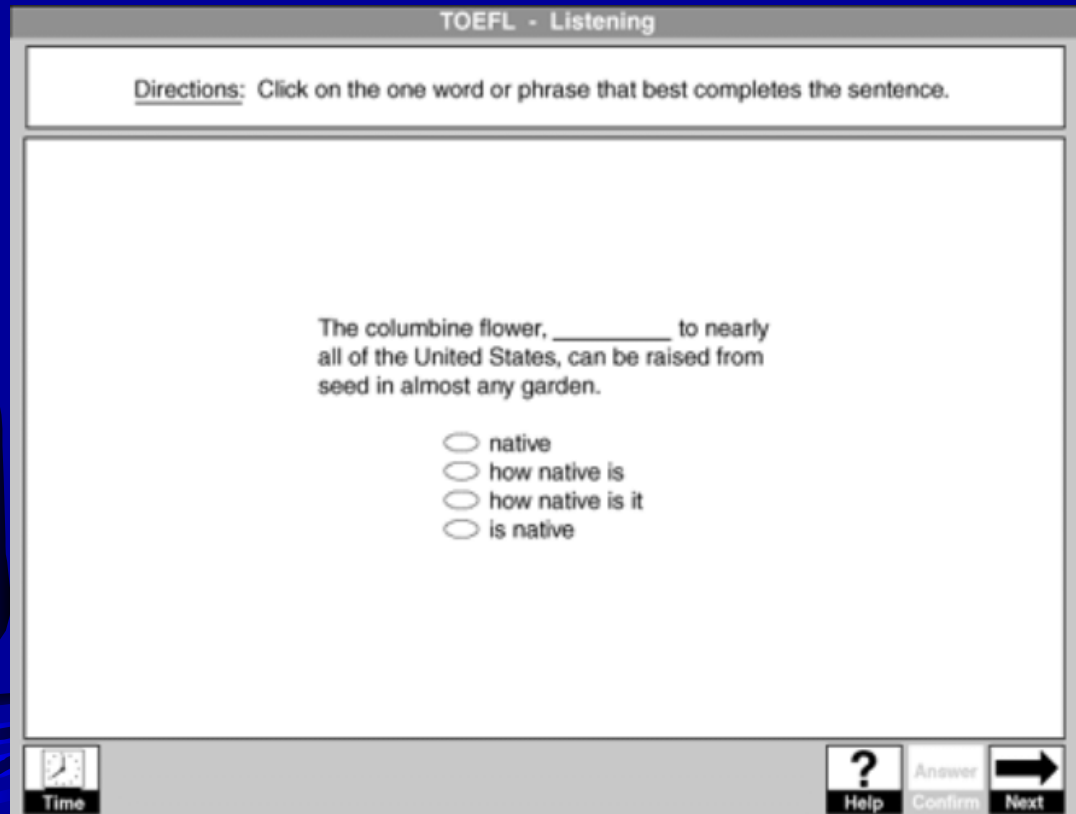


D



Multiple-choice

- Choose an answer from a small set of response options



TOEFL - Listening

Directions: Click on the one word or phrase that best completes the sentence.

The columbine flower, _____ to nearly all of the United States, can be raised from seed in almost any garden.

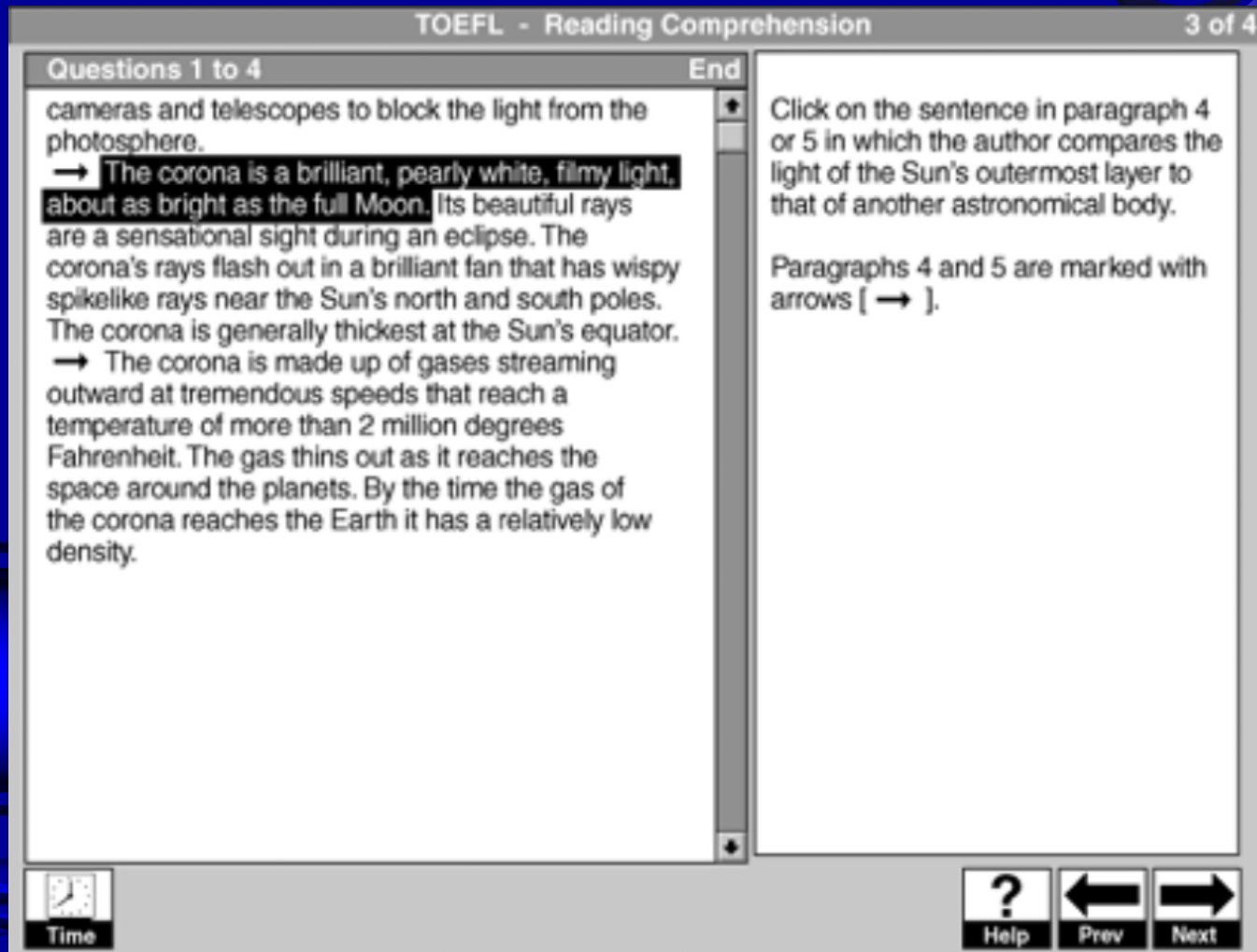
- ☐ native
- ☐ how native is
- ☐ how native is it
- ☐ is native

Time 2:00

? Help Answer Confirm Next

Highlighting Text

(Carey, 2001; Walker & Crandall, 1999)



The screenshot displays a software window titled "TOEFL - Reading Comprehension" with a sub-header "Questions 1 to 4" and a "3 of 4" indicator in the top right. The main text area on the left contains two paragraphs about the Sun's corona. The first paragraph is followed by a right-pointing arrow (→) and a highlighted sentence: "The corona is a brilliant, pearly white, filmy light, about as bright as the full Moon." The second paragraph is also preceded by a right-pointing arrow (→). A vertical scrollbar is positioned to the right of the text. On the right side of the window, there is instructional text: "Click on the sentence in paragraph 4 or 5 in which the author compares the light of the Sun's outermost layer to that of another astronomical body." Below this, it says "Paragraphs 4 and 5 are marked with arrows [→]." At the bottom of the window, there is a "Time" icon on the left and three buttons on the right: "Help" (with a question mark icon), "Prev" (with a left arrow icon), and "Next" (with a right arrow icon).

TOEFL - Reading Comprehension 3 of 4

Questions 1 to 4 End

cameras and telescopes to block the light from the photosphere.

→ The corona is a brilliant, pearly white, filmy light, about as bright as the full Moon. Its beautiful rays are a sensational sight during an eclipse. The corona's rays flash out in a brilliant fan that has wispy spikelike rays near the Sun's north and south poles. The corona is generally thickest at the Sun's equator.

→ The corona is made up of gases streaming outward at tremendous speeds that reach a temperature of more than 2 million degrees Fahrenheit. The gas thins out as it reaches the space around the planets. By the time the gas of the corona reaches the Earth it has a relatively low density.

Click on the sentence in paragraph 4 or 5 in which the author compares the light of the Sun's outermost layer to that of another astronomical body.

Paragraphs 4 and 5 are marked with arrows [→].

Time ? Help Prev Next

Highlighting Text

(Carey, 2001; Walker & Crandall, 1999)

00:59 ETS CBT Demonstration - Section 1: Sample Items 4 of 14

Beginning

These questions are based on the passage below.

Passage One

Prehistory is the study of civilizations that left no written records, whereas history is the study of civilizations that did leave written records. Yet the Maya, who had the most highly developed system of writing in pre-Columbian America, were until recently studied as a pre-historic people. The reason was simple: their writing could not be read. But now, building on insights into the structure of Mayan writing which were put forward in the 1950's, a fairly small group of scholars has puzzled out a sizable amount of the known writings of the Maya. These writings, inscribed on stone monuments or painted on ceramic vessels, have begun to expand the picture of Mayan society that was previously derived from the patient work of excavation.

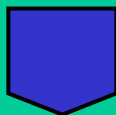
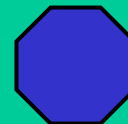
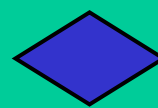
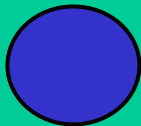
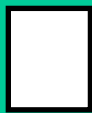
Some of the new findings confirm that rites of bloodletting, carried out by the nobility, had an important role in Mayan society. Perhaps more significant is what the inscriptions tell us about Mayan politics. Most of the inscriptions are chronicles of specific rulers, marking their births, rituals, conquests, and deaths.

Highlight the sentence in passage one in which the author asserts that recently translated Mayan writings have affected the understanding of Mayan society provided by earlier archaeological excavations. (Place the pointer on the sentence you wish to highlight, and click to select it.)

Test Quit Time Review Mark Erase Calc ? Help Prev Next

Multiple True-False

Use the mouse to make a ✓ next to each of the shapes below that are examples of polygons. Be sure and mark all of the polygons.

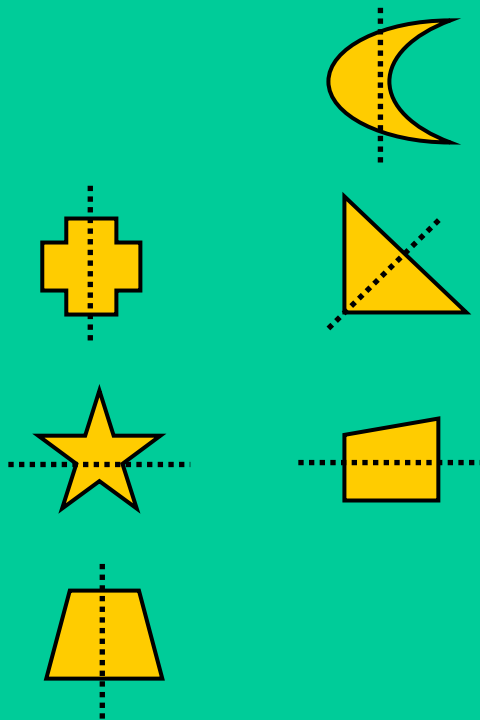



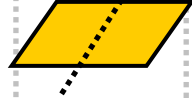






Click here
for the next
item

Create-a-Tree

(Fitzgerald, 2001; Walker & Crandall, 1999)

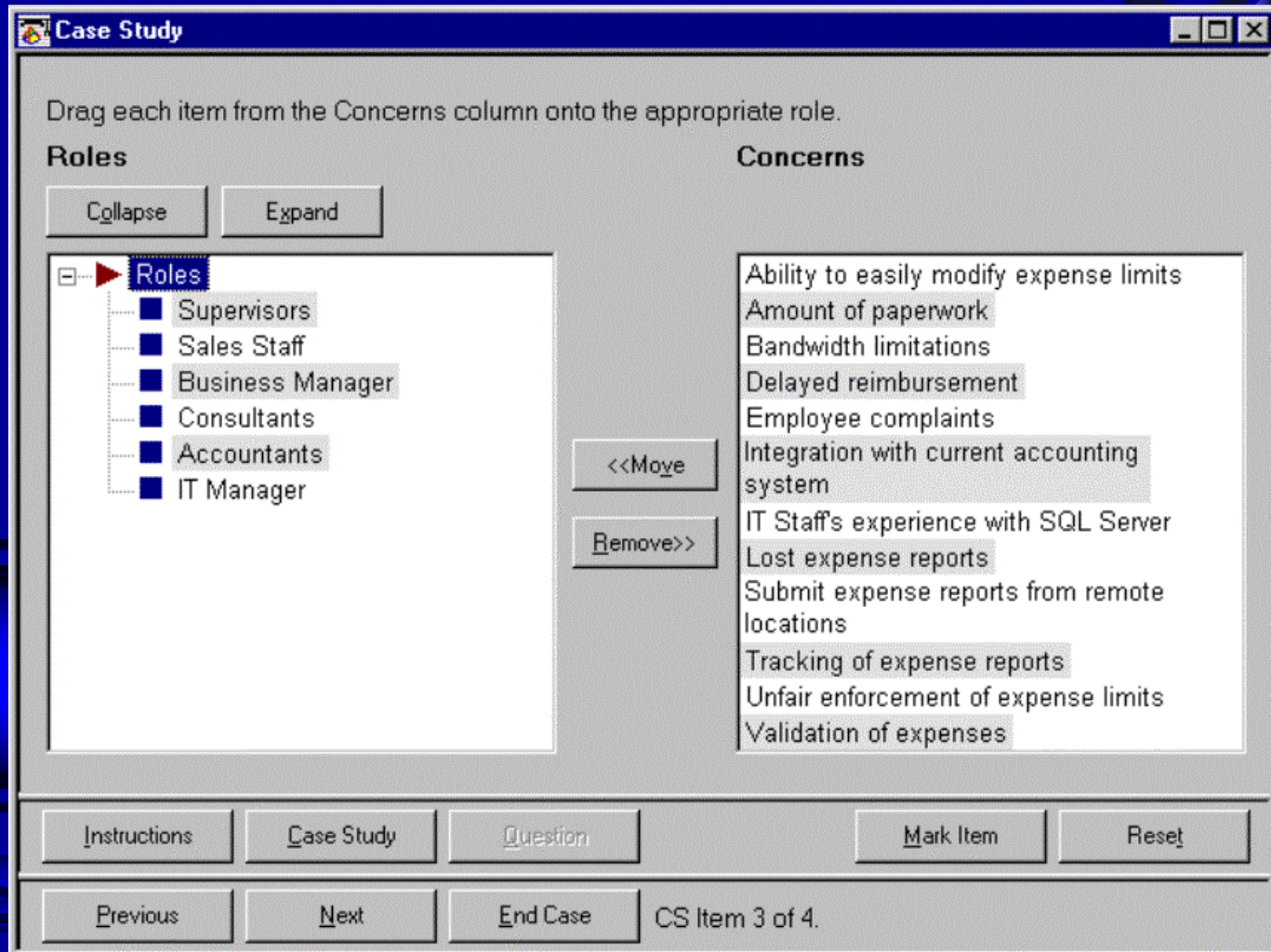
Below are several shapes that may or may not be symmetric along the dotted line. Decide if the shape is symmetric along the dotted line, click on the item, and drag it to the correct box.



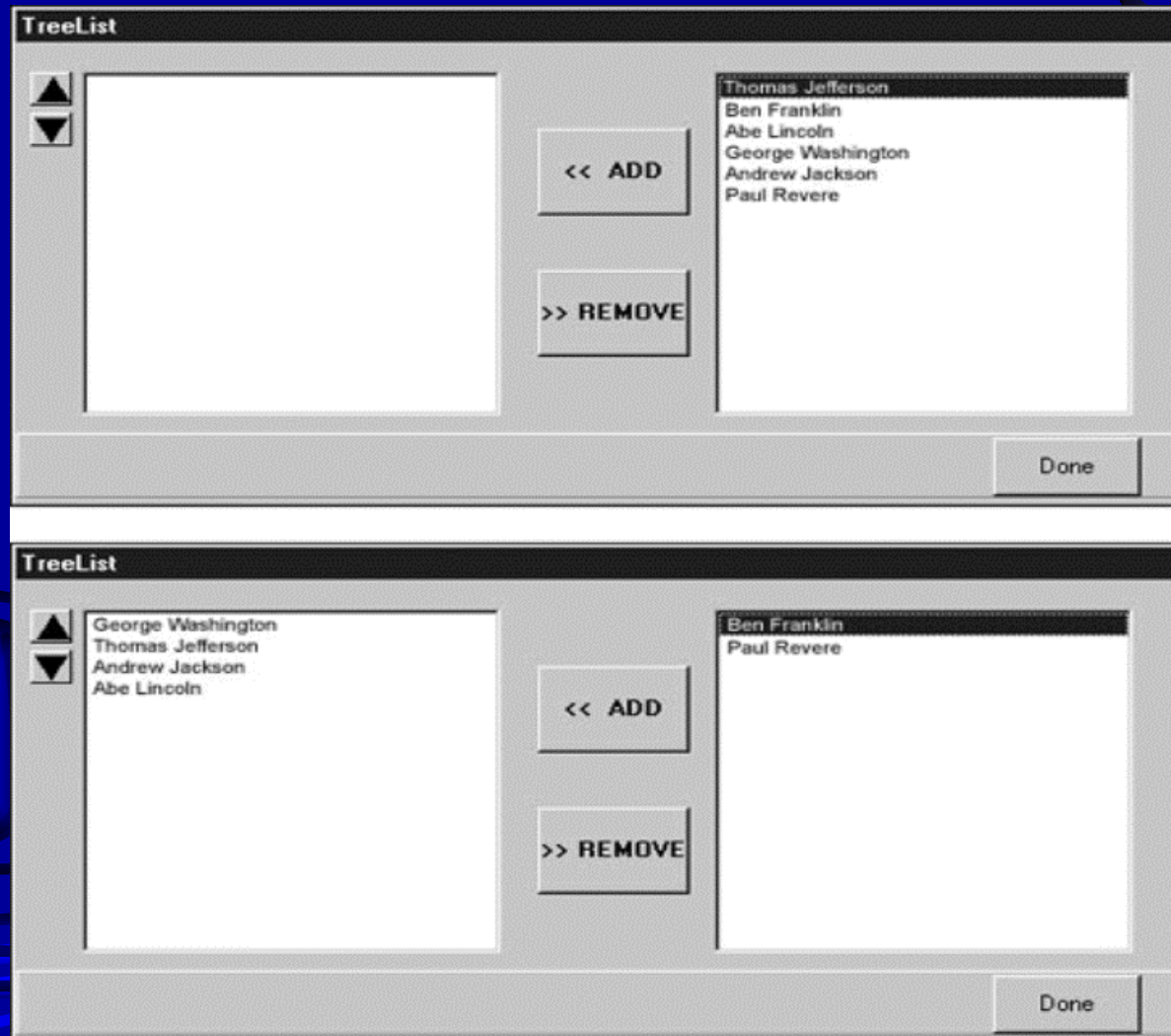
Symmetric	Not Symmetric
	
	
	
	

Create-a-Tree

(Fitzgerald, 2001; Walker & Crandall, 1999)

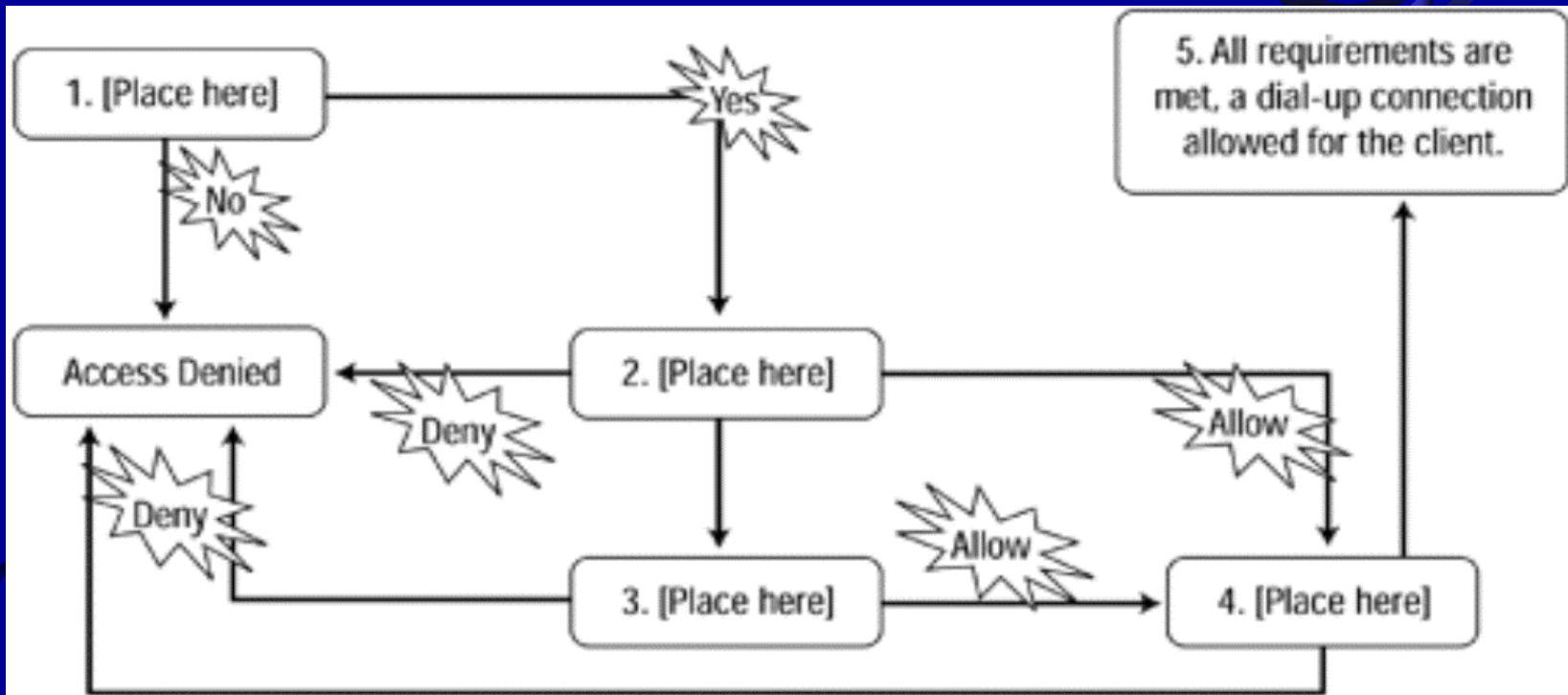


Create-a-Tree (Fitzgerald, 2001; Walker & Crandall, 1999)



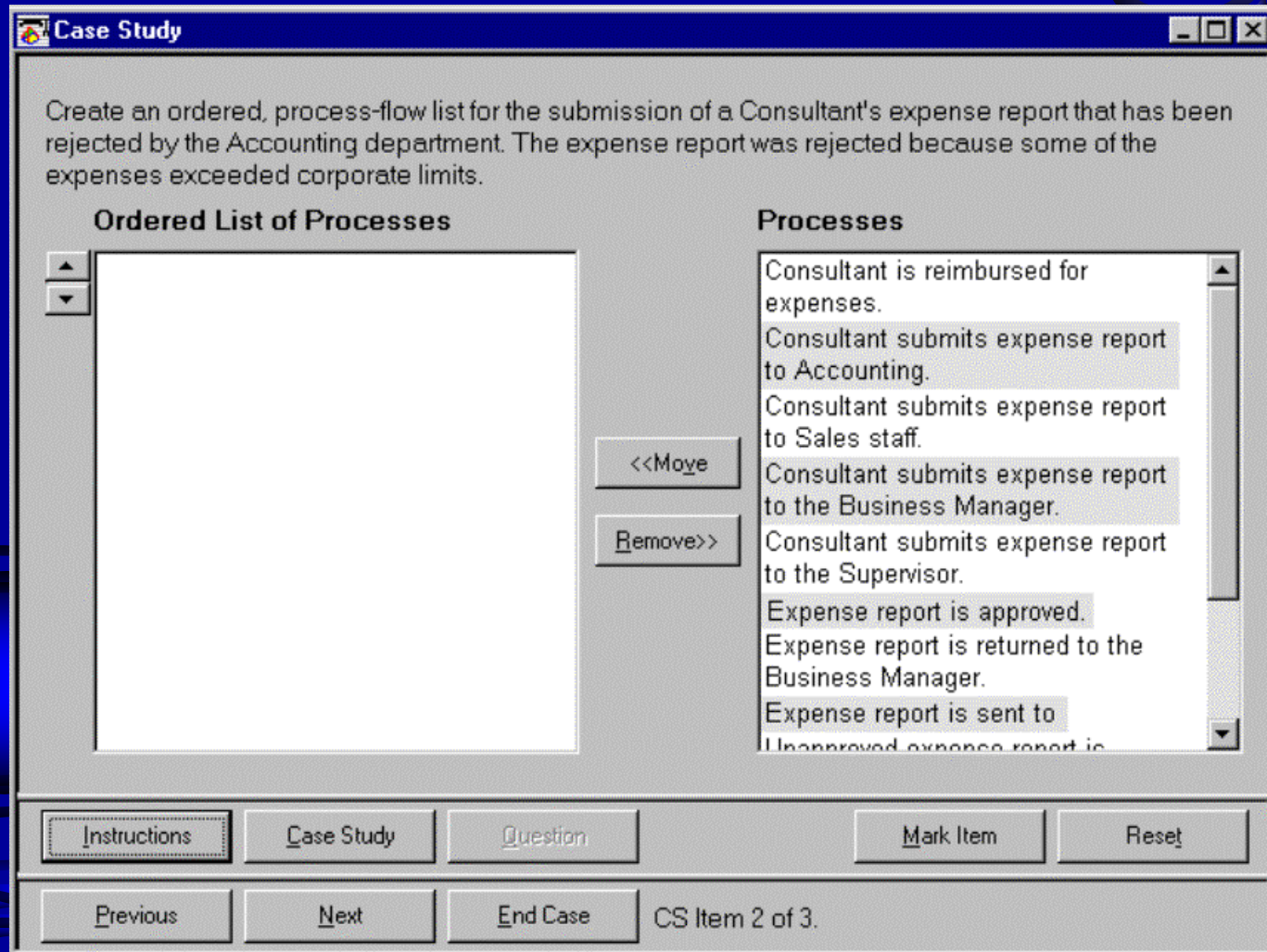
Select-and-Place

(Fitzgerald, 2001; Microsoft, 1999)



Policy Conditions	Account Conditions
Policy Permissions	Account Profile
Account Permissions	Policy Profile

Build, List, and Reorder (Microsoft, n.d.)



Drag-and-Connect (Fitzgerald, 2001)

You want to visit every planet starting at the planet closest to the sun and ending at the planet farthest from the sun. Indicate your route by connecting the planets in order of your visit. (Use all planets.)

The interface displays a collection of planet names in a grid-like arrangement. The planets shown are Saturn, Mercury, Jupiter, Neptune, Uranus, Mars, and Pluto. A path is being constructed, starting from Mercury, going to Venus, and then to Earth. The path is indicated by arrows and the text '>> Route >>' and '<< Route <<'. A panel on the right, titled 'Route', shows the current path: Route.

Route

Sorting Information (Bennett & Sebrechts, 1997)

Time Remaining: 0:22:01
Problem Sorting

Group A
 Tickets to a certain track meet were sold for \$4.50 each. If the same number of tickets had been sold for \$3.50 each, the revenues from the ticket sales would have been \$300 less. How many tickets were sold for the meet?
 $(a - b)x = c$, where $a = 4.50$, $b = 3.50$, and $c = 300$

Group D
 A quarry stocks 2 types of gravel. Type 1 is 100% slate chipped by volume and Type 2 is 80% slate chips by volume. If 1,000 cubic feet of Type 2 is mixed with enough Type 1 to make a new mixture that is 40% slate chips by volume, how many cubic feet of Type 1 must be added to make the new mixture?
 $sb + x = c(x + b)$, where $a = 0.2$, $b = 1,000$, and $c = 0.4$

2
7

1

Card 7
 Members of a certain club are selling tickets for a charity event. Tickets cost \$3.50, and the members have pledged that out of this only \$1.00 will go toward expenses, the rest will go to charity. If they want to give \$15,000 to the charity, how many tickets must they sell?

Group C
 A rectangular yard is 130 feet long by 110 feet wide. Of this, 200 is covered with grass. A walkway covers 1/4 of the area that is not covered by grass and the remaining area contains a patio. What is the area of the patio?
 $ab(1 - c)/4 - d = x$, where $a = 130$, $b = 110$, $c = 200$, and $d = 1/4$

Group D
 Pam and Tina are 4 miles apart. Traveling 4 miles takes Pam 14 minutes by bicycle and Tina 50 minutes by foot. If they begin traveling toward each other at these rates, how many minutes would it take before they meet?
 $x/a + x/b = c$, where $a = 14$, $b = 50$

3
4

5
6

Test
Quit

Click on one of the GED® items to place a CARD. Click on a new BRIDGE to move a CARD. Click on NEXT or PREVIOUS to locate a CARD.

Prev
Next

Create-a-Tree (Fitzgerald, 2001; Walker & Crandall, 1999)

03:09 Remaining Item 1 of 1

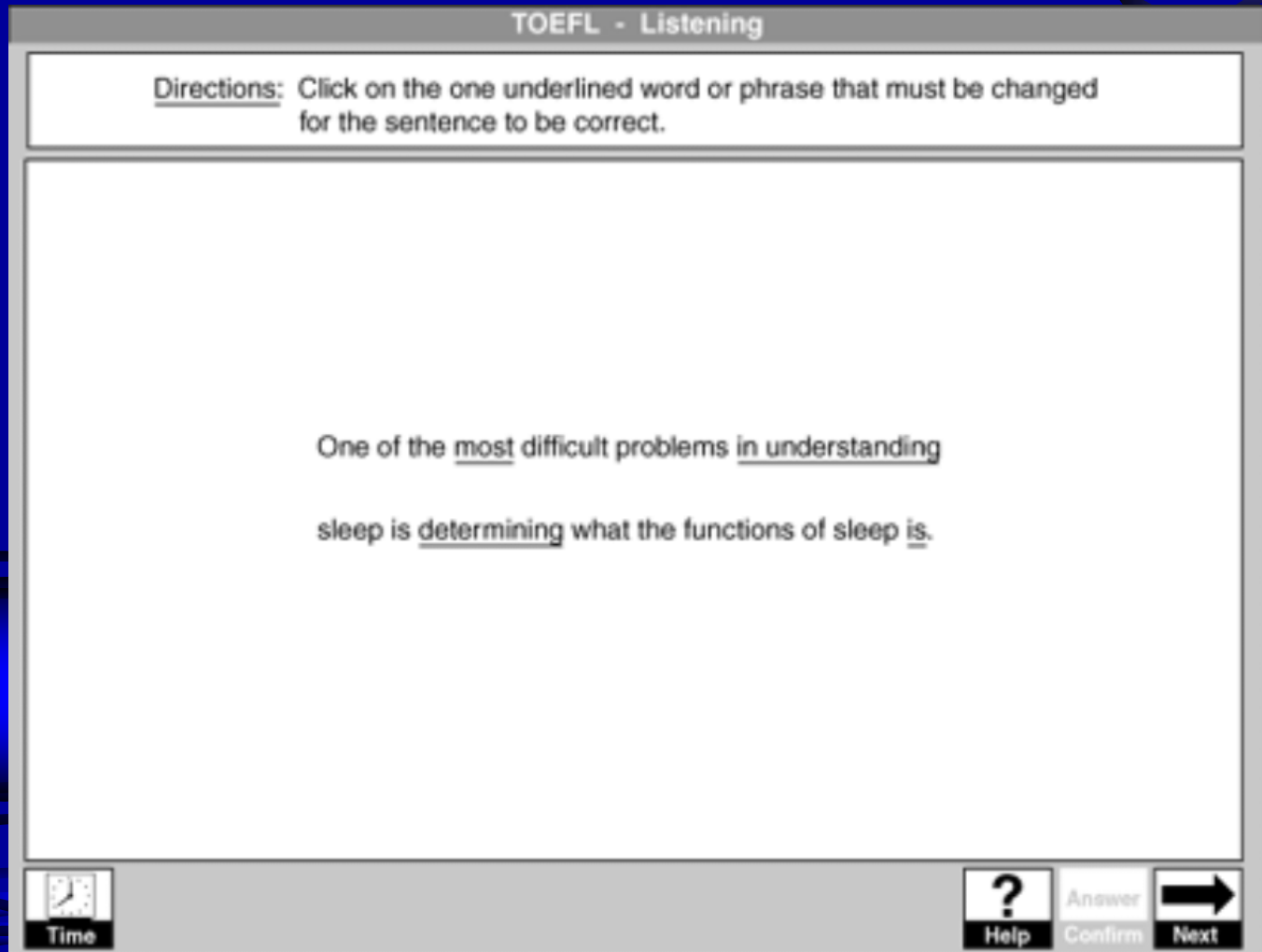
Listed below are (a) 12 countries and (b) 4 continents.
Please assign each country to its continent by clicking on the country and dragging it to the appropriate continent.

Countries	Continents
Chile	■ Africa
Denmark	└─ Malawi
Ethiopia	
Germany	■ Asia
Lithuania	
Malawi	
Mongolia	■ Europe
Peru	└─ Yugoslavia
Phillippines	└─ Lithuania
Thailand	■ South America
Venezuela	
Yugoslavia	

Done

Highlighting Text

(Carey, 2001; Walker & Crandall, 1999)

A screenshot of a TOEFL Listening test interface. The window has a title bar that says "TOEFL - Listening". Below the title bar is a box with the following text: "Directions: Click on the one underlined word or phrase that must be changed for the sentence to be correct." The main area of the window contains the sentence: "One of the most difficult problems in understanding sleep is determining what the functions of sleep is." The words "most", "in understanding", "determining", and "is" are underlined. At the bottom of the window is a control bar with four buttons: "Time" (with a clock icon), "Help" (with a question mark icon), "Answer Confirm" (with a question mark icon), and "Next" (with a right arrow icon).

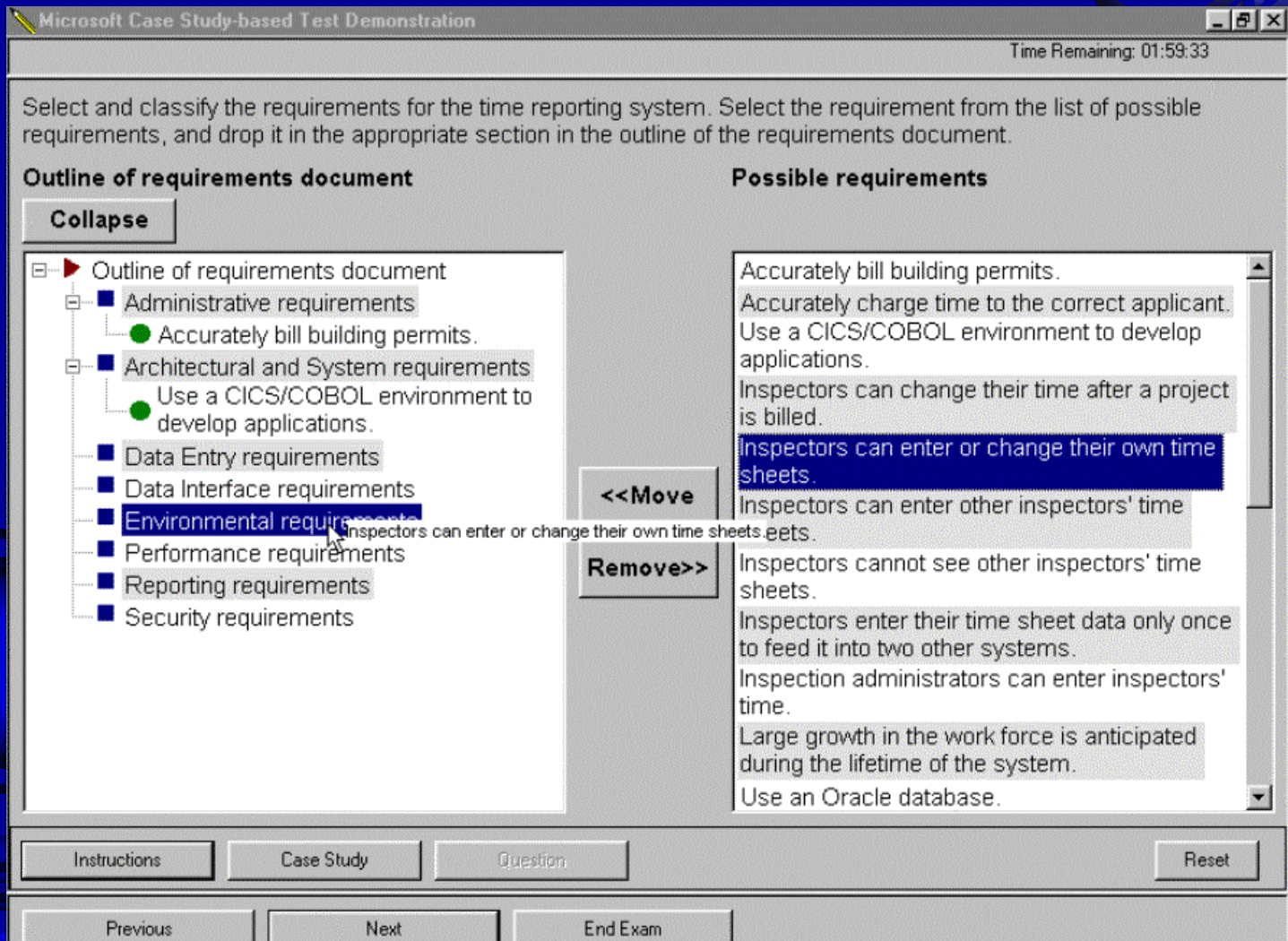
TOEFL - Listening

Directions: Click on the one underlined word or phrase that must be changed for the sentence to be correct.

One of the most difficult problems in understanding sleep is determining what the functions of sleep is.

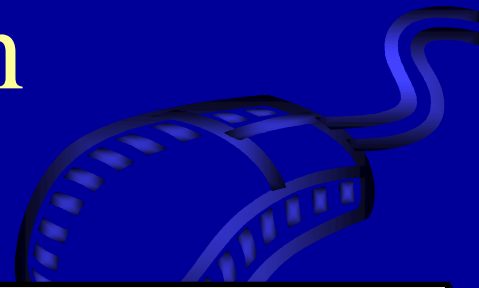
Time Help Answer Confirm Next

Select-and-Classify (Microsoft, 19XX)




Ordering Information

(Microsoft, n.d.)



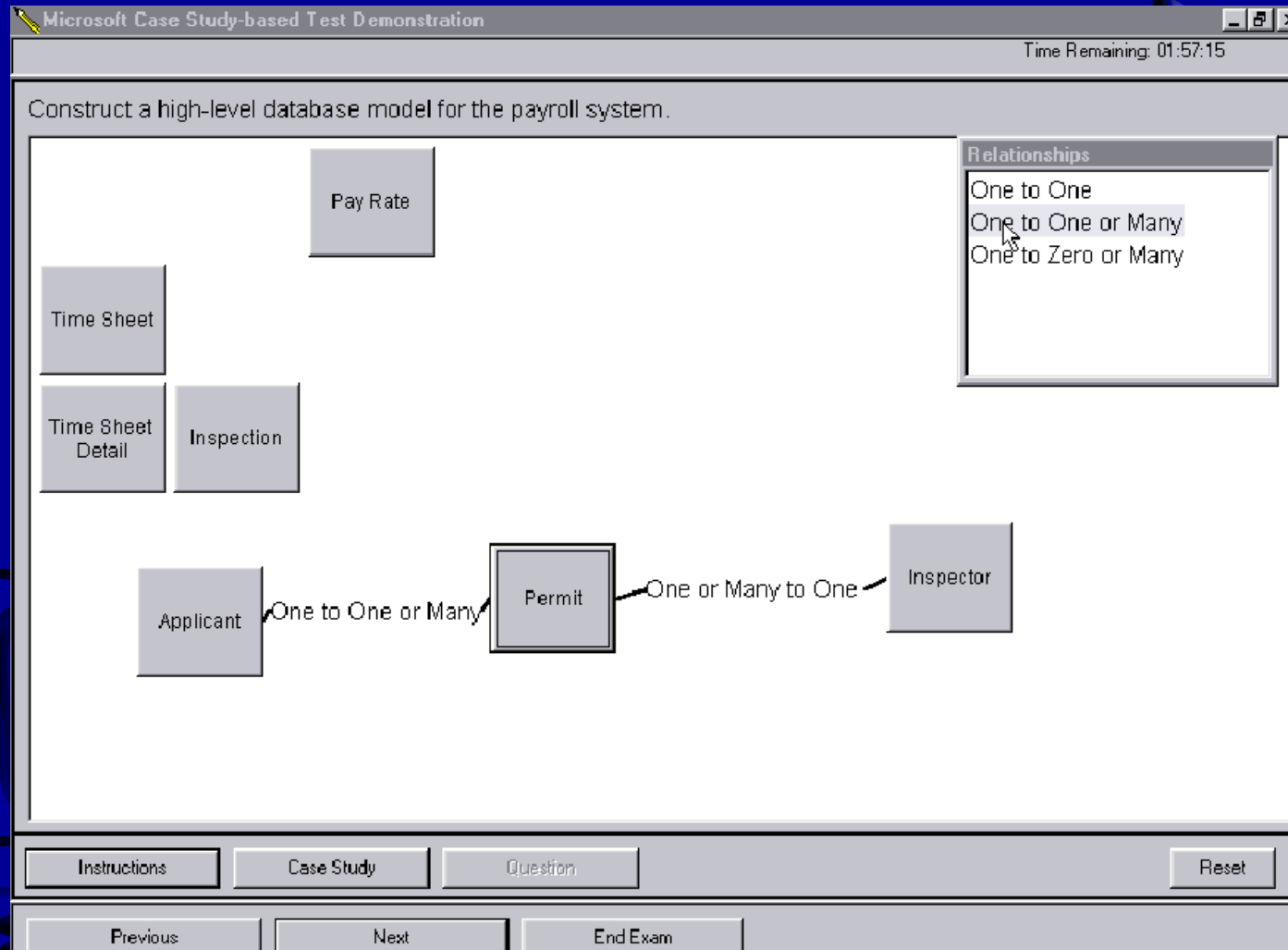
Below are listed six cities in Massachusetts and their populations from the last state census.

Re-order the list from the city with the most people to the city with the fewest.

Fall River: 91,938	Most  Fewest	
Pittsfield: 45,793		Springfield: 152,082
Springfield: 152,082		
Lowell: 105,167		
Dedham: 23,464		
Boston: 589,141		Dedham: 23,464

Specifying Relationships

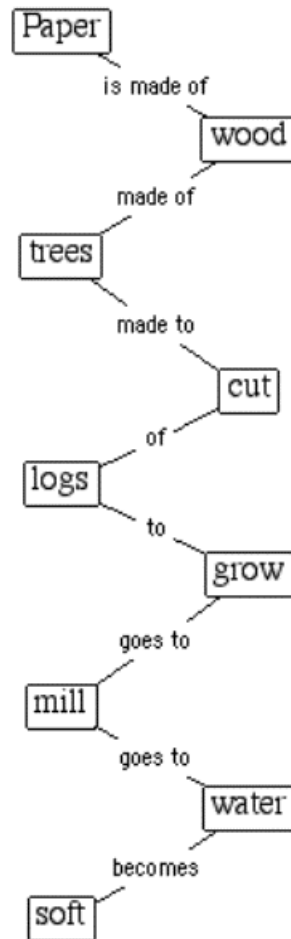
(Fitzgerald, 2001)



Simple Concept Maps (Novak, 1990)

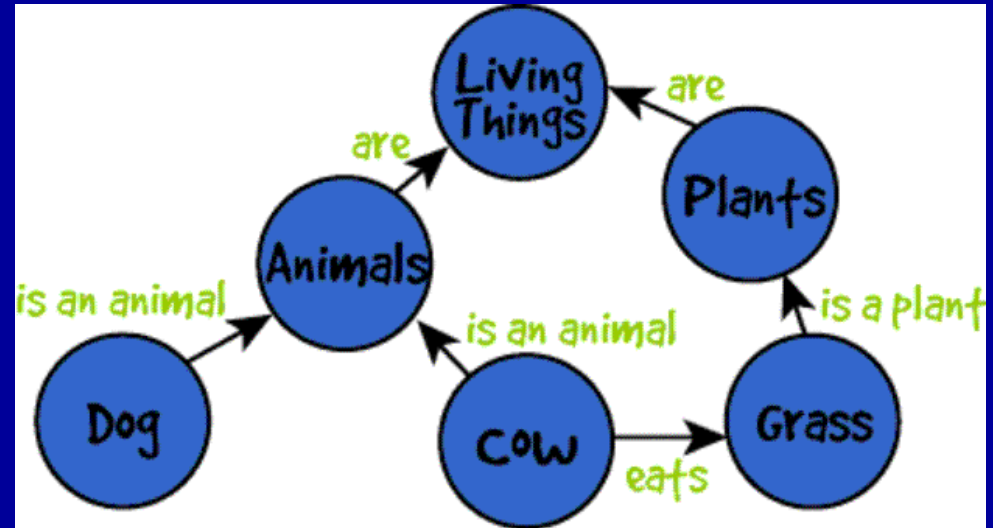
Concepts:

paper
wood
trees
logs
cut
grow
mill
water
soft
wasp nest
chew
pulp
fibers
writing
books

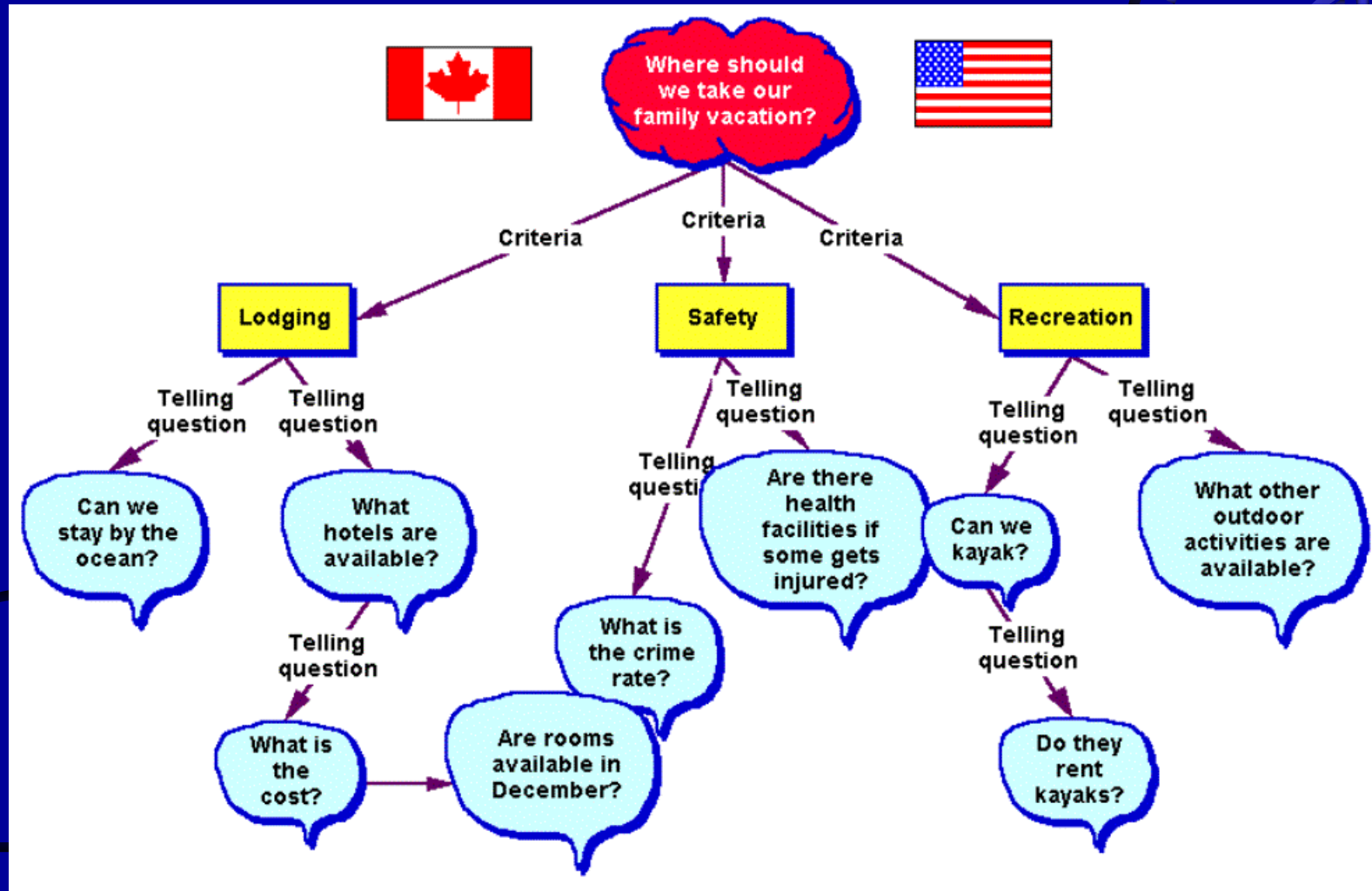


1

2

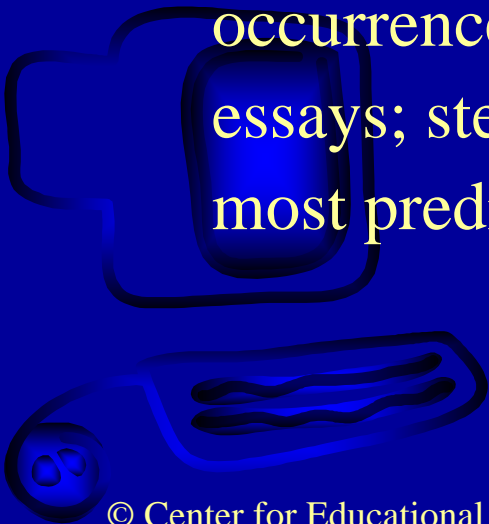


Concept Map (Klein, O'Neil, & Baker, 1998)



Automated Scoring of Text



- *Project Essay Grade* (Page, 1994; Page & Peterson, 1995)
 - Uses multiple regression to identify optimal set of surface features to predict score
 - *E-rater* (Burstein, et al, 1998)
 - Implements computational linguistics to quantify occurrence of syntactical, topical, and rhetorical features in essays; stepwise regression then derives weights for features most predictive of scores by humans
- 

Automated Scoring of Text (cont.)

- *Latent Semantic Analysis* (Landauer, Foltz, & Laham, 1998)
 - Relationships between words form semantic space
 - The LSA algorithm evolves a meaning for each word given semantic space between that word and every other word it is linked to
- *Text Categorization* (Larkey, 1998)
 - Linguistic expressions and contexts in texts used to classify them

Demo: PEG Automated Essay Scoring

Project Essay Grader Information Center - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites History

Address <http://134.68.43.165/pegdemo/NEXT.ASP> Go

PegDemo Peg People Other Links Research

PEG Demo Wizard

Step 2. Enter your written work

You have selected the **IUPUI English Placement Exam Model**.

Type your own essay using the [following prompt](#) or choose from several [preselected essays](#).

type essay here...

type essay here...

continue...

© 1998 Trustees of Indiana University
PEG components ©1998 TruJudge, Inc.
Other components © 1993-2002 Clifford C. Marsiglio

Done Internet

Essay Prompts - Microsoft Internet Explorer

[Close this Window](#)

In response to a perceived surge in violence, vandalism, and general mischievousness, many communities across the nation have begun to establish (or to re-establish) curfews for people under 18. Some people think curfews reduce crime, and keep young people safe and off the streets. Others think curfews are an imposition on the rights of these young people.

Take a few minutes to think about your experience and observations of one of the topics above. Then, write an essay in which you explain your positions on that topic.

A good essay will include :

- Serious thought about the topic.
- Clearly stated opinions.
- Evidence and experiences to support your opinion.
- Well organized ideas.

Demo: LSA Automated Essay Scoring

Essay Submission Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites History

Address <http://www-psych.nyu.edu/essay/essay.html> Go

Essay Submission Page

If you are using this site as part of a course, please fill in all the fields. If you are just testing the system, please just fill in the Name field

What is your name?

What is your class codenumber?

Which class are you in?

How would you like your results outputted?

☐ Simple (grade only, takes about 5 seconds)

☒ Extended (grade and suggestions, Note:- this takes 20-30 seconds to complete, DEFAULT)

Describe McClelland and Rumelhart's Interactive Activation model of word recognition. How does it account for the Word Superiority Effect?

The interactive activation model of word recognition put forth by McClelland and Rumelhart is very interesting. It represents a significant step forward in the development of approaches to automated scoring of text, particularly in that it incorporates balloons and confetti. It includes assumptions about the underlying links between items and in the process of teasing out such links it promotes a syntactic network of lexical terms. Processing in this model takes place at three different levels: these are the subterranean, the sorta-underground, and the surface. While serial processing is optimal in many situations, this model focuses on the possibilities associated with parallel processing. The levels of the model interact at multiple levels as well -- some levels are effectively noninteractive except in cases of particularly unusual word structures while others directly influence each other in the context of processing. Activation within levels is bidirectional and is designed by McClelland and Rumelhart to facilitate word recognition using all available information. Across levels, processing is structured as to as create an alphanumeric and syntactic network tht incorporates maximum flexibility for the task at hand. The word superiority effect is defined

Done Internet

Demo: LSA Automated Essay Scoring

Essay Submission Results - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites History

Address http://www.psych.nyu.edu/cgi-bin/essay_grade.pl Go

Thank you April.

On a scale of 0-100, the estimated grade you would get is: **78**

In comparison to undergraduates in PSY 301, your grade would correspond to a **C**.

Suggestions and comments

Your essay does not appear to focus enough on the following issue(s)

- What are the primary assumptions made by the model?
- The processing occurs at three different levels, what are they?
- Does the processing occur serially or in parallel?
- Provide more of a description of the interactions among the levels
- Describe the effect of the activation flowing between and within the levels
- Provide a definition of the Word Superiority effect
- Describe how the model accounts for the Word Superiority effect

Describe McClelland and Rumelhart's Interactive Activation model of word recognition. How does it account for the Word Superiority Effect?

Please make any changes you want below, then resubmit the essay to have it graded again.

How would you like your results outputted?

☐ Simple (grade only, takes about 5 seconds)

☒ Extended (grade and suggestions. **Note:** - this takes 20-30 seconds to complete, DEFAULT)

The interactive activation model of word recognition put forth by McClelland and Rumelhart is very interesting. It represents a significant step forward in the development of approaches to automated scoring of text, particularly in that it incorporates balloons and confetti. It includes assumptions about the underlying links between items and in the process of teasing out such links it promotes a syntactic network of lexical terms. Processing in this model takes place at three different levels: these are the subterranean, the sorta-underground, and the

Done Internet



Free-Response Mathematics

(Braswell, 1990)

Item : 1

$$\begin{array}{r} 63.35 \\ + 8.58 \\ \hline \end{array}$$

Answer:

 Help  Graphs **Next** **Close**

Move Figures/Symbols into Pictograph

(Martinez, 1991; French & Godwin, 1996)

04:23 Remaining Item 1 of 1

Choose one of the figures on the left and position it on the grid below to produce the graph of the function defined by $f(x) = x^2 - 1$.

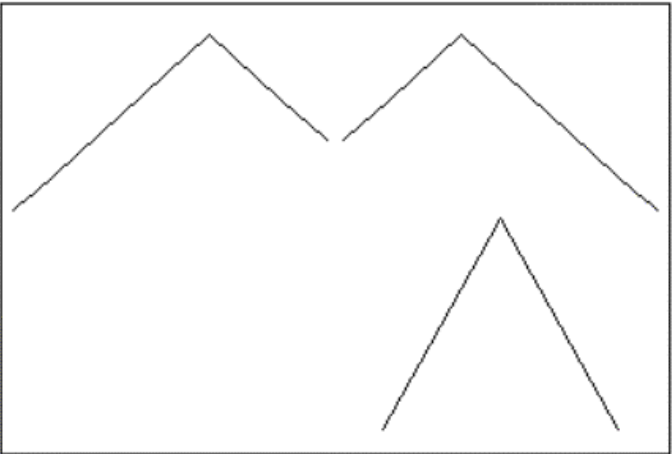
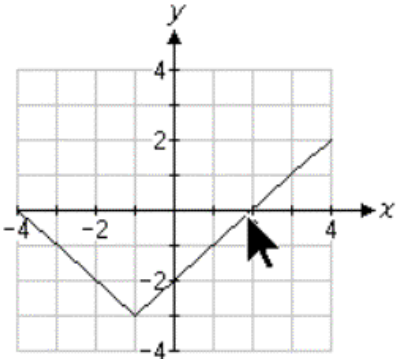
Done

Move Figures/Symbols into Pictograph

(Martinez, 1991; French & Godwin, 1996)

00:59 ETS CBT Demonstration - Section 1: Sample Items 14 of 14

Produce the graph of the function defined by $f(x) = 2 - |x + 1|$ by choosing one of the figures in the box and positioning it on the coordinate grid.

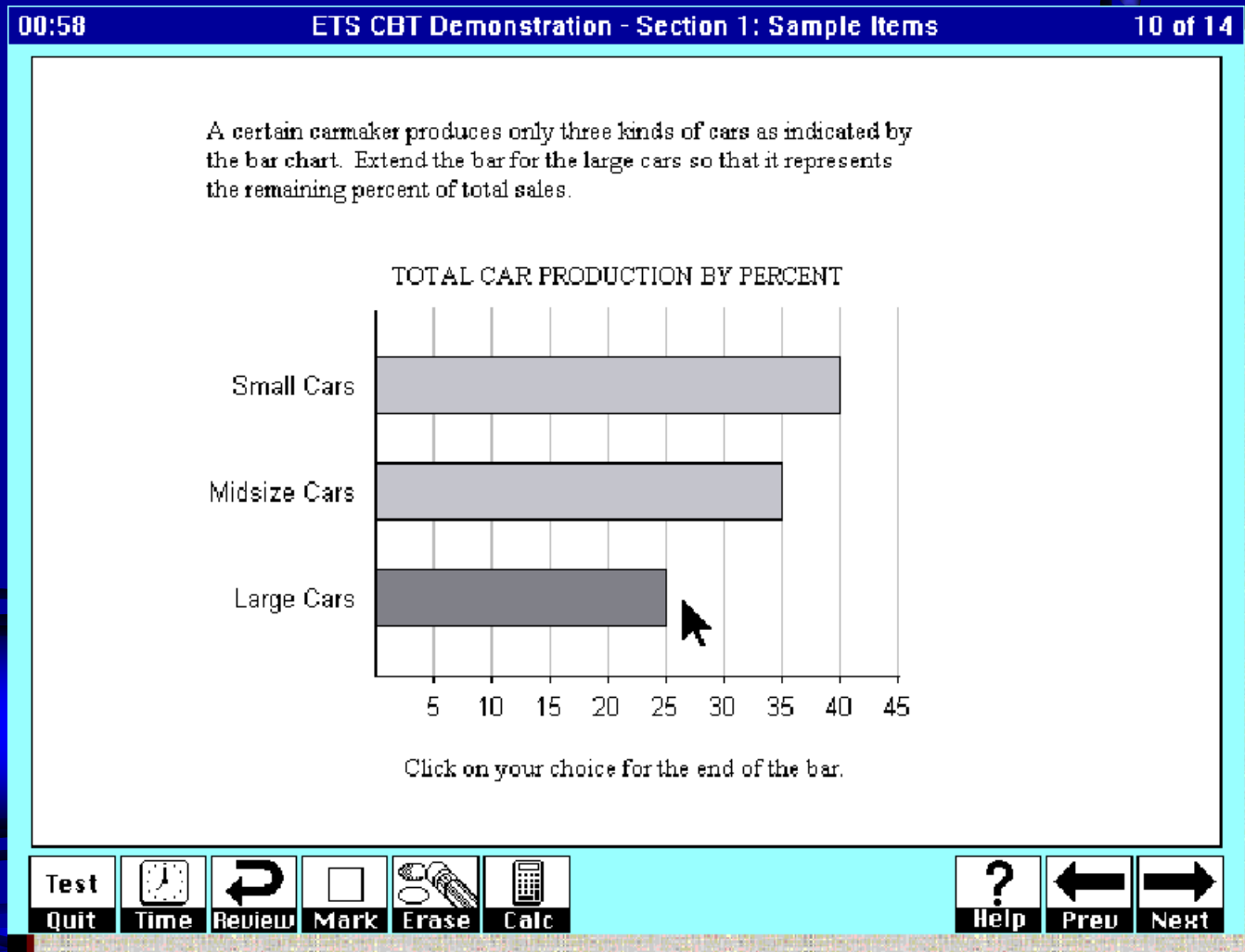


Click on an object you wish to place and drag it into position.

Test Quit Time Review Mark Erase Calc ? Help Prev Next

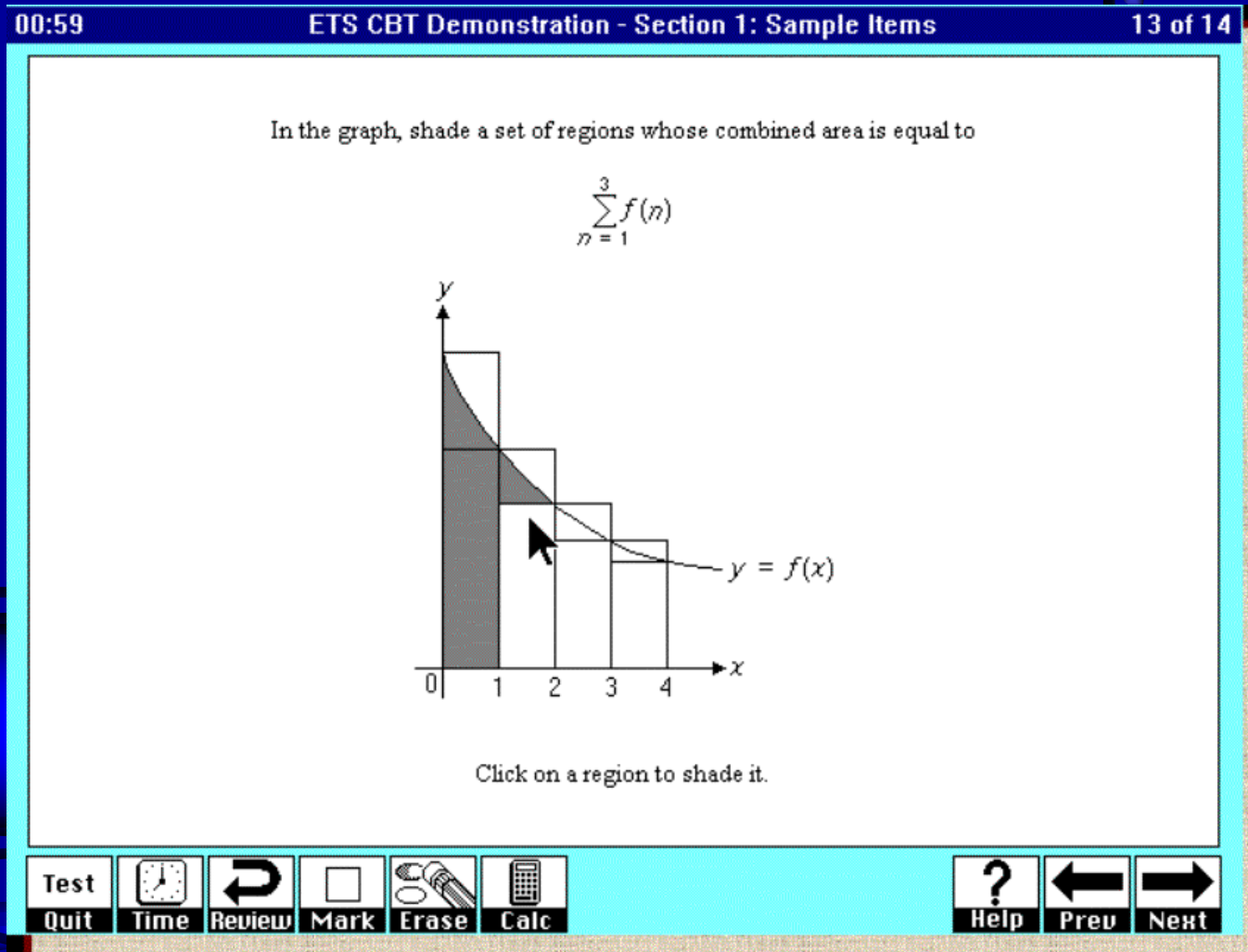
Graphical Modeling

(Bennett, Morley, & Quardt, 2000)



Graphical Modeling

(Bennett, Morley, & Quardt, 2000)



Multiple Numerical Response (Mills, n.d.)



Microsoft Excel

File Edit View Insert Format Tools Data Window Help

Courier 10 B I U [Formatting Icons] 100% Prompt

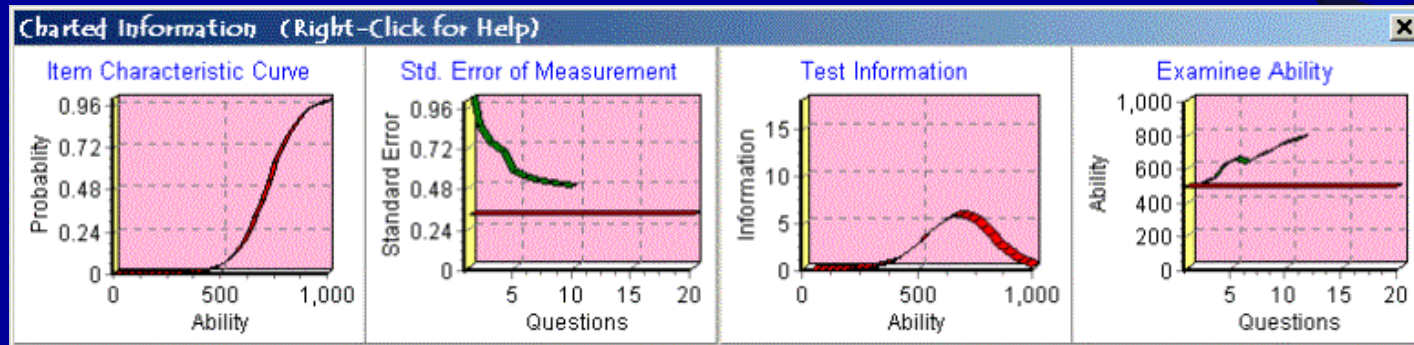
E3

balancesht-sample.xls

	A	B	C	D	E	F	G	H
1	Statement of Financial Position							
2	31-Dec-99							
3	(unaudited)							
4								
5								
6	Current Assets							
7	Cash on Hand		\$0					
8	Checking Account		43,550					
9	Savings Account		25,950					
10	Market Fund Accounts		30,500					
11	Net Assets (Balance of Funds)		100,000					
12								
13	Balance of Funds January 1, 1998		91,700					
14								
15	1999 Receipts							
16	Subscriptions	74,400						
17	Mailing List Receipts	1,000						
18	Advertising Revenues	5,500						
19	Conference Revenues	12,500						
20	Interest income	5,300						
21	Total Income & Receipts	98,700	98,700					
22								
23	Subtotal Available Funds		190,400					
24								
25	1999 Disbursements							
26	Publishing Direct Costs	50,500						
27	Journal Shipments, Postage	3,540						
28	FTE Salaries	9,600						
29	Editorial and Publication Mgmt. Fees	9,460						
30	Officer Stipends	4,000						
31	Conference Fees	10,500						

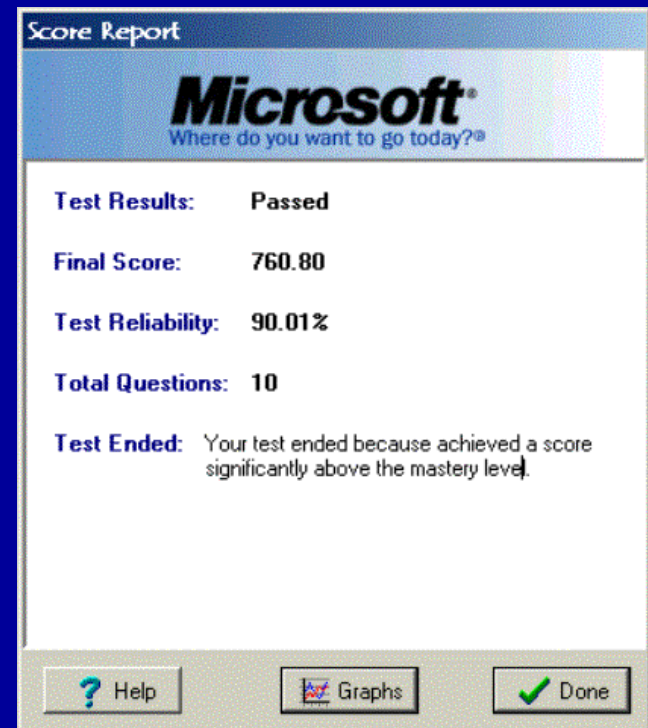
MyBalanceSheet

Examples: Online Feedback/Reporting



The example above illustrates some *measurement* feedback you might want back after taking a test...

At right is a sample score report from an adaptive math test found online



Computer-based essay

(Burstein, et al., 1998)

Analytical Writing Assessment - Analysis of an Argument

Read the argument and the instructions that follow it, and then make any notes that will help you plan your response. Begin typing your response in the box at the bottom of the screen.

Beginning

The following appeared as part of an article in a weekly newsmagazine.

“The country of Sacchar can best solve its current trade deficit problem by lowering the price of sugar, its primary export. Such an action would make Sacchar better able to compete for markets with other sugar-exporting countries. The sale of Sacchar’s sugar abroad would increase, and this increase would substantially reduce Sacchar’s trade deficit.”

Discuss how well reasoned you find this argument. In your discussion be sure to

Cut

Paste

Undo

Test **Section** **Time** **Help** **Answer** **Confirm** **Next**

Problem Solving Vignette/Simulation

Item 2 of 3

☐ Mark Current Time: 2:34:32 PM

You host a Web site for a customer named Just Togs. You want to change the default document so that users view Justtogs.htm instead of Default.htm when they connect by using the URL <http://www.justtogs.com>.

- Use Microsoft Management Console to change the default document to Justtogs.htm. (Click the **Microsoft Management Console** button.)

Microsoft Management Console

Click Next (or More) to continue.

Next **Previous** **Help**