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Introduction

Computerized test scoring is a free service provided by Data Center Operations for the benefit of all KSU instructors. Its purpose is to use the computer to grade objective classroom tests. A device called the scanner reads pencil marks from specially printed forms and creates a computer readable data file. The computer reads the data, scores the tests, tabulates the scores, sorts the tests, and prints the results. This saves instructors considerable time otherwise spent manually grading tests. Not only can the computer score a test or quiz, but it can also keep track of student test scores throughout the semester. This option, known as Classbook, is very popular as it provides a computerized grade book for the class. Tests and students can be added, updated, and deleted as needed. The entire test history and total points are printed for each student. This makes Classbook especially useful for recording midterm and final grades.

New Information as it Pertains to Sensitive Information

The Banner ID has taken the place of the Social Security Number; all nine digits of the Banner ID must be gridded in the student number grid in order to identify the student.

Summary of Features

This section provides a summary of the computerized test scoring features available.

Test Scoring

The test scoring program scores and prints the results for a single classroom test. The reports include a frequency distribution of scores, an item analysis, and student listings. Student listings are printed alphabetically by name and rank order by score for grade recording, numeric by student id for grade posting, and right/wrong answer sheets for student feedback. If you are teaching several sections of a course, these reports can be sorted and printed for each class section.

To use test scoring, fill out a control sheet specifying the desired reports and grading options. Following this will be the grading key(s) and finally the student test papers. Grading options include adding a constant to each test paper, multiplying by a constant, adding individual points from the test papers, correcting for guessing, and setting the test value. If desired, a disk file containing the student test data and scores can be sent to your e-mail account or copied to a diskette.

The main grading key specifies the correct test answers. The optional either/or key allows two correct answers for each item. The optional weighting key assigns two or more points to the questions you specify. If a test contains several distinct sections, you can submit subkeys to score and report the sections separately.

To discourage cheating, you may give different versions of a test. The standard test form is available in several colors for this purpose. You can manually separate the tests into groups and achieve the same results.

Classbook

Classbook maintains a computerized grade book of scores created by the test scoring program. Tests and students may be added, updated, and deleted as necessary. Classbook can keep up to nine tests. Multiple scores such as homework and attendance points can be accumulated using a single classbook test. Reports are similar to those from test scoring with the addition that all tests and the total score are listed. Several options are available to control how the total points are computed. Tests may be weighted at any time throughout the semester. The lowest test(s) can be dropped for each student. You can exempt a test (such as the final) from being dropped. Finally, the total points can be weighted or set as needed.
Where to Get Help

This help memo is the primary source of information for using computerized testing. The Users Guide provides a thorough introduction. The one page Quick Reference Guide makes a handy summary for filling out the control sheet. The Reference Guide contains all details on using the various options. The Statistics Guide explaining how to interpret the report statistics is included for your enjoyment. Personnel at the data entry window can also help answer your questions.

For new users, we recommend thoroughly reading the Users Guide and Quick Reference Guide. Skim the Reference and Statistics Guides, referring to them whenever you need detailed information.

We encourage feedback for ways to improve our service. After you become familiar with computerized test scoring, please take a moment to fill out and return the User Survey at the end of this memo. Tell us how you use testing services, what options you use, and how we can improve the service. Just as important, tell us what we are doing right so we keep doing it.

Thank you for using our services and we look forward to working with you in the semesters ahead.

How to Use Testing Services

Data Center Operations is located in Room 120 on the first floor of the library. The Data Center Operations window is located on your right as you enter the Computer Center. At this window you can pick up blank answer sheets, submit completed sheets for scoring, and pick up the results. Scanning and Test Scoring Services hours are 8:00 a.m. to 5:00 p.m. Monday through Friday. Call us at 330-672-3736 if you have questions. The steps for using testing services are outlined below.

1. Blank answer sheets are available at the Data Center Operations window. We do not charge for scanner forms but keep track of their usage. When you pick up the forms, you will be asked to fill out a control sheet. Grid your department name, the date, and your department account number. Data Center Operations personnel will complete the control sheet and give you the forms.

2. Instruct your students to grid their responses on the answer sheets. It is important that the students use a pencil, grid only one response per test item, and thoroughly erase all changes. Remind the students to grid their names and student numbers (the same way for each test) if they want credit for taking the test.

3. Take the test yourself, bubbling in the correct answers on an answer sheet. Grid all 9s as the student number. This sheet is used as the grading key by the computer.

4. Fill out a control sheet specifying the report and grading options desired. Grid your name, the date, department account number, and call number. For classbook, grid the test number (1 through 9). Subsequent sections of this memo will explain the control sheet options for test scoring and classbook.

5. Be sure the scanner forms are oriented in the same direction with the control sheet on top, followed by the grading key, followed by the answer sheets. Remove all staples, paper clips, grids gum, and extraneous papers such as test booklets, surveys, etc. Paper clips and staples will not pass through the scanner. Insure that the forms are not torn, folded, or otherwise damaged.

6. Submit the forms to be processed at the Data Center Operations window. You will be notified when the work is completed, usually two to four hours.

7. If you find an error on the reports such as an incorrect grading key or incorrect control sheet option, the error must be corrected and the test papers resubmitted for scoring. Because of the batch nature of the test scoring system, it will save much time if the grading key and control sheet are carefully checked before scoring.
Available Scanner Forms

Several general purpose answer sheets are available from Data Center Operations. These forms are free to the KSU community and are the only forms that will work with the scanner.

DP-001
This is a half sheet (5.5 X 8.5) form available in red, green, blue, and violet. There are 105 test items with 5 responses per item. This is our most popular answer sheet. The different colors are used to discourage cheating by giving different versions of the test.

DP-002
This is a full size (8.5 X 11) form available in red or blue depending on inventory. The form has 225 items with 5 responses per item.

DP-004 and DP-004A
This form has 52 items with 5 responses per item (DP-004) or 10 responses per item (DP-004A) and allows survey or test questions to be printed directly on the forms. This full size red form is most often used for large surveys.

DP-008
This form has 150 items with 10 responses per item. These full size blue forms are used for surveys and tests requiring more than 5 answer choices.

DP-003
The Control Sheet specifies scoring and report options. It must be submitted with each scanning request. These brown forms are available in both full and half sheet sizes.

How the Scanner Works

Computerized testing centers around a mechanical device called the scanner. When you submit your test papers for scoring, the Data Center Operations personnel take the forms into the machine room where the scanner is located. The scanner operator loads the test papers into the scanner and starts the machine. The scanner reads a form by bouncing light off the paper and sensing the amount of reflection. Pencil absorbs light and does not reflect. The absence of a reflection indicates a mark. This is why ball point pen ink, which leaves a shiny surface, will not work with the scanner. The scanner differentiates light and dark pencil marks. The darkest mark is interpreted as the indicated response. It is very important that all changes are cleanly erased. More than one dark mark is called a multiple grid and is treated as a blank response.

After reading the form, the scanner sends the information to a PC that converts the mark information into computer data. Each scanner sheet becomes a record in a data file. Each response is a column in the record. Once all test forms are scanned, the data file is sent to the server where two programs process the data. The test scoring program reads the grading key, scores the test papers, and prints reports for the test. The scores are sent to the classbook program that keeps track of test scores for each student. Classbook totals the scores and prints reports containing the test history and total points for all students. The reports are printed, checked for obvious errors, and returned to the instructor.

Annually half a million tests, surveys, and evaluations are scanned and reported at KSU. Each semester over 1,400 classroom tests containing 140,000 test papers are scanned, scored, and reported. Some 200 classbook sections track test scores for 20,000 students. If you assume one minute to hand score and tabulate a test, it would take one person 58 forty hour weeks to score a single semester’s tests.

In summary, this system provides an orderly and efficient method for many instructors to use the scanner and test scoring services.

Test Scoring Example

KSU’s own Dr. Flash (affectionately known as Dr. F) is teaching section 10023 of Marine Biology. He determines the students’ grades will be based on six tests and an extra credit project. He plans to drop the lowest test and use the best five grades to determine the total score. The extra credit project counts as bonus points. Each test is worth 100 points and the total score based on 500 points. Each of the six tests contains a combination of true-false, matching, and multiple choice questions. Dr. F plans to use the computer to score his tests. Classbook will keep his grade book. All Dr. F has to do is assign final letter grades at the end of the semester. The computer will score, total, sort, and print the test results.

It is now the end of the term and Dr. F is ready to give the sixth and final test. On test day, the students receive a
copy of the test questions and an answer sheet. The students are reminded to use a pencil and grid their names and student numbers on the forms. They grid their answers and leave the completed forms with the instructor. To discourage cheating, different versions of the test are created by rearranging the order of the test items. Some students receive a red answer sheet (test A), some a blue sheet (test B), and some a green sheet (test C). By strategically alternating the colors, Dr. F insures no adjacent students have the same color answer sheet. Dr. F could diabolically use different color answer sheets, give all students the exact same test, and save himself some work.

Dr. F fills out a grading key for each version of the test. Using the corresponding color answer sheet, he grids the correct responses and grids all 9s in the student number. The 9s tell the computer which answer sheets are grading keys. Had all students taken the same test, Dr. F would only need to fill out a single key on any color form he chooses.

The answer sheets are arranged to face in the same direction with the keys on top of the stack. The order of the answer sheets is not important as Dr. F knows the computer will use the form color to grade each test paper using the correct key.

Dr. F turns his attention to the control sheet he will use to tell the computer which reports and grading options he wants. On the front of the control sheet, he grids his Name, the Date, and department Account Number. He grids the Call number 10023 and Test number 6. Because he is adding a new test to classbook, Dr. F grids Classbook Add for the Scoring Procedure.

He requests alphabetic Student Listings for grade recording, numeric listings for public grade posting, and right/wrong answer sheets to hand back to the students. He plans to keep the answer sheets in case any students have questions later.

At this point, Dr. F normally puts the completed control sheet on top of the stack and heads off to the Computer Center to score the papers. This time he wants to use some additional options so he turns the control sheet over and continues. The test contains 50 questions and Dr. F wants the test to count as 100 points. He figures the way to do this is multiply each score by 2. On the upper left of the control sheet, he locates the Test Score Grading Options, grids Multiply Factor, and grids 2.00 as the Multiplication Factor.

While taking the test, several students complain that one of the questions was confusing. After thoughtful review, Dr. F decides to throw out the question and give everyone credit for it. He takes the grading keys and carefully erases the offending item. The test now has 49 questions. Multiplied by 2, this gives a test value of 98 points. Dr. F needs to add 2 points to bring the test value to 100 points. He grids Add Constant and grids 2 as the Addition Constant. In this case, the computer can easily figure out that the test is worth 100 points. Dr. F grids a Test Value of 100 as a mental reminder to himself. The grided test value overrides the value that the computer normally uses. The options to score test 6 are now complete.

We turn our attention to how classbook computes the total points. Classbook normally totals the existing tests and prints the results. Because this is the final test, Dr. F tells classbook how he wants the total points computed. The first task is to insure each test has the proper point value. Each test had 50 questions and should count 100 points each. Tests 3 through 6 were multiplied by 2 when added to classbook; tests 1 and 2 were not. One way to correct this is to rescore the first two tests and multiply each by 2. This requires the original answer sheets and grading keys. An easier method is to tell classbook the new test values and let the computer double the scores. Dr. F. grids 100 as the Classbook Test Value for test 1 and 2. Classbook will now use a scaling factor of 2 for the first two tests.

Dr. F wants to drop the lowest of the six tests. He grids Drop Lowest Test in the bottom right of the control sheet. He remembers test 9 was used for the extra credit project and does not want these points dropped. Griding a zero for the test value insures test 9 is not dropped. Test 9 will be added to the total points. Almost finished, Dr. F forges ahead.

Learning he has been granted a year's sabbatical at Sea World, Dr. F decides to share his good fortune with his students and gives them each an additional 10 points. Locating the Classbook Total Point Options in the upper right of the control sheet, he grids 10 as the Addition Constant.

Mustering the last of his analytical abilities, Dr. F adds the 500 points from the tests to the 20 extra credit points and the 10 bonus points for a 530 point total. He grids 500 as the Classbook Total Points so the final percentage points are based on 500 and not 530 points. He knows some students may score over 100% of the 500 possible points; they get an A. Obviously pleased with himself, Dr. Flash heads off to score the final test and assign letter grades. It has been a good semester indeed.
Overview
The test scoring system consists of two programs; test scoring and classbook. The test scoring program scores a test and prints the results. The classbook program keeps track of individual student test scores throughout the semester and prints reports containing the students' entire test history and total points. Both programs print test statistics and a frequency table of scores. Test scoring also prints an item analysis.

Assembling a Test for Scoring
To use the test scoring system, fill out a control sheet specifying the listing and grading options desired. Assemble the control sheet first, followed by the grading key(s), followed by the answer sheets. Submit the stack to be scored.

Answer Sheets
Instruct your students to grids their names and their Banner ID. This student number is especially important when using classbook. If reports are desired by section number, the section number must be gridded on all student test papers. To add essay or extra points to the objective test score, grids the additional points right justified in the special code area of the students’ papers (leading zeros are not required). Be sure your students use pencil, grid only one response per item, and erase all changes completely.

Grading Keys
The grading key specifies the correct test answers for test scoring. The main grading key is required. The either/or and weighting keys are optional.

Main Key
Grid all 9s in the student number. Grid the correct response (one answer only) for each test item. If you grid a name on the main key, the name is printed on the reports. The main key follows the control sheet.

Either/Or Key
Grid all 9s in the student number and EITHER as the key name. Grid the alternate test answer for those items that have two correct answers. You may have only one either/or key following each main key.

Weighting Key
Grid all 9s in the student number and WEIGHT as the key name. Grid the question value for those items worth more than one point. You may have only one weighting key following each main key. If all questions have the same value, consider using the multiplication factor instead.

Multiple Test Forms
If you give multiple forms of a test to discourage cheating, assign a different color answer sheet to each test form. Fill out a key for each test form using the corresponding color answer sheet. Fill out a control sheet followed by the keys and then followed by the test papers (the order of the test papers is not important). The student answer sheets will be scored with the corresponding color key. Each key can have its own either/or and weighting key. Alternatively, you can separate the test papers into groups by test form. Fill out a control sheet and grading key for each group. In the Number Groups option on each control sheet, grid the number of groups you have. Submit the groups together for scoring.

Subkeys
To independently score different test sections, fill out a key for each group of test items. Grid a name on each subkey to differentiate the reports. Submit a control sheet, all subkeys, and test papers as usual. The test papers are repeatedly scored and listed for each subkey. Each subkey may have its own either/or and weighting key. It is important that all subkeys and/or test papers be on the same color form. If you use different color keys and different color test papers, the computer scores each test paper only once using the matching colored key.
The control sheet specifies how the test papers are scored and printed. Some options apply to test scoring only, some to classbook only, and some to both. Grid the Instructor's name, date, department account number, and class section number on the control sheet. For classbook, be sure to also grid the test number (classbook can hold up to 9 tests).

Scoring Procedure

Select test scoring or classbook. Grid one bubble only for the requested scoring procedure

- Test scoring only. Do not grid this bubble when using classbook as test scoring runs automatically. If you grid the section number, it is printed on the reports.
- Add a new test to the classbook. If the test already exists, the new test scores are added to the existing scores. Unmatched students are added to the classbook.
- Update a classbook test. The existing test scores are replaced with the new scores. Unmatched students are added to the classbook. If no test papers are submitted, the test score grading options are applied to each student's score.
- Delete a classbook test. If test papers are submitted, those students are removed from the classbook. If no test papers are submitted, the entire test is deleted for each student in the classbook.

Student Listings

Grid all student listings desired for test scoring and classbook

- Alphabetic by name, useful for recording grades.
- Numeric by student number, for public grade posting.
- Rank Order by score, shows which students are doing well and those who are not.
- Right/Wrong Answer Sheets, lists all test items for student feedback.
- Section Listings, prints student reports combined and for each class section.
- Progress Reports, lists complete classbook test history for student feedback.

Test Score Grading Options

Grading options are used to adjust the test scores. Grid all that apply.

- Add a constant number of points to each student. Grid the number of points right justified in the Addition Constant. Useful when dropping a test item and giving all students credit for it.
- Multiply each test score by a constant. Grid the multiplication factor in the Multiply Factor. Allow for 2 decimal positions. Often used to insure a test is based on 100 points.
- Add individual points from the test papers to the objective test score. This is often used for essay or project points. The points must be gridded in the Special Code on each student's test paper. Grid the combined test value in Test Value so that the percentage points are computed correctly.
- 1/K guessing correction. Grid one less than the number of item responses in the 1/K Subtraction. The students are penalized a point for each K items answered incorrectly.
- Print raw scores on the test forms. The raw score does not reflect key or grading options.
- Requests an electronic disk file containing the student tests forms be sent to your e-mail account for further processing.

Classbook Test Values

To change the test values, use the Test Value blocks on the back of the control sheet. Grid the new test values desired. The students' tests are scaled as appropriate to the new values. Grid zero to suppress a test from printing. Tests remain scaled for subsequent classbook runs.

Classbook Drop Tests

This option drops the lowest test score(s) for each student in classbook. Grid the number of tests to drop. Grid zero in the Test Value to exempt a test from dropping. To reinstate dropped tests, grid Clear Drops. Tests remain dropped for subsequent classbook runs.

Classbook Total Points Options

Use these to adjust the total points computed by classbook for each student. You may add points to the total points, multiply the total points by a factor, or set the point value for the total points.
The typical test scoring job requires a control sheet to specify report and grading options, a grading key to score the tests, and the test answer sheets. This section describes the details of the various options available. Items will be discussed in the order they are normally handled by the instructor; the answer sheets first, followed by the grading keys, and finally the control sheet.

Keep in mind there are two basic parts of the test scoring system; test scoring and classbook. The test scoring program scores the answer sheets using the grading key and prints the results. If requested, the test scores are then sent to the classbook program. Classbook maintains a computer file for each class section containing a record for each student. The classbook record contains the student name, student number, call number, and up to 9 test scores. Classbook applies the test records to the classbook file, totals the scores for each student, and prints the reports. Tests and students can be added, updated, and deleted as needed.

The reports you receive contain the test scoring results followed by the classbook reports. Test scoring prints test statistics, a frequency table of scores, an item analysis, and student reports. Classbook prints statistics and frequencies of the total scores in addition to student reports.

Options for both programs are on the control sheet. Some options pertain to test scoring only, some to classbook only, and some to both.

### Student Answer Sheets

As an instructor, your first task is to write the test questions. Objective test items (true-false, matching, and multiple choice) are computer scored using an answer key. Completion items (fill in the blank and essay) are hand scored. You may decide to give different versions of the test to discourage cheating. This is usually done by changing the order of the test questions and/or the order of the possible answers. If you use the half sheet answer forms and assign a different color for each test version, you will not need to separate the answer sheets later. Read the Grading Key section for more information.

### Student Names and Numbers

Instruct your students to grid their names and their Banner ID on the answer sheets. Students should grid the same name and student number on each test. It is very difficult (impossible) to identify the students on the reports otherwise. Classbook uses the exact student name and student number to match the test records with the student records already in the classbook file. If a match is found, the test score is added to the student's classbook record. Unmatched test records are added to the classbook file as new students. Instruct your students to carefully grid their names and student numbers and contact Data Center Operations if you find an error.

### Section Number

If you teach several sections of the same course, have the students grid their call numbers on the answer sheets. You can submit the sections together for scoring. The computer prints the frequency table and item analysis for all sections combined. Student reports are printed combined and separately for each section. Use the combined reports as a master student roster and the section reports for grade posting and recording. Of course, you can submit each section separately if you prefer.

Classbook can also maintain several class sections in a single classbook file. Test statistics and the frequency table of scores are computed for all sections combined. Student reports are printed combined and separately for each section. The students must grid their call numbers when using this feature.

### Test Answers

Make sure you students use pencil when taking the tests. Ball point pen is NOT read by the scanner. The student may only grid one response per item. Multiple grids are treated as blank responses. The students must erase all changes completely as the scanner will pick up poorly erased marks. The students should not make any stray pencil marks on the forms as they may interfere with the scanner. Please note that gum, paper clips, staples, pop spills, rips, and other mutilations are detrimental to scanning.

### Special Code

If desired, non-objective (essay and fill in the blank) points can be gridded on the answer sheets and added to the objective test score. Grid these points right justified in the special code area of each student's answer sheet. The Add
Points bubble on the control sheet tells the computer to read and add these points to the objective test score.

The special code is also used to add attendance, lab, extra credit, and special project points to classbook. Grid these points right justified in the special code area of each student's answer sheet. Leading zeros are not required. Be sure to completely erase all changes. Answer sheets from a previous test are ideal for this purpose as the student's name and student number are already gridded. Fill out a blank answer key and submit the papers for scoring. The blank key gives each student a zero objective test score to which the special code points are added. These scores are sent to classbook for recording. They can be added to an existing test or added as a new test.

If for some reason you need to SUBTRACT points from the test score, add 1000 to the special code points. 1001 for example, means to subtract one point. 1020 will subtract 20 points. Any number over 1000 is considered a negative point value. While this is not intuitive, it does allow negative points to be used.

Grading Keys

The grading key supplies the correct test answers. Each group of test papers needs a main key, an optional either/or key, and an optional weighting key. You may have separate keys for different test versions or use subkeys to score different test sections separately.

Main Key
The main grading key immediately follows the control sheet. Grid the correct response for each item to be scored (blank items are skipped). Grid one response per item. If there are two correct answers, grid one answer on the main key and use an either/or key for the other answer. Grid all 9s for the student number. It is helpful to grid a descriptive name for the test on the key. The key name is printed on the reports if present.

Either/Or Key
The optional either/or key is used when there are two correct answers for a test item. After filling out the main key, grid the alternate answer on a separate key sheet (one response per item). Leave the rest of the items blank. Grid all 9s for the student number and grid EITHER as the student name. Only one either/or key may be used following the main key.

Weighting Key
By default, each test item is worth one point. Use the optional question weighting key to assign different point values to the test items. Grid the point value desired for each item on a separate key sheet. The value is one if left blank. Grid all 9s for the student number and grid WEIGHT as the student name. If all items have the same value, consider using the multiplication factor on the control sheet instead. Only one question weighting key may be used following the main and either/or keys.

Multiple Keys
Multiple test versions are used to discourage cheating. The half sheet scanner form DP-001, available in red, green, blue, and violet is ideal for this purpose. Assign a different color form to each test version. The students take the test using the color answer sheet matching their particular test. Fill out a grading key for each version on the corresponding color answer sheet. Assemble the student answer sheets into a single stack (the order is not important). Place the grading keys on top of the stack. Fill out one control sheet and you are done. The computer scores each test paper using the matching color key. Each key can have its own either/or and weighting key.

Another way to handle multiple test versions is to separate the answer sheets into groups according to test version. The form color is not important when using this method. Fill out a grading key and control sheet for each group. Grid the Number of Groups on each control sheet and assemble the groups into a single stack. The computer will score each group and combine the results on the reports. You can also use this method to combine multiple sections of a course together if the section numbers are not gridded on the answer sheets.

Subkeys
Subkeys are used when a test consists of several parts to be scored and reported separately. Fill out a grading key for each test section (one right after the other following the main key). The papers are scored and reports printed for each key. Grid a descriptive name on the keys to differentiate the reports. All keys must have 9s gridded for the student number. Each subkey can have its own either/or and weighting key. If you use the half size answer sheets, make sure the subkeys and/or test papers all use the same color form. Otherwise, the computer will score each paper only once using the matching color grading key.
Control Sheet

The control sheet specifies the report and grading options desired. Some options pertain to test scoring only, some to classbook only, and some to both.

Required Fields

Grid the instructor’s name and department account number on the control sheet. The name is printed on the reports. Grid the class call number assigned by the registrar in the schedule of classes. This is the name of the classbook file where all tests are stored throughout the semester. If you combine several class sections into a single classbook file, choose one of the section numbers as the classbook name. Grid the test number being scored. Up to nine tests can be entered into classbook. Attendance points, extra credit points, and project points are considered “tests” by classbook. Each time you use classbook, the instructor’s name, account number, section number, and test number are checked to insure that the wrong classbook file is not inadvertently updated. Please check these fields carefully when submitting a test.

Scoring Procedure

Select either test scoring or classbook. You may only grid one bubble in this area. Do not select test scoring when using classbook; test scoring runs automatically.

Test Scoring Only

This option runs the test scoring program only and does not send the scores to classbook. Summary test statistics, a frequency distribution of scores, an item analysis, and student reports are printed by the test scoring program. If you find yourself constantly updating classbook, you may want to select Test Scoring Only at first. You will receive fewer reports. Run classbook once the control sheet, grading keys, and test papers are correct.

Classbook - Add a Test

This is the most popular option. The test is scored and added to the classbook file. Classbook records and test records are matched by student name and student number. Unmatched test records are added as new students to the classbook file. Normally a test is added only once to the classbook. If the test already exists, the new test score is added to the existing test score for each student. If you accidentally re-add a test, the test scores are doubled. Use the classbook update procedure to correct this problem. This feature is sometimes used to accumulate attendance or quiz points using a single classbook test. For example, you might add ten 10 point quizzes to classbook test 4. At the end of the semester, test 4 will contain the total of all ten quizzes and be worth 100 points.

To add non-objective points to Classbook (lab grade, special project, etc.), grid the points to be added in the Special Code on each student’s test paper. Forms from a previous test are ideal for this purpose. Fill out the control sheet to add these points as the next test. Be sure to bubble the Add Points grading option and grid the Test Value on the control sheet. Fill out a grading key but leave all the items blank so that the objective items are not scored.

Classbook - Update a Test

Use this option when a test needs to be rescored after being added to classbook. Updating is useful if the grading key was incorrect or if some students have taken make-up exams that need to be added to classbook. The existing test scores are replaced with the new test scores. If you need to update a few students, you do not need to rescore the entire class, just the students to receive new scores. If you want to update every student in the classbook file for a particular test, you may not need to resubmit the student test papers. You can add a constant number of points or multiply the test scores by a factor without submitting test papers. Grid a control sheet to update the test and specify which grading option you want. All students in the classbook file who have a score for the test are updated.

Classbook - Delete a Test or Students

If you decide to drop a particular test for the entire class, select this classbook option and do not submit any test papers. This option is more often used to delete students who have dropped the course so that the final statistics are not biased. Grid classbook delete and include test papers for those students to be deleted. Old answer sheets are ideal for this purpose as the student’s name and student number are already gridded.

Another way to delete a student is to grid DELETE as the student’s name and include the form in the next classbook add or update. Be sure to grid the student number on each test form. This has the disadvantage of requiring a new answer sheet for each student but does not require a separate classbook run.
Student Listings

The test statistics, frequency table of scores, and item analysis are always printed. You select which student listings you require. Alphabetic, numeric, rank order, right/wrong answer sheets, and classbook progress reports are available. These reports may be printed by call number if desired.

Instructors sometimes comment that they receive more reports than needed. One way to avoid this is to select only those student reports you really need. Section listings, right/wrong answer sheets and classbook progress report generate an especially large amount of output.

Alphabetic List by Student Name

This listing includes student name, number, score, % correct, Z-score, T-score, and percentile rank. This report is used as a student roster to record grades. The test scoring report contains the grading options while the classbook report contains the test history for each student.

Numeric List by Student Number

This listing is used for public grade posting with the student Banner ID and test scores reported. The classbook numeric report contains the entire test history for each student.

Rank Order List by Test Score

This is the same as the alphabetic listing except students are sorted by test score in descending order. This report shows which students are doing well and those who are not. It is printed by test scoring and classbook.

Right/Wrong Answer Sheets

The right/wrong answer sheet reports the name, number, test key items, student responses, test score, and % correct for each student. This listing is returned to the student in lieu of the actual answer sheet. The answer sheet is retained by the instructor to settle grade disputes or for later reuse. Reports for five students are printed per page.

Section Listings

If you are teaching several sections of the same course, select this option and score all the tests as a single group. The test statistics, frequency table, and item analysis are reported for all papers combined. The student listings are printed for each class section and all sections combined. Use the combined reports as a master student roster and the section reports for grade posting and recording. Be sure your students grid the call number on their test papers when using this option.

Classbook Progress Reports

The progress report prints the test history for each student in a format similar to the right/wrong answer sheets. Five students are printed per page. Use these reports to give your students a confidential copy of their test history. Use the numeric listing to publicly post the student's test history.

Multiple Copies of the Reports

Grid the number of copies to print. One copy is printed if left blank. Up to five copies may be requested. Use this option wisely as the computer can generate a lot of paper.

Multiple Groups

One way to handle multiple test versions is to separate the answer sheets into groups according to test version. Fill out a grading key and control sheet for each group. Grid the Number of Groups on each control sheet and assemble the groups into a single stack. The computer will score each group and combine the results on the reports. You can also use this option to combine multiple sections together if the section numbers are not gridded on the answer sheets.

Test Score Grading Options

These options are used by the test scoring program along with the grading key to score the test papers. Mark all grading options and corresponding option blocks you require. The formula used to compute the test scores is shown below.

\[
\text{score} = (\text{items correct} - \text{guessing correction}) \times \text{multiply factor} + \text{addition constant} + \text{individual points}
\]

Adding Points

This option is most often used to drop a test item and give everyone credit for it. A constant number of points is added to each paper. Grid the Add Constant bubble and grid the number of points to be added as the Addition Constant. The number must be an integer value right justified. For example, to add ten points to each paper grid 0010. If for some reason you need to subtract points from the test scores, add 1000 to the Addition Constant. 1001 for example, means to subtract one point. 1020 will subtract 20 points. Any number over 1000 is considered a negative point value. While this is not intuitive, it does allow negative points to be used.

Multiplying by a Factor
This option is often used to scale a test to 100 points. For example, a 50 item test multiplied by 2 will be worth 100 points. Grid the Multiply Factor bubble and grid the Multiply Factor right justified to 2 decimal places. To multiply by 2.00, grid 0200.

Adding Individual Points
Use this option to add points from another source (perhaps an essay question) to each test paper. Grid the individual points right justified in the Special Code area of each answer sheet. These points will be added to the objective score for each student. Grid Add Points and grid the combined Test Value (objective + added points) on the control sheet. Normally the computer can figure out the test value from the grading key and grading options. In this case, the computer does not know what the added points are worth. The test value is used to compute the percentage points correct for each student.

Setting the Test Value
Tests are occasionally designed with bonus questions so that a score above 100% is possible. Grid the desired Test Value on the control sheet. This number is used to compute the percentage points correct for each student. For example, if a 103 item test is worth 100 points, grid 0100 as the Test Value. It will then be possible to receive 103% of the test value.

Correcting for Guessing
To correct for guessing, grid the Subtract 1/K bubble and grid the 1/K Subtraction value right justified on the control sheet. 1/K times the number of wrong responses will be subtracted from the final score. The K value is normally one less than the number of answer choices on the test. For example, there is a 1 in 5 chance of guessing a multiple choice item correct if it has 5 possible answers. This means that 1 out of every 5 items are likely to be guessed correctly. Subtracting 1 point for every 4 incorrect responses "corrects" the score. This practice is frowned upon by scholars and rarely used.

Printing the Raw Score
This option directs the scanner to print the raw test score (number of items correct) on the answer sheets. The raw score does not reflect any key or grading options, so the score printed on the forms may be different than the score printed on the reports. Return the right/wrong answer sheets (which reflect the grading options) to the students instead of the actual test forms. The test forms are retained by the instructor to settle grade disputes.

Requesting a Disk File
If further analysis of the student data is required, grid Disk File on the control sheet. A disk file containing the student data will be sent to your e-mail account. You will receive a report detailing the record layout of the data file. This file can be downloaded to a PC and used with your favorite program if desired. This is often done by instructors who keep their own computer grade books but want the scanner to initially score the tests.

Classbook Test Values
Use the Classbook Test Values to change the point value of the tests. You may want to change the point values so each test contributes the proper percentage towards the total points. Classbook will scale the tests from their original values to the test values you specify. For example, three tests worth 50, 50, and 100 points contribute 25%, 25%, and 50% respectively towards the maximum possible score of 200 points. Suppose each test is to count equally towards the total points. The way to do this is to make each test worth the same point value (say 100 points). Gridding 100 as the test value for the first two tests will scale each by 2 (100 divided by 50). All three tests are now worth 100 points and count equally towards the total score.

Test scaling is optional and you may change the test values more than once if needed. Tests remain scaled for subsequent classbook runs until you change them. The maximum total of all the tests is currently 1000 points.

Another use of the Classbook Test Values is to temporarily disregard a test by gridding a test value of zero. The test remains in classbook but is not printed on the reports nor does it add to the total points.

Classbook Drop Tests
Classbook can drop up to three of the lowest tests for each student before computing total points. Grid the number of tests to drop in the Classbook Drop Tests area of the control sheet. Dropped tests are flagged with asterisks on the reports. Tests remain dropped for subsequent classbook runs until another drop option is requested. To reinstate previously dropped tests, grid the Clear Drops bubble.

Classbook normally considers all tests for dropping. To exempt a test from being dropped, grid zero as its Classbook Test Value. The test is not dropped, is added to the total points, and printed on the reports. If you exempt a test that has already been dropped, the test will remain dropped unless you grid the Clear Drops bubble.
Classbook Total Points Options

Use these options to adjust the total classbook points for each student.

Addition Constant

Use this option for adding bonus points to each student's total score. Grid the number of points to add right justified in the Addition Constant field.

Multiply Factor

Grid the Multiply Factor to two decimal places on the control sheet. The total points are multiplied by this number. You may want to scale the total points down to 100 or average the tests using this option. To average the tests, use a multiply factor of 1/number of tests.

Total Points

This option sets the total point value used to compute the percentage points correct of the total score. This is normally used in conjunction with the addition constant to allow bonus points.
Statistics Guide
Interpreting the Reports

Test scoring and classbook print three types of reports. The summary statistics and frequency table describe the distribution of test scores. The item analysis evaluates each test item. The student listings display the test results for each student. Descriptions of the report statistics are presented here. Refer to a statistical text for more detailed information.

Summary Test Statistics
This report gives you an overall view of the test results. The summary test statistics include measures of central tendency, variability, and shape of the test score distribution.

Range of Scores
The lowest and highest occurring test scores are reported. The range is a basic measure of variability.

Mean
The mean is the average test score and the most widely reported measure of central tendency. It is computed by summing all scores and dividing by the number of papers.

Median
If all scores are ranked from lowest to highest, the median is the middle score. Half of the scores will be lower than the median. The median is also known as the 50th percentile.

Standard Deviation
The standard deviation is a measure of variability. It measures how far the scores deviate from the mean. If the scores are grouped closely together, the test will have a small standard deviation. A test with a large variation of test scores will have a large standard deviation. The standard deviation is computed by summing the squared deviation scores, dividing by the number of papers, and taking the square root. The standard deviation is used to compute standard scores, namely Z-scores and T-scores.

Skewness
Skewness measures the symmetry of the distribution. A skewness of zero indicates that the scores distribute evenly on both sides of the mean score. In a negatively skewed distribution, more scores occur above the mean and fewer scores below the mean. An example might be a 100 point test with a mean of 85. The higher scores tend to bunch up close to the mean while the lower scores tail off. Positively skewed distributions are just the opposite.

Kurtosis
Kurtosis measures the peakedness or flatness of the test score distribution. Peaked distributions, where scores tend to bunch up in the middle, have a positive kurtosis. A negative kurtosis indicates a fairly flat distribution with a larger percentage of scores in the tails.

Frequency Table of Scores
The frequency table summarizes how often each score occurs. It includes the distribution of test scores, related statistics, and a histogram. This report is useful in assigning a grading curve and letter grades for the test.

Score
This is the test score value.

Count
The number of students who got this score.

Cumulative Count
A count of students who scored at or below this score.

Percentage of Total
The percentage of students who got this score.

Percentile Rank
The percentile rank is the percentage of students who scored below a particular score. If a score is reported as the
90th percentile, 90 percent of the students scored lower than that score.

**Percent Correct**

This is the percentage correct of the test value.

**Z-Score**

The Z-score reports the relative position of a score in the test distribution. It is the number of standard deviations a score is from the test mean. The mean will have a Z-score of zero. Scores above the mean have a positive Z-score and scores below the mean have a negative Z-score. Z-scores and T-scores are called standard scores. Because standard scores take into account test length, test difficulty, and variability of test scores, they are very useful in comparing a student's test scores throughout the semester. These scores are usually interpreted in conjunction with the normal curve where 68% of the scores fall within one standard deviation of the mean; 96% of the scores fall within two standard deviations of the mean; and 99% of the scores fall within three standard deviations of the mean.

**T-Score**

T-scores are obtained by multiplying the Z-score by 10 and adding 50. This gives T-scores a mean of 50 and a standard deviation of 10. A T-score of 65 is 1.5 standard deviations above the mean.

**Histogram**

The histogram is a visual representation of the test score distribution. An asterisk is printed for each paper receiving the score.

**Item Analysis**

**Test Validity and Reliability**

The two factors that determine overall test quality are test validity and test reliability. Test validity is the appropriateness of the test for the subject area and students being tested. Validity cannot be measured by a computer. It is up to the instructor to design valid test items that best measure the intended subject area. By definition, valid tests are reliable. However, a reliable test is not necessarily valid. For example, a math test comprised entirely of word problems may be measuring as much verbal skills as math ability.

Test reliability measures the accuracy, stability, and consistency of the test scores. Reliability is affected by the characteristics of the students, characteristics of the test, and conditions affecting test administration and scoring. Item analysis assesses the test characteristics and how the test items affect test reliability.

The item analysis "tests the test". This report analyzes each test item and the overall test reliability. Item analysis points out items that are mis-keyed, ambiguous, overly easy or difficult, and non-discriminating. These items detract from overall test reliability. Item analysis also shows the kinds of errors students are making on the test items. An underlying assumption of item analysis is that all test items attempt to measure the same subject matter. This is especially true of the discrimination and reliability indices.

**Response Percentages**

These columns report the percentage of response for each item answer. The correct response is marked with an ‘*’ (an ‘&’ if the either/or key is used). If the most commonly marked answer does not agree with the grading key, that item may be mis-keyed and should be checked. Each incorrect alternative (known as a distractor) should be attractive to some students. Distractors that are not selected should be revised to make them more plausible. Likewise, distractors selected by the majority of students indicate an ambiguous test item and should also be reviewed.

**Item Easiness**

The percentage of students responding correctly to an item is called item easiness or item difficulty (depending on your point of view). The larger the item easiness, the easier the item. Item easiness is read from the response percentage columns discussed above. Classroom achievement tests usually contain items with a wide range of difficulty. For purpose of item discrimination and reliability, the majority of items should be moderately difficult. This ideal item easiness is halfway between the chance score and 100 percent.

<table>
<thead>
<tr>
<th>Number</th>
<th>Chance Options</th>
<th>Ideal Item Easiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>50%</td>
<td>75%</td>
</tr>
<tr>
<td>3</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>4</td>
<td>25%</td>
<td>63%</td>
</tr>
<tr>
<td>5</td>
<td>20%</td>
<td>60%</td>
</tr>
</tbody>
</table>

**Mean Item Easiness**

Mean item easiness is the average easiness of all test items. It is an overall measure of the test difficulty and ideally ranges between 60 and 80 percent for classroom achievement tests. Lower numbers indicate a difficult test while higher numbers indicate an easy test.
Discrimination Index

The discrimination index measures the ability of an item to distinguish between lower and upper scoring students taking the test. The index is computed by taking the number of students in the upper 27% group who answered correctly minus the number in the lower 27% group who answered correctly and dividing by 27% of the total number of students.

\[
\text{DI} = \frac{\text{# correct in upper group} - \text{# correct in lower group}}{27\% \text{ of the number of students}}
\]

The discrimination index ranges between 1.00 and -1.00. 1.00 is achieved if all upper students got the item right and all lower students missed it. 0.00 indicates that the same number of students from each group marked the item correctly. A negative number indicates that the lower students did better than the upper students on the item. Ideally, test items will have a positive discrimination index above 0.30. Very easy or very difficult items cannot discriminate well between students. Overly difficult items are missed by both upper and lower scoring students while overly easy items are correctly answered by both groups. As a result, overly easy and overly difficult items will have a low discrimination index. You may still want to include these items (to cover the test content, for example) even though they do not assist in assigning grades.

Mean Discrimination Index

This is the average discrimination index for all test items combined. A large positive value (above 0.30) indicates good discrimination between the upper and lower scoring students. Tests that do not discriminate well are generally not very reliable and should be reviewed.

Correlation Coefficient

The correlation coefficient also measures an item's ability to discriminate between students. The results for the item are correlated with the overall test score. The item correlations are interpreted much like the discrimination index. Because correlations include all students, they may be more representative than the discrimination index if the class size is small.

Mean Correlation Coefficient

The average correlation of all the test items with the total score. It is a measure of overall test discrimination. A large positive value indicates good discrimination between students.

Kuder-Richardson 20 Reliability Estimate

Reliability is the consistency or stability of the test scores. If a test is reliable, students would obtain similar scores if they took another form of the same test. Reliability ranges from 0.00 to 1.00 with large values indicating high reliability. For classroom achievement tests, reliability of at least 0.75 is desirable. Reliability can be increased by replacing ambiguous, overly easy or difficult, and non-discriminating items with quality items. Increasing the number of quality test items will also improve test reliability.

Standard Error

The standard error also measures the stability of the test scores. It is the standard deviation of the differences in scores if the students were to take another form of the same test. A reliable test will have a small standard error. The standard error measures the confidence level of the test scores. On the average, a student's "true" score falls within the observed score plus or minus one standard error 68% of the time. This confidence increases to 96% for two standard errors above and below the observed test score.

Student Listings

The student listings display the test results for each student and include alphabetic, numeric, rank order, and right/wrong reports. The report statistics are explained in the frequency table discussion above.

When using Classbook, reports are printed for both test scoring and Classbook. Classbook reports include all test scores taken to date, total points, percentage correct, average Z-score, and average T-score for each student.

The average Z-scores and T-scores are measures of overall student achievement. The individual Z-scores and T-scores are weighted before averaging and take into account differences in test values, test difficulty levels and test score variability.
User Survey

Tell us what you think

We encourage feedback for ways to improve our service. After you become familiar with computerized test scoring, please take a moment to fill out this survey. Thank you! Return completed surveys to: Kenneth Eldridge or Steve Machamer, Data Center Operations, Kent State University.

- (Optional) Name_________________________________________ Department___________
  Phone________

- How do you use computerized testing? What features do you find useful?

- How can we improve the program features, reports, scanner forms, and documentation?

- How can we administer testing services to better serve you?