DC Circuits Challenge

Main Opening Page

The main or opening page of the program allows students to select any activity with a click of the mouse button. The opening page also lists some program utilities that are primarily useful to instructors. An interactive circuit is shown at the right side of the opening page. Mouse clicks on circuit board positions will cause resistor value to change. The possible values of each resistor position are 270 ohms, 560 ohms, 1200 ohms, shorted and open. The ohmmeter displays the total resistance of the circuit. This circuit can be used to show total resistance for simple series, parallel and combination circuits.

Activity Introductions

Each learning activity begins with an introduction. The introduction presents essential concepts for learning the topic of the activity. Most introductions include a presentation of any formulas and processes required in the activity. Examples and sample solutions are also often included. Activity introductions often contain several pages that can be selected by clicking tabs at the top of the pages. Students can start the interactive activity at any time by clicking the "Begin" button.

Interactive Activities

 The interactive activities are of several forms depending on the nature of the topic. Some require the learner to calculate solutions for a series of circuit situations. Others require the learner to analyze a complete circuit. Some activities present the learner with a series of multiple-choice items.

Activities are modified on each use by students. Multiple-choice items are presented in a different order on each use. In addition, the order of the options is also changed on each use of an activity. Circuit parameters such as voltages and resistances are randomly selected on each use of an activity. Therefore, learners can reuse a given activity several times without seeing the same situations. Students cannot copy when working on the same activity as each student will have different parameter values.

The program records the time required to complete each activity.

Score Recording

<u>Important:</u> In order to get credit for completing the exercise you must save your grade the following way:

- **Enter your full first and last name in the top box.**
- **Enter your full six digit student number in the bottom box.**

A database is created based on the ID code entered. This database will store all of the grades for every exercise completed. Because of this, it is very important that all of the exercises be saved under the exact same ID code. Failure to do this may result in possible lost grades.

A floppy disk is **not** needed in order to save despite what it says in the Circuits Challenge Introduction. When you save a completed exercise it will save directly to the server which houses Propalms TSE. The instructor will then access the grades through the server.

After the exercise has been saved, you will be given an option to print a certificate of completion. This is not required but recommended to allow the student to track his or her progress through the exercises.

Required Accuracy

This program grades numeric answers to a percentage of accuracy. Answers that are within 5% of the right solution are scored as correct.

Significant Digits

Calculators often give solutions that are 20 or more digits in length. How many digits should be entered? In general practice you should calculate and record solutions that are sufficiently accurate for the task at hand.

The easiest way to describe accuracy is in significant digits. Trailing zeros do not count as significant digits. Zeros leading digits to the left of the decimal do not count as significant digits. Included zeros are significant digits. A list of examples is given below.

436 --------------Three significant digits

20.05 ----------- 4 significant digits, included zeros are significant.

013.200 ------ Three significant digits, leading and trailing zeros are not significant

1.3050 -------- Four significant digits, trailing zero is not significant

.0000032 ---- Two significant digits, leading zeros are not significant

Two significant digits will give solutions that are approximately 1% accurate. This would be sufficient accuracy for single solutions in this program. However, in

several exercises   one solution is used in the calculation of another solution that in turn is used in the calculation of yet another solution. Errors tend to grow each time we use solutions progressively. Therefore, it is recommended that at least three significant digits be used in solving the problems in this program. Greater accuracy should be used if required by your instructor.