

CD2: Multiplication Exploded

Installation

Insert the CD (assume drive d), then choose **Start** and **Run**. Type `d:\setup.exe` and hit the ENTER key. It is best to accept the default directory because the delete program can only delete files in there.

“If all else fails, read the instructions.”

Do this to save time

Run the program and choose **Enter**. Toggle the button on the right to show “Grid” rather than “Standard Written Method”. Use the keyboard or mouse to enter 45×25 . Leave the answer blank and choose Okay.

Answers can be entered into the grid cells, but don't do that yet. Select the 40×20 cell with the mouse or arrow keys. Click the '?' help icon or right-click the 40×20 cell. The multipliers fly down. Use the hammer, or right-click a number, to break it into factors. Break it into $4 \times 10 \times 2 \times 10$. You can multiply when an X sign swells up. Drag the 2 over to the 4 and click the X sign between. Multiply until done. Click the destination cell, the up arrow or drag the answer into any acceptable cell.

When not using help, you can view arrays of objects. Either select the icon on the right or hit the enter key. Drag the mouse over the 40×20 cell and the selection is highlighted and stated. Click in this cell to re-size the selection. Go back and forth to the main grid and fill in the answers.

Once done, the multipliers drop into the standard written format. Click a cell, drag a number or hit ENTER to move the sub-totals down. When the mouse moves over an item, highlights show the connections. When complete you can drag the sub-totals onto each other and, if appropriate, they automatically add together. In test mode (the **Choose** option) you have to type the answer in. Don't bother with the padlock yet, instead just drag to get the answer. When complete, click the board rubber. You can drag it to clean the board.

Now start again but this time enter 999×111 and toggle the button on the right to Standard Written Method. This time there is no grid and instead of nine cells to complete we can choose more efficient calculations. Click the arrows on the left to swop the order if you want to. Place the mouse on the left-most 1, i.e. the 100 in the 111, and drag the 999×100 to another line. Drag out the 999×10 too. You can keep doing this until you get multipliers that are convenient to use.

Even when the answers are filled in you can still pull apart or combine the sub-totals. Once the answers have been entered, try re-arranging them as 900x111, 90x111 and 9x111 or as 999x100, 999x10 and 999x1.

When each multiplier has only one non-zero digit, such as 40x20, the '?' help icon is available when the mouse is on the left edge of the screen. In test mode you cannot drag and drop to combine the sub-totals. When all the sub-totals have been entered the padlock arrives.

When the sub-totals are unlocked from their multipliers, any answer digit can be combined with any other. Click the key to unlock. Vertical lines help the user to work out the answer. Digits are entered left to right if the left-most digit is typed first but don't enter it yet. Instead, drag the digits to collect the 10's of thousands on the top line, 1000's on the next, 100s next and then 10's and 1's. This helps the user to recognise place value. You can type the answer in at any time.

Choose Option

The worksheet pages a to j have exercises drawn from the text file grid.txt. Highlight an exercise and choose **Start** or double-click it. Enter the answer now or leave the answer blank for completion later. Choose the method to use before you move on. Records are kept for two attempts. User versions of these worksheets are available in the printout.doc file.

User Records

To setup for a user, from the main menu click bottom left to go to the load/save menu. Choose Save Record, enter a password and save a file for the user. Reset for the next user. If you have written another set of worksheets for a specific user you could load these before saving a record for him/her.

Double Password: **control** followed by: **teacher123**

Change teacher123 to a new password now. You need the second password if you use the delete program (see help.doc). Enter the passwords from Load Records if you want to view the users' scores, password, etc. **Read the help.doc file** in the grid directory. If you forget the password, copy the file grid.inf from the CD to reset it.

Multiplication Strategies

These arrays are a great way to look at multiplication strategies. With a cell such as 20x20, highlight 11x11 and notice the various parts. Also notice that $20 \times 19 = 20 \times 20 - 20$. Square numbers such as 5x5 give a square. The maximum number of objects is 199x199.