

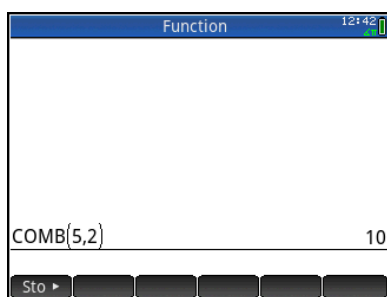


## TECHNOLOGY CORNER

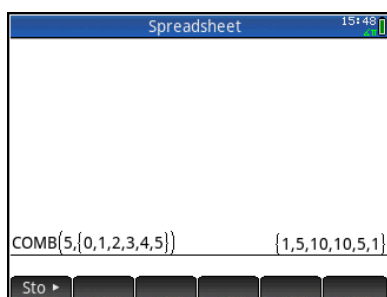
### 12. Binomial Coefficients and distributions on the HP Prime

To calculate a binomial coefficient like  $\binom{5}{2}$  on an HP Prime, proceed as follows:

1. Binomial coefficients in the Home view
  - Press to enter the Home view. Press and tap **Math** to open the Math menu.
  - Tap **Probability** and select **Combinations**.
  - Press to complete the command and press .



- To see the combinations of 5 items taken from 0 to 5 at a time, use a list in place of  $k$ :

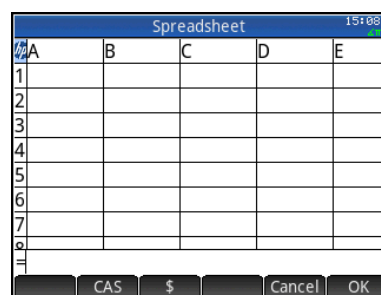


2. Binomial distributions in the Spreadsheet app

The formula we wish to use is the familiar binomial probability formula, with  $n$  replaced by the variable *Row*,  $k$  replaced by *Col-1*, and  $p=0.25$ . We use *Col-1* instead of *Col* because we want the first column to show the probability of zero children with type O blood instead of one child.

$$\text{COMB}(\text{Row}, \text{Col} - 1) \cdot 0.25^{\text{Col}-1} \cdot (1 - 0.25)^{\text{Row}-\text{Col}+1}$$

- Press and tap on the **Spreadsheet** icon
- Tap on the HP logo in the upper left corner to select the entire spreadsheet
- Press to start the formula that will define each cell in the spreadsheet in terms of its row and column



#### Notes:

- To find COMB, see Example 1
- To find the variables *Row* and *Col*, press , tap , tap **Spreadsheet**, tap **Numeric**, and select *Row* or *Col*

The formula is repeated here for easy reference:

$$\text{COMB}(\text{Row}, \text{Col} - 1) \cdot 0.25^{\text{Col} - 1} \cdot (1 - 0.25)^{\text{Row} - \text{Col} + 1}$$

- Enter the formula, as shown below

| Spreadsheet |   |   |   |   |
|-------------|---|---|---|---|
| A           | B | C | D | E |
| 1           |   |   |   |   |
| 2           |   |   |   |   |
| 3           |   |   |   |   |
| 4           |   |   |   |   |
| 5           |   |   |   |   |
| 6           |   |   |   |   |
| 7           |   |   |   |   |
| 8           |   |   |   |   |
| 9           |   |   |   |   |

=COMB(Row,Col-1)\*.25<sup>Col-1</sup>\*(1-.25)<sup>Row-Col+1</sup>

CAS \$ Cancel OK

- With the formula complete, press

Enter

| Spreadsheet |        |        |        |        |        |        |
|-------------|--------|--------|--------|--------|--------|--------|
| A           | B      | C      | D      | E      | F      | G      |
| 1           | .75    | .25    | 0      | 0      | 0      | 0      |
| 2           | .5625  | .375   | .0625  | 0      | 0      | 0      |
| 3           | .42187 | .42187 | .14062 | .01562 | 0      | 0      |
| 4           | .31640 | .42187 | .21093 | .04687 | .00390 | 0      |
| 5           | .23730 | .39550 | .26367 | .08789 | .01464 | .00097 |
| 6           | .17797 | .35595 | .29663 | .13183 | .03295 | .00439 |
| 7           | .13348 | .31146 | .31146 | .17303 | .05767 | .01153 |
| 8           | .10011 | .26696 | .31146 | .20764 | .08651 | .02307 |
| 9           | .07508 | .22525 | .30033 | .23359 | .11679 | .03893 |
| 10          | .05631 | .18771 | .28156 | .25028 | .14599 | .05839 |

Format Go To Sel\* Go ↓ Sort

If you prefer, you can make the same definition apply to only one row; highlight the row number before entering the formula. You can use copy and paste from the previous example and replace *Row* with 5.

| Spreadsheet |   |   |   |   |
|-------------|---|---|---|---|
| A           | B | C | D | E |
| 1           |   |   |   |   |
| 2           |   |   |   |   |
| 3           |   |   |   |   |
| 4           |   |   |   |   |
| 5           |   |   |   |   |
| 6           |   |   |   |   |
| 7           |   |   |   |   |
| 8           |   |   |   |   |
| 9           |   |   |   |   |

=COMB(5,Col-1)\*.25<sup>Col-1</sup>\*(1-.25)<sup>5-Col+1</sup>

Name CAS \$ Cancel OK

| Spreadsheet |        |        |        |        |        |        |
|-------------|--------|--------|--------|--------|--------|--------|
| A           | B      | C      | D      | E      | F      | G      |
| 1           | .23730 | .39550 | .26367 | .08789 | .01464 | .00097 |
| 2           |        |        |        |        |        |        |
| 3           |        |        |        |        |        |        |
| 4           |        |        |        |        |        |        |
| 5           |        |        |        |        |        |        |
| 6           |        |        |        |        |        |        |
| 7           |        |        |        |        |        |        |
| 8           |        |        |        |        |        |        |
| 9           |        |        |        |        |        |        |
| 10          |        |        |        |        |        |        |

=COMB(5,Col-1)\*.25<sup>Col-1</sup>\*(1-.25)<sup>5-Col+1</sup>

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The fifth row (highlighted in blue) contains the distribution for the case in which the family has exactly 5 children. The first column shows the probability that zero of those children have type O blood (0.2373), the second column shows the probability that exactly one has type O blood, etc.

You can view the distribution for any case you like by scrolling to the appropriate row.