

# RPN 67 SD – Box Maximum Volume for LxW

Snover & Spikell, 1979

[Documentos/HP 35s/Miscelaneas/HP 67/MATH/Max & min](#)

## I- Program listing

|                           |                        |                       |
|---------------------------|------------------------|-----------------------|
| <b>*LBL A:</b>            | 038: 33 03 STO 3       | <b>*LBL C:</b>        |
| 001: 31 25 11 LBL A       | 039: 34 04 RCL 4       | 076: 31 25 13 LBL C   |
| 002: 33 01 STO 1          | 040: 34 05 RCL 5       | 077: 34 11 RCL A      |
| 003: 35 52 $x \geq y$     | 041: 51 -              | 078: 34 14 RCL D      |
| 004: 33 00 STO 0          | 042: 34 02 RCL 2       | 079: 61 +             |
|                           | 043: 81 ÷              | 080: 33 06 STO 6      |
| <b>LBL 0:</b>             | 044: 02 2              | 081: 35 22 RTN        |
| 005: 31 25 00 LBL 0       | 045: 81 ÷              |                       |
| 006: 34 01 RCL 1          | 046: 34 03 RCL 3       | <b>*LBL D:</b>        |
| 007: 35 72 PAUSE          | 047: 81 ÷              | 082: 31 25 14 LBL D   |
| 008: 35 64 ABS            | 048: 33 51 01 STO-1    | 083: 34 12 RCL B      |
| 009: 01 1                 | 049: 35 64 ABS         | 084: 34 14 RCL D      |
| 010: 61 +                 | 050: 34 00 RCL 0       | 085: 61 +             |
| 011: 43 EEX               | 051: 32 71 $x \leq y?$ | 086: 33 07 STO 7      |
| 012: 42 CHS               | 052: 22 00 GTO 0 [005] | 087: 35 22 RTN        |
| 013: 03 3                 | 053: 34 03 RCL 3       |                       |
| 014: 71 ×                 | 054: 41 ENTER          | <b>*LBL B:</b>        |
| 015: 33 02 STO 2          | 055: 35 64 ABS         | 088: 31 25 12 LBL B   |
| 016: 34 01 RCL 1          | 056: 81 ÷              | 089: 33 12 STO B      |
| 017: 31 22 15 GSB E [060] | 057: 42 CHS            | 090: 35 52 $x \geq y$ |
| 018: 33 03 STO 3          | 058: 34 01 RCL 1       | 091: 33 11 STO A      |
| 019: 34 01 RCL 1          | 059: 35 22 RTN         | 092: 35 22 RTN        |
| 020: 34 02 RCL 2          |                        |                       |
| 021: 61 +                 | <b>*LBL E:</b>         | <b>*LBL a:</b>        |
| 022: 31 22 15 GSB E [060] | 060: 31 25 15 LBL E    | 093: 32 25 11 LBL a   |
| 023: 33 04 STO 4          | 061: 33 13 STO C       | 094: 34 11 RCL A      |
| 024: 34 01 RCL 1          | 062: 02 2              | 095: 31 84 -x-        |
| 025: 34 02 RCL 2          | 063: 71 ×              | 096: 34 12 RCL B      |
| 026: 51 -                 | 064: 42 CHS            | 097: 31 84 -x-        |
| 027: 31 22 15 GSB E [060] | 065: 33 14 STO D       | 098: 35 84 SPACE      |
| 028: 33 05 STO 5          | 066: 34 11 RCL A       | 099: 34 01 RCL 1      |
| 029: 34 04 RCL 4          | 067: 34 14 RCL D       | 100: 31 84 -x-        |
| 030: 61 +                 | 068: 61 +              | 101: 34 06 RCL 6      |
| 031: 34 03 RCL 3          | 069: 34 12 RCL B       | 102: 31 84 -x-        |
| 032: 02 2                 | 070: 34 14 RCL D       | 103: 34 07 RCL 7      |
| 033: 71 ×                 | 071: 61 +              | 104: 31 84 -x-        |
| 034: 51 -                 | 072: 71 ×              | 105: 34 04 RCL 4      |
| 035: 34 02 RCL 2          | 073: 34 13 RCL C       | 106: 31 84 -x-        |
| 036: 32 54 $x^2$          | 074: 71 ×              | 107: 35 22 RTN        |
| 037: 81 ÷                 | 075: 35 22 RTN         |                       |

## II- Description

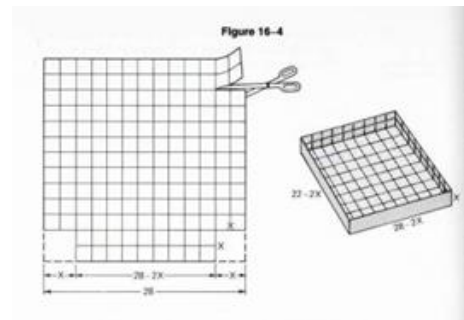
Maximum volume of an open box from a sheet of paper of L x W dimensions

Reference: Snover, SL and Spikell, MA. 1979. How to program your programmable calculator. Prentice-Hall. Chap. 16: 197-199

The box has an x-cm square cut of each corner.

$V(x) = (W-2x)(L-2x)(x)$  is the volume formula, where x represents the box height. The condition is that  $2x < W$ , so X has to be smaller than  $(W/2)-1$  as the maximum value  $[X_{max} = (W/2)-1]$ .

A length difference comparison (X guess-X optimal) has to be considering in order reaching certain precision (e.g. E-5).



Four data are needed: paper L, W, precision (E-5). The solution consists in box height, length, wide and volume. For this is important to press the keys in the following order: [B], [A], [E], [C] and [D]. The information is shown in display and print in paper strip.

## III- Instructions (follow key stroke solution order)

### Data

L [ENTER] W [B]  
 Precision [ENTER] GUESS N°  
 (EEX 5 CHS) ENTER (N)

### Solution

[A] height---check for Max  
 $[x < y] = +1$   
 if not, change guess number  
 $= -1$  is a min (-1)  
 [E] volume V  
 [C] length L'  
 [D] wide W'

### Print option [f a]

L.....sheet length  
 W.....sheet wide  
 X.....box height  
 L'.....box length  
 W'.....box wide  
 V.....box volume

## IV- Register use and Stack status

R<sub>A</sub>= L

R<sub>B</sub>= W

R<sub>C</sub>= X height

R<sub>D</sub>= -2x

R<sub>0</sub>= precision

R<sub>1</sub>= X height

R<sub>2</sub>= used

R<sub>3</sub>= used

R<sub>4</sub>= volume

R<sub>5</sub>= volume

R<sub>6</sub>= box length L'

R<sub>7</sub>= box wide W'

T= X height

Z= L' length

Y= W' wide

X= volume

Last X= volume

Cleaning Registers and Stack is optional: [f] [CL REG], [RCL] [ENTER]

**V- Examples**

Important to follow this steps order: [B], [A], [E], [C] and [D]

**Example\_1**

L= 28  
 W= 22  
 Precision= E-5  
 Guessing N= 1  
  
 height= 4.07762  
 length= 19.84476  
 wide= 13.84476  
 volume= 1120.30822

**Example\_2**

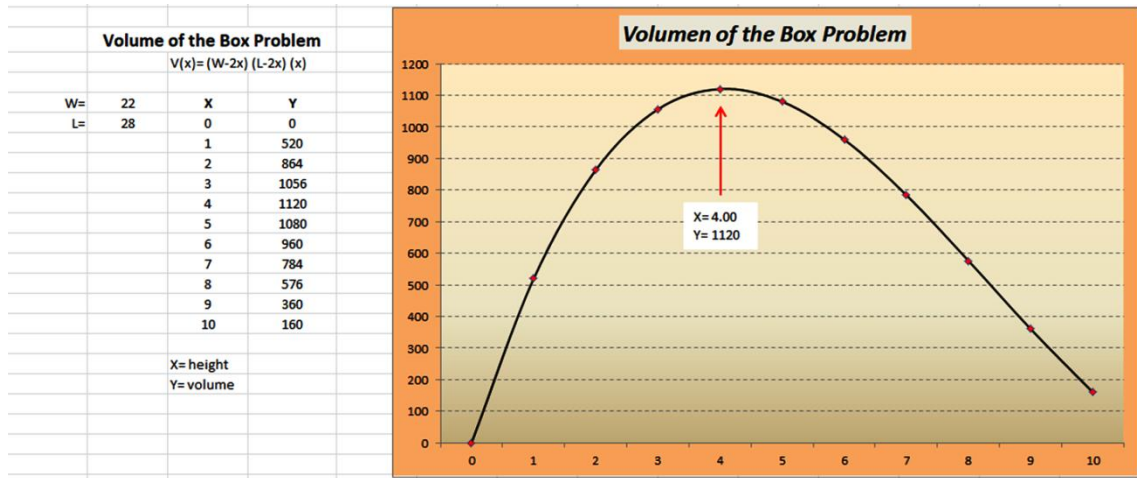
L= 60  
 W= 40  
 Precision= E-5  
 Guessing N= 1  
  
 height= 7.84750  
 length= 44.32270  
 wide= 24.32270  
 volume= 8450.43888

**Example\_3**

L= 120  
 W= 80  
 Precision= E-5  
 Guessing N= 1  
  
 height= 15,69499  
 length= 88,61001  
 wide= 48,61001  
 volume= 67603,51835

**Example\_4**

L= 56.23560  
 W= 23.12480  
 Precision= E-5  
 Guessing N= 1  
  
 height= 5.06728  
 length= 46.10104  
 wide= 12.99024  
 volume= 3034.60581



Web reference: <https://www.geogebra.org/m/QkpT9VQe>