



60060 Program Description I

Page 1 of 6

Program Title MULTIPLY TWO NUMBERS UP TO TWENTY DIGITS

Contributor's Name Franz Sagmüller

Address Furthof 31

City Hohenberg

Country Österreich Postal Code A-3192

Program Description, Equations, Variables Each factor will be cut off 10 digits from the right end into two parts.

Ex.: $X = 12192655739527343599$ will be transformed into

$X_1 = 1219265573$ and $X_2 = 9527343599$

Each part will be stored in the form Integer, Fractional as
 $12192,65573$ (A,B) and $95273,43599$ (C,D)

Y will be treated in the same way.

Two factors $X = X_1 X_2 = A,B C,D$ and

$Y = Y_1 Y_2 = E,F G,H$

will be multiplied by the products of all possible combinations of
 $D \times G, C \times H, D \times G, C \times G$ and so on.

The fractions part of results are the figures of the product.

Top results with 0,00000 are not be shown.

Operating Limits and Warnings

This program has been verified only with respect to the numerical example given in *Program Description II*. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

NEITHER HP NOR THE CONTRIBUTOR MAKES ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH REGARD TO THIS PROGRAM MATERIAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NEITHER HP NOR THE CONTRIBUTOR SHALL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING OUT OF THE FURNISHING, USE OR PERFORMANCE OF THIS PROGRAM MATERIAL.

Sketch(es)

Sample Problem(s)

Sample 1 : 12192655739527343599 x 426494300070417098 =
= 5200098175629268173205545127890455702

Sample 2 : 9999999999999999999² = 9999999999999999999800000000000000000001

Sample 3 : 9000000000000000008 x 1050000000000007 =
= 945000000000063840000000000056

Sample 4 : 45² = 2025

Solution(s) 1 : 1219265573 [Enter] 9527343599 [A]
42649430 [Enter] 70417098 [B]
[C] → 0,00052 0,00098 0,17562 0,92681 0,73205 0,54512 0,78904 0,55702

Solution 2 : 9999999999 [Enter] 9999999999 [E] →
→ 0,99999 0,99999 0,99999 0,99998 0,00000 0,00000 0,00000 0,00001

Solution 3 : 900000 [Enter] 8 [A] 10500 [Enter] 7 [B]
[C] → 0,94500 0,00000 0,00063 0,84000 0,00000 0,00056

Solution 4 : 0 [Enter] 45 [E] → 0,02025

Reference(s) This program is a revise to program 51273 D
from Kent A. Wigström



60060 Program Description II

Sketch(es)

Sample Problem(s) Program 51273 D shows no product 10^{30} (there is an endless loop)
Sample 3 and 4 : The results are in the register but would not be shown.

Sometimes you can get a result like 100000,0000 than you must correct the result:

Sample 2 : 99999999999999999999² is shown as 99999,99999

99999,99997

100000,0000

0,00001

This revised program shows correct :

0,99999 0,99999 0,99999 0,99998 0,00000 0,00000 0,00000 0,00001

Solution(s)

Reference(s)

[illegible]

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
001	* R LBL A	31 25 11			RCL A	34 11	
	* C I Reg	31 43			RCL D	34 14	
	EEX	43			FGSB 3	31 22 03	B x H
	5	05		060	FGSB 6	31 22 06	
	STO E	33 15	$R_E = 10^5$		RCL E	34 15	
	:	81			STO:9	33 81 09	
	STO B	33 12	$R_B = X2$		CIX	44	
	h x-y	35 52			STO 8	33 08	$R_8 = 0$
	RCL E	34 15			RCL B	34 12	
010	:	81			RCL C	34 13	
	STO A	33 11	$R_A = X1$		FGSB 4	31 22 04	C x F
	h RTN	35 22			RCL C	34 13	
	* R LBL B	31 25 12			RCL B	34 12	
	RCL E	34 15		070	FGSB 4	31 22 04	D x E
	:	81			RCL A	34 11	
	STO D	33 14	$R_D = Y2$		RCL D	34 14	
	h x-y	35 52			FGSB 4	31 22 04	A x H
	RCL E	34 15			RCL D	34 14	
	:	81			RCL A	34 11	
020	STO C	33 13	$R_C = Y1$		FGSB 4	31 22 04	B x G
	h RTN	35 22			FGSB 5	31 22 05	
	FLBLE	31 25 15			CIX	44	
	FGSB A	31 22 11			STO 9	33 09	$R_9 = 0$
	STO C	33 13	$R_C = R_A = X1$	080	RCL B	34 12	
	h x-y	35 52			RCL C	34 13	
	STO D	33 14	$R_D = R_B = X2$		FGSB 0	31 22 00	C x E
	* FLBLC	31 25 13			FGSB 6	31 22 06	
	Y	07			RCL A	34 11	
	h STO I	35 33			RCL C	34 13	
030	RCL B	34 12			FGSB 3	31 22 03	B x F
	RCL D	34 14			FGSB 6	31 22 06	
	FGSB 3	31 22 03	D x H		RCL A	34 11	
	ENT↑	41			RCL D	34 14	
	g FRAC	32 83		090	FGSB 0	31 22 00	A x G
	STO 7	33 07			FGSB 6	31 22 06	
	-	51			RCL E	34 15	
	RCL E	34 15			STO:9	33 81 09	
	:	81			CIX	44	
	STO 9	33 09			STO 8	33 08	$R_8 = 0$
040	RCL B	34 12			RCL A	34 11	
	RCL D	34 14			RCL C	34 13	
	FGSB 4	31 22 04	G x H		FGSB 4	31 22 04	A x F
	RCL D	34 14			RCL C	34 13	
	RCL B	34 12		100	RCL A	34 11	
	FGSB 4	31 22 04	D x G		FGSB 4	31 22 04	B x F
	FGSB 5	31 22 05			FGSB 5	31 22 05	
	CIX	44			STO 1	33 01	
	STO 9	33 09	$R_9 = 0$		RCL A	34 11	
	RCL B	34 12			RCL C	34 13	
050	RCL C	34 13			FGSB 0	31 22 00	A x E
	FGSB 3	31 22 03	D x F		ENT↑	41	
	FGSB 6	31 22 06			g FRAC	32 83	
	RCL B	34 12			STO +1	33 61 01	
	RCL D	34 14		110	-	51	
	FGSB 0	31 22 00	C x G		RCL E	34 15	
	FGSB 6	31 22 06			:	81	

REGISTERS

0	1	2	3	4	5	6	7	8	9
		STORE	RESULT					Intermediate results	
S0	S1	S2	S3	S4	S5	S6	S7	S8	S9
A X1=A,B	B X2=C,D	C Y1=E,F	D Y2=G,H	E 10^5	I used				

STEP	KEY ENTRY	KEY CODE	COMMENTS	STEP	KEY ENTRY	KEY CODE	COMMENTS
	STO 0	33 00			7	07	
	GTO 7	22 07		170	h STO I	35 33	
*	FLBL 4	31 25 04	contribute	*	FLBL 8	31 25 08	
	FGSB 1	31 22 01			RCL(i)	34 24	
	ENT↑	41			ENT↑	41	
	g FRAC	32 83			g FRAC	32 83	
	STO+9	33 61 09	$R_g = \text{Frac part}$		STO(i)	33 24	
120	-	51			-	51	
	STO+8	33 61 08	$R_g = \text{Int part}$		RCLF	34 15	
	h RTN	35 22			:	81	
*	FLAL 5	31 25 05			f DSZ	31 33	
	RCL 9	34 09		180	GTO 9	22 09	
	ENT↑	41			STO+0	33 61 00	
	f INT	31 83			GTO D	22 14	
	STO+8	33 61 08		*	FLBL 9	31 25 09	
	-	51			STO+(i)	33 61 24	
	f DSZ	31 33			GTO 8	22 08	
130	STO+(i)	33 61 24		*	FLBL D	31 25 14	DISPLAY
	RCL 8	34 08			CIX	44	
	RCLF	34 15			h STO I	35 33	
	:	81		*	g LBL a	32 25 11	
	f DSZ	31 33		190	RCL(i)	34 24	
	STO(i)	33 24			f ISZ	31 34	
	h RTN	35 22			f x = 0	31 51	
*	FLBL 6	31 25 06			GTO fa	22 31 11	
	ENT↑	41			f DSZ	31 33	
	g FRAC	32 83		*	g LBL b	32 25 12	
140	STO+(i)	33 61 24			RCL(i)	34 24	
	-	51			f - x -	31 84	
	STO+9	33 61 09			f ISZ	31 34	
	h RTN	35 22			6	06	
*	FLBL 0	31 25 00		200	h RCL I	35 34	
	f INT	31 83			g x ≤ y	32 71	
	h SFO	35 51 00	INT x INT		GTO fb	22 31 12	
	GTO 2	22 02			RCL 7	34 07	
*	FLBL 1	31 25 01		204	h RTN	35 22	
	g FRAC	32 83	INT x FRAC				
150	FLBL 2	31 25 02					
	h x - y	35 52					
	f INT	31 83					
	GTO 2	22 02					
*	FLBL 3	31 25 03					
	g FRAC	32 83	FRAC x FRAC				
	h x - y	35 52					
	g FRAC	32 83					
	RCLF	34 15					
	x	71					
160	FLBL 2	31 25 02					
	x	71					
	h FO ?	35 71 00					
	RCLF	34 15					
	h FO ?	35 71 00					
	:	81					
	h CFO	35 61 00					
	h RTN	35 22					
*	FLBL 7	31 25 07					

LABELS

FLAGS

SET STATUS

A	X	B	Y	C	X·Y	D	Review X·Y	E	X ²	0	used	FLAGS	TRIG	DISP
a	✓	b	✓	c		d		e		1		ON OFF		
0	✓	1	✓	2	✓	3	✓	4	✓	2		0 ☐ ☒	DEG ☒	FIX ☒
5	✓	6	✓	7	✓	8	✓	9	✓	3		1 ☐ ☒	GRAD ☐	SCI ☐
												2 ☐ ☒	RAD ☐	ENG ☐
												3 ☐ ☒		n <u>5</u>