


Booth's Example: $11 \times (-13)$

11 - Multiplicand (M), (-13) - multiplier (Q)
(01011)

$$13 - 001101 \quad (-13) = 1's = \begin{array}{r} 10010 \\ + 1 \\ \hline \end{array}$$

$$2's = \underline{\underline{110011}}$$

$$11 - 001011 \quad (-11) = 1's = \begin{array}{r} 10100 \\ + 1 \\ \hline \end{array}$$

$$\underline{\underline{110101}}$$

Truing Table

A	Q	q_0	n
000000 110101	110011	0	6
110101	110011	0	5
111010	111001	1	
111101	011100	1	4
001011			3
001000	011100		
000100	001110	0	
000010	000111	0	2
110101			
110111	000111		1
111011	100011	1	
111101	110001	1	0
A Q \Rightarrow Product			

Steps
Initialization

$A \leftarrow A - M$
 $A \leftarrow A + 2^k(M)$
 $ASR(AQq_0)$

$ASR(AQq_0)$

$A \leftarrow A + M$
 $ASR(AQq_0)$

$ASR(AQq_0)$

$A \leftarrow A - M$
 $ASR(AQq_0)$

$ASR(AQq_0)$

-143

ANS: *Checker: neg*

1 1 1 1 0 1 1 1 0 0 0 1

0 0 0 0 1 0 0 0 1 1 1 0 (1's)

+ 1

0 0 0 0 1 0 0 0 1 1 1 1 (2's)

8 6 5 4 3 2 1 0
2 2 2 2 2 2 2 2

143

Sign bit of answer
already indicates it
is a Negative number

ANS: -143

Modified Booth's Algorithm

The diagram illustrates the steps of Booth's multiplication algorithm for the numbers $-14 \times M$ and -143 .

Initialization:

- $A = 000000$
- $Q = 110011$
- $Q_{-1} = 0$

Step 2: ASR (A, Q, Q_{-1}) (2 times)

After two right shifts, the values are:

- $A = 001011$
- $Q = 001000$
- $Q_{-1} = 0$

Step 1: ASR (part) 2 times

After two more right shifts, the values are:

- $A = 110101$
- $Q = 000100$
- $Q_{-1} = 0$

Final Product:

The final product is 111011100011 , which is -143 .