Tut 2.

① Multiply $(-9) \times 8$ using Signed Magnitude Multiplication.
② Multiply $(-6) \times (-5)$ using Booth's Multiplication Algo.

① Multiplicand (B) $-9 \Rightarrow$ 1 1001 (1001 → data bit)
Sign bit $B_s = 1$. (1 ↙ Sign bit)

Multiplier (Q) $+8 \Rightarrow$ 0 1000 (1000 → data bit)
Sign bit $Q_s = 0$. (0 ↙ Sign bit)

4 data bits in Multiplier ⇒ Sequence Counter value ⇒ 100.

Sign bit of Multiplication result ⇒ $B_s \oplus Q_s = 1 \oplus 0 = 1$.
So resultant sign bit 1 implies negative sign.

Multiplicand B = 1001.

		E	A	Q	SC
		0	0000	1000	100
$Q_n = 0$	Shr AQ		0000	0100	011
$Q_n = 0$	Shr.		0000	0010	010
$Q_n = 0$	Shr.		0000	0001	001
$Q_n = 1$	~~Shr~~ Add B.		1001		
			1001		
	Shr.		0100	1000	000

Result.

∴ Resultant sign bit was 1.
So Result is $-72 \Rightarrow$ 1 0100 1000 (1 ↙ Sign bit; 0100 1000 → data.)

(2) Multiplicand −6
Multiplier −5

Booth's Algo. is all about 2's complement Multiplication.

6 → 110 5 → 101
1's comp. → 001 1's comp → 010
2's comp. → 010 2's comp → 011

∴ (−6) will be represented in 2's complement as 1010
(−5) will be represented in 2's complement as 1011

∴ Multiplicand (BR) = 1010 } sequence counter
Multiplier (QR) = 1011 } (SC) = 100.

BR = 1010
$\overline{BR}$+1 = 0101 +1 = 0110

Qn	Qn+1	operation	AC	QR	Qn+1	SC.
			0000	1011	0	100
1	0	SUB BR	0110			
			0110			
		ASHR	0011	0101	1	011
1	1	ASHR	0001	1010	1	010
0	1	ADD BR	1010			
			1011			
		ASHR	1101	1101	0	001
1	0	SUB BR	0110			
			(1) 0011			
			↓ discard			
		ASHR	00011110		1	000

⇓
Result.
MSB = 0 so positive result.
Result is 00011110 ⇒ +30.