



Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y	0	→ .	→ .	→ .	
G	↓ .	→ .	→ .	→ .	
G	↓ .	→ .	→ .	→ .	
A	↓ .	→ .	→ .	→ .	
A	↓ .	→ .	→ .	→ .	
T	↓ .	→ .	→ .	→ .	
G	↓ .	→ .	→ .	→ .	
G	↓ .	→ .	→ .	→ .	

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0 → -2			
G					
G					
A					
A					
T					
G					
G					

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	.
G	.		.	.	.
G	.		.	.	.
A	.		.	.	.
A	.		.	.	.
T	.		.	.	.
G	.		.	.	.
G	.		.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0 → -2 → -4 → -6			
G		↓	↓	↓	↓
G		↓	↓	↓	↓
A		↓	↓	↓	↓
A		↓	↓	↓	↓
T		↓	↓	↓	↓
G		↓	↓	↓	↓
G		↓	↓	↓	↓

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0 → -2 → -4 → -6			
G		-2	.	.	.
G		.	.	.	.
A		.	.	.	.
A		.	.	.	.
T		.	.	.	.
G		.	.	.	.
G		.	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0 → -2 → -4 → -6			
G		↓ -2	↓ .	↓ .	↓ .
G		↓ -4	↓ .	↓ .	↓ .
A		↓ -6	↓ .	↓ .	↓ .
A		↓ -8	↓ .	↓ .	↓ .
T		↓ -10	↓ .	↓ .	↓ .
G		↓ -12	↓ .	↓ .	↓ .
G		↓ -14	↓ .	↓ .	↓ .

Match = 3
 Mismatch = -1
 Gap = -2

	X	A	T	G
Y	0 → -2 → -4 → -6			
G	-2	-1	.	.
G	-4	.	.	.
A	-6	.	.	.
A	-8	.	.	.
T	-10	.	.	.
G	-12	.	.	.
G	-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	.
G		-4	.	.	.
A		-6	.	.	.
A		-8	.	.	.
T		-10	.	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

	X	A	T	G
Y	0	-2	-4	-6
G	-2	-1	-3	-1
G	-4	.	.	.
A	-6	.	.	.
A	-8	.	.	.
T	-10	.	.	.
G	-12	.	.	.
G	-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

	X	A	T	G
Y	0	-2	-4	-6
G	-2	-1	-3	-1
G	-4	-3	.	.
A	-6	.	.	.
A	-8	.	.	.
T	-10	.	.	.
G	-12	.	.	.
G	-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	.
A		-6	.	.	.
A		-8	.	.	.
T		-10	.	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	.	.	.
A		-8	.	.	.
T		-10	.	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	.	.
A		-8	.	.	.
T		-10	.	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	.
A		-8	.	.	.
T		-10	.	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	.	.	.
T		-10	.	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

	X	A	T	G
Y	0 → -2 → -4 → -6			
G	-2	-1	-3	-1
G	-4	-3	-2	0
A	-6	-1	-3	-2
A	-8	-3	.	.
T	-10	.	.	.
G	-12	.	.	.
G	-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	.
T		-10	.	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	.	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	.	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	.
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	.	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	.	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	-2	.
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	-2	3
G		-14	.	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	-2	3
G		-14	-9	.	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	-2	3
G		-14	-9	-4	.

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	-2	3
G		-14	-9	-4	1

Match = 3
 Mismatch = -1
 Gap = -2

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	-2	3
G		-14	-9	-4	1

Match = 3
 Mismatch = -1
 Gap = -2

Alignment Score = 1

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	-2	3
G		-14	-9	-4	1

Match = 3
 Mismatch = -1
 Gap = -2

Alignment Score = 1

	X	A	T	G
Y	0	-2	-4	-6
G	-2	-1	-3	-1
G	-4	-3	-2	0
A	-6	-1	-3	-2
A	-8	-3	-2	-4
T	-10	-5	0	-2
G	-12	-7	-2	3
G	-14	-9	-4	1

Match = 3
 Mismatch = -1
 Gap = -2

Alignment Score = 1

	X	A	T	G
Y	0	-2	-4	-6
G	-2	-1	-3	-1
G	-4	-3	-2	0
A	-6	-1	-3	-2
A	-8	-3	-2	-4
T	-10	-5	0	-2
G	-12	-7	-2	3
G	-14	-9	-4	1

Match = 3
 Mismatch = -1
 Gap = -2

Alignment Score = 1

	X	A	T	G
Y	0	-2	-4	-6
G	-2	-1	-3	-1
G	-4	-3	-2	0
A	-6	-1	-3	-2
A	-8	-3	-2	-4
T	-10	-5	0	-2
G	-12	-7	-2	3
G	-14	-9	-4	1

Match = 3
Mismatch = -1
Gap = -2

X: G
|
Y: G

Alignment Score = 1

	X	A	T	G
Y	0	-2	-4	-6
G	-2	-1	-3	-1
G	-4	-3	-2	0
A	-6	-1	-3	-2
A	-8	-3	-2	-4
T	-10	-5	0	-2
G	-12	-7	-2	3
G	-14	-9	-4	1

Match = 3
 Mismatch = -1
 Gap = -2

X: -G
 |
 Y: GG

Alignment Score = 1

		X	A	T	G
Y		0	-2	-4	-6
G		-2	-1	-3	-1
G		-4	-3	-2	0
A		-6	-1	-3	-2
A		-8	-3	-2	-4
T		-10	-5	0	-2
G		-12	-7	-2	3
G		-14	-9	-4	1

Match = 3
Mismatch = -1
Gap = -2

X: T-G
| |
Y: TGG

Alignment Score = 1

	X	A	T	G
Y	0	-2	-4	-6
G	-2	-1	-3	-1
G	-4	-3	-2	0
A	-6	-1	-3	-2
A	-8	-3	-2	-4
T	-10	-5	0	-2
G	-12	-7	-2	3
G	-14	-9	-4	1

Match = 3
 Mismatch = -1
 Gap = -2

X: AT-G
 | | |
 Y: ATGG

Alignment Score = 1

	X	A	T	G
Y	0 → -2 → -4 → -6			
G	-2 → -1 → -3 → -1			
G	-4 → -3 → -2 → 0			
A	-6 → -1 → -3 → -2			
A	-8 → -3 → -2 → -4			
T	-10 → -5 → 0 → -2			
G	-12 → -7 → -2 → 3			
G	-14 → -9 → -4 → 1			

Match = 3
Mismatch = -1
Gap = -2

X: -AT-G
 | | |
Y: AATGG

Alignment Score = 1

	X	A	T	G
Y	0 → -2 → -4 → -6			
G	-2 → -1 → -3 → -1			
G	-4 → -3 → -2 → 0			
A	-6 → -1 → -3 → -2			
A	-8 → -3 → -2 → -4			
T	-10 → -5 → 0 → -2			
G	-12 → -7 → -2 → 3			
G	-14 → -9 → -4 → 1			

Match = 3
 Mismatch = -1
 Gap = -2

X: --AT-G
 | | |
 Y: GAATGG

Alignment Score = 1

	X	A	T	G
Y	0	-2	-4	-6
G	-2	-1	-3	-1
G	-4	-3	-2	0
A	-6	-1	-3	-2
A	-8	-3	-2	-4
T	-10	-5	0	-2
G	-12	-7	-2	3
G	-14	-9	-4	1

Match = 3
 Mismatch = -1
 Gap = -2

X: ---AT-G
 | | |
 Y: GGAATGG

Alignment Score = 1

		X	A	T	G
Y		0	0	0	0
G		0	0	0	3
G		0	0	0	3
A		0	3	1	1
A		0	3	2	0
T		0	1	6	4
G		0	0	4	9
G		0	0	2	7

Match = 3
 Mismatch = -1
 Gap = -2

X: ATG
 |||
 Y: ATG