1)

- We know that if there is a gap penalty or mismatch penalty, score will decrease and only matching can increment the score. If there is matching, score of the upper left cell should be added to matching score and written to the new cell. We can see that all of the scores incremented by 7.

Matching Score : 7

	-	M	I	M	A	G	E	D	I	L
-	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	7	3	0	0	0
A	0	0	0	0	7	3	1	0	0	0
M	0	7	3	7	3	1	0	0	0	0
A	0	3	1	3	14	10	6	2	0	0
E	0	0	0	0	10	8	17	13	9	5
D	0	0	0	0	6	4	13	24	20	16
K	0	0	0	0	2	0	9	20	18	14

- Scores which are highlighted shows mismatch scores. If there is no matching and values coming from above and left (gap penalty+(left cell's val or upper cell's val)) are smaller than calculated value (upper left val.+ mismatch penalty val.), we can find mismatch score

Mismatch score : -6

	-	M	I	M	A	G	E	D	I	L
-	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	7	3	0	0	0
A	0	0	0	0	7	3	1	0	0	0
M	0	7	3	7	3	1	0	0	0	0
A	0	3	1	3	14	10	6	2	0	0
E	0	0	0	0	10	8	17	13	9	5
D	0	0	0	0	6	4	13	24	20	16
K	0	0	0	0	2	0	9	20	18	14

- Because it is local alignment there is no negative scores so almost all of the 0's coming from gap penalty. Also, score of gap penalties can be seen from the table below.

Gap penalty:-4

	-	M	I	M	A	G	E	D	I	L
-	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	7 — 3		0	0	0
A	0	0	0	0	7 — 3		1	0	0	0
M	0	7 — 3		7 — 3		1	0	0	0	0
A	0	3	1	3	14 — 10 —		6 — 2		0	0
E	0	0	0	0	10	8	17 — 13		9 — 5	
D	0	0	0	0	6	4	13	24 — 20 —		16
K	0	0	0	0	2	0	9	20	18 — 14	

- Because it is local alignment, firstly, we should find max value on table (24).Then, we should follow the correct path(traceback) until it reaches zero

	-	M	I	M	A	G	E	D	I	L
-	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	7	3	0	0	0
A	0	0	0	0	7	3	1	0	0	0
M	0	7	3	7	3	1	0	0	0	0
A	0	3	1	3	14	10	6	2	0	0
E	0	0	0	0	10	8	17	13	9	5
D	0	0	0	0	6	4	13	24	20	16
K	0	0	0	0	2	0	9	20	18	14

Sequence 1: horizontal

Sequence 2: vertical

M A G E D

| | | | |

M A [] E D

7+ 7- 4+ 7+ 7 = 24

2)

- According to BLOSUM62 matrix, I took values of matches/ mismatches. Then, I filled the table depends on given gap penalty and values taken from BLOSUM62.

	-	M	C	G	M	G	C	M	E	L
-	0	-4	-8	-12	-16	-20	-24	-28	-32	-36
G	-4	-3	-7	-2	-6	-10	-14	-18	-22	-26
M	-8	1	-3	-6	3	-1	-5	-9	-13	-17
C	-12	-3	10	6	2	0	8	4	0	-4
M	-16	-7	6	7	11	7	4	13	9	5
E	-20	-11	2	4	7	9	5	9	18	14
D	-24	-15	-2	1	3	6	6	5	14	14
L	-28	-19	-6	-3	3	2	5	8	10	18

Horizontal: 1st sequence

Vertical: 2nd sequence

M C G M G C M E [] L

| | | | | | | | | |

[] [] G M [] C M E D L

-4- 4 + 6 +5 -4 + 9 + 5 + 5- 4 +4= 18