1.

(a) $64k = 2^{16}$

6 bit tag	8 bit index	2 bit relational position

number of bits for block = 2 bits = 4 position.
number of bits for index = size of cache (block form) = 8 bits.
number of bits for tag = 6 bits.

(b) 16 bits.

(c) $2^{10}/4 = 2^8 = 256$ blocks.

(d) $T_{access} = 100(h_1) + (1 - h_1)(1200 + 100) \leq 0.2 * 1200 \rightarrow 1060 \leq 1200h_1$
$\rightarrow 1 \geq h_1 \geq 0.883333$

2. size of the cache is 16 blocks.

requested address	tag	hit 1	hit 2	hit 3
0	0	x	✓	✓
21	1	x	✓	✓
23	1	✓	✓	✓
35	2	x	✓	✓
76	4	x	✓	✓
1	0	✓	✓	✓
66	4	✓	✓	✓
80	5	x	✓	✓
54	3	x	✓	✓
36	2	✓	✓	✓
24	1	✓	✓	✓
23	1	✓	✓	✓
75	4	✓	✓	✓

In the second and the third round all of the addresses are hitted because all of the requested addresses are less than 256.
Miss ratio = 6/42 = 1/7

3.

(a)

requested addresses	tag	hit	number of fulled	row
0	0	x	1	0
1	0	✓	1	0
15	3	x	2	0
14	3	✓	2	0
14	3	✓	2	0
15	3	✓	2	0
16	4	x	1	1
2	0	✓	2	0
23	5	x	2	1
27	6	x	3	1
16	4	✓	3	1
14	3	✓	2	0
1	0	✓	2	0
21	5	✓	3	1
22	5	✓	3	1
23	5	✓	3	1
22	5	✓	3	1
10	2	x	3	0
18	4	✓	3	1
15	3	✓	3	1
1	0	✓	3	0
0	0	✓	3	0
14	3	✓	3	0
28	7	x	4	1
25	6	✓	4	1

Hit ratio is equal to 0.72.
Final state of cache:

0	1	2	3	null	null	null	null	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

(b,c) These two states are the same.

requested address	tag	hit
0	0	x
1	0	✓
15	7	x
14	7	✓
14	7	✓
15	7	✓
16	8	x
2	1	x
23	11	x
27	13	x
16	8	✓
14	7	✓
1	0	✓
21	10	x
22	11	✓
23	11	✓
22	11	✓
10	5	x
18	8	✓
15	7	✓
1	0	✓
0	0	✓
14	7	✓
28	14	x
25	12	x

The hit ratio is equal to 0.56

4. Time of not finding requested data in cache = 70ns.
$T_{access} = 0.95 * 10 + 0.05 * (60 + 10) = 13.0ns$