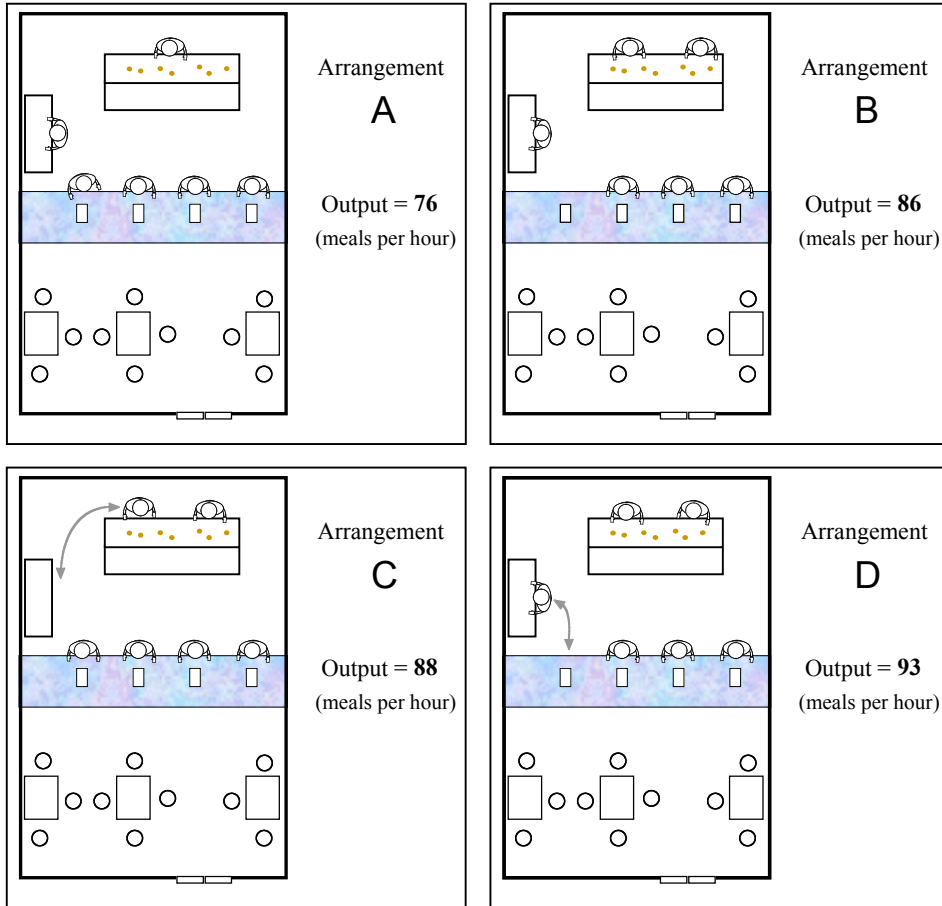
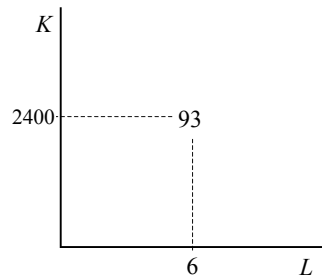


Technical Efficiency and the Production Function

Consider a fast-food restaurant with six workers ($L = 6$) and a 60'x40' building ($K = 2400$ sq. ft.). The firm's managers will try to organize the six workers in the best possible way (i.e. in order to get the greatest output for the factors (or inputs) of $L = 6$ and $K = 2400$). Consider the following four arrangements of these inputs.



If arrangement **D** gives the greatest output for these amounts of the inputs, then **D** is called *technically efficient*. We could enter 93 in a table, along with $L = 6$, $K = 2400$. This would be one entry in a *production function*—which we can define in the following way: “It shows the maximum possible output that a firm can get from a given amount of input(s).”



A Production Function

K	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
3,600	17	36	55	73	89	104	117	127	136	142	145	147	145	140	133	122
3,000	16	34	52	69	85	100	113	124	133	139	145	147	147	144	139	131
2,400	15	31	48	64	79	93	106	117	127	136	142	145	147	147	144	139
1,800	13	28	44	59	73	87	100	111	121	129	136	142	145	147	147	145
1,200	11	25	39	52	65	77	89	100	110	119	127	133	139	142	145	144
600	7	15	25	39	52	63	73	83	92	100	108	116	123	127	130	133

We will assume that firms are technically efficient all of the time. This is not, of course, true, but firms must strive to be close to technical efficiency as much of the time as possible, so the assumption is not far off. This assumption allows us to find the exact output level for any combination of input amounts by looking on the production function. This simplifies our analysis tremendously and has very little effect on the conclusions we will make about firm behaviour.

The Short Run and Long Run in a Production Function

K	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
3,600	17	36	55	73	89	104	117	127	136	142	145	147	145	140	133	122
3,000	16	34	52	69	85	100	113	124	133	139	145	147	147	144	139	131
2,400	15	31	48	64	79	93	106	117	127	136	142	145	147	147	144	139
1,800	13	28	44	59	73	87	100	111	121	129	136	142	145	147	147	145
1,200	11	25	39	52	65	77	89	100	110	119	127	133	139	142	145	144
600	7	15	25	39	52	63	73	83	92	100	108	116	123	127	130	133

Since the short run is the period in which the firm can vary labor but not capital, short run changes in output must occur horizontally in the production function. All other changes must be long run because a change in capital is involved (e.g. arrows shown). If a horizontal “strip” is used by itself, then we have what is referred to as a short run production function (see below).

L	Q
0	0
1	15
2	31
3	48
4	64
5	79
6	93
7	106
8	117
9	127
10	136
11	142
12	145
13	147
14	147
15	144
16	139

A Short Run Production Function

