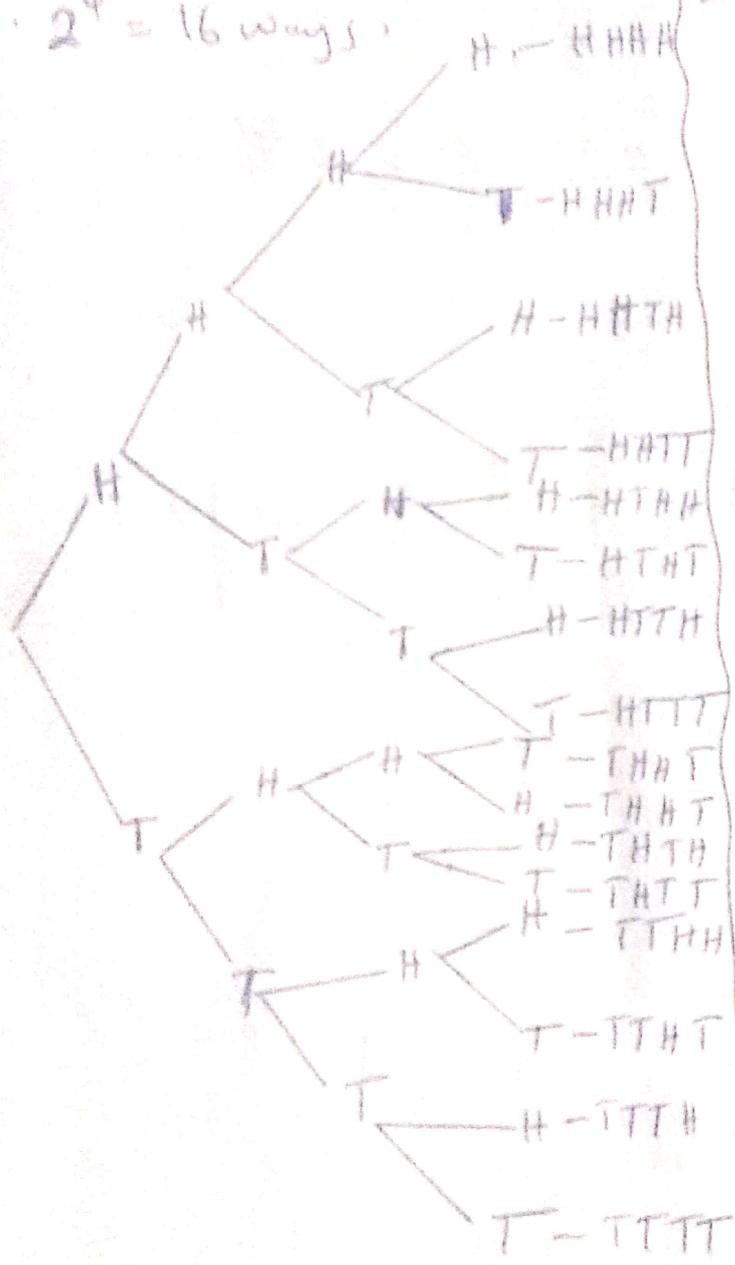


a) $2^4 = 16$ ways.



c) From the tree diagram,
Number of possible outcomes
= 16. This corresponds to
 $2^4 = 16$ in part a.

2. a) ${}_{15}P_6 = \frac{15!}{(15-6)!} = \frac{15!}{9!}$

$$= \frac{15 \times 14 \times 13 \times 12 \times 11 \times 10 \times 9!}{9!}$$

$$= 3603600$$

b) $P(6,2) = \frac{6!}{(6-2)!} = \frac{6!}{4!}$

$$= \frac{6 \times 5 \times 4!}{4!} = 30$$

c) ${}_7P_3 = \frac{7!}{(7-3)!} = \frac{7!}{4!} = \frac{7 \times 6 \times 5 \times 4!}{4!}$

$$= 210$$

d) ${}_9P_9 = \frac{9!}{(9-9)!} = \frac{9!}{0!} = 362880$

e) $P(7,0) = \frac{7!}{(7-0)!} = \frac{7!}{7!} = 1$

4. $P(7,4) = \frac{7!}{(7-4)!} = \frac{7!}{3!}$

$$= \frac{7 \times 6 \times 5 \times 4 \times 3!}{3!}$$

$$= 840$$

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

5 ways to roll 6
 1 way to roll 12
 total 5 + 1 = 6 ways

a) data

no. of d's - 1
 no. of a's - 2
 no. of t's - 1
 Total - 4

number of permutations = $\frac{4!}{1!2!1!}$
 $= \frac{4 \times 3 \times 2 \times 1}{2 \times 1}$
 $= 12$

b) management

no. of m's = 2
 no. of a's = 2
 no. of n's = 2
 no. of g's = 1
 no. of e's = 2
 no. of t's = 1

Total = 10

No. of permutations

= $\frac{10!}{2!2!2!1!2!1!}$

= $\frac{10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1 \times 2 \times 1 \times 2 \times 1 \times 1 \times 2 \times 1 \times 1}$
 $= 226800$

c) Microwave

no. of m's = 1
 no. of i's = 1
 no. of c's = 1
 no. of r's = 1
 no. of o's = 1
 no. of w's = 1
 no. of g's = 1
 no. of v's = 1
 no. of s's = 1

no. of permutations = $\frac{9!}{(1!)^8}$
 $= 9!$
 $= 362880$

Total = 9

a) i) $3 \times 3 \times 3 = 27.$

ii) $3 \times 3 \times 3 + 3 \times 3 + 3$

$$27 + 9 + 3$$

$$= 39$$

b) One operation done
in m ways and the
other in n ways;
total possible outcomes
 $= (m+n)$