

## Permutations Sheet

$$1. a) 9P_4 = 3024$$

$$b) 14P_{10} = 3632428800$$

$$c) 5P_5 = 120$$

$$nPr = \frac{n!}{(n-r)!}$$

$$d) nP_2 = 30$$

$$\frac{n!}{(n-2)!} = 30$$

$$\frac{n \cdot (n-1) \cancel{(n-2)!}}{\cancel{(n-2)!}} = 30$$

$$n(n-1) = 30$$

$$n^2 - n = 30$$

$$n^2 - n - 30 = 0$$

$$(n-6)(n+5) = 0$$

$$\boxed{n=6} \quad n \neq -5$$

$$nPr = \frac{n!}{(n-r)!}$$

$$e) (n-1)P_2 = 12$$

$$\frac{(n-1)!}{(n-1-2)!} \Rightarrow \frac{(n-1)!}{(n-3)!} = 12$$

$$\frac{(n-1)(n-2) \cancel{(n-3)!}}{\cancel{(n-3)!}} = 12$$

$$(n-1)(n-2) = 12$$

$$n^2 - 3n + 2 = 12$$

$$n^2 - 3n - 10 = 0$$

$$(n-5)(n+2) = 0$$

$$\boxed{n=5} \quad n \neq -2$$

$$2. \quad 7P_4 \quad \text{or} \quad \underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{4}$$

$$3. \quad 8P_3 \quad \text{or} \quad \underline{8} \cdot \underline{7} \cdot \underline{6}$$

$$4. \quad 10P_3 \quad \text{or} \quad \underline{10} \cdot \underline{9} \cdot \underline{8}$$

$$5. \quad 10P_3$$

$$6. \quad 8P_2$$

$$7. \quad 6P_2$$

$$8. \quad 7P_4$$

Sec. 2.4 : Permutations when  
objects are Identical

## MATHEMATICS

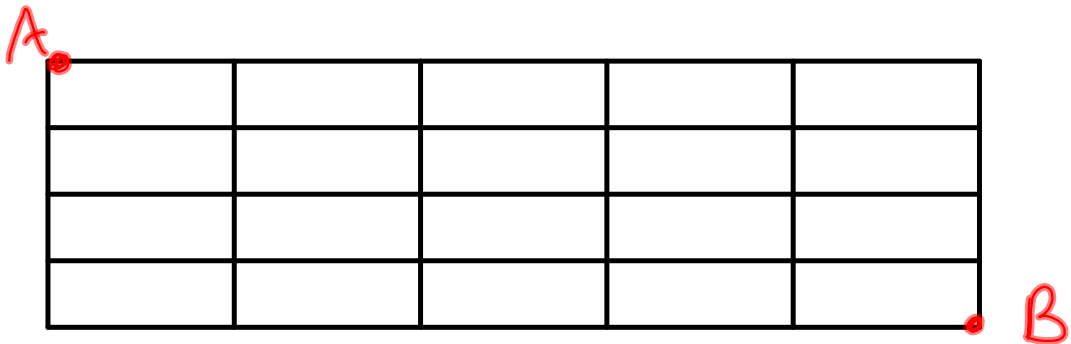
How many distinct arrangements  
can be made?

$$\frac{\text{Total!}}{\text{Repeats!}} \Rightarrow \frac{n!}{a!b!c!...}$$

$$\frac{11!}{2!2!2!} = \frac{39916800}{8} = 4989600$$

2(M) 2A 2T

## ex.2) Route Problems



How many routes are possible to get from A to B?

4 Down 5 Right

DDDDRRRRR

$$\frac{n!}{a!b!} = \frac{9!}{4!5!} = \frac{362880}{2880} = 126$$