

PERMUTATIONS INVOLVING IDENTICAL OBJECTS

In general, the number of permutations of n objects of which there are a objects alike of one kind, b alike of another kind, c alike of another kind (and so on)

is:

$$\frac{n!}{a!b!c!...}$$

Examples 1

(1) A, B, C, D, D $\Rightarrow \frac{5!}{2!} = \underline{\underline{60}}$

(2) A, B, D, D, D $\Rightarrow \frac{5!}{3!} = \underline{\underline{20}}$

(3) A, B, B, C, C $\Rightarrow \frac{5!}{2!2!} = \underline{\underline{30}}$

(4) A, A, A, B, B $\Rightarrow \frac{5!}{3!2!} = \underline{\underline{10}}$

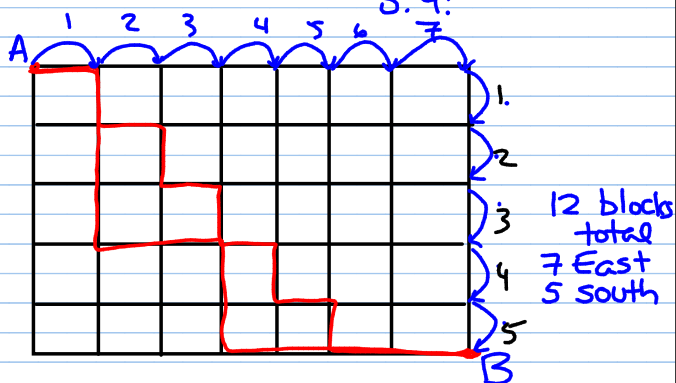
EX 2 A T/F test has 7 questions. How many keys are possible if 3 answers are true and 4 answers are false?

TTT FFFF

of permutations: $\frac{7!}{3!4!} = \underline{\underline{35}}$

EX 3

How many paths are there from A to B if you can only move East \rightarrow and South \downarrow ?



EEEEEE SSSSS

$$\frac{12!}{7!5!} = \underline{\underline{792}}$$

Now, feel free to do 6.3 ü

AB <u>BB</u> BA <u>BB</u> BB <u>AB</u> BB <u>BA</u>	 AB<u>BB</u> BA<u>BB</u> BB<u>AB</u> BB<u>BA</u> 	 AB<u>BB</u> BA<u>BB</u> BB<u>AB</u> BB<u>BA</u> 	 AE<u>BE</u> FA<u>BE</u> FE<u>AB</u> FE<u>BA</u>
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AE <u>EB</u> EA <u>EB</u> EB <u>AE</u> EB <u>EA</u>	 AE<u>EB</u> FA<u>EB</u> EB<u>AE</u> EB<u>EA</u>
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ABEF ⇒ 24

ABEE ⇒ 12 ⇒ $\frac{24}{2}$ or $\frac{4!}{2!}$

ABBB ⇒ $\frac{4!}{3!} = \frac{24}{6} = 4$

ABEF	ABFE	AEBF	AFBE
BAEF	BAFE	EABF	FABE
BEAF	BFAE	EFAB	FEAB
BEFA	BFEA	EFBA	FEBA

A <u>EFB</u>	A <u>FEB</u>
E <u>AFB</u>	F <u>AEB</u>
E <u>BAF</u>	F <u>BAE</u>
E <u>BFA</u>	F <u>BEA</u>