

# C12 - 11.7 - Identical Objects Notes

How many different words can we make from the letters POLE?

4! = 24	POLE	OLEP	EPOL	LOPE
	PELO	OLPE	EPLO	LEPO
	PLEO	OPLE	ELPO	LPOE
	PLOE	OPEL	ELOP	LPEO
	POEL	OELP	EOPL	LPEO
	PEOL	OEPL	EOLP	LOEP

$$\underline{4} \times \underline{3} \times \underline{2} \times \underline{1} = 24$$

How many different words can we make from the letter POLO?

$\frac{4!}{2!} = \frac{24}{2} = 12$	POOL	LOOP	OLOP	OPLO
	POLO	LOPO	OLPO	OOPL
	PLOO	LPOO	OPOL	OOLP

*POOL = POOL*

Because these words are identical, we must divide by the number of ways we can permute the O's (i.e., 2!) so that we don't double count.

How many different words can we make from the letters PEEP?

$\frac{4!}{2!2!} = \frac{24}{2 \times 2}$ $= \frac{24}{4}$ $= 6$	PEEP	EPPE
	PEPE	EPEP
	PPEE	EEPP

A ten question multiple choice exam has solutions as follows: 5 A's, 3 B's, 1 C, 1 D. In how many different combinations could these answers be ordered?

$$\frac{10!}{5!3!} = \frac{10 \times 9 \times 8 \times 7 \times 5!}{5!(3 \times 2 \times 1)}$$

$$= \frac{10 \times 9 \times 8 \times 7}{6}$$

$$= 840$$

$\frac{(\# \text{ of letters})!}{(\text{repeating letter})! (\text{other repeating letter})! \dots}$
--