

Oct. 7

Thursday, October 03, 2013  
1:07 PM

### 4.4 cont. Identical Objects

Recall formula =  $\frac{n!}{a!b!c! \dots}$        $n = \text{total objects}$

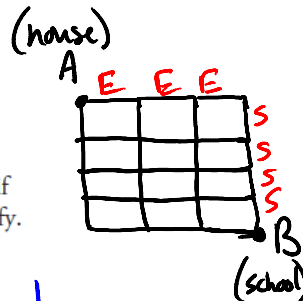
$\left. \begin{matrix} a \\ b \\ c \end{matrix} \right\} \text{\# of repeating objects}$

When traveling from point A to point B, use East & South direction (assume no back tracking or change to West or North)

Ex 3 Your Turn. p. 265

#### Your Turn

The school is three blocks east and four blocks south of Carrie's house. Predict whether Carrie will have more or fewer than 56 possible routes if she always travels south or east. Determine the number of routes to verify.



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$n = E + S$

$a = \# \text{ of } E$

$b = \# \text{ of } S$

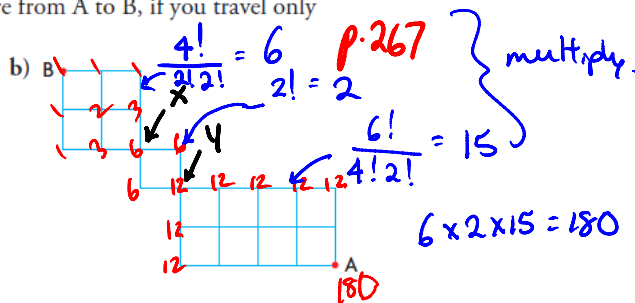
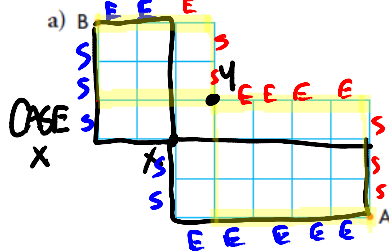
use  $\frac{n!}{a!b!}$

$\frac{7!}{3!4!} =$

7! / (3!4!)      35

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11. How many different routes are there from A to B, if you travel only north or west?



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a) Case X

$$\frac{5!}{2!3!} \times \frac{7!}{5!2!} = 210$$

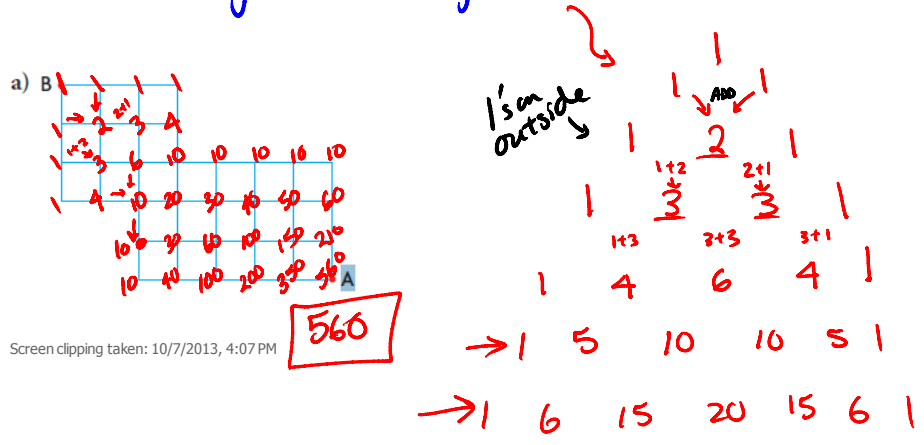
$\frac{5!}{2!3!}$  is labeled "1st block to point X" with arrows pointing to 2E and 3S. A red arrow points to the 5! numerator with the label "2Es+3S".  
 $\frac{7!}{5!2!}$  is labeled "2nd block from X to A" with arrows pointing to 5E and 2S. A red arrow points to the 7! numerator with the label "5E+2S".

ADD  
 210 + 350  
 = 560 ways  
 from point  
 B to A.

Case Y

$$\frac{5!}{3!2!} \times \frac{7!}{4!3!} = 350$$

### Pascal's Triangle Counting Method.



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### 4.5-4.7 Combinations.

p. 271

↳ Combination = total unordered arrangements of objects

ex: group of ppl, vs pic of ppl

hand of cards

scoops of icecream

toppings on pizza.

Notation  $nC_r$  or  $\binom{n}{r}$

$n$  = total # of objects

$r$  = # of objects chosen

Formula  $nCr = \frac{n!}{r!(n-r)!}$  chosen

Calculator = MATH  $\rightarrow$  left arrow  $\rightarrow$  PRB  $\rightarrow$  3:  $nCr$

p.275 Your Turn.

3 scoops of icecream from 10 flavors

$${}_{10}C_3 = 120$$

1 must be chocolate + 2 others

$$1 \times {}_9C_2 = 1 \times 36 = 36$$

Groups of ppl are combination questions b/c the order of ppl being chosen doesn't matter

Ex 3 Your Turn p.277

all females  $n = 4$  females

$r = 4$  choosing 4

$${}_4C_4 = 1$$

When question say "At Least" or "at most", use cases to solve.

Ex: 4 let's do a group of 4 with at least 1 student.

students = 5  
teachers = 8

Case 1 = 1 student + 3 teachers.

$${}_5C_1 \times {}_8C_3 = 280$$

Case 2 = 2 students + 2 teachers.

$$\binom{5}{2} \times \binom{8}{2} = 280$$

Case 3 = 3 students + 1 teacher

$${}^5C_3 \times {}^8C_1 = 80$$

Case 4 = 4 students (+ 0 teachers)

$$\binom{5}{4} = 5$$

ADD cases 645

Complement = calculating the total by subtraction the opposite that is needed in question from the general total.

general (no conditions) - opposite of desired

Total group, 4 no conditions - group with zero students

opposite of at least 1 student

$$n=13, r=4 \quad {}^{13}C_4 - {}^8C_4 = 645$$

4.7

Ex: 1 Your Turn p. 285

### Your Turn

For another pose, the photographer wants the two tallest students, Jill and Sam, to sit at either end, Jill on the left and Sam on the right, and the teacher to sit in the middle. How many different seating arrangements are there for this pose?

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Boys = 3    5 Girls    1 piano teacher

Jill    3 students    teacher    3 students    Sam

since there are 6 students left from 8 students.

$${}^6P_3 \times {}^3P_3 \text{ or } 3!$$

$$= 120 \times 6 = 720$$

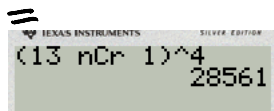
## Example Card Questions

#4 p 288

52 card deck  $\rightarrow$  4 card hand.

$${}_{13}C_1 \times {}_{13}C_1 \times \binom{13}{1} \times \binom{13}{1}$$

♥



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~~EX~~ 5-card hand with at least 3 face cards?

$$\text{Case 1} = {}_{12}C_3 \times {}_{40}C_2 = 171600$$

$$\text{Case 2} = {}_{12}C_4 \times {}_{40}C_1 = 19800$$

$$\text{Case 3} = {}_{12}C_5 \times {}_{40}C_0 = 792$$

$$\text{ADD} = \boxed{192192}$$

HW = p. 280 #3, 6, 11, 12, 15a

p. 288 #2, 7, 9, 11, 16

p. 291 Chapter Self-test

finish Chapter Practice Test (key online)