

Combinatorics Review Warmup

1. How many arrangements of the letters in the word SCHOOLS are there if

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| <p>a) there are no restrictions</p> $\frac{7!}{2! \cdot 2!}$ | <p>b) the letter S must be at the end</p> <p>-----S</p> $\frac{6!}{2!} \cdot 1$ | <p>c) the two O's must be together</p> <p>Treat 2 'o's as a single letter.</p> $\frac{6!}{2!}$ <p>↑ 2 s</p> |
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2. How many five card hands are possible from a standard 52 card deck

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| <p>a) containing exactly 3 clubs</p> $13 C_3 \cdot 39 C_2$ | <p>b) containing 2 jacks, 2 aces and one other card</p> $4 C_2 \cdot 4 C_2 \cdot 44 C_1$ | <p>c) containing exactly 4 red cards</p> $26 C_4 \cdot 26 C_1$ | <p>d) containing at least 3 red cards</p> $26 C_3 26 C_2 + 26 C_4 26 C_1 + 26 C_5$ <p>or 1 299 480</p> <p>$26 C_3 \cdot 26 C_2$</p> <p>$3 \cdot 057 600$</p> |
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3. Solve for n:

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| <p>a) ${}_n P_2 = 56$</p> $\frac{n!}{(n-2)!} = 56$ $n(n-1) = 56$ $n^2 - n - 56 = 0$ $(n-8)(n+7) = 0$ <p>n=8 n=7</p> | <p>b) $\frac{n!}{80} = (n-1)!$</p> $\frac{n!}{(n-1)!} = 80$ $n = 80$ | <p>c) ${}_n C_2 = 28$</p> $\frac{n!}{2!(n-2)!} = 28$ $n(n-1) = 56$ $n^2 - n - 56 = 0$ $(n-8)(n+7) = 0$ <p>n=8 n=7</p> |
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4. How many routes from A to B if you are always moving to get closer to B?

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| <p>A</p> <p>$\frac{7!}{3! \cdot 4!} \cdot \frac{4!}{3!}$</p> | <p>$3 \cdot 4 = 12$</p> | |
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Combinatorics Review

1. Simplify: $\frac{n(n+1)!}{(n-1)!}$ $n^2(n+1)$

2. In the expansion of $(2a-3b)^6$, find the coefficient of the term containing a^4b^2
 2160

3. Solve for n : $\frac{(n-1)!}{(n-3)!} = 30$ $n=7$

4. A coach must choose 3 out of 10 players for a tie-breaking penalty shot. If the coach must designate the order of the 3 players, how many arrangements are possible?
 ${}_{10}P_3 = 720$

5. Determine the fourth term in the expansion $(x-2y)^5$
 $-80x^2y^3$

6. Express ${}_{33}C_5$ in factorial notation
 $\frac{33!}{5!28!}$

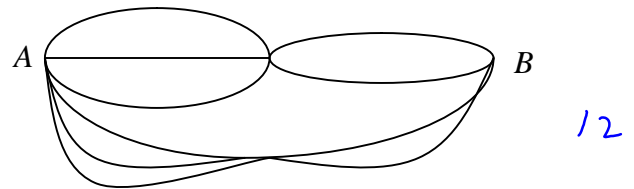
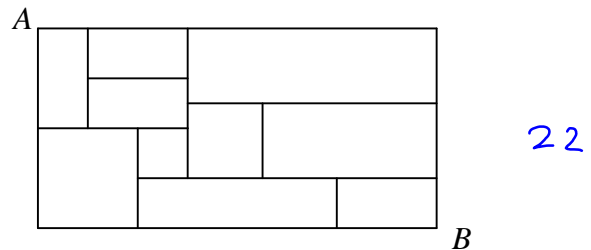
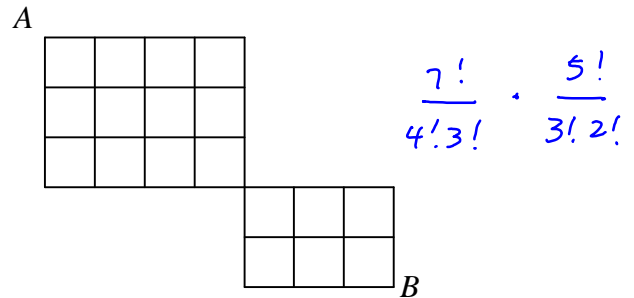
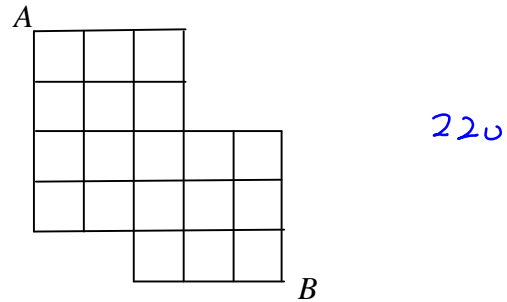
7. There are 10 boys and 20 girls in a class. How many committees of 3 are possible if a committee contains 1 boy and 2 girls?
 ${}_{10}C_1 \cdot {}_{20}C_2 = 1900$

8. How many ways can a committee of 3 people be selected from a class of 30?
 ${}_{30}C_3$
 How many ways can an executive committee (Pres., Vice Pres, Secretary) be selected from this class?
 ${}_{30}P_3$

9. A toy box has 5 different cars and 6 different trucks.
 a) How many ways can 5 toys be chosen if there are 2 cars and 3 trucks?
 b) How many ways can 5 toys be chosen if there are at least 3 cars?

a) $5^C_2 \cdot 6^C_3$
 b) $5^C_3 6^C_2 + 5^C_4 6^C_1 + 5^C_5$

10. Assuming that you are always moving closer to B, how many paths are there from A to B?



11. What is the 5th number in the 27th row of Pascal's triangle?
 ${}_{26}C_4$

12. Given TSAWWASSEN, how many permutations are there
 a) without restrictions
 b) if the first letter must be S
 c) the three S's are together

13. Find the 7th term in the expansion $(3x-2y)^{15}$
 ${}_{15}C_6 (3x)^9 (-2y)^6$