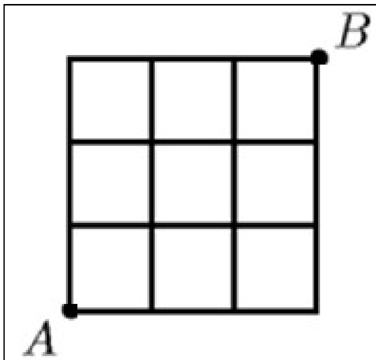
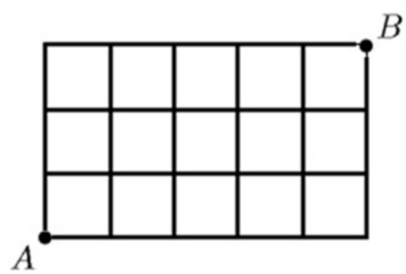
Name:____________________ **Math 10 Enriched HW 6.3 Combinations and Pascals Triangle**

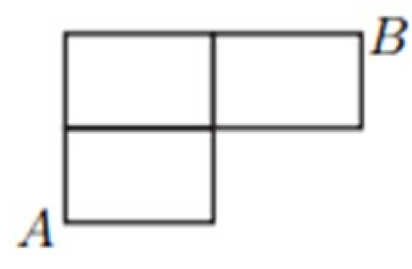
1. Simplify each of the following:

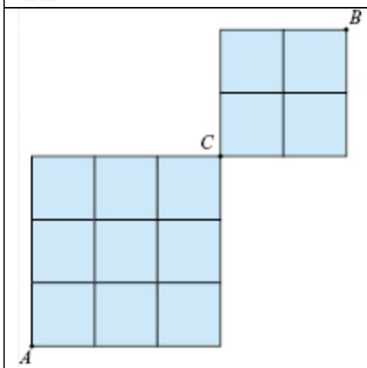
a) $\dfrac{8!}{3!4!5!}$	b) $\dfrac{13!}{5!4!3!}$	c) $\dfrac{8!-7!}{6!-5!}$
d) $\dfrac{(3!)!}{3!+4!}$	e) $\dfrac{(2n+3)!}{(2n-1)!}$	f) $\dfrac{n!-6(n-2)!}{(n-3)(n-2)!}$

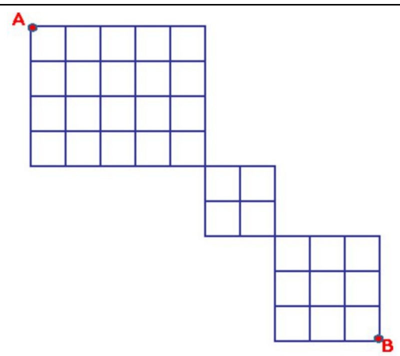
2. For each of the following diagrams below, find the number of paths from Point A to B if you can only travel "up" and "right".

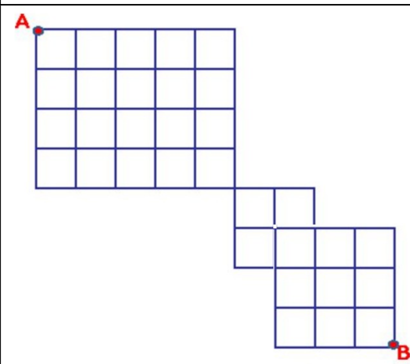


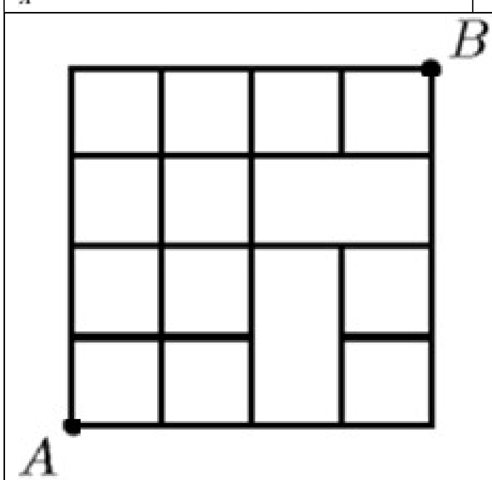


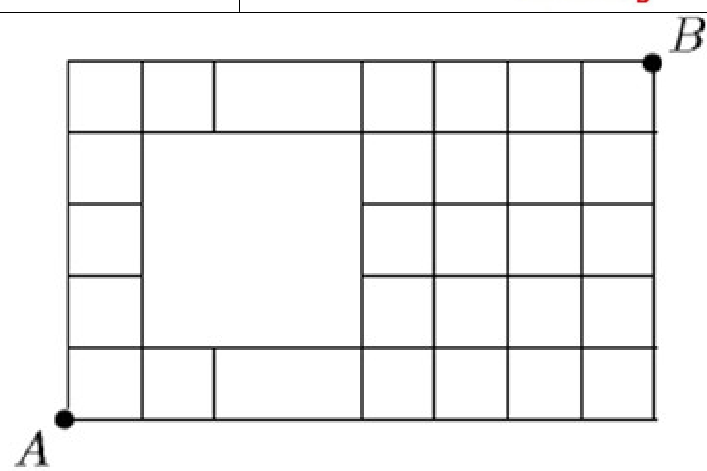












3. A teacher has 4 bananas, 3 apples, 5 oranges, and 7 watermelons. In how many ways can the teacher distribute these fruits to 19 students with one each?

4. The Lakers played the Golden State Warriors in a 7 game series. How many ways can the games be won by the two teams. The series is over if any team wins four games.

5. The Canucks played the Flames in a 5 game playoff series. If the Canucks won the series, how many ways can the games in the series be won?

6. How many 8 digit numbers have 3 ones, 2 fives, and 3 sixes?

7. If $a \neq b$ and $9Ca = 9Cb$, then what is the value of $a + b$?

8. If the sum of all the numbers in the nth row of Pascals triangle is 8192, then what is ${}_nC_7$ equal to?

9. How many ways can the letters in the word MINICOOPER be arranged?

10. For the AMC 12 contest, a student can advance to the AIME if they answer 17 questions correctly and leave the rest. Out of 25 questions, how many ways can a student answer 17 correctly and make the AIME?

11. In how many ways can the letters of the word STATE be scrambled in the two T's cannot be consecutive?

12. The letters in APPLEPIE are rearranged and it must begin with the letter "P". How many different arrangements can there be?

13. A teacher has 5 apples, 4 bananas, and 3 watermelons. How many ways can all these 12 fruits be distributed to 11 people if each person must have at least one?

14. If there are 10 bananas, 3 apples, and 4 watermelons, how many ways can the fruit be distributed to four people if each person can have only one fruit?

15. Challenge: How many ways can 10,000 bananas, 5000 apples, and 8,000 watermelon be distributed to 5,001 people if each person can have only one fruit?

16. Challenge: How many 15 letter arrangements of 5 A's, 5 B's, and 5 C's have no A's in the first 5 letters no B's in the next 5 letters, and no C's in the last 5 letters? AMC 12

20. How many 15-letter arrangements of 5 A's, 5 B's, and 5 C's have no A's in the first 5 letters, no B's in the next 5 letters, and no C's in the last 5 letters?

(A) $\displaystyle\sum_{k=0}^{5} \binom{5}{k}^3$ **(B)** $3^5 \cdot 2^5$ **(C)** 2^{15} **(D)** $\dfrac{15!}{(5!)^3}$ **(E)** 3^{15}