IB Math SL
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Combinations, Permutations and Binomial Theorem

Date

Matter List all possible combinations.

$$\begin{array}{c}
123, 234, 341, 124 \\
(4) \rightarrow \frac{4^{1}}{(4-3)^{1}} \rightarrow \frac{4^{1}}{1^{1}} \rightarrow \frac{4^{1}}{1^{1}} \rightarrow \frac{4^{1}}{1^{3}} \rightarrow \frac{4^{3}}{1^{3}} = 4
\end{array}$$

2) 4, 5, 6, 7, 8, taken two at a time
$$\begin{pmatrix}
5 \\
2
\end{pmatrix} = \frac{5}{(5-2)!2!} = \frac{5}{3!2!}$$

$$= \frac{5}{3!2!} = \frac{5}{3!2!} = \frac{5}{3!2!}$$

Evaluate each expression.

$$\frac{3)_{14}C_{9}}{5^{\frac{1}{9}}} = 3003$$

$$4)_{22}C_{4} \left(\begin{array}{c} 22 \\ 4 \end{array} \right) = \frac{23}{8^{1}4^{1}}$$
$$= 7.315$$

List all possible permutations.

$$\frac{41}{(4-3)!} = \frac{41}{1!} = 24$$

$$3P_2 = 3$$
 $(3-2)^{1}$
 $= 6$
 $12,21,23,32$

$$= 6$$
 $12,21,23,32,$
 $31,13$

Evaluate each expression.

$$\frac{7) {}_{6}P_{6}}{(6-6)!} = \frac{6!}{0!} = 6$$

$$0! = 1$$

Find the number of unique permutations of the letters in each word.

$$\frac{6!}{2!} = \frac{65432}{2}$$
= 360

$$\frac{7}{2^{1}2^{1}2} = 630$$

State if each scenario involves a permutation or a combination. Then find the number of possibilities.

12) Mary and Kayla are planning trips to nine countries this year. There are 11 countries they would like to visit. They are deciding which countries to skip.

$$\frac{11^{9}}{2!9!} \text{ or } \frac{11^{1}}{9!2!} = 55$$

 $3^{2} = \frac{8^{1}}{6^{1}}$ $= 876^{1} = 56$

Expand completely.

$$6^{4} + 166^{3} + 966^{2} + 2566 + 256$$

$$(x^{2}-3y^{4})^{4}$$

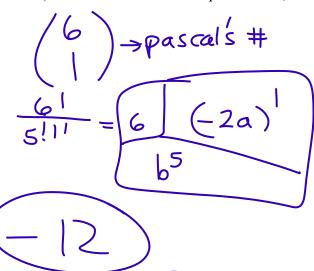
$$(x^{2})^{4} \quad (x^{2})^{3} \quad (x^{2})^{2} \quad (x^{2})^{4} \quad -$$

$$-3y^{4} \quad (-3y^{4})^{2} \quad (-3y^{3})^{2} \quad (-3y^{3})^{4} \quad (-3y^{4})^{2}$$

$$27y^6 - 54y^4x^3 + 36y^2x^6 - 8x$$
 $x^8 - 12x^6y^4 + 54x^4y^{-108x^2y^2}$

Find each coefficient described.

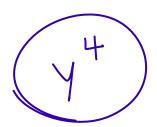
18) Coefficient of b^5a in expansion of $(b-2a)^6$



19) Coefficient of x^2y^{16} in expansion of $(2x - y^4)^6$

Find each term described.

20) 5th term in expansion of $(2x^3 - y)^4$



21) 4th term in expansion of $(3x-1)^5$

