

Name _____

Date _____

Worksheet A2 : Fundamental Counting Principle, Factorials, Permutations Intro

1. A restaurant offers four sizes of pizza, two types of crust, and eight toppings. How many possible combinations of pizza with one topping are there?
2. How many ways can 5 paintings be line up on a wall?
3. Rob has 4 shirts, 3 pairs of pants, and 2 pairs of shoes that all coordinate. How many outfits can you put together?
4. Grace loves to eat salad! How many salads can she put together if she can pick out one type of lettuce from 2 choices, one vegetable from 4 choices and one dressing from 7 choices?
5. PA license plates have 3 letters followed by 4 numbers.
 - a. If the same letter or number can be repeated, how many can be made?
 - b. If the same letter CANNOT be repeated, how many can be made?
6. How many 5-digit numbers can be formed (using 0 - 9)?
7. How many 5-digit numbers can be formed if each one uses all the digits 0, 1, 2, 3, 4 without repetition?
8. In how many ways can 6 bicycles be parked in a row?

9. Evaluate (show all your work):

a. $6!$

b. $9!$

c. $10!$

10. Rewrite $10!$ with a factor of $8!$ (Hint: $____ \cdot ____ \cdot 8!$)

11. $\frac{5!}{2!}$

12. $\frac{10!}{8!}$

13. $\frac{25!}{20!}$

14. $\frac{12!}{(12-7)!}$

15. $\frac{12!}{9!3!}$

16. In how many ways can 7 different card be laid out on a table in a row?

Name _____

Date _____

Worksheet B2 : Permutations

1. A lock contains 3 dials, each with ten digits. How many possible sequences of numbers exist?
2. Four students are to be chosen from a group of 10 to fill the positions of president, vice-president, treasurer and secretary. In how many ways can this be accomplished?
3. How many ways can the letters MATH be arranged?
4. A shelf can hold 7 trophies. How many ways can the trophies be arranged if there are 10 trophies available?
5. Bill has three pairs of pants, 5 shirts and 2 pairs of shoes. How many outfits can he make?

Name _____

Date _____

Worksheet C2 : All Types of Permutations

1. How many 5-number license plates can be made using the digits 0, 1, 2, 3, 4, 5, if
 - a. repetitions ARE allowed
 - b. repetitions are NOT allowed

2. A teacher wants to write an ordered 4-question test from a pool of 12 questions. How many different forms of the test can the teacher write?

3. How many 5-number license plates can be made using the digits 1, 2, 3, 4, 5, 6, 7, if an odd digit must come first and
 - a. repetitions ARE allowed
 - b. repetitions are NOT allowed

4. Assume the same situation as #3, but tell me how many EVEN license plates can be made if repetitions ARE allowed.

5. In how many ways can 4 blue, 3 red, and 2 green flags be arranged on a pole?

6. Find the number of permutations of the letters of these words:

a. DEED

b. COMMITTEE

c. CINCINNATI

7. A player in a word game has the letters E, E, B, D, G, G, G. In how many ways can these letters be arranged?

8. Find the number of permutations of six colors on a spinner.

9. Find the number of ways 10 cheerleaders can make a circular formation.

Name _____

Date _____

Worksheet D2: Graphing Calculator Practice

Meet Your TI-84 or TI-83+ Graphing Calculator

Some basic functions:

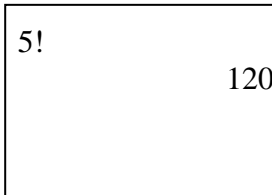
- To turn you calculator on: Press **on**
- To turn your calculator off: Press the yellow **2nd** button and press **on**
- To square a number:
 - Example: 8^2 : Press **8**; press **x²**; press **ENTER**
- To raise a number to a power greater than 2:
 - Example: 5^4 : Press **5**; press **^** ; press **4**
- To find the square root of a number:
 - Example: $\sqrt{63}$: Press the yellow **2nd** button; press **x²**; press **63**; press **ENTER**
- To find the nth root of a number:
 - Example: $\sqrt[6]{995}$: Press **6**; press **MATH**; press **5**; press **995**; press **ENTER**
- To add fractions:
 - Example: $3\frac{1}{3} + \frac{1}{15} \div 1\frac{2}{3}$: Press (; press **3**; press +; press **1**; press ÷; press **3**; press) ; press +; press (; press **1**; press ÷; press **15**; press) ; press ÷; press (; press **1**; press +; press **2**; press ÷; press **3**; press) ; press **ENTER**
 - To convert from decimal to fraction: press **MATH**, press **ENTER**; press **ENTER**
 - For the example above, the answer is **253/75**.

Worksheet D2 - continued

Factorials and Permutations on your Graphing Calculator

HOW TO USE YOUR CALCULATOR FOR FACTORIALS (!)

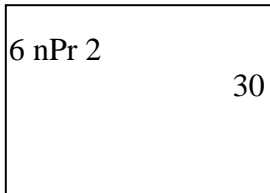
- Example: $5!$:
 - Press **5**;
 - press **MATH**;
 - scroll with **◀** or **▶** to reach the **PRB** column;
 - scroll with **▲** or **▼** to reach the **!**;
 - press **ENTER**;
 - press **ENTER**;
 - Screen:



A rectangular box representing a calculator screen. On the left side, the text "5!" is displayed. On the right side, the text "120" is displayed.

HOW TO USE YOUR CALCULATOR FOR PERMUTATIONS (${}_nP_r$)

- Example: ${}_6P_2 =$
 - Press **6**;
 - press **MATH**;
 - scroll with **◀** or **▶** to reach the **PRB** column;
 - scroll with **▲** or **▼** to reach the **nPr**;
 - press **ENTER**;
 - Press **2**;
 - press **ENTER**;
 - Screen:



A rectangular box representing a calculator screen. On the left side, the text "6 nPr 2" is displayed. On the right side, the text "30" is displayed.

Worksheet D2 – continued

Graphing Calculator Take Home Quiz 1

Name _____

/ 7 pts

- Round final answers as indicated. Do NOT round until final answer is reached.
- Place answers on space provided
- If you do not know how to complete a problem, please consult your TI-83 or TI-83+ graphing calculator manual.

1 pt each

Give final answers as indicated.

Example: $12\frac{7}{8} - 5\frac{3}{20} =$ (simplest fraction)

Answer: $12\frac{7}{8} - 5\frac{3}{20} = 7.725 = 7\frac{29}{40}$

1. $1\frac{3}{5} \times 2\frac{5}{6} \div \frac{3}{7} =$ (simplest fraction) _____

2. $16\frac{5}{8} + 14\frac{3}{16} - 4\frac{7}{15} =$ (simplest fraction) _____

3. $23\frac{5}{9} \div 10\frac{13}{16} =$ (simplest fraction) _____

4. $\sqrt{316} =$ (nearest hundredth) _____

5. $\sqrt[5]{425} =$ (nearest hundredth) _____

6. $32^2 =$ _____

7. $12^4 =$ _____

Worksheet D2 – continued

Graphing Calculator Take Home Quiz 2

Name _____

/ 6 pts

- Place answers on space provided
- Complete all problems using your graphing calculator
- If you do not know how to complete a problem, please consult your TI-84 or TI-83+ graphing calculator manual or the worksheet provided.

1 pt each

1. $10!$ _____

2. What is the highest $n!$ such that your calculator will display all of the digits?
Hint: $3! = 6$
 $25! = 1.551121004 \text{ E}25$ on calculator
The correct answer is between these two.

3. ${}_{10}P_6 =$ _____

4. ${}_{60}P_4 =$ _____

5. ${}_6P_9 =$ (according to your calculator) _____

6. Why does your answer for problem #5 make sense? (i.e. Why does your calculator display this answer for problem #5?)

!!!!!! Reminder: These graphing calculator functions are tools to help you check your work. You will be required to show all work by hand on assessments!!!!!!

Name _____

Date _____

Worksheet E2 : Combinations

Use the combinations formula to simplify each problem.

1. ${}^9C_4 =$

2. ${}^4C_4 =$

3. ${}^9C_0 =$

4. ${}^{40}C_3 =$

5. ${}^{12}C_4 =$

6. ${}^{12}C_8 =$

7. How many different 12-member juries be chosen from a pool of 32 people?

8. A test consists of 20 questions, but you are told to answer only 15. In how many different ways can you choose the 15 questions?

9. How many ways can nine starting players be chosen from a softball team of 15?

10. Four seniors will speak at graduation. If 30 students audition to speak, how many different groups of 4 speakers can be selected?

Name _____

Date _____

Worksheet F2 : More Combinations

Use the combinations formula to simplify each problem.

1. $\binom{9}{5} =$

2. $\binom{50}{2} =$

3. $\binom{12}{8} =$

4. $\binom{n}{n} =$

5. $\binom{n}{n-1} =$

6. $\binom{n+1}{n-1} =$

7. How many basketball games are played in a 10-team league if each team plays all other teams TWICE?

8. of the first 8 questions on a test, a student must answer 6. Of the next 7 questions, 4 must be answered. In how many ways can this be done?

9. Irene's Ice Cream serves 10 flavors of ice cream, 4 kinds of syrup, and 6 varieties of toppings. How many different Sundaes can you make if each has 2 flavors of ice cream, 2 kinds of syrup, and 3 toppings?

Name _____

Date _____

Worksheet G2: Mixed Combinatorics

Decide if the problem is an example of a permutation or combination. Then evaluate each one. Show proper notation, and your work.

1. How many teams of 4 horses would be made if there were 9 horses in the stable?
2. A lock manufacturer uses the numbers 1 - 30 in its combinations. How many different combinations for the lock are there if it uses 3-number combinations?
3. Mike has nine baseball trophies to arrange on the shelf. How many different ways can they be arranged?
4. In math class, there are 24 students. The teacher picks 4 students to help do a demonstration. How many different groups of 4 could she have chosen?
5. In how many ways can 10 people wait in line for concert tickets?
6. The teacher has listed 30 books as book report options. You must read 5. How many different sets of 5 books could you have chosen to read?
7. How many different ways are there to purchase 2 CD's, 3 DVD's and 1 set of headphones if there are 7 CD titles, 5 DVD titles, and 3 types of headphones available?

Name _____

Date _____

Worksheet H2 : Intro to Binomial Theorem

Use Pascal's triangle and the pattern from our notes sheet to expand each binomial according to the power.

1. $(x + y)^3$

2. $(a + b)^6$

3. $(x + y)^7$

4. $(a + b)^8$

Name _____

Date _____

Worksheet 12 : Binomial Theorem

Use Combinations and the pattern from our notes sheet to expand each binomial according to the power.

1. $(2x + 5y)^3$

2. $(a - b)^6$

3. $(3x + y)^7$

4. $(a - 2b)^8$

Name _____

Date _____

Worksheet J2 : Binomial Theorem- Find 1 Term

Use Combinations and the pattern from our notes sheet to find each SINGLE TERM from the binomial expansion.

1. Find the 2nd term of $(2x + 3y)^3$

2. Find the 4th term of $(a - b)^7$

3. Find the 5th term of $(3x + 4y)^7$

4. Write the term of $(a - 5b)^8$ that contains a^3b^5 .

Name _____

Date _____

Worksheet K2 : REVIEW problems

- Find the number of permutations of the digits 0 - 9 for each situation.
 - 4-digit numbers
 - 6-digit numbers

- A display case has room for 10 statues. Find the number of ways 10 statues can be displayed if each number of statues is available.
 - 10 statues
 - 20 statues

- Find the number of permutations of the letters in each word.
 - factorial
 - permutation
 - applications

- In a class of 30 students, find the number of permutations for each situation.
 - 7 students for the debate team

 - 25 students for the baseball team

 - first, second, and third place in the art show

- Find the value of each expression.
 - ${}_8C_3 \times {}_{10}C_4$
 - $\frac{{}_{12}C_3}{{}_3C_2}$
 - ${}_{10}P_4$

6. Find the number of ways a French test can be made.
- a. 20 questions from a test bank of 100 questions

 - b. 4 questions from a test bank of 12 questions
7. Pizzas can be topped with 4 different sauces, 5 different meats and 4 different cheeses. In how many ways can a pizza be made with the following ingredients?
- a. 2 meats and 2 cheeses
 - b. 3 sauces, 4 meats, and 2 cheeses
8. Determine if the situation involves a permutation or a combination, then find the answer.
- a. In how many ways can 12 members of a jury be selected from a jury pool of 150?

 - b. In how many ways can a foreman, assistant foreman, and secretary be selected from a 12-member group?
9. Expand each binomial raised to a power - don't just use the distributive property!
- a. $(x - y)^5$
 - b. $(2x + 3y)^4$
10. For the expression of $(x + 4y)^8$, find the indicated terms.
- a. 3rd term
 - b. 7th term