

Packet #3

This contains extension topics that were added into current Math 2 units. Refer to your text book and notes to review ideas on Probability and Algebra concepts.

These two lessons are add-ons to the Math 2 Unit on Probability. Refer to your textbook Ch. 13 Objective 3

13.2 Fundamental Counting Principle & Permutations

Name _____

Solve each problem on a separate piece of paper. Show work for EVERY problem.

1. A band sells t-shirts in 3 sizes and 2 different colors. How many different t-shirts are there to choose from?
2. Each player on the baseball team can order a bat with natural or black finish with lengths of 32", 33", 34". They can also choose either Ash or Maple for the materials. How many choices are there?
3. A skier has 2 pairs of skis, 2 pairs of boots, and 2 different pairs of gloves to choose from. If she buys another pair of gloves, how many more combinations will be possible?

Evaluate. Write out the formula for each problem.

4. ${}_6P_3 =$

5. ${}_8P_6 =$

6. ${}_5P_5 =$

7. ${}_{10}P_2 =$

8. ${}_7P_4 =$

9. ${}_4P_1 =$

Show your work for each problem.

10. How many ways can arrange the letters in the word FRACTION?

11. How many distinguishable permutations of the letters DOCTOR are possible?

12. How many distinguishable permutations of the letters HAWAIIAN are possible?

13. How many different 6-character license plates can made if the first three characters are letters and the next three characters are numbers. Letters or numbers may repeat.

14. Consider #13 above if repeats are not allowed.
15. 30 people are running a race. In how many ways can people win first, second, and third place?
16. In how many different orders can 6 people sit in a row of 6 seats at a movie theater?
17. Explain why you can use $n!$ to find the number of possible orders for n objects.
18. The numbers 1-10 are put in a hat. If the numbers are taken out one at a time, what is the probability they come out in ascending order?

13.3 Fundamental Counting Principle & Combinations

Evaluate. Write out the formula for each problem.

1. ${}_6C_3 =$

2. ${}_8C_6 =$

3. ${}_5C_5 =$

4. ${}_{10}C_2 =$

5. ${}_7C_4 =$

6. ${}_4C_1 =$

Tell whether each of the following is a permutation or combination.

7. An arrangement of the letters in the word MATH
8. Choosing a clean-up committee from the 35 students in the class

9. Determining first, second, and third place in a race.

10. Looking at 14 photos and selecting one for the photobook front cover and one for the back cover.

11. Dialing the numbers in a telephone number.

12. Determining the batting order for the 9 players on a baseball team.

13. The answers on a true-false test.

14. Ordering a dish of ice cream with 2 scoops chosen from 31 flavors.

15. Three books selected from a collection of 20 books.

16. Buying ten items at the grocery store.

Show your work for each combination.

17. A basketball coach chooses 5 players from a group of 8 to start the game. How many different groups of starting players are possible?

18. A smoothie place has ten kinds of fruit. How many different smoothies can be made if each one has four different fruits in it?

19. How many ways can three dancers be selected for a number if 18 dancers tried out?

20. A committee is made up 6 members: 3 boys and 3 girls. If 6 boys and 5 girls want to be on the committee, how many different committees are possible?

21. A dodgeball tournament requires teams of 4 students and 2 teachers. If 10 students and 3 teachers agree to play, how many ways can a team be picked?

Work out the following problems. Some are combinations and some are permutations.

22. AP students are given a list of 9 books for summer reading. How many ways can 5 books be selected from the list?

23. Quality control for the Sharpie Company tests 2 out of 150 pens. In how many ways can those two pens be selected?

24. One hundred students qualified to run finals at Woodward Park. In how many ways can 1st, 2nd, and 3rd be awarded?

25. A teacher, her aide, and 5 students are lining up. How many different ways can they line up if the teacher must be in the front of the line and the aide must be in the back?

26. John goes to the store to buy ketchup, mustard, mayonnaise, BBQ sauce, tomatoes, and lettuce. He realizes he only has enough money to buy 3 of the items. How many groups of 3 items are possible?

27. The freshmen council has 10 members. In how many ways can they select a President, a Vice President, a Secretary, and a Treasurer?

28. A tablet has comes in 32 GB, 64 GB, and 128 GB sizes with color options black, white, red, and blue. It also comes with or without cellular data capabilities. How many unique tablets are possible?

29. How many distinguishable permutations of the letters NEEDED are possible?

Find the probability for the scenario.

30. A game involves correctly choosing the correct 5 randomly drawn numbers out of 1-18. What is the chance of winning?

Algebra Extension:

Name: _____

The following are algebra review concepts that are extensions from your Math 2 units. Refer to the Pearson text and your notes from Math 2 for support.

Algebra Review

Factor completely:

1. $m^2 - 9n^2$

2. $x^2 + 8x + 15$

3. $36 - 49m^2$

4. $2x^2 - 72$

5. $x^{1/2} + 5x^{1/4} + 6$

6. $10 - 3x - x^2$

7. $5x^3 - 125xy^2$

8. $6x^2 + 5x + 1$

9. $16 - m^4$

10. $3x^{2/3} - 8x^{1/3} - 3$

11. $9a^4 - 13a^2 + 4$

12. $a^2 + 2ab + b^2$

13. $x(a + b) + y(a + b)$

14. $3(a + b) + (4 - x)(a + b)$

15. $(x + y)^2 - a^2$

16. $4(m + n)^2 - 81$

17. $(x^2 - 6x + 9) - 121y^2$

18. $(x + y)^2 - 3(x + y) + 2$

19. $(xy + 2z)^2 - 9x^2y^2$

20. $(x^2 - 3x - 6)^2 + 10(x^2 - 3x - 6) + 16$

Factor Completely:

1. $ac + bc - ad - bd$

2. $3ab + 4cd - cb - 12ad$

3. $2st - 3t - 4s + 6$

4. $x^2 - 10x + 25 - y^2$

5. $y^2 - x^2 - 2x - 1$

6. $x^2y^2 - 4y^2 + 5x^2 - 20$

7. $x^2y^2 - x^2 - 9y^2 + 9$

8. $4cd + 8d^2 - 8cf - 16df$

9. $a^3 + b^3$

10. $a^3 + 3a^2b + 3ab^2 + b^3$

11. $a^9 + 1$

12. $125a^6 - b^3$

13. $64a^3 - 8b^3$

14. $(3x+1)^3 - (2x)^3$

15. $(x+y)^3 - (x-y)^3$

Simplify the following.

1. $\frac{x^2 - 4}{x^3 + 4x^2 + 4x}$

2. $\frac{x^3 + 1}{(x+1)^3}$

3. $\frac{x^4 - 16}{x^3 - 2x^2 + 4x - 8}$

$$4. \frac{9-h^2}{12-h-h^2}$$

$$5. \frac{(x+h)^2 - h^2}{x}$$

Simplify the following.

$$1. \frac{\frac{1}{a}}{\frac{2}{3a}}$$

$$2. \frac{\frac{1}{2} + \frac{1}{a}}{\frac{1}{2a}}$$

$$3. \frac{\frac{x}{2} - \frac{y}{3}}{\frac{1}{4}}$$

$$4. \frac{\frac{1}{x} + \frac{1}{a}}{\frac{1}{a} + \frac{2}{x}}$$

$$5. \frac{a + \frac{a}{b}}{-b + \frac{1}{b}}$$

$$6. \frac{\frac{x}{y} - \frac{y}{x}}{\frac{1}{x} - \frac{1}{y}}$$

$$7. \frac{\frac{a+b}{a-b} - \frac{a-b}{a+b}}{\frac{b}{a-b} + \frac{a}{a+b}}$$

$$8. \frac{\frac{1}{x^2} - \frac{1}{4}}{x-2}$$

$$9. \frac{\frac{x}{x-2} - 2}{x-4}$$

$$10. \frac{\frac{1}{x-1} - \frac{8}{x^2-1}}{\frac{2}{x+1} - \frac{1}{x-1}}$$