Practice

Permutations and Combinations

1. A band sells t-shirts in 3 sizes and 2 different colors. How many different t-shirts are there to choose from? **6**

2. Each player on the baseball team can order a baseball bat using the table to the right. How many choices does each player have? **12 choices**

Finish	Length	Wood Type
Natural	32″	Ash
Black	33″	Maple
	34″	

3. In how many different orders can 5 runners finish a race? **120 orders**

4. Evaluate 7!. **5040**

5. What is the value of $\frac{25!}{24!}$? **25**

6. How many possible combinations of 3 items from a group of 5 are possible? **10 combinations**

7. Evaluate $_6P_3$. **120**

8. A basketball coach will choose 5 players from a group of 8 players to start the next game. How many different groups of starting players are possible? **56**

9. What is the value of $_nC_r$ when $n = 7$ and $r = 4$? **35**

10. What is the probability of randomly choosing a penny and a nickel from a cup of coins that contains a penny, a nickel, a dime, and a quarter? $\frac{2}{6}$ **OR equivalent fraction, decimal, or percent.**

11. Three playing cards are randomly chosen from a set numbered from 1 to 7. What is the probability that the chosen cards are numbered 1, 2 and 3? **approximately 0.17**

Practice (continued)   *Form G*

Permutations and Combinations

12. **Recreation** When renting a bike from a local bike shop, you can choose from the types, sizes, and colors in the table shown below?

Type	Size	Color
Mountain	Small	Green
Cruising	Medium	Red
Road	Large	Blue

How many different choices do you have? **27**

13. **Open-Ended** Use an example to explain why you can use $n!$ to find the number of possible orders for n objects. **Answers will vary. Sample: There are 4 people in a race. There are 4 possible first-place finishers. Once the first place finisher is determined, there are 3 possible 2nd-place, etc. So the number of orders is $4 \cdot 3 \cdot 2 \cdot 1 = 4! = 24$. For a race with n people, there are $n!$ possible orders of finishing.**

14. **Reasoning** A hiker has 2 pairs of hiking shoes, 3 different shirts, and 2 different pairs of shorts to choose from. How does the number of combinations of shoes, shirts, and shorts change as the hiker adds shirts to his collection? Explain. **Each time the hiker adds a shirt to his collection, 4 additional combinations are possible. The initial number of combinations is $2 \cdot 3 \cdot 2 = 12$. When another shirt is added, the number of combinations becomes $2 \cdot 4 \cdot 2 = 16$.**

15. **Business** For each weekly meeting of a group of business leaders, members take turns being the note-taker, the facilitator, and the speaker. In how many different ways can these positions be chosen from the 9 members? **504 ways**

16. **Writing** Explain how the Fundamental Counting Principle is related to a tree diagram. **A tree diagram lists options of each type in columns, and links each type of option to show outcomes. The Fundamental Counting Principle uses numbers only. The numbers of options in each column of a tree diagram are multiplied, yielding the number of possible outcomes.**

17. A game at the fair involves ping-pong balls numbered 1 to 18. You can win a prize if you correctly choose the 5 numbers that are randomly drawn. What are your chances of winning? **approximately 0.014**