ACC Geometry

Name: Key

Alg 2 Book: 12-1 Introduction, The Counting Principle

State whether the following events are *independent* or *dependent*. Use the Concept Summary on pg. 686 in your textbook to help you understand the difference between the two events.

1. Finishing in first, second, or third place in a ten-person race.

dependent

2. Choosing a pizza size and topping for the pizza

Independent

3. Seventy-five raffle tickets are placed in a jar. Three tickets are then selected, one after the other, without replacing a ticket after it is chosen.

dependent

4. The 232 members of the freshman class all vote by secret ballot for the class representative to the Student Senate.

independent

5. Choosing an ice cream flavor and choosing a topping for the ice cream.

independent

6. Choosing an offensive player of the game and a defensive player of the game in a professional football game.

independent

7. From 15 entries in an art contest, a camp counselor chooses first, second, and third place winners.

dependent

8. Jillian is selecting two or more courses for her block schedule next semester. She must select one of three morning history classes and one of two afternoon math classes.

independent

9. A jar contains 6 red marbles, 4 blue marbles, and 3 yellow marbles. A marble is drawn out of the jar and is not replaced. A second marble is drawn.

dependent

10. A jar contains 10 black marbles and 10 white marbles. A marble is drawn out of the jar and is put back in. The jar is shaken. A second marble is drawn.

independent

11. Explain the differences between an independent and a dependent event. Be sure to include how finding the number of choices of an event changes when it is independent versus a dependent event. Give an example for each to support your explanation.

independent

Answers may vary See defs.

dependent

Complete pg. 687-689 (12-18, 21-25, 32, 42-49). Show work to support your answers.

12. Tim wants to buy one of three different books he sees in a book store. Each is available in print and on CD. How many book and format choices does he have? 6

13. A video store has 8 new releases this week. Each is available on videotape and on DVD. How many ways can a customer choose a new release and a format to rent? 16

14. Carlos has homework in math, chemistry, and English. How many ways can he choose the order in which to do his homework? 6

15. The menu for a banquet has a choice of 2 types of salad, 5 main courses, and 3 desserts. How many ways can a salad, a main course, and a dessert be selected to form a meal? 30

16. A baseball glove manufacturer makes gloves in 4 different sizes, 3 different types by position, 2 different materials, and 2 different levels of quality. How many different gloves are possible? 48

17. Each question on a five-question multiple-choice quiz has answer choices labeled A, B, C, and D. How many different ways can a student answer the five questions? 1024

18. **PASSWORDS** Abby is registering at a Web site. She must select a password containing six numerals to be able to use the site. How many passwords are allowed if no digit may be used more than once? 151,200

AREA CODES For Exercises 21 and 22, refer to the information about telephone area codes at the left.

21. How many area codes were possible before 1995? 160

22. In 1995, the restriction on the middle digit was removed, allowing any digit in that position. How many total codes were possible after this change was made? 800

23. How many ways can six different books be arranged on a shelf if one of the books is a dictionary and it must be on an end? 240

24. In how many orders can eight actors be listed in the opening credits of a movie if the leading actor must be listed first or last? 10,080

NAME Key DATE _____ PERIOD ____

12-1 Study Guide and Intervention

The Counting Principle

Independent Events If the outcome of one event does not affect the outcome of another event and vice versa, the events are called **independent events.**

Fundamental Counting Principle	If event M can occur in m ways and is followed by event N that can occur in n ways, then the event M followed by the event N can occur in $m \cdot n$ ways.

Example **FOOD For the Breakfast Special at the Country Pantry, customers can choose their eggs scrambled, fried, or poached, whole wheat or white toast, and either orange, apple, tomato, or grapefruit juice. How many different Breakfast Specials can a customer order?**

A customer's choice of eggs does not affect his or her choice of toast or juice, so the events are independent. There are 3 ways to choose eggs, 2 ways to choose toast, and 4 ways to choose juice. By the Fundamental Counting Principle, there are $3 \cdot 2 \cdot 4$ or 24 ways to choose the Breakfast Special.

Exercises

Solve each problem.

1. The Palace of Pizza offers small, medium, or large pizzas with 14 different toppings available. How many different one-topping pizzas do they serve?

$3 \cdot 14 =$ 42 pizzas

2. The letters A, B, C, and D are used to form four-letter passwords for entering a computer file. How many passwords are possible if letters can be repeated?

$4 \cdot 4 \cdot 4 \cdot 4 = 4^4 =$ 256 diff. passwords

3. A restaurant serves 5 main dishes, 3 salads, and 4 desserts. How many different meals could be ordered if each has a main dish, a salad, and a dessert?

$5 \cdot 3 \cdot 4 =$ 60 meals

4. Marissa brought 8 T-shirts and 6 pairs of shorts to summer camp. How many different outfits consisting of a T-shirt and a pair of shorts does she have?

$8 \cdot 6 =$ 48 outfits

5. There are 6 different packages available for school pictures. The studio offers 5 different backgrounds and 2 different finishes. How many different options are available?

$6 \cdot 5 \cdot 2 =$ 60 diffent options

6. How many 5-digit even numbers can be formed using the digits 4, 6, 7, 2, 8 if digits can be repeated?

2500 $5 \cdot 5 \cdot 5 \cdot 5 \cdot 4$

7. How many license plate numbers consisting of three letters followed by three numbers are possible when repetition is allowed?

$26 \cdot 26 \cdot 26 \cdot 10 \cdot 10 \cdot 10 =$ 17576000 combos

8. How many 4-digit positive even integers are there?

$9 \cdot 10 \cdot 10 \cdot 5 = 4500$

NAME _____ DATE _____ PERIOD ____

12-1 Study Guide and Intervention *(continued)*

The Counting Principle

Dependent Events If the outcome of an event *does* affect the outcome of another event, the two events are said to be **dependent**. The Fundamental Counting Principle still applies.

Example **ENTERTAINMENT** **The guests at a sleepover brought 8 videos. They decided they would only watch 3 videos. How many orders of 3 different videos are possible?**

After the group chooses to watch a video, they will not choose to watch it again, so the choices of videos are dependent events.

There are 8 choices for the first video. That leaves 7 choices for the second. After they choose the first 2 videos, there are 6 remaining choices. Thus, by the Fundamental Counting Principle, there are $8 \cdot 7 \cdot 6$ or 336 orders of 3 different videos.

Exercises

Solve each problem.

1. Three students are scheduled to give oral reports on Monday. In how many ways can their presentations be ordered?

3.2.1 = 6

2. In how many ways can the first five letters of the alphabet be arranged if each letter is used only once?

120 5.4.3.2.1 = 120

3. In how many different ways can 4 different books be arranged on the shelf? 24

4. How many license plates consisting of three letters followed by three numbers are possible when no repetition is allowed?

=11,232,000 26.25.24.10.9.8

5. Sixteen teams are competing in a soccer match. Gold, silver, and bronze medals will be awarded to the top three finishers. In how many ways can the medals be awarded?

16.15.14 = 3,360

6. In a word-building game each player picks 7 letter tiles. If Julio's letters are all different, how many 3-letter combinations can he make out of his 7 letters?

7 6 5 210

7. The editor has accepted 6 articles for the newsletter. In how many ways can the 6 articles be ordered?

6.5.4.3.2.1 = 720

8. There are 10 one-hour workshops scheduled for the open house at the greenhouse. There is only one conference room available. In how many ways can the workshops be ordered?

10.9.8.7.6.5.3.2.1 = 3628800

9. The top 5 runners at the cross-country meet will receive trophies. If there are 22 runners in the race, in how many ways can the trophies be awarded?

22.21.20.19.18

3160080

NAME _____ DATE_____ PERIOD ____

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Exercises

Solve each problem.

1. The Palace of Pizza offers small, medium, or large pizzas with 14 different toppings available. How many different one-topping pizzas do they serve? 42

2. The letters A, B, C, and D are used to form four-letter passwords for entering a computer file. How many passwords are possible if letters can be repeated? 256

3. A restaurant serves 5 main dishes, 3 salads, and 4 desserts. How many different meals could be ordered if each has a main dish, a salad, and a dessert? 60

4. Marissa brought 8 T-shirts and 6 pairs of shorts to summer camp. How many different outfits consisting of a T-shirt and a pair of shorts does she have? 48

5. There are 6 different packages available for school pictures. The studio offers 5 different backgrounds and 2 different finishes. How many different options are available? 60

6. How many 5-digit even numbers can be formed using the digits 4, 6, 7, 2, 8 if digits can be repeated? 2500

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Solve each problem.

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2. In how many ways can the first five letters of the alphabet be arranged if each letter is used only once? 120

3. In how many different ways can 4 different books be arranged on the shelf? 24

4. How many license plates consisting of three letters followed by three numbers are possible when no repetition is allowed? 11,232,000

5. Sixteen teams are competing in a soccer match. Gold, silver, and bronze medals will be awarded to the top three finishers. In how many ways can the medals be awarded? 3360

6. In a word-building game each player picks 7 letter tiles. If Julio's letters are all different, how many 3-letter combinations can he make out of his 7 letters? 210

7. The editor has accepted 6 articles for the newsletter. In how many ways can the 6 articles be ordered? 720

8. There are 10 one-hour workshops scheduled for the open house at the greenhouse. There is only one conference room available. In how many ways can the workshops be ordered? 3,628,800

9. The top 5 runners at the cross-country meet will receive trophies. If there are 22 runners in the race, in how many ways can the trophies be awarded? 3,160,080

ACC Geometry Name: _____

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3. In how many different ways can 4 different books be arranged on the shelf?

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Lesson 12-1