Exercises

Use the Fundamental Counting Principle to determine the number of outcomes.

1. **FOOD** How many different combinations of sandwich, side, and beverage are possible? **60**

Sandwiches	Sides	Beverages
hot dog hamburger veggie burger bratwurst grilled chicken	chips apple pasta salad	bottled water soda juice milk

2. **QUIZZES** 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**

3. **DANCES** Dane is renting a tuxedo for prom. Once he has chosen his jacket, he must choose from three types of pants and six colors of vests. How many different ways can he select his attire for prom? **18**

4. **MANUFACTURING** A baseball glove manufacturer makes a glove with the different options shown in the table. How many different gloves are possible? **48**

Option	Number of Choices
sizes	4
types by position	3
materials	2
levels of quality	2

Evaluate each permutation or combination.

5. ${}_6P_3$ **120**
6. ${}_7P_5$ **2520**
7. ${}_4C_2$ **6**
8. ${}_{12}C_7$ **792**
9. ${}_6C_1$ **6**
10. ${}_9P_5$ **15,120**

Determine whether each situation involves *permutations* or *combinations*. Then solve the problem.

11. **SCHOOL** Charlita wants to take 6 different classes next year. Assuming that each class is offered each period, how m [illegible] have? **permutations, 720**

Determine whether each situation involves *permutations* or *combinations*. Then solve the problem.

11. **SCHOOL** Charlita wants to take 6 different classes next year. Assuming that each class is offered each period, how many different schedules could she have? **permutations, 720**

12. **BALLOONS** How many 4-colored groups can be selected from 13 different colored balloons? **combinations, 715**

13. **CONTEST** How many ways are there to choose the winner and first, second, and third runners-up in a contest with 10 finalists? **permutations, 5040**

14. **BANDS** A band is choosing 3 new backup singers from a group of 18 who try out. How many ways can they choose the new singers? **combinations, 816**

15. **PIZZA** How many different two-topping pizzas can be made if there are 6 options for toppings? **combinations, 15**

16. **SOFTBALL** How many ways can the manager of a softball team choose players for the top 4 spots in the lineup if she has 7 possible players in mind? **permutations, 840**

17. **NEWSPAPERS** A newspaper has 9 reporters available to cover 4 different stories. How many ways can the reporters be assigned? **permutations, 3024**

18. **READING** Jack has a reading list of 12 books. How many ways can he select 9 books from the list to check out of the library? **combinations, 220**

19. **CHALLENGE** Abby is registering at a Web site and must select a six-character password. The password can contain either letters or digits.

    a. How many passwords are possible if characters can be repeated? if no characters can be repeated? **2,176,782,336; 1,402,410,240**

    b. How many passwords are possible if all characters are letters that can be repeated? if the password must contain exactly one digit? Which type of password is more secure? Explain. **See margin.**

Glossary Index

Exercises

1. **CARNIVAL GAMES** A spinner has sections of equal size. The table shows the results of several spins. **See Chapter 0 Answer Appendix.**

Color	Frequency
red	6
blue	7
yellow	9
orange	12
purple	5
green	11

   a. Copy the table and add a column to show the experimental probability of the spinner landing on each of the colors with the next spin.

   b. Create a bar graph that shows these experimental probabilities.

   c. Add a column to your table that shows the theoretical probability of the spinner landing on each of the colors with the next spin.

   d. Create a bar graph that shows these theoretical probabilities.

   e. Interpret and compare the graphs you created in parts **b** and **d.**

Determine whether the events are *mutually exclusive* or *not mutually exclusive*. Then find the probability. **2–5. See margin.**

2. Two dice are rolled.

   a. *P*(sum of 10 or doubles) **b.** *P*(sum of 6 or 7) **c.** *P*(sum < 3 or sum > 10)

3. A card is drawn at random from a standard deck of cards.

   a. *P*(club or diamond) **b.** *P*(ace or spade) **c.** *P*(jack or red card)

4. In a French class, there are 10 freshmen, 8 sophomores, and 2 juniors. Of these students, 9 freshmen, 2 sophomores, and 1 junior are female. A student is selected at random.

   a. *P*(freshman or female) **b.** *P*(sophomore or male) **c.** *P*(freshman or sophomore)

5. There are 40 vehicles on a rental car lot. All are either sedans or SUVs. There are 18 red vehicles, and 3 of them are sedans. There are 15 blue vehicles, and 9 of them are SUVs. Of the remaining vehicles, all are black and 2 are SUVs. A vehicle is selected at random.

   a. *P*(blue or black) **b.** *P*(red or SUV) **c.** *P*(black or sedan)

6. **DRIVING** A survey of Longview High School students found that the probability of a student driving while texting was 0.16, the probability of a student getting into an accident while driving was 0.07, and the probability of a student getting into an accident while driving and texting was 0.05. What is the probability of a student driving while texting or getting into an accident while driving? **0.18 or 18%**

7. **REASONING** Explain why the rule $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ can be used for both mutually exclusive and not mutually exclusive events. **When events are mutually exclusive, *P*(*A* and *B*) will always equal 0, so the probability will simplify to P(A) + P(B).**

ODDS Another measure of the chance that an ev... of an event occurring is a ratio that compares ...

3 Assess

Formative Assessment

Use Exercises 1–10 to assess whether students can compute theoretical probabilities, experimental probabilities, and probabilities of compound events.

Ticket Out the Door Write examples of events involving probability on index cards. Give each student one index card. Before students can leave the room, have them state whether their event is simple, compound, mutually exclusive, or inclusive, and have them give the probability of the event.

Additional Answers

2a. not mutually exclusive, $\frac{2}{9}$

2b. mutually exclusive, $\frac{11}{36}$

2c. mutually exclusive, $\frac{1}{9}$

3a. mutually exclusive, $\frac{1}{2}$

3b. not mutually exclusive, $\frac{4}{13}$

3c. not mutually exclusive, $\frac{7}{13}$

4a. not mutually exclusive, $\frac{13}{20}$

4b. not mutually exclusive, ...

a. P(club or diamond) **b.** P(ace or spade) **c.** P(jack or red card)

4. In a French class, there are 10 freshmen, 8 sophomores, and 2 juniors. Of these students, 9 freshmen, 2 sophomores, and 1 junior are female. A student is selected at random.

a. P(freshman or female) **b.** P(sophomore or male) **c.** P(freshman or sophomore)

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ODDS **Another measure of the chance that an event will occur is called odds. The odds of an event occurring is a ratio that compares the number of ways an event can occur s (successes) to the number of ways it cannot occur f (failure), or s to f. The sum of the number of success and failures equals the number of possible outcomes.** **8–10. See margin.**

8. A card is drawn from a standard deck of 52 cards. Find the odds in favor of drawing a heart. Then find the odds against drawing an ace.

9. Two fair coins are tossed. Find the odds in favor of both landing on heads. Then find the odds in favor of exactly one landing on tails.

10. The results of rolling a die 120 times are shown.

Roll	1	2	3	4	5	6
Frequency	16	24	17	25	30	8

Find the experimental odds against rolling a 1 or a 6. Then find the experimental odds in favor of rolling a number less than 3.

give the probability of the event.

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2c. mutually exclusive, $\frac{1}{9}$

3a. mutually exclusive, $\frac{1}{2}$

3b. not mutually exclusive, $\frac{4}{13}$

3c. not mutually exclusive, $\frac{7}{13}$

4a. not mutually exclusive, $\frac{13}{20}$

4b. not mutually exclusive, $\frac{1}{2}$

4c. mutually exclusive, $\frac{9}{10}$

5a. mutually exclusive, $\frac{11}{20}$

5b. not mutually exclusive, $\frac{29}{40}$

5c. not mutually exclusive, $\frac{2}{5}$

8. 13 to 39 or 1 to 3; 48 to 4 or 12 to 1

9. 1 to 3; 1 to 1

10. 96 to 24 or 4 to 1; 40 to 80 or 1 to 2

Teach with Tech

Interactive Whiteboard Help students visualize an example involving events that are not mutually exclusive with a Venn diagram. Label one circle with t… …vent for B.

Exercises

Determine whether the events are *independent* or *dependent*. Then find the probability.

1. A red die and a blue die are rolled. What is the probability of getting the result shown? **independent; $\frac{1}{36}$**
2. Yana has 4 black socks, 6 blue socks, and 8 white socks in his drawer. If he selects three socks at random with no replacement, what is the probability that he will first select a blue sock, then a black sock, and then another blue sock? **dependent; $\frac{5}{204}$ or about 0.025**

A die is rolled twice. Find each probability.

3. P(2 and 3) $\frac{1}{36}$
4. P(two 4s) $\frac{1}{36}$
5. P(no 6s) $\frac{25}{36}$
6. P(two of the same number) $\frac{1}{6}$

A bag contains 8 blue marbles, 6 red marbles, and 5 green marbles. Three marbles are drawn one at a time. Find each probability.

7. The second marble is green, given that the first marble is blue and not replaced. $\frac{5}{18}$
8. The second marble is red, given that the first marble is green and is replaced. $\frac{6}{19}$
9. The third marble is red, given that the first two are red and blue and not replaced. $\frac{5}{17}$
10. The third marble is green, given that the first two are red and are replaced. $\frac{5}{19}$

DVDS There are 8 action, 3 comedy, and 5 drama DVDs on a shelf. Suppose three DVDs are selected at random from the shelf. Find each probability.

11. P(3 action), with replacement $\frac{1}{8}$
12. P(2 action, then a comedy), without replacement $\frac{1}{20}$
13. **CARDS** You draw a card from a standard deck of cards and show it to a friend. The friend tells you that the card is red. What is the probability that you correctly guess that the card is the ace of diamonds? $\frac{1}{[illegible]}$
14. **HONOR ROLL** Suppos… AP Calculus and is on the

replacement $\frac{?}{20}$

13. CARDS You draw a card from a standard deck of cards and show it to a friend. The friend tells you that the card is red. What is the probability that you correctly guess that the card is the ace of diamonds? $\frac{1}{26}$

14. HONOR ROLL Suppose the probability that a student takes AP Calculus and is on the honor roll is 0.0035, and the probability that a student is on the honor roll is 0.23. Find the probability that a student takes AP Calculus given that he or she is on the honor roll. **about 0.015**

15. DRIVING TESTS The table shows how students in Mr. Diaz's class fared on their first driving test. Some took a class to prepare, while others did not. Find each probability.

Status	Class	No Class
passed	64	48
failed	18	32

a. Paige passed, given that she took the class. $\frac{32}{41}$

b. Madison failed, given that she did not take the class. $\frac{2}{5}$

c. Jamal did not take the class, given that he passed. $\frac{3}{7}$

16. SCHOOL CLUBS King High School tallied the number of males and females that were members of at least one after school club. Find each probability.

Gender	Clubs	No Clubs
male	156	242
female	312	108

a. A student is a member of a club given that he is male. **16a.** $\frac{78}{199}$ **or about 39.2%**

b. A student is not a member of a club given that she is female. $\frac{9}{35}$ **or 25.7%**

c. A student is a male given that he is not a member of a club. $\frac{121}{175}$ **or 69.1%**

17. FOOTBALL ATTENDANCE The number of students who have attended a football game at North Coast High School is shown. Find each probability.

Class	Freshman	Sophomore	Junior	Senior
attended	48	90	224	254
not attended	182	141	36	8

a. Given that a student is a freshman, the student has not attended a game. $\frac{91}{115}$ **or about 79.1%**

b. Given that a student has attended a game, the student is an upperclassman (a junior or senior). $\frac{239}{308}$ **or about 77.6%**