



UNDERSTAND

- 17. Use Structure** Dwayne bought a new bike lock, and the lock came with instructions to choose 3 out of 30 numbers on a circular dial to keep his bike secure. The numbers cannot be repeated. How many possible arrangements can Dwayne choose for his lock? Do the arrangements represent permutations or combinations? Explain.
- 18. Construct Arguments** Sage volunteers to read and play with sick children in a hospital. She selects some erasers at random from a bag to use as prizes. There are 8 alien erasers and 10 flying saucer erasers.
- How many groups of 6 erasers can be formed from the 18 erasers? Explain.
 - In how many ways can 3 aliens be selected? Explain.
 - In how many ways can 3 aliens and 3 flying saucers be selected? Explain.
 - What is the probability that 3 aliens and 3 flying saucers will be selected? Explain.
- 19. Error Analysis** There are 6 tiles numbered 1 to 6 in a box. Two tiles are selected at random without replacement to form a 2-digit number. Jeffrey found the probability that the number selected is 16. Explain his error.

The number of ways to select 1 and 6 is given by ${}_6C_2 = 15$

$$P(16) = \frac{1}{{}_6C_2} = \frac{1}{15}$$



- 20. Mathematical Connections** How many lines are determined by the points, P , Q , R , and S ? Explain.

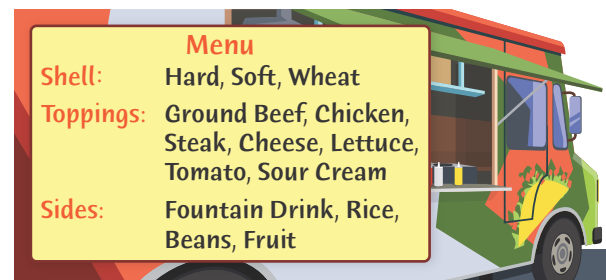


- 21. Higher Order Thinking** There are $11!$ different ways for a group of people to sit around a circular table. How many people are in the group? Explain.

PRACTICE

For Exercises 22–27, state if the possible arrangements represent permutations or combinations, then state the number of possible arrangements. SEE EXAMPLES 1, 2, AND 3

- A student chooses at random 4 books from a reading list of 11 books.
- At the end of a season, 10 soccer teams are ranked by the state.
- A committee of 5 people is being selected from a group of 9 to choose the food for a sport's banquet.
- Hugo displays his 8 model planes in a single row.
- A class president, secretary, and treasurer are chosen from 12 students running for office.
- A food truck has a lunch special on tacos. Customers choose a shell, three toppings, and two sides for one price.



- There are 4 comedians and 5 musicians performing in a variety show. The order in which the performers are chosen is random. SEE EXAMPLE 4

 - What is the probability that the first 3 performers are comedians?
 - What is the probability that the first two performers are a comedian followed by a musician?

- A jewelry maker chooses three beads at random from a bag with 10 beads labeled A, B, C, D, E, F, G, H, I, and J. SEE EXAMPLES 2, 3, AND 4

 - How can you use permutations or combinations to find $P(\text{selected beads spell the initials DEB})$? What is the probability?
 - How can you use permutations or combinations to find $P(\text{selected beads are all vowels})$? What is the probability?

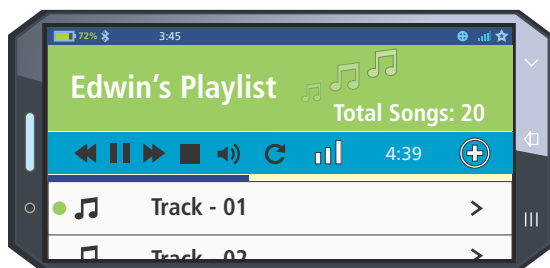


APPLY

30. **Make Sense and Persevere** Amaya's wallet contains three \$1 bills, two \$5 bills, and three \$10 bills. If she pulls 2 bills without looking, what is the probability that she draws a \$1-bill and a \$10-bill? Explain.
31. **Model with Mathematics** Raul's favorite restaurant is running a prize game. Five of each of the winning tickets shown are available, and a customer must collect three winning tickets to receive the prize. What is the probability Raul will receive the prize for the baseball cap with his first 3 tickets?



32. **Look for Relationships** Smart Phones, Inc. chooses a 5-digit security code at random from the digits 0–9.
- Suppose the digits cannot be repeated. What is the probability that the security code is 30429? Explain.
 - Suppose the digits can be repeated. What is the probability that the security code is 30429? Explain.
33. **Make Sense and Persevere** Edwin randomly plays 6 different songs from his playlist.



- What is the probability that Edwin hears his 6 favorite songs?
- What is the probability that he hears the songs in order from his most favorite to his sixth most favorite?

ASSESSMENT PRACTICE

34. Consider an arrangement of 8 items taken 3 at a time in which order is not important. Does each expression give the correct number of arrangements? Select Yes or No.

	Yes	No
$8P_3$	<input type="checkbox"/>	<input type="checkbox"/>
$8C_3$	<input type="checkbox"/>	<input type="checkbox"/>
$\frac{8P_3}{3!}$	<input type="checkbox"/>	<input type="checkbox"/>
$8! \cdot 3!$	<input type="checkbox"/>	<input type="checkbox"/>
$\frac{8!}{3!}$	<input type="checkbox"/>	<input type="checkbox"/>
$\frac{8!}{5!}$	<input type="checkbox"/>	<input type="checkbox"/>
$\frac{8!}{3!5!}$	<input type="checkbox"/>	<input type="checkbox"/>
$8 \cdot 7$	<input type="checkbox"/>	<input type="checkbox"/>

35. **SAT/ACT** Fifteen students enter a Safety Week poster contest in which prizes will be awarded for first through fourth place. In how many ways could the prizes be given out?
- 4
 - 60
 - 1,365
 - 32,760
 - 50,625
36. **Performance Task** Use the word shown on the tiles below to find each probability.



Part A Two tiles are chosen at random without replacement. Use conditional probability to find the probability that both letters are vowels. Then find the probability using permutations or combinations. Explain.

Part B Four of the tiles are chosen at random and placed in the order in which they are drawn. Use conditional probability to find the probability the tiles spell the word SURF. Then find the probability using permutations or combinations. Explain.