

## Calculating Probabilities

Ernie's Sandwich Shop has a special "Bruin Burger" that offers your choice of steak, ham or bear meat on a sesame seed bun, a wheat bun, white bun or an Italian bun. You also can choose olives or peppers to go on the Bruin Burger.

1. How many different sandwiches can a MV Bruin select?

Give the probability a randomly selected sandwich has:

- |                                     |   |
|-------------------------------------|---|
| 2. bear on white bread with olives. | 3. steak or ham, on Italian with peppers. |
| 4. wheat bread.                     | 5. a sesame-seed bun.                     |

Sam wants to ask Jill to the Senior Prom, but wants to make sure he asks in a clever way. He knows Jill loves to eat, so he goes to the cupboard and sees some M & M's, Snickers, Kit Kats and Skittles. He also has his choice of chocolate milk, white milk, soy milk and goats milk.

6. How many combinations can he use to impress Jill with a "gourmet" snack?

What is the probability he randomly chooses:

- |                                     |  |
|-------------------------------------|--|
| 7. a skittles and white milk snack? | 8. a chocolate candy bar and chocolate milk? |
| 9. white milk and a Twix?           | 10. a candy bar and milk?                    |

Wanting to look his best, Sam checks his closet. He finds some checkered bell bottoms, some striped straight legs and one pair of levis. He finds a white muscle shirt, a red turtle neck, a yellow T-shirt, his favorite Jazz jersey and his bright green Christmas sweater. He also has Adidas, Nikes, Pumas, dress shoes and flip flops.

11. Even though it seems hopeless how many ways can Sam look good for Jill?

What is the probability he chooses:

- |                                       |  |
|---------------------------------------|--|
| 12. bell bottoms?                     | 13. striped pants or levis?                      |
| 14. levi's, his jazz jersey and Nikes | 15. striped pants, a turtle neck and flip flops? |

Jessie needs to register for next school year. She will take 8 classes. She has 8 classes to choose from with each class offered every period.

16. How many different schedules can Jessie create?

17. If she can repeat classes as many times as she wants, how many schedules can she create?

18. How many schedules could she choose with 12 classes to choose from but with no repetition allowed?

19. Baskin-Robbins offers a waffle cone and a plain cone to go with their 31 flavors of ice cream. How many choices does Landon have when he picks a one-scoop cone on his next birthday?

- a. 31      b. 33      c. 93      d. 62

20. In the Olympics, there are 10 downhill racers. How many ways can the gold, silver and bronze medals be awarded?

- a. 10      b. 720      c. 560      d. 30

21. Coach Boyack needs to make a seating chart. He has seven students who need to sit in the middle row. He wants to be careful how he arranges the first 3 seats in that row. How many ways can he arrange the first 3 seats of the middle row?

- a. 210      b. 35      c. 21      d. 350

22. Coach Herring wants to select 2 students to make a presentation. He has decided to choose students from those with the 10 highest grades. It doesn't matter who presents first. How many ways can Coach Herring order the presentations?

- a. 45      b. 10      c. 90      d. 20

23. In an upcoming dance recital, Ms. Ballet has to choose 4 students to perform in a certain order. She has 13 students. How many ways can Ms. Ballet arrange the order?

- a. 210      b. 42      c. 840      d. 7!

For the following problems, determine if it's a permutation or a combination and find the number of arrangements:

24. A boss selects 2 of his 9 employees to attend a CPR clinic.

- a. comb.; 72      b. perm.; 72      c. comb.; 36      d. perm.; 36

25. You place 4 books on a shelf

- a. comb.; 60      b. perm.; 60      c. comb.; 20      d. perm.; 20

26. Madi and Hannah buy 3 CD's from a selection of 10 at Best Buy

- a. comb.; 720      b. perm.; 720      c. comb.; 120      d. perm.; 120

27. There 6 people in line waiting to buy tickets to an Imagine Dragons concert

- a. comb.; 720      b. perm.; 720      c. comb.; 360      d. perm.; 360

EVALUATE the following:

28.  $3!$

29.  $C(10,4)$

30.  $P(6,2)$

31.  $7!$

32.  $C(8,4)$

33.  $P(5,2)$

34.  $5!$

35.  $C(5,2)$

36.  $P(8,7)$

37.  $C(5,4)$

38.  $P(8,1)$

39.  $1!$

Write the formula for the following:

40.  $n!$

41.  $P(n,r)$

42.  $C(n,r)$