

Counting methods

2. The new Alberta license plates consist of 7 characters, 3 are letters and 4 are digits.

- How many different plates are possible if there are no restrictions?
- How many plates are possible if no digit can be repeated?

3. True or False

The Fundamental Counting Principle applies to the following situation:

Counting the number of possibilities when drawing a face card from a standard deck.

Select one:

True

False

4. A band sells shirts and CDs at their concerts. They have 3 CDs and there are 4 different styles of shirt available in small, medium, large, and extra large.

How many ways could you buy one CD and one shirt if you only consider one size of shirt?

5. Algebraically solve for n , where $n \in \mathbb{I}$.

$$\frac{(n+1)!}{2(n-1)!} = 6$$

6. Solve for n , where $n \in \mathbb{I}$.

$$\frac{(n-2)!}{(n-3)!} = 15$$

Select one:

- 13
- 15
- 17
- 18

7. Evaluate.

$$\frac{14!}{3! \cdot 4! \cdot 7!}$$

9. Gabby is picking music for a flight to Europe. In her collection, there are 12 reggae CDs and 10 jazz CDs. How many different ways can she select 2 reggae CDs and 1 jazz CD?

10. The town council wants to create a committee to look at the environmental issues of its local lake. They asked the high school for volunteers. They had 10 teachers and 8 students volunteer to be on the environmental action committee. The committee must consist of 2 teachers and 2 students. How many different environmental action committees does the council chairperson have to choose from?

Select one:

- a. 45
- b. 73
- c. 1260
- d. 5040

11. Which of the following is equivalent to $\frac{24!}{14! \cdot 10!}$?

Select one:

- a. $\frac{24!}{14!}$
- b. $\frac{24!}{14! \cdot 10!}$
- c. $\frac{24!}{12! \cdot 12!}$
- d. $\frac{24!}{10!}$

12. Jasmine is having a sleepover for her birthday. She has twelve friends that she is considering to give invitations to. But her parents have limited her to inviting five friends to the party. How many ways can Jasmine choose five friends to attend her sleepover?

13. Using the digits 1 through 9, once each, fill in the blanks so that the statement is true.
Try to make two statements true.

$$20 \leq \square C \square \leq 30$$

14. A combination lock opens with the correct four-letter code. Each wheel rotates through the letters A to L.

a) How many different four-letter codes are possible?

b) What percent of these codes repeat at least one letter? Give your answer to the nearest percent.

15. The daily lunch special at the newly opened deli offers a choice of 6 sandwiches, 4 salads, 6 drinks, and 3 desserts on its menu. How many different meals are possible if you choose one item from each category?

Select one:

- a. 432
- b. 576
- c. 646
- d. 720

16. A combination lock opens with the correct three-digit code. Each wheel rotates through the digits 1 to 8. How many different three-digit codes are possible?

Select one:

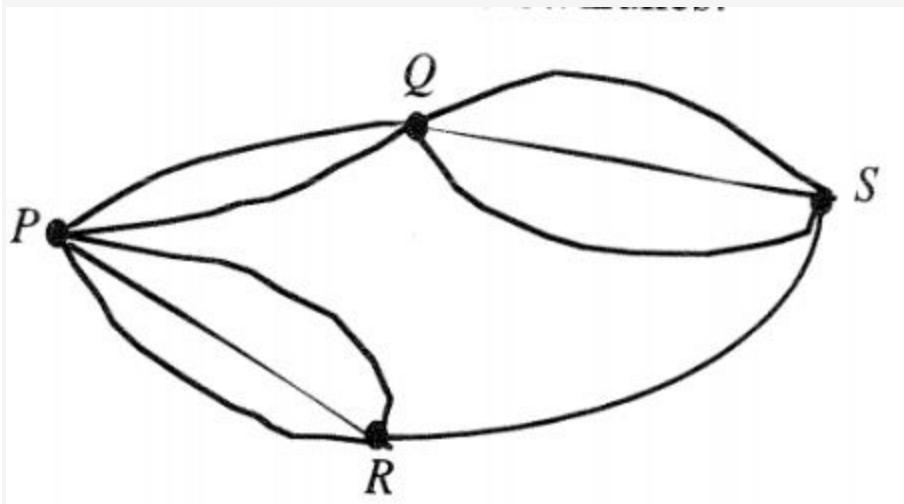
- a. 24
- b. 64
- c. 512
- d. 1024

17. The new local fast food restaurant has 60 flavours of wings on the menu. How many ways can two people order two servings of wings, either the same flavour or different flavours?

Select one:

- a. 3481
- b. 3540
- c. 3600
- d. 3660

18. There are two routes from Pitland to Queensville, three routes from Queensville to St. Lukes, three routes from Pitland to Rutherford, and one route from Rutherford to St. Lukes.



How many routes are there from Pitland to St Lukes?

[show workings for all to obtain full marks]

Select one:

- a. 4
- b. 8
- c. 3

d. 9

e. 6

19. How many even 5-digit whole numbers are there? Note that 31248 is acceptable, but 01248 is not.

[show workings for all to obtain full marks]

Select one:

a. 15120

b. 50000

c. 13776

d. 45000

21. Identify the term that best describes the following situation:

Determine the number of two-card hands you can be dealt from a standard deck of 52 cards.

Select one:

a. permutations

b. combinations

c. factorial

d. none of the above

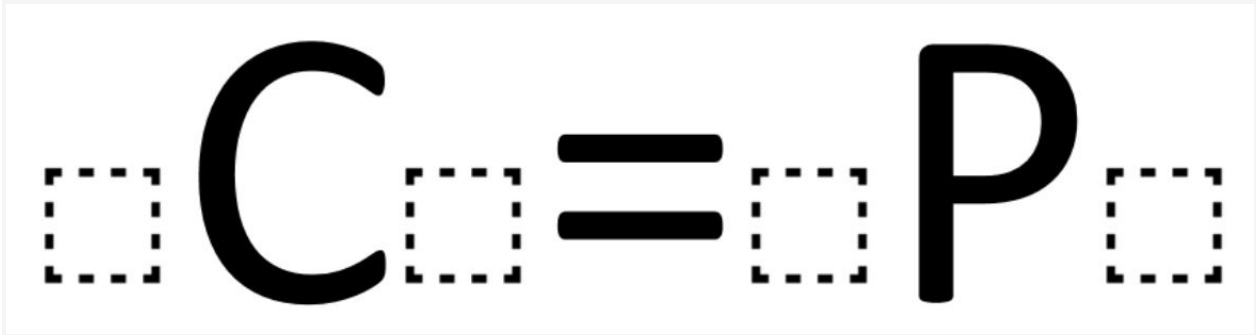
22. Solve for n .

$${}_n - 2P_2 = 30$$

Select one:

- a. $n = 5$
- b. $n = 6$
- c. $n = 7$
- d. $n = 8$

23. Using the digits 1 through 9, once each for all 4 blanks, fill in the blanks so that the statement is true. Try to find more than one statement to make this true.



24. An isogram is a word or phrase without a repeating letter.

Vito and Kira are playing a guessing game involving isograms. Vito thinks of a word with no repeated letters. He tells Kira that his word can be used to make 42 letter pairs. He gives LS, OG, and GO as examples.

a) How many letters are in Vito's word?

b) What could Vito's word be?

25. Mr. Ellis is teaching about the counting method. One of his questions says that a word is any string of letters. How many five-letter words can you make from the letters in WINDSOR if you do not repeat any letters in the word?

Select one:

a. 78 125

b. 16 807

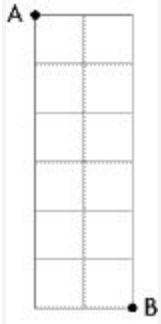
c. 2520

d. 1250

26. Solve for r .

$${}_{34}P_r = 34$$

27. How many different routes are there from A to B, if you only travel south or east?

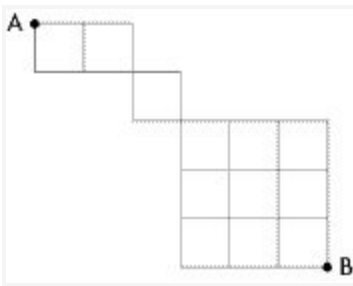


[show workings for all to obtain full marks]

Select one:

- a. 16
- b. 24
- c. 28
- d. 56

28. How many different routes are there from A to B, if you only travel south or east?



[show workings for all to obtain full marks]

29. Ten friends on bicycles find an empty bike rack with exactly ten spots for bikes. How many ways can the ten bikes be parked so that Elsa is at one end of the bike rack?

Select one:

a. $9!$

b. $2 \cdot 9!$

c. $10!$

d. $\frac{10!}{2}$

30. A physics teacher has three topics for students to research: baryons, mesons, and leptons. How many different ways can her class of 24 students be divided evenly among the 3 topics?

PROBABILITY

3. Debra is the coach of a junior ultimate team. Based on the team's record, it has a 70% chance of winning on calm days and a 50% chance of winning on windy days. Tomorrow, there is a 30% chance of high winds. There are no ties in ultimate. What is the probability that Debra's team will win tomorrow? Show your work.

4. A street performer asks David's mother to draw a card from his well-shuffled standard deck of 52 playing cards. Then she draws another card from the deck without replacing the first card. Determine the probability that both cards are NOT face cards. Select one:

a. $\frac{1}{10}$

b. $\frac{1}{3}$

c. $\frac{10}{17}$

d. $\frac{12}{15}$

5. The upcoming graduating class at Windsor Collegiate has 40 males and 60 females. Of these students, 10 males and 20 females plan to attend an American university next year. Determine the probability that a randomly selected student plans to attend the university.

Select one:

a. 0.3

b. 0.4

c. 0.5

d. 0.6

6. A computer manufacturer knows that, in a box of 175 computer chips, 5 will be defective. Fred will draw 2 chips at random, from a box of 175. Determine, to six decimal places, the probability that Fred will draw 2 defective chips.

7. A game has four possible outcomes: A, B, C, and D. If $P(A) = 0.4$, $P(B) = 0.1$, and $P(C) = P(D)$, what is the probability of event C?

8. Given the following probabilities, which event is most likely to occur?

Select one:

a. $P(A) = 0.2$

b. $P(B) = \frac{1}{6}$

c. $P(C) = 0.3$

d. $P(D) = \frac{1}{3}$

9. Select the events that are independent.

Select one:

- a. Drawing a 10 from a standard deck of 52 playing cards and then drawing another card, without replacing the first card.
- b. Rolling a 4 and rolling a 5 with a pair of six-sided dice, numbered 1 to 6.
- c. Choosing a number between 1 and 20 with the number being a multiple of 3 and also a multiple of 9.
- d. Drawing a diamond from a standard deck of 52 playing cards and then drawing another diamond, without replacing the first card.

10. Elin estimates that her probability of passing French is 0.6 and her probability of passing chemistry is 0.8. Determine the probability that Elin will pass both French and chemistry. Show your work.

11. Billy is trying to improve his health and level of fitness. He has started going to the gym and does two different cardio workouts each day. At the gym, his choices include using a stationary bike, a treadmill, and running the track. Determine the probability that the next time Billy goes to the gym will use the stationary bike and then run the track.

Select one:

- a. 16.7%
- b. 26.1%
- c. 33.4%
- d. 41.9%

12. Select the independent events.

Select one:

- a. $P(A) = 0.22$, $P(B) = 0.39$, and $P(A \cap B) = 0.072$
- b. $P(A) = 0.18$, $P(B) = 0.7$, and $P(A \cap B) = 0.163$
- c. $P(A) = 0.51$, $P(B) = 0.1$, and $P(A \cap B) = 0.069$
- d. $P(A) = 0.9$, $P(B) = 0.23$, and $P(A \cap B) = 0.207$

13. The Anderson family has three children. Determine the probability that they have two boys and a girl.

Select one:

- a. 12.5%
- b. 25%
- c. 37.5%
- d. 50%

14. Two cards are drawn, without being replaced, from a standard deck of 52 playing cards. Determine the probability of drawing a five then drawing a two.

Select one:

- a. 0.603%
- b. 1.227%
- c. 1.613%
- d. 2.009%

15. A die is rolled twice. Determine the probability that the first roll is greater than 2, and the second roll is odd.

16. Mr. Jenkins is showing his class some card tricks and relating them to probability. He asks Franny to draw a card at random from a standard deck of 52 playing cards. Determine the probability that she will draw a red card or a 7.

Select one:

- a. $\frac{1}{13}$

b. $\frac{1}{2}$

c. $\frac{7}{13}$

d. $\frac{15}{26}$

17. Janice is on a trip in Las Vegas. She stops to watch a magician where a little boy is about to draw a card at random from a standard deck of 52 playing cards. Determine the probability that he will draw a black card or a spade.

Select one:

a. $\frac{1}{4}$

b. $\frac{1}{2}$

c. $\frac{29}{52}$

d. $\frac{5}{6}$

19. State whether the following events are mutually exclusive and explain your reasoning. Selecting a prime number or selecting an even number from a set of 10 balls, numbered 1 to 10.

20. A car manufacturer keeps a database of all the cars that are available for sale at all the dealerships in Western Canada. For model A, the database reports that 19% have heated leather seats, 39% have a sunroof, and 46% have neither. Determine the probability of a model A car at a dealership having both heated leather seats and a sunroof. Show your work.

21. A group of students are holding a charity carnival to support a local animal shelter. The students have created a dice game that they call Zing and a card game that they call Bloop. The odds against winning Zing are 3 : 2, and the odds against winning Bloop are 3 : 7. Which game should Lena play? Show your work.

22. The weather forecaster says that there is a 30% probability of fog tomorrow. Determine the odds against fog.

Select one:

- a. 3 : 7
- b. 3 : 10
- c. 7 : 3
- d. 7 : 10

23. Tia notices that yogurt is on sale at a local grocery store. The last eight times that yogurt was on sale, it was available only three times. Determine the odds against yogurt being available this time.

Select one:

- a. 3 : 5
- b. 3 : 8
- c. 5 : 8
- d. 5 : 3

24. Jeff has been awarded a penalty shot in a hockey game. Braden is the goalie. Jeff has scored 6 times in his last 10 penalty shots. Braden has blocked 5 of the last 10 penalty shots. Determine the odds in favour of Jeff scoring, using his data.

25. Greg, Bogdan, Dave, and Li are competing with eight other boys to be on their school's cross-country team. All the boys have an equal chance of winning the trial race. Determine the probability that Greg, Bogdan, Dave, and Li will place first, second, third, and fourth in any order. Show your work.

26. From the student council committee of 18 people, 2 of these people are randomly chosen to be president and secretary. Determine the number of ways in which these 2 people can be chosen for president and secretary.

Select one:

- a. ${}_2P_2$
- b. ${}_2P_1$
- c. ${}_{18}P_2$
- d. ${}_{18}P_{16}$

27. Yvonne tosses three coins. She is calculating the probability that at least one coin will land as heads. Determine the total number of outcomes.

Select one:

- a. 2
- b. 4
- c. 8
- d. 16

28. Veata needs to create a four-digit password to access her voice mail. She can repeat some of the digits, but all four digits cannot be the same. Determine the probability that the first digit of her password will be 7.

29. Some people have argued that probability is an experimental science rather than a theoretical science. What do you think? Explain your thinking and give reasons for your decision.

30. Write to explain the advantages and disadvantages of listing a sample space for determining probabilities. Include at least 2 examples to illustrate your explanation.

31. Explain a mutually exclusive event and describe how the probabilities of related events are affected when they are NOT mutually exclusive.

32. Explain the difference between independent and dependent events. Include an explanation of how these are different from mutually exclusive events. Use examples to show the difference.