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- a. 30
- b. 60

- c. 120
- d. 240

- _____ 10. Which of the following expressions is not equal to the others?
- a. ${}_{43}P_{41}$ c.
- b. $P(43, 41)$ d. 1806
- _____ 11. The final score of a hockey game is 4 to 3. How many different scores could there have been at the end of the first period?
- a. 12 c. 7
- b. 20 d. 5

Short Answer

12. Simplify $t_{40,12} - t_{39,12}$ to a single term from Pascal's triangle.
13. Express the following in factorial notation.
- a) $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$
- b) $11 \times 10 \times 9 \times \dots \times 3 \times 2 \times 1$
- c) $3 \times 2 \times 4 \times 5 \times 7 \times 6$
14. In how many ways can you roll a sum of 6 or a sum of 10 with a pair of dice?
15. Bill works in an ice cream store for the summer months. How many different two- or three-scoop cones can Bill create if he has chocolate, mint chocolate chip, vanilla, maple walnut, and pistachio ice cream available?
16. In how many different orders can you arrange all the letters of the word *parallel*?
17. How many different ways can eight members of a family pose for a photograph if they stand in a single row?
18. How many ways are there to draw a 7 or a king from a standard deck of 52 playing cards?
19. How many six-digit even numbers less than 200 000 can be formed using all the digits 1, 1, 2, 2, 3, and 5?
20. Simplify $t_{6,2} + t_{6,3}$ to a single term from Pascal's triangle.
21. On his university application, Enzo must list his course choices in order of preference. He must choose three of the four courses available in his major discipline, and two of the three courses offered in related subjects. In how many ways can Enzo list his course choices? Explain your reasoning.

In Switzerland the postal codes consist of two letters followed by four numbers.

22. How many postal codes are possible in the Swiss system if there are no restrictions on the choice of letters or numbers?
23. How many postal codes are possible in the Swiss system if you cannot use the number 0 or any of the letters O, X, Y, and Z?
24. How many postal codes are possible in the Swiss system if you cannot use the letter O or the number 0?
25. You flip a coin six times. In how many different orders can two heads and four tails occur?
26. In how many ways can a set of eight books be arranged on a shelf so that volumes one and two are beside one another?

27. In anticipation of a lunchtime rush, a small cafe has made seven egg-salad sandwiches, five tuna sandwiches, and six ham sandwiches, along with nine garden salads and six Caesar salads. In how many ways can this food be displayed in a single row on the counter?
28. Draw a tree diagram to illustrate the possible itineraries for Daima's family if they can travel from their home in North Bay to Toronto by bus or train, and then from Toronto to Halifax by bus, train, or plane. How many possible itineraries are there?
29. Norma is creating a new game that has 15 different cards. In how many different ways can you deal out 5 cards from Norma's deck?
30. In how many ways can a student answer all of the questions on a true/false test that has eight questions? Explain your solution.
31. How many ten-digit telephone numbers are possible if the first three digits must all be different?

Problem

You are thinking of using some leftover ceramic tiles to make a decorative border for a patio. You have ten blue, four gold, and six white tiles.

32. In how many ways can you make the border if you need nine tiles and use equal numbers of all three colours? Explain your reasoning.
33. In how many ways can you make the border if you need 12 tiles and you use all three colours with at least 8 blue tiles and more gold tiles than white tiles? Explain your reasoning.
34. In how many ways can make the border if you use a total of six gold and white tiles and you want to use more gold than white? Explain your reasoning.
35. In how many ways can you make the border if you must use all the tiles to put a single row along the edge of the patio? Show how you arrive at your answer.
36. In how many ways can you make the border if it requires 15 tiles and you use only blue and white ones? Explain your reasoning.
37. In how many ways can the eight members of a students' council pose in a line for a yearbook photograph if the chair and vice-chair must be side by side? Explain your reasoning.