

Permutations

List all possible permutations.

- 1) 1, 2, 3
- 2) T, V, W, taken two at a time
- 3) ☺, ☀, ♥, ▲, taken two at a time
- 4) A, B, C, D

Evaluate each expression.

- 5) ${}_4P_2$
- 6) ${}_5P_1$
- 7) ${}_6P_2$
- 8) ${}_6P_6$
- 9) $-4 + {}_7P_4$
- 10) $5 \cdot {}_6P_5$

Find the number of unique permutations of the letters in each word.

- 11) DESIGN
- 12) MATH
- 13) CHEESE
- 14) FURTHER
- 15) BALLISTICS
- 16) BILLIONAIRE

Critical thinking questions:

- 17) Write a word for which there are 30 unique permutations of the letters.
- 18) Simplify ${}_xP_{x-2}$

Permutations

List all possible permutations.

1) 1, 2, 3

123 213 312
132 231 321

2) T, V, W, taken two at a time

TV VT WT
TW VW WV

3) ☺, ☀, ♥, ▲, taken two at a time

☺☀ ☀☺ ♥☺ ▲☺
☺♥ ☀♥ ♥☀ ▲☀
☺▲ ☀▲ ♥▲ ▲♥

4) A, B, C, D

ABCD BACD CABD DABC
ABDC BADC CADB DACB
ACBD BCAD CBAD DBAC
ACDB BCDA CBDA DBCA
ADBC BDAC CDAB DCAB
ADCB BDCA CDBA DCBA

Evaluate each expression.5) ${}_4P_2$

12

6) ${}_5P_1$

5

7) ${}_6P_2$

30

8) ${}_6P_6$

720

9) $-4 + {}_7P_4$

836

10) $5 \cdot {}_6P_5$

3,600

Find the number of unique permutations of the letters in each word.

11) DESIGN

720

12) MATH

24

13) CHEESE

120

14) FURTHER

2,520

15) BALLISTICS

453,600

16) BILLIONAIRE

3,326,400

Critical thinking questions:

17) Write a word for which there are 30 unique permutations of the letters.

LEVEL

18) Simplify ${}_xP_{x-2}$ $\frac{x!}{2}$