

Find the number of possible arrangements of each set of items.

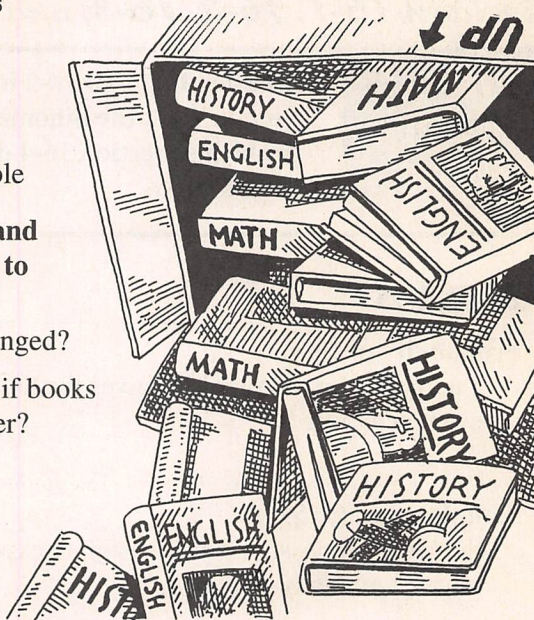
10. the letters in the word SEARCH
11. the letters in the word LEVELED
12. seven people sitting around a circular table

A box contains 5 English, 4 mathematics, and 6 history textbooks, all different. They are to be put on a shelf.

13. In how many ways can the books be arranged?
14. In how many ways can they be arranged if books of the same subject are to be kept together?

Consider the expansion of $(a - 3)^{10}$.

15. Find the 4th term of the expansion.
16. Find the term containing a^8 .



MIXED REVIEW

Chapters 1–15

1. How many communication matrices are possible which describe a network of three stations (a station does not communicate with itself)?

Consider the transformation $T: (x, y) \rightarrow (3x + y, -2x)$.

2. Find the image under T of $\triangle PQR$ with vertices $P(0, 0)$, $Q(3, 4)$, and $R(0, 3)$.
3. Find the matrix T and the value of its determinant $|T|$. What information does $|T|$ provide?
4. Find the matrix T^{-1} and the transformation $T^{-1}: (x, y) \rightarrow (?, ?)$.

Find the sums. If the sum does not exist, so state.

$$5. \sum_{n=2}^{20} 3n \qquad 6. \sum_{n=1}^{\infty} 3\left(-\frac{1}{5}\right)^n \qquad 7. \sum_{n=1}^{\infty} (10 + n)$$

In Exercises 8–16, sketch the graph of the relation.

8. $r = 1 + \sin 2\theta$
9. $xy = -2$
10. $4y^2 + 16x^2 = 64$
11. $y = \log_2 x$
12. $\frac{x}{10} - \frac{y}{6} = 1$
13. $y = |x - 5|$
14. $y = 3 \sin 2\left(x - \frac{\pi}{4}\right)$, where $-\pi \leq x \leq \pi$
15. $f(n) = \left(-\frac{2}{3}\right)^n$, where $n = 0, 1, 2, \dots$
16. $(x, y) = (2t, 1 + t^2)$, $t \geq 0$
17. Use the binomial theorem to expand $\left(\frac{1}{4} + \frac{3}{4}\right)^6$. What is the sum of the seven resulting terms? Why?