1. How many digits would it take to represent the decimal number 7,621 in binary notation?
2. Consider twenty lines drawn at a tangent to an ellipse. The intersections of these lines create both bounded and unbounded regions. How many unbounded regions are there?
3. Find the two values of ***k*** such that the equation $x\left(2x+k\right)=-72$ has exactly one solution.
4. What is the remainder when 333333 is divided by ten?
5. Five numbers have mean 9, median 12, and unique mode 3. What is the greatest of the five numbers?
6. There are 100 women in a certain town. 85 are married, 70 have a telephone, 75 own a car, and 80 own their own house. What is the least possible number of these 100 women who are married, have a telephone, own a car, and own their own house?
7. The complex numbers  and  are both roots of the equation , where *A*, *B*, *C,* and *D* are integers. What is the value of ?
8. Ed drives to work at a constant speed *S*. One day he is halfway to work when he immediately turns around, speeds up by 8 mph, and drives home. As soon as he is home, he turns around and drives to work at 6 mph faster than he drove home. His total commute time is exactly 67% greater than usual. Find *S* in mph.
9. If , then what does  equal in terms of *k*?
10. A company is decreasing by 8% the amount of soup sold in cylindrical cans. The cans will be the same height but have a smaller diameter. To the nearest tenth of a percent how much should the diameter be decreased to accommodate the change?
11. In how many ways can 75 be expressed as the sum of at least two positive integers, all of which are consecutive?
12. Andrew and Bob were racing their remote control cars in a 100 yard race which Bob’s car won by 5 yards. Andrew agreed to another race but only if Bob started his car from 5 yards behind the start line. Assuming that the cars traveled at the same constant speed as the previous race, whose car won the race and by how many inches?
13. The schools in an athletic conference compete in a cross-country meet to which each school sent three participants. Eric finished the race in the middle position; Joe finished after Eric, in 19th position; and Sam finished 29th. How many schools are there in the conference?
14. Let *f*(*x*) be a function such that  for every real number *x*. Find *f*(1).
15. Margaret has 4 red and 4 blue identical dinner plates. She wants to determine how many different ways she can set a square table with one plate on each side (four plates total). She considers two settings the same if the table can be rotated to make the settings match. How many different settings does Margaret have?

Answers:

1. 13
2. 40
3. 24 and -24
4. 3
5. 14
6. 10
7. 1
8. 42 mph
9.  or 5.25*k*
10. 4.1%
11. 5
12. Bob by 9 inches
13. 11
14. 
15. 6