1. Find the number whose double is 60 more than its half.

2. The internal angles of a heptagon sum to 900°. Find the sum of the internal angles of a heptadecagon.

3. Given that
$$6^{2x+y} = 36^7$$
and
$$6^{x+4y} = 216^7$$
find xy.

4. Two vertices of an equilaterial triangle are $(1, 1)$ and $(7, 1)$. Find the coordinates of the third vertex.

5. What is the thousandth digit after the decimal place of $1/7$?

6. Evaluate
$$3 + 6 + 9 + \cdots + 300.$$

7. How many four-digit numbers can be formed using the digits $3, 1, 4, 1$?

8. A right-angled triangle has vertices $(0, 0)$, (a, b), $(a, 0)$ with hypotenuse $(a+b)/(a-b)$. The point (a, b) lies on a circle of radius 4. Find ab.

9. In a set of 50 numbers, the average of the first 20 is 30 while the average of the other 30 is 20. What is the average of all 50 numbers?

10. Find the first date in this millenium to have 8 unique digits when written in the form DD/MM/YYYY.

11. Find the probability that a randomly chosen number between 2 and 100 inclusive is prime.

12. A family consists of a mother, a father, and a number of children. The average age of the family is 20. The average age of just the mother and the children is 16. If the father's age is 48, how many children are there in the family?

13. An equilaterial triangle with area 1 is inscribed inside a circle. This circle is itself inscribed inside a larger equilaterial triangle. What is the area of the larger triangle?

14. What is the smallest positive integer that leaves a remainder of 1 when divided by each of the numbers $2, 3, \ldots, 10$?

15. At exactly midnight the hour hand of a clock begins to move twice its normal speed while the minute hand begins to move at half its normal speed. What is the correct time the next time the two hands meet?

16. A regular decagon has an area of 100 square units. What is the length of one of its sides to three decimal places?

17. If
$$A = 1^{-3} + 2^{-3} + 3^{-3} + \cdots$$
find
$$1^{-3} + 3^{-3} + 5^{-3} + \cdots$$
in terms of A.

18. Today, the 18th of July, 2023 is a Tuesday. What was the day of the week on the 18th of July 1823?

19. The numbers $1, 2, \ldots, 1000$ are written on the whiteboard. On each turn, two numbers x and y erased from the board and replaced by $xy - x - y + 2$. This continues until only one number remains. What is this number?

20. Two real numbers x and y, where $x > y$ have the property that they are equal to 1 plus their recriprocal. What is
$$\frac{x^2 - y^2}{\sqrt{5}}?$$

1. 40
2. 2700°
3. 20
4. $(4, 1 + 3\sqrt{3})$
5. 8
6. 15150
7. 12
8. $24/5$
9. 24
10. 17/06/2345
11. $25/99$
12. 6
13. 4
14. 2521
15. 3 am
16. 3.605
17. $(1 - 2^{-3})A$
18. Friday
19. 1
20. 1