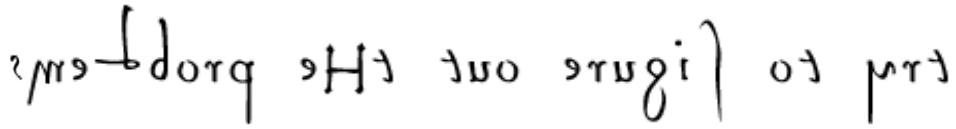
1. My friend, I bid you welcome to this quest
   Before we start, I pose a painless test
   To probe you're worthy of this noble game,
   Please write (with care) DaVinci's given name.

2. Well done, my friend, I sense your heart is true.
   You now have earned the right to your next clue.
   This famous museum of art once housed kings.
   A lavish Paris palace with three wings.
   One wing is Sully... one is Richelieu.
   Please name the third (I've mentioned only two).

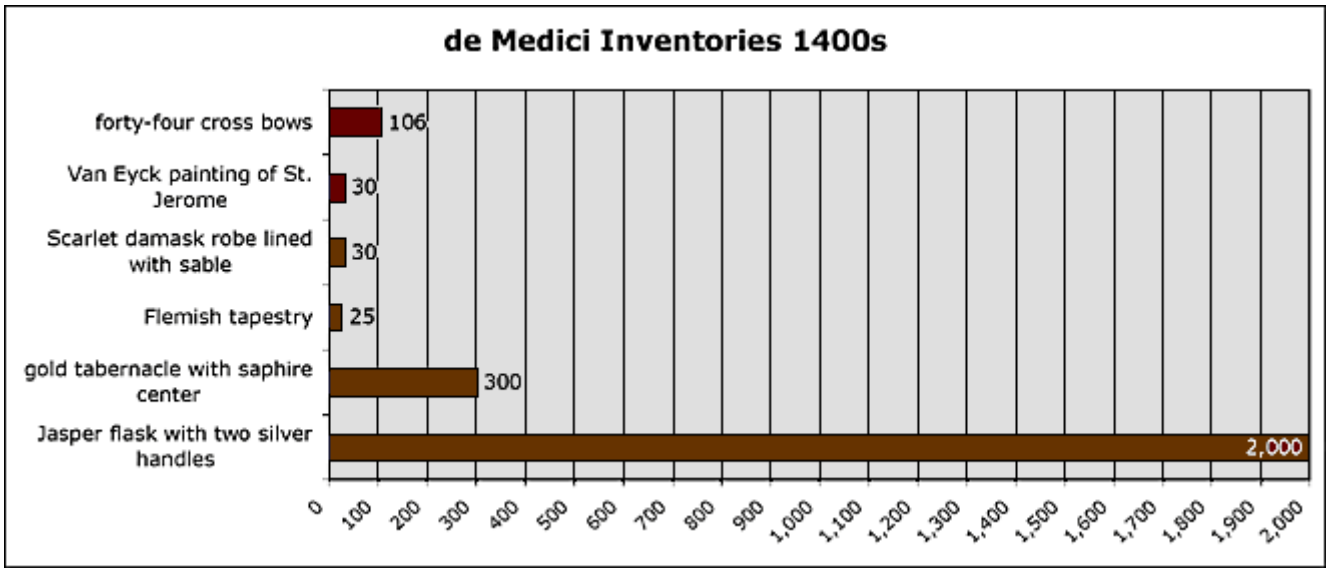
3. I can see my friend that you know your stuff.
   But did you know DaVinci didn't like ink on his cuffs?
   So, he wrote his words in such a way,
   That not everyone could read the way they lay.
   Not only were the words from right to left,
   But too a mirror was needed to decipher the notes he left.
   Open your mind, you don't need to pray,
   So tell me now what does it say?

4. Now you seek a famous fresco he painted in Milan.
   That some in the world think is a con.
   But for those who believe, it shows a simple man
   Surrounded by 12 others, feasting while they can.

5. One more before the real problems begin.
   Make sure, my friend, you are not using a pen.
   This painting he painted is one we ALL know,
   And if you don't know it, you must be blinded by snow.
   Part of it's mystique is the smile that beams forth,
   Whether one views it from the south or the north.

6. Inventories of the wealthy patron family of de Medicis recorded art, weapons, clothes, and antiques. Values of each item were recorded in florins (currency of Renaissance Florence). According to the chart, what is the average value in florins of the items on the chart, rounded to the nearest whole number?



7. Rhetorical algebra has never really gone away. In a 16th century notebook, for example, one finds the following rule for computing the area of a triangle: for half the sum of the three sides subtract each side severally, multiply the half sum and the three remainders continually together, and the square root of the last product will be the area of the triangle. What is the name of the modern day rule that this represents?

8. As Leonardo was mixing two **equal capacity** jugs, he realized a very interesting concept. First he filled one jug with water and the other jug with wine. Then 2 gallons were taken from each jug and transferred into the other jug. Each jug then had its contents thoroughly mixed. Then he took 2 gallons again from each jug and again transferred it into the other jug. After doing all this, he realized the amount of wine in each jug was identical. What was the original capacity of each jug (in gallons)?

9. Leonardo loved to look at different designs. One day he helically wrapped a wire 10 times around a cylindrical tube of length 9 inches and outside circumference of 4 inches. The ends of the wire coincided with endpoints of a line segment on the lateral surface of the cylinder which gives the height of the cylinder. Find the length of the wire in inches.

10. Another design that he worked with involves the axes of symmetry of two right circular cylinders each of height 2-inches with radius r. The two cylinders overlap in such a way that the axes of symmetry intersect at right angles at the cylinders' geometric centers. What is the volume of the intersection of the two cylinders?

11. Interesting problems always intrigued Leonardo. Try simplifying this one:

$$\left(\frac{1\cdot 2\cdot 4+2\cdot 4\cdot 8+3\cdot 6\cdot 12+\ldots}{1\cdot 3\cdot 9+2\cdot 6\cdot 18+3\cdot 9\cdot 27+\ldots}\right)^{1/3}$$

12. Or this one: What square is the product of 4 consecutive odd integers?

13. As he rode a ferry across a river one day, Leonardo thought of this problem: Two ferry boats travel back and forth across a river with constant speeds, turning at the banks without loss of time. They leave from opposite shores at the same instant, meet for the first time 700 feet from one shore, continue on their ways to the opposite banks, return and meet for the second time 400 feet from the opposite shore. What is the width of the river, in feet?

14. If DaVinci walks to his shop in the morning and then rides a carriage back home, it takes him an hour and a half. When he rides a carriage both ways, it takes him 30 minutes. How many hours would it take him to make the round trip by walking?

15. When Leonardo reached a certain age he realized that if his age then was reduced by 7 and the remainder was multiplied by 7, the result is the same as when his same age then was reduced by 11 and the remainder was multiplied by 11. Find the age Leonardo had reached.

16. Probability always fascinated DaVinci. Find the probability that if each of the digits 0, 1, 2, …,9 are placed in random order, using each exactly once, in the blank spaces of:
    5 _ 3 8 3 _ 8 _ 2 _ 9 3 6 _ 5 _ 8 _ 2 0 3 _ 9 _ 3 _ 7 6,
    then the resulting number will be divisible by 396.

17. In Florence, 60% of the days are fair, 30% are rainy, and 10% are snowy. Leonardo realized that he got to his workshop on time 80% of the time when the weather was fair, 60% of the time on rainy days and 40% of the time when it snowed. If it is known that on a given day Leonardo arrived to his workshop on time, what is the probability that it was a rainy day?

18. As DaVinci sat in his studio one day he looked up where 2 walls and a ceiling met at right angles at some point P. He noticed a fly in the air one meter from one wall, eight meters from the other wall, and nine meters from point P. How many meters is the fly from the ceiling?

19. DaVinci often thought of the motion of helicopters and Ferris wheels. In one problem, a Ferris wheel with a radius of 20 feet revolves at the constant rate of one revolution per minute. How many seconds does it take a rider to travel from the bottom of the wheel to a point 10 vertical feet above the bottom?

20. Death fascinated DaVinci and he often thought of problems dealing with it. Here is an example. Suppose a man can be granted mercy after receiving a death sentence in the following way: He is given 18 white balls and 6 black balls. He must divide all balls among 3 boxes with at least one ball in each box. Then, blindfolded, he must choose a box at random and then select a ball from within this chosen box. He receives mercy only if the chosen ball is white. Assuming the man distributed the balls in the most favorable manner, what is the probability that he receives mercy (fraction form)?

21. Did you know that DaVinci originally designed a cube similar to the Rubik's cube? Suppose you take a 5 by 5 by 5 cube and paint all of its faces red, then cut it into 125 smaller cubes that are 1 by 1 by 1. The small cubes are then placed in a bag and thoroughly mixed. One is drawn at random and rolled like a die. What is the probability that a red face shows on the top side?

22. All vertices of a cube are colored such that no two vertices on the same edge of the cube are the same color. What is the minimum number of colors that are needed to color the vertices of the cube?

23. Consider a cube with each side having a length of 1 unit. The centers of each pair of faces of the cube sharing a common edge are connected to form a rectangular octahedron. What is the volume of this octahedron?

24. A cube with each side having a length of 4 cm is cut into individual 1 cm cubes. What is the number of these 1 cm cubes which are face-to-face with exactly four other 1 cm cubes?

25. 27 dots are arranged in a cube so that there is a dot at each corner, a dot at the midpoint of each edge, a dot in the center of each face, and a dot in the center of the cube. How many different sets of 3 dots lying in a straight line can be found?