

Some word problems

1. Someone gives you a sack with 24 pounds of nails and a balance with two pans (at equal length from the fulcrum). Explain, in words, how to measure out 9 pounds of nails.
2. Peter says, “The day before yesterday I was 10, but I will turn 13 next year.” Explain why this is or is not possible.
3. In a certain year, there were exactly four Mondays and four Fridays in January. What day of the week was January 20th?

(Hint: This problem has two parts. You have to explain why January 20th *could* have been the day you say it was, as well as why this is the *only* day it could possibly have been.)

Some visual problems

1. Show how to break the shape below into 4 pieces, each of which is similar to the original shape.
2. If 10 coins are arranged as below, what is the minimum number of coins that we need to remove so that no three of the remaining coins lie in an equilateral triangle?
3. The top of a dining room table is subdivided into 199×991 small squares. If a line is drawn from one corner to the opposite one, how many edges does it cross?
(Hint: Draw a picture for a version of this problem where the numbers aren't so huge!)

Some tactile problems

1. Is it possible to arrange 6 round pencils so that each pencil touches every other one?
(Hint: Try it!)
2. (*) Show how to hang a picture from two nails with one piece of wire in such a way that if *either* nail is removed, the picture falls to the ground while if both nails are left untouched, the picture hangs.
- 2'. (**) If you've seen this before (and you can still figure out the answer), try it for three nails.