(#6-1) We have a simple balancing scale with 2 trays (and no extra weights), and a set of ***N*** coins, which all look identical. We know that there is exactly one fake coin among them, and that it's either a little bit lighter, or a little bit heavier than a genuine coin. We would like to find out whether the fake coin is heavier or lighter than a genuine one, (note that we are not trying to find the actual coin itself) but we are only allowed to use the scale 2 times. Find all numbers ***N*** for which this can be done.

(#6-2) In a country there are 2004 towns, some are connected by airlines. You can fly from any town to any other town, maybe with some connections. However, all flights depart at the same time, once a day, so you can only take one flight per day. James Bond is trying to catch Dr. No. He can get him for sure if they arrive at the same town on the same day. Unfortunately for No, Bond has tagged him with a tracking device, so Bond always knows where No is. No never flies on Sundays (but Bond can). Prove that Bond can catch No sooner or later.

(#6-3) A man finishes work early, and so he takes the early train home, arriving at the train station one hour earlier than normal. He knows that his wife is planning to pick him up at the normal time, so he begins to walk home. His wife sees him on the road, and picks him up. They arrive home 20 minutes earlier than normal. How long was the man walking?

(#6-4) On a plane, there is 1 straight line (representing a brook) plus 2 points, both on the same side of the brook, representing a house and a barn. Every day a girl takes a bucket, walks from the house to the brook to get water, and then brings it to the horse who is in the barn. Draw the shortest path for her to walk (you may use a compass and a ruler).

(#6-5) A dentist has 3 patients waiting, but he has only 2 pairs of gloves left. He wants to treat all 3 patients, and he must use both of his hands while treating each patient. Is there a way to do it?

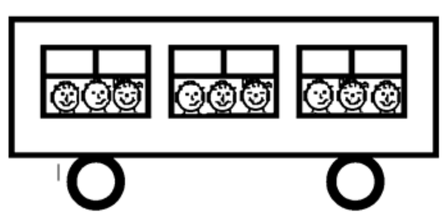
(#6-6) Pooh and Piglet are 1 mile apart. They start walking towards each other, each at 2 mph. At the same time Owl, who was sitting on Pooh's head, takes off and flies towards Piglet at 10 mph. As soon as he reaches Piglet, he turns around and flies towards Pooh, then back to Piglet, and so on, until Pooh and Piglet meet. Find the total distance Owl has flown.

(#6-7) Given 99 blank cards, we first write numbers 1, 2, …, 99 on them, one number per card. We then shuffle the cards, turn them upside down, and again write numbers 1, 2, …, 99 on them. Then, for each card, we add the 2 numbers written on it, and then multiply these 99 new numbers. Prove that the result is an even number.

(#6-8) You have 2 glasses of the same size, one with Coke, the other with milk. First, take a spoonful of Coke, add it to milk, and mix well. Then, take a spoonful (same amount as before) of this mixture, add it back to Coke, and mix well. Is there more milk in the Coke now, or more Coke in the milk?

(#6-9) There are 4 people in a family. If the daughter's salary is doubled, then total family income will increase by 5%. If, instead, Mom's salary is doubled, it would increase by 15%. If Dad's salary is doubled, it would increase by 25%. By what percentage would the total income increase if Grandpa's pension is doubled?

(#6-10) Below is a photo of a school bus in Boston, Massachusetts (the school is to the left, and children's homes are to the right). Can you tell what time it is, knowing that it is Monday, either 8 AM, or 3 PM ?



SCHOOL «-------------------- **---------------------» HOMES**

(#6-11) Is it possible to place 4 players on a football field so that the 6 distances between them would equal 1, 2, 3, 4, 5, and 6 yards?

(#6-12) In this game for 2 players, there are 99 stones arranged in a circle. To make a move, one must remove and discard either 1, or 2 stones. But, if one removes 2 stones, they must be adjacent to each other, with no gap between them ("adjacent" means they were adjacent since the beginning of the game). The player who removes the last stone, wins. Which player has a winning strategy? Same question if you start with 100 stones.

(#6-13) Tigger, Piglet, Pooh, and Eeyore came to a bridge. They have 1 flashlight. It's dark, so nobody can walk without the flashlight. Anyone can walk either alone, or together with another animal, but no more than 2 animals can walk together. It takes Tigger 1 minute to cross the bridge (walking either way); Piglet - 2 minutes; Pooh - 5 minutes; Eeyore - 10 minutes. Any 2 animals together walk at the speed of the slower one. Find the fastest way for them to cross the bridge.

(#6-14) A rectangular chocolate bar is divided by grooves into 10 x 12 little squares. Your task is to completely break it, along the grooves only, into 120 individual little square pieces. While you are doing it, at any given point, there would be several rectangular pieces on the table, and you are allowed to pick up any one piece only, then make only one complete straight cut along any groove you choose (to break that piece into 2 smaller pieces), then you put them back on the table. This counts as 1 move. What's the smallest number of moves you need to complete your task?

(#6-15) When the math teacher asked John to explain why he skipped the math class every day for the last 100 days, John wrote the following note:

There is 1 false statement in this note. There are 2 false statements in this note. There are 3 false statements in this note. There are 4 false statements in this note… … …

………… and so it went on and on, and it ended like this:

There are 98 false statements in this note. There are 99 false statements in this note. There are 100 false statements in this note.

What is the total number of false statements in John's note?

(#6-16) There are 3 boxes: one containing apples, the second one - oranges, the third - a mix of both apples and oranges. They are labeled “apples”, “oranges”, and “mix”, however, none is labeled correctly. You can remove one fruit at a time from any box. What’s the minimum total number you’d need to remove to figure out the contents of each box?

(#6-17) Give an example of 5 numbers the product of which does not equal 0, and such that if you subtract 1 from each number, then their product will remain the same.

(#6-18) On an island, $\frac{2}{3}$ of all men are married, and $\frac{3}{5}$ of all women are married. What percentage of the island’s population is married?

(#6-19) This 1-story 5-room house has 16 doors: exactly 1 door (“D”) in each of its 16 walls. Is it possible to start at some point, inside or outside the house, and then walk through each door exactly once, and finish at any point (not necessarily where you started; you may visit same room more than once, of course).

```
+------D------+------D------+
|             |             |
|             |             |
D             D             D
|             |             |
|             |             |
+---D---+--D--+--D-+----D---+
|       |          |        |
|       |          |        |
D       D          D        D
|       |          |        |
|       |          |        |
+---D--------D---------D----+
```

(#6-20) Imagine that you are color-blind (can't tell green from red). There are 24 identical red/green game pieces from the game "Reversi" (a.k.a. "Othello") on a table in front of you. These look the same as pieces used in Checkers, except one side of each is green, and the other side is red.

You know that 16 pieces are red-on-top, and the remaining 8 pieces are green-on-top. You are welcome to play with all the pieces for as long as you want. You may flip them, write on them, discard some, etc. Your task is to select 2 groups of pieces A and B (A and B together may contain any number of pieces - from 1 up to 24) so that the number of green-on-top pieces in A would be equal to the number of green-on-top pieces in B. Can you do it?

(#6-21) Are there any **n** for which there exists a set of **n** different points: A_1, A_2, A_3, ... A_n on a plane such that when you draw the following segments: A_1A_2, A_2A_3, A_3A_4, ..., $A_{(n-1)}A_n$, A_nA_1, then each of these segments would intersect another one of these segments at exactly 1 point?

(#6-22) John skipped a math class. The Principal gave him 2 baskets, 10 apples, and 10 lemons. John must place the fruits into the baskets in any way he wants. The Principal will then pick one fruit at random from one of the baskets, without looking. If it's an apple, then John can go home. If it's a lemon, he gets a detention. How should John arrange the fruits if no eating is allowed?

(#6-23) How many ways are there of spelling out "TATYANA" by traversing the following diamond, always going from one letter to an adjacent one?

```
      T
    A   A
  T   T   T
Y   Y   Y   Y
  A   A   A
    N   N
      A
```

(#6-24) 25 lazy students are standing in a single line, all facing the Math Teacher. The Math Teacher said: "Everybody turn to the left" after which some students turned to the left, some turned to the right, and some didn't move. Is it always true that the Math Teacher can now insert herself into the line in such a way that the numbers of students facing her on both of her sides will be the same?

(#6-25) A fuse (as in "a combustible cord for setting off an explosive") is called "regular" if its total burning time is exactly 1 hour. However, it may burn unevenly (faster in some places and slower in others). You have 2 regular fuses and matches. Can you measure a time period of exactly 45 minutes?

(#6-26) Pooh is going to walk from his home to the Piglet's house for a sleepover. He left home Friday at 6 pm and arrived at the Piglet's house at 8 pm. On Saturday, he left the Piglet's house at 6 pm, walked along the same path, and arrived home at 8 pm. Prove that there exists a point on his route such that he was at that point on Saturday at exactly the same time as on Friday.

(#6-27) There are 3 piles consisting of 5, 49, and 51 stones. At any point, you may either choose any two piles and combine them to make a single pile, or, instead, if there exists a pile with an even number of stones in it, then you may divide it into two equal piles. Is there a way to end up with 105 piles, each consisting of 1 stone?

(#6-28) In the state of Shmassachusetts, the total income earned by 10% of those people who have the highest income equals 90% of the total income of everyone in the state. Shmassachusetts is divided into several counties. If you select any 10% of the population of any given county, then their income will not exceed 11% of the total income of everyone in that county. Is this possible?

(#6-29) Five couples met at a party, and started hugging each other, except that nobody hugged his/her own partner. One of the five couples were the host and the hostess. At some point the host told everyone to stop hugging, and asked each of the nine people how many people they had hugged so far. Everyone gave a different answer. How many people had the hostess hugged?

(#6-30) Prove that for any prime $p \geq 7$ the number $p^4 - 1$ is divisible by 240.

(#6-31) There is a circle with 6 numbers placed along it. In the beginning, these numbers are:

```
  0  1
1      0
  0  0
```

In this solitaire game, you make a move by adding "1" to each of any 2 adjacent numbers. You win the game if you make all 6 numbers equal to 2004.

Can this game be won? Either describe the winning strategy, or prove that it is impossible to win.

(#6-32). A group of soldiers is assigned to guard a tent, which is a 1x1 yard square, during a dark night. Each soldier has a headlamp which illuminates a straight segment 100 yards long right in front of him. Once in position, the soldiers must remain still: they are not allowed to move, nor to turn their headlamps. Is it possible to place some finite number of soldiers so that the enemy won't be able to sneak in on either the tent, or on any soldier.

(#6-33) Pooh and Piglet are lost in a forest. Pooh is carrying 2 bags, one with black beans, the other - with white beans. They agreed in advance that if they were to become separated, then Pooh would walk in a straight line, and drop beans behind him. When Piglet finds Pooh's trail of beans, he wants to also be able to tell which way Pooh went (right or left), so he could then try and catch up with him. What is the shortest repeating binary pattern (white bean means "0", black one means "1") they can agree on which Pooh can use in order to communicate to Piglet in which direction Pooh was walking?

(#6-34) In a park, the distance between any two trees is less than the difference between their heights. The tallest tree is 100 ft. tall. Prove that you can build a fence around this park (to keep a bear out so he won't damage trees), the length of which is less than 200 ft. Note that the fence can be of any shape, as long as all trees are on the inside of the fence, so the bear can't get to any tree.

(#6-35) Prove that the following is never true for any set of 4 natural numbers a, b, c, and d: $\mathbf{3a^4 + 5b^4 + 7c^4 = 11d^4}$

(#6-36) Given a balancing scale with 2 trays and no extra weights, and 3 very large identical bottles. One of the bottles has 1 oz of water in it. How can you fill one bottle with exactly 85 oz of water from a garden hose if you are allowed to use the scale no more than 8 times?

(#6-37) On a sheet of paper, every point is painted in 1 of 3 colors. Prove that there exist 2 points of same color such that the distance between them equals 1 inch.

(#6-38) On a plane, there are 2 parallel straight lines (representing a brook) plus 2 points, on the opposite sides of the brook representing a house and a barn. Every day a girl takes a bucket, walks from the house to the brook to get water, and then brings it to the horse who is in the barn. When she reaches the brook, she always crosses it by the shortest possible route (which is a segment perpendicular to the brook's shores). Draw the shortest path for her to walk (you may use a compass and a ruler).

(#6-39) In the Martian language there are only two letters, **a** and **b**, and it is postulated that the letter **a** is a word. Furthermore, all additional words are formed according to the following rules:

(A) Given any word, a new word can be formed from it by adding a **b** at the right hand end.

(B) If in any word a sequence **aaa** appears, a new word can be formed by replacing **aaa** by the letter **b**.

(C) If in any word a sequence **bbb** appears, a new word can be formed by omitting **bbb**.

(D) Given any word, a new word can be formed by writing down the sequence that constitutes the given word twice.

For example, by (D), **aa** is a word, and by (D) again, **aaaa** is a word. Hence by (B) **ba** is a word, and by (A), **bab** is also a word. Again, by (A), **babb** is a word, and so by (D), **babbbabb** is also a word. Finally, by (C) we find that **baabb** is a word.

Prove that in this language **baabaabaa** is not a word.

(#6-40) There are 20 trees arranged in a straight line, and on each of them there sits 1 bird. Every minute 2 of the birds take off and each of them lands on a tree next to the one where it sat before. However, the 2 birds always fly in the opposite directions (one to the right, the other one to the left). Can all 20 birds eventually gather together on the same tree?

(#6-41) An 8x8 chessboard is empty except for 2 pawns which occupy 2 diagonally opposite corners (A1 and H8). You also have 31 dominos of the size 2x1. Is it possible to completely cover the rest of the chessboard with these dominos by placing each on some 2 adjacent squares?

(#6-42) Let **A** be some set of ten two-digit natural numbers. Prove that one can always find 2 subsets of **A**, each consisting of 2 or more numbers, so that if one adds up all numbers within each of these subsets, these 2 sums will be the same.

(#6-43) There is a set of dominos glued to a flat surface; they do not overlap. 2 dominos are called “adjacent” if they touch each other along parts of their borders (at more than 1 point). Let’s call a coloring of a set of dominos “regular” (with each domino painted with a single color) if any 2 adjacent dominos are painted with different colors. Give an example of such a set which cannot be regular-colored using 3 colors.

(#6-44) We have 31 sets; each consists of exactly 6 elements; the union of any 2 of them consists of exactly 11 elements. What could be the number of elements in the union of all 31 sets? (Find all possible answers.)

(#6-45)) A pool table is a square, each side is 1 yard long. It has 4 holes: 1 in each corner. Going clockwise, the corners are named A, B, C, and D. A ball is positioned at corner A. You need to shoot the ball in such a way that it would bounce off point E on side BC, than bounce off point F on side CD, than bounce off point G on side DA, than fall into hole at corner B. Where should you aim? (Which means - you need to find exactly where the point E should be).

(#6-46) This is a true story: My son David said he needed to check if 97 was a prime number. He said: “I checked and found that it’s not divisible by 2, 3, 5, and 7. And since $11^2>97$, I concluded that I don’t need to look for any other divisors, therefore 97 is a prime”. Then I said: “I am not so sure about that rule of yours that says you can stop looking for divisors after you checked 7, because, you said, the square of the next prime number, which in this case is 11, is greater than 97. Look, if you wanted to check if 99 was a prime, for example, instead of 97, and followed the same logic and didn’t check 11, you would make a mistake, because 99 is divisible by 11”. Explain what’s going on here.

(#6-47) On an infinite sheet of graph paper where the size of each square is 1x1, an infinite set of 2x1 dominos is placed so that each domino covers 2 cells and every 1x1 cell is covered. Can this be done in such a way that for every grid line there would exist only a finite set of dominos which are cut in half by that line?

(#6-48) A 10x20 table is filled with 200 different numbers. First, in each row, we take 2 greatest numbers and circle them. Then, in each column, we take 2 greatest numbers and highlight them. Prove that there exist at least 3 numbers, each of which is both circled and highlighted.

(#6-49) As people were arriving at a party, each person who just came in hugged some other people. Prove that at any given moment, the number of people who have hugged an odd number of times is an even number.

(#6-50) 2 different numbers x and y (not necessarily integers) are such that $x^2-2004x = y^2-2004y$. Find the number $x+y$.

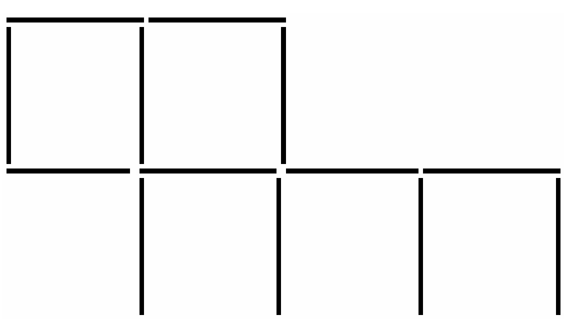
(#6-51) Prove that among 5 consecutive natural numbers there always exists at least 1 number which is relatively prime with each one of the other 4 numbers.

(#6-52) An "8x8" chessboard is empty except for a single pawn in a corner. You also have 21 "3x1" rectangles called “triminos”. Is it possible to cover the rest of the board with them (each trimino occupying 3 adjacent squares)?

(#6-53) There is $500 in Pooh’s bank account. He has no other money, but he has an ATM card. The ATM machine offers a choice of only 2 transactions: either withdraw $300, or deposit $198, and it won’t allow you to overdraw the account, but there is no limit on the number of transactions. What is the maximum amount Pooh can withdraw?

(#6-54) Is it possible to put a sequence of 100 points on the plane (first put the first one, then the second one, and so on) so that no 3 of them would belong to the same straight line, and so that at any moment the current set of points would have a line of symmetry?

(#6-55) Move 2 sticks to make 4 equal squares, with no left-over sticks. Find all possible solutions.



(#6-56) You have a set of 11 coins, the weight of each in grams is a natural number. If you remove any 1 of the 11 coins, then the remaining 10 coins can be divided into 2 groups of 5 coins each, so that the weights of these 2 groups would be equal. Prove that all 11 coins have the same weight.

(#6-57) 64 students are arranged as a square: 8 rows and 8 columns. First, in each row, the tallest student is selected (and if there are several tallest ones who have the same height, then one of these is chosen at random), and the shortest of these 8 is named The Shortest Tall (ST). Then, from each column, the shortest student is selected, and the tallest one of these 8 is named The Tallest Short (TS). Which statements are true:
(A) ST is never shorter than TS.
(B) ST is never taller than TS.
(C) ST and TS are always the same height.
(D) ST can be either shorter, or taller, or the same height as TS.

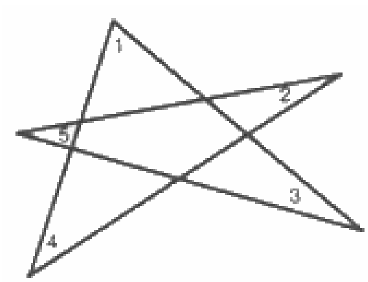
(#6-58) In this infinite number triangle, each number equals the sum of 3 numbers in the previous row (the one which is right above it, plus its 2 neighbors).

```
      1
    1 1 1
  1 2 3 2 1
1 3 6 7 6 3 1
.................
```

Prove that there is at least 1 even number in every row (except for the first 2 rows, of course).

(#6-59) Pooh poured himself a cup of coffee, then drank $\frac{1}{2}$ of the cup, then topped it off with milk, stirred it, then drank $\frac{1}{3}$ of the cup, then topped it off with milk, stirred it, then drank $\frac{1}{6}$ of the cup, then topped it off with milk, stirred it, then drank up the whole cup. Find the ratio of the amounts of coffee and milk that he had drunk.

(#6-60) Find the sum of the 5 internal angles of a 5-angled star:



(#6-61) Each natural number is assigned 1 of 2 colors: blue or red. Prove that there exists a color, such that for every natural k there exist an infinite number of natural numbers of that color which are divisible by k .

(#6-62) In a deck of 52 cards, some cards are positioned face-up, and others are face-down. From time to time, the player selects such contiguous part of this deck (a set of 1 or more adjacent cards) in which both the top and the bottom cards are currently positioned face-up (if there is only 1 card in that set, then it must be face-up). He then slides this entire set out, turns it upside-down as one piece (without moving or flipping individual cards), and then re-inserts it back into the exact spot in the deck where he removed it from. Prove that no matter how he plays, eventually (after a finite number of moves) the game will end (meaning: all cards in the deck will be positioned face-down, so it won't be possible to make another move).

(#6-63) Is it possible to replace each "±" in the following equalities with either a "+" or a "–" to get correct equalities? :

$$1 \pm 2 \pm 3 \pm 4 \pm 5 \pm 6 \pm 7 \pm 8 \pm 9 = 20$$

$$1 \pm 2 \pm 4 \pm 8 \pm 16 \pm 32 \pm 64 = 27$$

(#6-64) Given an equilateral triangle ABC and a point X, let $\mathbf{f}$(X) be the sum of the 3 distances from X to the triangle's sides AB, BC, and CA. Prove that for any 2 points Y and Z which both lie inside the triangle ABC, $\mathbf{f}(Y)= \mathbf{f}(Z)$.

(#6-65) In a class of 16 students there are at least 2 students who have different eye color. There are also at least 2 students who have different hair color. Prove that there are at least 2 students who have both different eye color and different hair color.

(#6-66) Given 3 natural numbers **a, b, c**, and $p=b^c+a$, $q=a^b+c$, $r=c^a+b$. All 3 numbers **p, q**, and **r** are primes. Prove that among numbers **p, q**, and **r** at least 2 are equal to one another.

(#6-67)) reserved for olympiad as of 5-6

(#6-68) A farmer brought 9 cows to a pasture and they ate all the grass in 6 days. If he had brought 8 cows instead, they would have eaten all the grass in 9 days. What's the maximum number of cows that can feed on this pasture forever, while the grass is growing?

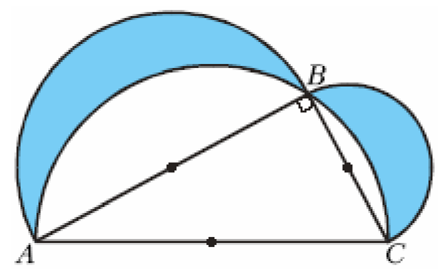
(#6-69) Starting with 2 decks of playing cards, each containing 36 cards, each of which has been shuffled, we place one of them on top of the other, and then find the number of cards between each pair of identical cards in these 2 decks (for example, we count how many cards are between the ace of spades of the top deck and the ace of spades of the bottom deck, and so on). We then add up all these 36 numbers. Find the result.

(#6-70) Find the smallest natural numbers a and b such that $b>1$ and $\sqrt{a\sqrt{a\sqrt{a}}} = b$

(#6-71) Piglet asked Pooh: “What’s the number of your house?” Pooh said: “If you add up all 6 possible 2-digit numbers that you can form from it, then half of that sum will be the number of my house”. What’s the number of Pooh’s house?

(#6-72) Find all natural n such that the absolute value of $n^2–7n+10$ is a prime number.

(#6-73) Prove that the sum of areas of 2 shaded crescents is equal to the area of the right-angled triangle ABC (the 3 shown middle points of the triangle’s sides are the centers of the 3 circles).



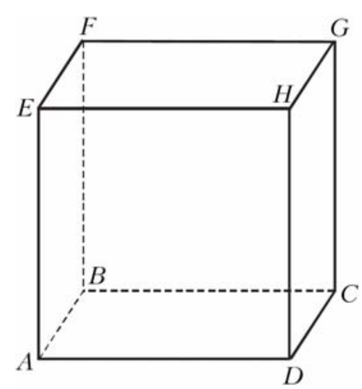
(#6-74) Pooh wrote down this fraction: $\frac{10}{97}$. Piglet may do several operations with it: at each step, he may either

(1) add the same natural number to both the numerator and to the denominator; or

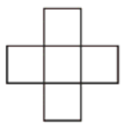
(2) multiply both the numerator and the denominator by the same natural number.

Will Piglet be able to get a fraction which is equal to (A) $\frac{1}{2}$; (B) 1 ?

(#6-75) There is a natural number placed at each of the 8 vertices of a cube. The difference between numbers at any 2 neighbors (vertices connected by an edge, like A and B) is not greater than 1. Prove that there exists a pair of opposite vertices (such as A and G, for example) such that the difference between numbers at them is also not greater than 1.

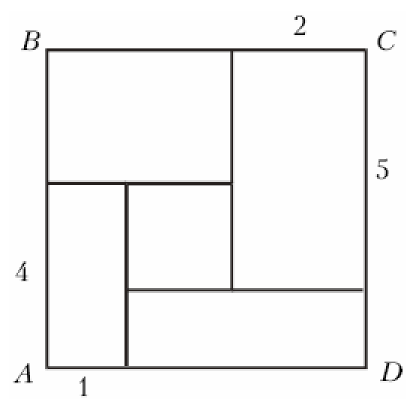


(#6-76) Tigger, Piglet, Pooh, and Eeyore are at Pooh's house. They are going to the Piglet's house which is 33 miles away. They have a 2-seat scooter which rides at 25 miles per hour with 1 rider on it; or, at 20 miles per hour with 2 riders. Each of the 4 friends walks at 5 miles per hour. Prove that all 4 of them can make it to the Piglet's house in less than 3 hours.

(#6-77) On an infinite sheet of graph paper each cell is assigned 1 of 5 colors. In every figure of this type  all 5 colors are different. Prove that in any figure of this type  all 5 colors are also different.

(#6-78) There is a sequence of 2005 numbers, where the first number equals 1. Every number, except for the first one and the last one, is equal to the sum of its 2 neighbors. Find the last number.

(#6-79) The big square is cut into 4 rectangles and the small square. The sizes of 2 of the rectangles are, as shown, 1x4 and 2x5. Find the length of the side of the small square.



(#6-80) You may change a table of numbers by either (A) swapping places of any 2 of its rows, or (B) swapping places of any 2 of its columns. Is it possible to apply a sequence of (A) and (B) steps to one of these tables so that it would become the other one?

1	2	3
4	5	6
7	8	9

1	2	3
6	5	4
7	8	9

(#6-81) At sunrise, Piglet started walking from his house towards Pooh's house. At the exact same moment, Pooh started walking from his house towards Piglet's house, along the same path, each walking at a constant speed. They passed each other at Noon, and each continued walking without stopping. Piglet arrived at Pooh's house at 4 PM. Pooh arrived at Piglet's house at 9 PM. At what time did the sunrise happen?

(#6-82) On the board, there were several points marked on a straight line. A teacher put one additional point between every two points which were neighbors (meaning there were no other points between them). Then she repeated this procedure 2 more times (that's a total of 3 times). There were now 113 points. How many points were there in the beginning?

(#6-83) In a sequence of 100 numbers $\{ a_1, a_2, \ldots, a_{100} \}$ half of the numbers are written with a blue pencil, the rest – with a red one. The sequence of all blue numbers (which is what would be left if one erased all red numbers) is in fact the set of all numbers from 1 to 50, written in ascending order. The sequence of all red numbers is also the set of all numbers from 1 to 50, but written in descending order. Prove that the first half of the entire sequence $\{ a_1, a_2, \ldots, a_{50} \}$ contains all numbers from 1 to 50.

(#6-84) While trick-o-treating, Pooh collected a total of 30 items. He noticed that no matter how he selected 12 of these items, there was always at least 1 truffle among them. He also noticed that if he selected any 20 of his items, then at least one of those would be a bubble gum. How many truffles did he have?

(#6-85) Pooh has 3 coconuts. There is a Tree which has branches on different Levels, and Pooh numbered all these Levels in order, starting at the ground which he called "Level #1", and then going upwards. He then took 1 of his coconuts and climbed the Tree up to Level #11, where he accidentally dropped his coconut, and it broke as it hit the ground. Now Pooh decided he wanted to find the highest possible Level from which a coconut can be dropped without breaking. He is going to try and drop some more coconuts (note, he has 2 of them left) from some Levels. Note, if a coconut falls and doesn't break, then Pooh can use it again. Can he find the answer by making no more then 4 drops (not counting the very first one which, as you may recall, fell from Level #11 by accident)?

(#6-86) In a game for 2 players, in which they alternate making moves, each move consists of adding 1 pawn to an 8x8 board (which is empty in the beginning). There must never be more than 2 pawns in any column, nor in any row. The player who cannot make his next move loses. Which player has a winning strategy?

(#6-87) We have a simple balancing scale with 2 trays (and no extra weights), and a set of 15 coins, which all look identical. We know that there is exactly one fake coin among them, and that it's either a little bit lighter, or a little bit heavier than a genuine coin. We also know that coin #1 is genuine. Can you find the fake coin by using the scales no more then 3 times?

(#6-88) I the English language every word must have at least 1 vowel. We consider sequences of words which start with the word DOCK, and in which in any 2 neighboring words exactly 1 letter is different, and such that the last word is SHIP. Here is an example: DOCK, LOCK, LOOK, LOOT, SOOT, SLOT, SLOP, SLIP, SHIP. Prove that in any such sequence there exists at least 1 word which has 2 vowels.

(#6-89) Pooh came to a party at Piglet's house, and brought a barrel with 18 gallons of wine in it. Also, Eeyore came and brought two empty 7-gallon buckets and one empty 4-gallon pot. How can they divide the wine into 3 equal portions (so as to end up with 6 gallons in the barrel, and 6 gallons in each of the two buckets)?

(#6-90)