Logic Puzzles I.

BULBS

This is one of my most favorite logic puzzles.
Imagine you are in a room with 3 switches. In adjacent room there are 3 bulbs (all are off at the moment), each switch belongs to some bulb. It is impossible to see from one room to another. How can you find out, which switch belongs to which bulb, if you may enter the room with bulbs only once?

BALL IN A HOLE

A table tennis ball fell into a tight deep pipe. The pipe was only a bit wider then the ball, so you can not use your hand. How would you take it out, with no damage?

THE MAN IN THE ELEVATOR

A man lives on the tenth floor of a building. Every morning he takes the elevator down to the lobby and leaves the building. In the evening, he gets into the elevator, and, if there is someone else in the elevator - or if it was raining that day - he goes back to his floor directly. Otherwise, he goes to the seventh floor and walks up three flights of stairs to his apartment. Can you explain why it is so?
(This is probably the best known and most celebrated of all lateral thinking puzzles. It is a true classic. Although there are many possible solutions which fit the initial conditions, only the canonical answer is truly satisfying.)

BALL

How can you throw a ball as hard as you can and have it come back to you, even if it doesn't hit anything, there is nothing attached to it, and no one else catches or throws it?

MAGNET

This is one of logic puzzles published in the Martin Gardner's column in the Scientific American.
You are in a room where there are no metal objects except for two iron rods. Only one of them is a magnet. How can you identify this magnet?

CASTLE

A square medieval castle on a square island was under siege. All around the island, there was 10 metres wide water moat. But the conquerors could make foot-bridges only 9.5 metres long. Nevertheless a wise man was able to figure out how to get over the water. What do you think was his advice?
(There's a place on the other side to put the bridge against, not just a sheer wall. Water moat has square corners - that section of the moat is about 14.1 metres wide.)

BIOLOGY

Let's say some primitive organisms divide themselves every minute in two equals which also divide the next minute and so on. The saucer in which we started observing this process was full at 12.00. When was it full to the half?

SHEIKH'S HERITAGE

An Arab sheikh tells his two sons to race their camels to a distant city to see who will inherit his fortune. The one whose camel is slower will win. The brothers, after wandering aimlessly for days, ask a wise man for advise. After hearing the advice they jump on the camels and race as fast as they can to the city. What does the wise man say?

PHILOSOPHER'S CLOCK

It is an old logic puzzle. One philosopher had a clock, which he had forgotten to wind up. He had no other clock, watch, radio, TV, phone or any other device telling the time. So when his clock stopped he went to a friend, stayed there the whole night and when he came home, he knew the right time. How could he know?

MASTERS OF LOGIC PUZZLES I. (DOTS)

Three masters of logic wanted to find out, who is the wisest one. So they invited the grand master, who took them into a dark room and said: „I will paint each one of you a red or a blue dot on forehead. When you walk out and you will see at least one red point, hands-up. Who says what colour is the dot on his own forehead as first, wins." Then he painted only red dots on every one. When they went out everybody had their hands up and after a while of killing thinking one of them said: „I have a red dot on my head."
How could he be so sure?

MASTERS OF LOGIC PUZZLES II. (HATS)

The two losing masters wanted a riposte, and so the grand master showed 5 hats, two white and three black. Then he said: „I will turn off the light and put each of you a hat on a head and I hide the other hats. When I turn on the light you will have equal chances to win. Each of you will see the hats of the two others, however not his own. The first one saying the colour of his hat will win." Then before he could turn off the light, one of the masters (the same one again) guessed, what the colour of his hat will be.
What hat should it have been and how did he know?

MASTERS OF LOGIC PUZZLES III. (STAMPS)

Eat this. The grand master takes a set of 8 stamps, 4 red and 4 green, known to the logicians, and loosely affixes two to the forehead of each logician so that each logician can see all the other stamps except those 2 in the moderator's pocket and the two on her own head. He asks them in turn if they know the colors of their own stamps: A: "No." B: "No." C: "No." A: "No." B: "Yes."
What are the colors of her stamps, and what is the situation?

HEAD BANDS

Three white men were taken captive by a hostile Indian tribe. The chieftain was willing to let them go so he took them to a tepee, where there was no light. He put one head band on each head of them (he had 3 white and 2 red - so 2 head bands were not used). Then they went out in a queue so that each man saw the head-band of those standing in front of himself (the first one did not see any head band, the second one saw the first one's head band, and the third one saw the head bands of the two others). If somebody had said the colour of his head-band, they all would have been free. After a quiet while one of them said: „My head-band is ...".
What colour was his head band? And how would you reason it?

CHRISTMAS TREE

There were 4 angels on a Christmas tree (besides other frou-frou). Two had a blue aureole and two yellow, however none of them can see behind his head. Angel A is on the highest place and he can see angels B and C, which hang below him. Below hangs angel B, that can see only angel C under him. Angel C can't see anybody, because angel D hangs under a twig (nobody can see him and he can not see anyone either).
Which one of them will be the first to guess, what his own aureole is?

Logic Puzzles II.

BRICK
An old riddle is as follows: One brick is one kilogram and half a brick heavy. How heavy is one brick?
(This is a typical elementary math brain teaser.)

STRANGE COINS
I have two US coins totaling 55 cents. One is not a nickel. What are the coins?

WHAT IS CORRECT
Is it correct seven and five *is* thirteen or seven and five *are* thirteen?

TRAINS
A train leaves New York for Boston. Five minutes later another train leaves Boston for New York, having a double speed. Which train will be closer to New York, when they encounter?

FLY
Two trains 200 km from each other are moving at the speed of 50 km/hour to encounter. From one train a fly takes off, flying straight (upon the rails) to the other train at the speed of 75 km/hour, bounces away from it and flies back to the first train. This is repeated till the trains crash to each other and the fly is smashed.
What distance is the fly able to fly until its judgement moment?
(There is a complicated and an easy way to solve this math brain teaser.)

SPEEDING UP
If I go half a way to the town at the speed of 30 km/hour, how fast do I have to go for the rest of the way to have the average speed of the entire way 60 km/hour?

WIRED EQUATOR
Perimeter of the globe is approximately 40 000 km. If we made a circle of wire around the globe, that is only 10 metres (so 0,01 km) longer than the perimeter of earth, could a flea, a rabbit or even a man creep under it?

DIOPHANTUS
We know a little about this Helen mathematician from Alexandria (called father of algebra) except that he lived about year 250 B. C. Due to one admirer of him, who described his life by the means of an algebraic riddle (math brain teaser), we know at least something about his life.
Diophantus's youth lasted 1/6 of his life. He had the first beard in the next 1/12 of his life. At the end of the following 1/7 of his life Diophantus got married. Five years from then his son was born. His son lived exactly 1/2 of Diophantus's life. Diophantus died 4 years after the death of his son.
How long did Diophantus live?

AHMES'S PAPYRUS
About 2000 years B. C. there lived Ahmes, a royal secretary and mathematician of the Pharaoh Amenemhat III. In year 1853 an Englishman Rhind found one of Ahmes's papyruses near the temple of Ramses II. in Thebes. The papyrus is a rectangle 33 cm wide and about 5 m long. There is the following math brain teaser on it (besides others).
100 measures of corn must be divided among 5 workers, so that the second worker gets as many measures more than the first worker, as the third gets more than the second, the fourth more than the third and the fifth more than the fourth. The first two workers shall get seven times less measures of corn than the three others.
How many measures of corn shall each worker get?

MIDNIGHT
If it were two hours later, it would be half as long until midnight as it would be if it were an hour later. What time is it now?

CLOCK
On every clock we can see that at noon the hour, minute and second hand correctly overlay. In about one hour and five minutes the minute and hour hand will overlay again. Can you calculate the exact time (to a millisecond), when it will occur and what angle they will contain with second hand?

RESERVOIR

One reservoir has four taps. Using the first takes two days to saturate the reservoir, the second tap three days, the third four days and the last one 6 hours. What time will it last to fill the reservoir using all 4 taps at once?

CAR

A military car carrying an important letter must cross a desert. There is no petrol station on the desert and the car has space only for petrol that lasts to the middle of the desert. There are also other cars that can transfer their petrol into one another.
How can the letter be delivered?

AEROPLANE

There is only one airport on a fictional planet, and that is on the north pole. There are only 3 aeroplanes and lots of fuel at the airport. Full tank of an aeroplane lasts exactly to fly to the south pole, however the aeroplanes can transfer their fuel among one another.
Your mission is to fly round the globe with at least one aeroplane (above the south pole) and in the end all aeroplanes must be OK back at the airport.

BELT

A magic rectangular belt always shrinks its length to 1/2 and width to 1/3 whenever its owner wishes something. After three such wishes, its surface was 4 cm^2. What was the original length, if the original width was 9 cm?

BALDYVILLE

There are following conditions in Baldyville:

1. No two inhabitants have the same number of hair on their head.
2. No inhabitant has exactly 518 hairs.
3. There live more inhabitants than any inhabitant's hair in the town .

What is the highest possible number of inhabitants?

JOSEPHINE

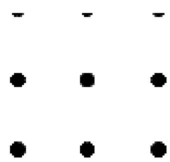
The recent expedition to the lost city of Atlantis discovered scrolls attributed to the great poet, scholar, philosopher Josephine. They number eight in all, and here is the first.
The kingdom of Mamajorca, was ruled by queen Henrietta I. In Mamajorca women have to pass an extensive logic exam before they are allowed to get married. Queens do not have to take this exam. All the women in Mamajorca are loyal to their queen and do whatever she tells them to. The queens of Mamajorca are truthful. All shots fired in Mamajorca can be heard in every house. All above facts are known to be common knowledge.
Henrietta was worried about the infidelity of the married men in Mamajorca. She summoned all the wives to the town square, and made the following announcement. "There is at least one unfaithful husband in Mamajorca. All wives know which husbands are unfaithful, but have no knowledge about the fidelity of their own husband. You are forbidden to discuss your husband's faithfulness with any other woman. If you discover that your husband is unfaithful, you must shoot him at precisely midnight of the day you find that out."
Thirty-nine silent nights followed the queen's announcement. On the fortieth night, shots were heard. Queen Henrietta I is revered in Mamajorcan history.

WHY 1 = 2

Where is the mistake in these mathematical equations?

$$x = 2$$
$$x(x-1) = 2(x-1)$$
$$x^2-x = 2x-2$$
$$x^2-2x = x-2$$
$$x(x-2) = x-2$$
$$x = 1$$

OPEN POLYGON
Join all 9 dots creating an open polygon with four lines.



Logic Puzzles III.

PEARS
There are a few trees in a garden. On one of them, on a pear-tree, grow pears (quite logical). But after a stronger wind blew, there were neither pears on the tree nor on the ground. How come?

APPLES
A basket contains 5 apples. Do you know how to divide them to 5 kids so that each one has an apple and one apple stays in the basket?

SACK
A poor farmer went to a market to sell some pea and lentil, however as he had only one sack and didn't want to mix peas and lentils, he poured in the sack the peas at first, bound the sack up and than poured in the lentils. At the market a rich innkeeper wanted to buy the peas, but he did not want the lentils.
How would you solve this problem if you had only the sack of innkeeper, which he wants to keep (without devaluing the goods).

MARINE
Captain of a big ship was telling this interesting story: "Once a saw two marines standing on the opposite sides of the ship. One was looking to the west and the other one to the east. And they saw each other very well."
How can be that possible?

SHIP LADDER
A ship anchored in a port has a ladder (beginning and ending with a tave), where the bottom tave touches water. Distance between taves is 20 cm and length of the ladder is 180 cm. Tide is raising water at the speed of 15 cm each hour.
When will be the water on the third tave from above?

HOTEL BILL
Three people check into a hotel. They pay $30 to the manager and go to their room. The manager finds out that the room rate is $25 and gives $5 to the bellboy to return. On the way to the room the bellboy reasons that $5 would be difficult to share among three people so he pockets $2 and gives $1 to each person. Now each person paid $10 and got back $1. So they paid $9 each, totalling $27. The bellboy has $2, totalling $29.
Where is the remaining dollar?

HOTEL
13 people came into a hotel with 12 rooms and everybody wanted his own room. The bellboy solved this problem.
He asked the thirteenth guest to wait a moment with the first guest in room number 1. So in the first room there were two people. The bellboy took the third guest to room number 2, the fourth to number 3, ... and the twelfth guest to room number 11. Then he returned to room number 1 and took the thirteenth guest to empty room number 12.
So everybody has his own room?

PUZZLING PRATTLE (BY SAM LOYD)
Two children, who were all tangled up in their reckoning of the days of the week, paused on their way to school to straighten matters out. "When the day after tomorrow is yesterday," said Priscilla, then 'today' will be as far from Sunday as that day was which was 'today' when the day before yesterday was tomorrow!"
On which day of the week did this puzzling prattle occur?

TWINS
Two girls are born to the same mother, on the same day, at the same time, in the same year and yet they're not twins. How can this be?

PHOTOGRAPH
I am looking at somebody's photo. Who is it I am looking at, if I don't have any brother or sister and father of that man on the photo is the son of my father?

ONE-WAY STREET
A girl who was just learning to drive went down a one-way street in the wrong direction, but didn't

break the law. How come?

COST OF WAR

Here's a variation on a famous puzzle by Lewis Carroll, who wrote Alice's Adventures in Wonderland.
A group of 100 soldiers suffered the following injuries in a battle: 70 soldiers lost an eye, 75 lost an ear, 85 lost a leg, and 80 lost an arm.
What is the minimum number of soldiers who must have lost all 4?

BAVARIAN

Having 2 glasses, in one is 10 cl of tonic and in the other 10 cl of fernet. Overspill 3 cl of tonic to the glass with fernet and after thorough mixing overspill 3 cl of the mixture back to the glass with tonic. Is it now more tonic in the glass of fernet or more fernet in the glass of tonic?
(Ignore chemical composition!)

JUST IN TIME

What occurs once in every minute, twice in every moment, yet never in a thousand years?

THE SHORT ONES

- Why can't a man living in the USA be buried in Canada?
- Is it legal for a man in California to marry his widow's sister? Why?
- A man builds a house rectangular in shape. All sides have southern exposure. A big bear walks by, what color is the bear? Why? (similar to the Bear riddle in the section **Einstein's Riddles (einsteins-riddles.htm)**)
- If there are 3 apples and you take away 2, how many do you have?
- How far can a dog run into the woods?
- One big hockey fan claimed to be able to say the score before any game. How did he do it?
- You shall start fire if you have alcohol, petrol, kerosene, paper, candle, coke, full matchbox and a piece of cotton wool. What is the first thing you light?
- Why do Chinese men eat more rice than Japanese men?
- What word describes a woman who does not have all her fingers on one hand?

Logic Problems

HONESTANTS AND SWINDLECANTS I.
These are typical ***logic problems*** which can be solved by using classic logic operations.
There live two kinds of people on a mysterious island. There are so called Honestants who speak always the truth, and the others are Swindlecants who always lie in everyone's throat.
Three fellows (A, B and C) are having a quarrel at the market. A gringo goes by and asks the A fellow: "Are you an Honestant or a Swindlecant?" The answer is incomprehensible so the gringo asks B: "What did A say?" B answers: "A said that he is a Swindlecant." And to that says the fellow C: "Do not believe B, he is lying!" Who is B and C?

HONESTANTS AND SWINDLECANTS II.
Afterwards he meets another two aborigines. One says: "I am a Swindlecant or the other one is an Honestant." Who are they?

HONESTANTS AND SWINDLECANTS III.
Our gringo displeased the sovereign with his intrusive questions and was condemned to death. But there was also a generous chance to save himself by the means of solving the following logic problem. The gringo was shown two doors - one leading to scaffold and the second one to freedom (both doors were the same) and only door guards knew what was behind the doors. The sovereign let the gringo put one question to one guard. And because the sovereign was an honest man he warned that exactly one guard is a Swindlecant.
What question can save the gringo's life?

HONESTANTS AND SWINDLECANTS IV.
Our gringo was lucky and survived. On his way to the pub he met three aborigines. One made this statement: "We are all Swindlecants." The second one concluded: "Just one of us is an honest man." Who are they?

HONESTANTS AND SWINDLECANTS V.
In the pub the gringo met a funny guy who said: "If my wife is an Honestant, then I am Swindlecant." Who is this couple?

HONESTANTS AND SWINDLECANTS VI.
When the gringo wanted to pay and leave the pub, the bartender told him how much his drink costed. It was quite much money, so he asked the bartender if he speaks the truth. But the gringo did not hear the whispered answer so he asked a man sitting next to him about it. And the man said: "The bartender said yes, but he is a big liar." Who are they?

HONESTANTS AND SWINDLECANTS VII.
Going out of the pub, the gringo heard about a fantastic buried treasure. He wanted to be sure so he asked another man who replied:
"What, on this island is a treasure, only if I am an honest man."
So shall he go and find the treasure?

HONESTANTS AND SWINDLECANTS VIII.
Thinking about the treasure, the gringo forgot what a day it was, so he asked four aborigines and got these answers:
A: Yesterday was Wednesday.
B: Tomorrow will be Sunday.
C: Today is Friday.
D: The day before yesterday was Thursday.
Because everything you need to know is how many people lied, I will not tell. What day in week was it?

HONESTANTS AND SWINDLECANTS IX.
After a hard day the gringo wanted some time to relax. But a few minutes later two aborigines wanted to talk to him. To make things clear, the gringo asked: "Is at least one of you an honestant?" After the answer, there was no doubt. Who are they and who answered?

HONESTANTS AND SWINDLECANTS X.
There was a girl on this island, and everybody wanted her. However, she wanted just a rich swindlecant. If you were a rich swindlecant, how would you convince her saying only one sentence. And what if she wanted a rich honestant (and if you were one). Let us assume for this logic problem

that there are only rich or poor people on the island.

LOGIC PROBLEMS AT THE COURT I.

And now a few cases from the island of honestants and swindlecants. A prisoner at the bar was allowed to say one sentence to defend himself. After a while he said: "A swindlecant committed the crime." Did it rescue him?

LOGIC PROBLEMS AT THE COURT II.

Two truthful lawyers had the following conversation.
Plaintiff: "If the prisoner is guilty, then he had an accomplice."
Solicitor: "That's not truth!"
Did the solicitor help his client?

LOGIC PROBLEMS AT THE COURT III.

This time you are one of inhabitants of the island. There was committed a crime and people think you did it. At the court you can say only one sentence to rescue your life. So what do you say?

- If you were a swindlecant (the court does not know that) and you were innocent. It is known that a swindlecant did it.
- The same situation but you are guilty.
- If you were an honestant (the court does not know that) and you were innocent. It is known that an honestant did it.
- If you were innocent and everybody knows that the one who did it is not normal. Normal people sometimes lie and sometimes speak the truth. What sentence, no matter if you were an honestant, a swindlecant or normal can prove your innocence?

PANDORA'S BOX I.

Once upon a time, there was a girl named Pandora, who wanted a bright groom so she made up a few logic problems for the wannabe. This is one of them.
Based upon the inscriptions on the boxes (none or just one of them is true), choose one box where the wedding ring is hidden.

Golden box	Silver box	Lead box
The ring is in this box.	The ring is not in this box.	The ring is not in the golden box.

PANDORA'S BOX II.

And here is the second test. At least one inscription is true and at least one is false. Which means the ring is in the...

Golden box	Silver box	Lead box
The ring is not in the silver box.	The ring is not in this box.	The ring is in this box.

LION AND UNICORN I.

Alice came across a lion and a unicorn in a forest of forgetfulness. Those two are strange beings. Lion lies every Monday, Tuesday and Wednesday and the other days in week he speaks the truth. Unicorn lies on Thursdays, Fridays and Saturdays, however the other days in week he speaks the truth.
Lion: Yesterday I was lying.
Unicorn: So was I.
Which day did they say that?

LION AND UNICORN II.

Lion said: Yesterday I was lying and two days after tomorrow I will be lying again.
Which day did he say that?

ISLAND BAAL

There live people and strange monkeys on this island, and you can not tell who is who. They speak either only the truth or only the lie.
Who are the following two guys?
A: B is a lying monkey. I am human.
B: A is telling the truth.

TRUTH, LIE AND WISDOM

Three goddesses were sitting in an old Indian temple. Their names were Truth (always true), Lie (always lying) and Wisdom (sometimes lying). There was a following conversation:
Asking the left one: "Who is sitting next to you?"
"Truth," she answered.
Asking the middle one: "Who are you?"
"Wisdom."
And at last question for the right one: "Who is your neighbor?"
"Lie," she replied.
Now it is clear who is who.

IN THE ALPS

Three tourists have an argument regarding the way they should go. Hans says that Emanuel lies. Emanuel claims that Hans and Philip speak the same, only doesn't know what, whether truth or lie. So who is lying for sure?

COINS

Imagine there are 3 coins on the table. Gold, silver and copper. If you say a truthful sentence, you will get one coin. If you say a false sentence, you get nothing. Which sentence can guarantee gaining the gold coin?

SLIM LOVER

Something to relax. A slim young man asked a girl on a date:
"I say something. If it is truthful, will you give me your photo?"
"Yes," replied miss.
"And if it is a lie, do not give me your photograph. Would you promise that?"
The girl agreed. Then the chap said such a sentence, that after a little while of thinking she realised, that if she wanted to honor her promise, she wouldn't have to give him a photo but a *kiss*.
What would you say (if you were him) to be kissed and so on?

Overspilling and Weighing Puzzles

OVERSPILLING WATER I.
If you had a 5-litre and a 3-litre bowl and access to water. How would you measure exactly 4 litres?

OVERSPILLING WATER II.
Having three bowls: 8, 5 and 3 litres capacity. Share 8 litres on halves (4 + 4 litres) pouring water the minimum times.

OVERSPILLING WATER III.
Having three bowls: 7, 4 and 3 litres capacity. Only the 7-litre is full. Overspilling the fewest times gain the quantity of 2, 2 and 3 litres.

OVERSPILLING WATER IV.
How can you measure 6 litres of water using only 4 and 9-litre bowls.

OVERSPILLING WATER V.
Measure exactly 2 litres of water if you have:
1. 4 and 5-litre bowls
2. 4 and 3-litre bowls

OVERSPILLING WATER VI.
Imagine having three bowls. In the bowl A (8 litres capacity) are 5 litres of water. In the bowl B (5 litres capacity) are 3 litres of water. In the bowl C (3 litres capacity) are 2 litres of water.
Can you measure exactly 1 litre, overspilling only 2 times?

WEIGHING I.
Imagine you have 10 bags full of coins, in each bag 1000 coins. In one bag, there are all coins forgeries. The original coin is 1 gram light, forgery is 1.1 gram. Balancing just once on an accurate weighing-machine, how can you identify the bag with forgeries? And what if you didn't know how many bags contain forgeries?

WEIGHING II.
Real gummy drop bears have a mass of 10 grams, while imitation gummy drop bears have a mass of 9 grams. Spike has 7 cartons of gummy drop bears, 4 of which contain real gummy drop bears, the others imitation. Using a scale only once and the minimum number of gummy drop bears, how can Spike determine which cartons contain real gummy drop bears?

WEIGHING III.
This puzzle is a step further than the previous one (weight of fake and non fake coins is the same as the weight of bears in the previous puzzle). You have eight bags, each of them containing 48 coins. Five of these bags contain only true coins, the rest of them contain fake coins. Fake coins weigh 1 gram less than the real coins. You do not know what bags have fake coins and what bags have real coins. You can use a scale, a dynamometer type one, with precision up to 1 gram (an accurate weighing machine). Making only one weighing and using the minimum number of coins, how can you find the bags containing the fake coins?

WEIGHING IV.
One of twelve pool balls is a bit lighter or heavier (you do not know) than the others. At least how many times do you have to use an old pair of scales to identify this ball?
(a pair of scales = a scale consisting of a lever resting on a fulcrum with weighing pans at each end of the lever equidistant from the fulcrum)

WEIGHING V.
On a Christmas tree there were two blue, two red and two white balls. All seemed the same, however in each colour pair there was one ball was heavier. All three lighter balls were the same weight, just like all three heavier balls. Using a pair of scales twice, identify the lighter balls.

WEIGHING VI.
Having 9 balls, equally big, equally heavy. Only one of them is a bit heavier. How would you identify it if you could use a pair of scales only twice?

WEIGHING VII.

Having 27 table tennis balls, one is heavier than the others. How many times (minimum) do you need to use a pair of scales to identify it.

WEIGHING VIII.

Suppose that the objects to be weighed may range from 1 to 121 pounds at 1-pound intervals: 1, 2, 3,..., 119, 120, 121. After placing one such weight on either of two weighing pans of a pair of scales, one or more precalibrated weights are then placed in either or both pans until a balance is achieved, thus determining the weight of the object. If the relative positions of the lever, fulcrum, and pans may not be changed, and if one may not add to the initial set of precalibrated weights, what is the minimum number of such weights that would be sufficient to bring into balance any of the 121 possible objects?

SAND-GLASS I.

Having 2 sand-glasses: one 7-minute and the second one 4-minute. How can you time correctly 9 minutes.

SAND-GLASS II.

A teacher of mathematics used an unconventional method to measure time for a test lasting 15 minutes. He used just a sand-glass, which spills in 7 minutes and a second sand-glass, which spills in 11 minutes. During the whole time he turned sand-glasses only 3 times. Explain, how the teacher measured 15 minutes.

IGNITER CORDS

Your job is to measure 45 minutes, if you have only two igniter cords and matches to light the cords. The two igniter cords have the following features:

1. They are twisted from various materials and also different parts can burn at different speed (e. g. after ten minutes they will not burn at the same point).
2. Every cord burns from ignition to the end exactly one hour.

Describe your way of measuring the 45 minutes.

Einstein's Riddles

BEAR

The famous physicist made for his scholars this riddle. A fellow encountered a bear in a wasteland. There was nobody else there. Both were frightened and ran away. Fellow to the north, bear to the west. Suddenly the fellow stopped, aimed his gun to the south and shot the bear. What colour was the bear?
If you don't know, this may help you: if the bear ran 3.14 times faster than the fellow (still westwards), the fellow could have shot straight in front of him, however for the booty he would have to go to the south.

NEIGHBOURS

This quiz was made up by Albert Einstein and according to him 98% will not solve it.
There is a row of five houses, each having a different colour. In these houses live five people of various nationalities. Each of them nurtures a different beast, likes different drinks and smokes different brand of cigars.

1. The Brit lives in the Red house.
2. The Swede keeps dogs as pets.
3. The Dane drinks tea.
4. The Green house is on the left of the White house.
5. The owner of the Green house drinks coffee.
6. The person who smokes Pall Mall rears birds.
7. The owner of the Yellow house smokes Dunhill.
8. The man living in the centre house drinks milk.
9. The Norwegian lives in the first house.
10. The man who smokes Blends lives next to the one who keeps cats.
11. The man who keeps horses lives next to the man who smokes Dunhill.
12. The man who smokes Blue Master drinks beer.
13. The German smokes Prince.
14. The Norwegian lives next to the Blue house.
15. The man who smokes Blends has a neighbour who drinks water.

Who has fish at home? (are you one of the 2%).

MEETING (MEET THIS CHALLENGE)

Another hard nut to crack (just like that Einstein's) was published in the QUIZ 11/1986.
Eight married couples meet to lend one another some books. Couples have the same surname, employment and car. Each couple has a favourite colour. Furthermore we know the following facts:

1. Daniella Black and her husband work as Shop-Assistants.
2. The book "The Seadog" was brought by a couple who drive a Fiat and love the colour red.
3. Owen and his wife Victoria like the colour brown.
4. Stan Horricks and his wife Hannah like the colour white.
5. Jenny Smith and her husband work as Warehouse Managers and they drive a Wartburg.
6. Monica and her husband Alexander borrowed the book "Grandfather Joseph".
7. Mathew and his wife like the colour pink and brought the book "Mulatka Gabriela".
8. Irene and her husband Oto work as Accountants.
9. The book "We Were Five" was borrowed by a couple driving a Trabant.
10. The Cermaks are both Ticket-Collectors who brought the book "Shed Stoat".

11. Mr and Mrs Kuril are both Doctors who borrowed the book "Slovacko Judge".
12. Paul and his wife like the colour green.
13. Veronica Dvorak and her husband like the colour blue.
14. Rick and his wife brought the book "Slovacko Judge" and they drive a Ziguli.
15. One couple brought the book "Dame Commissar" and borrowed the book "Mulatka Gabriela".
16. The couple who drive a Dacia, love the colour violet.
17. The couple who work as Teachers borrowed the book "Dame Commissar".
18. The couple who work as Agriculturalists drive a Moskvic.
19. Pamela and her husband drive a Renault and brought the book "Grandfather Joseph".
20. Pamela and her husband borrowed the book that Mr and Mrs Zajac brought.
21. Robert and his wife like the colour yellow and borrowed the book "The Modern Comedy".
22. Mr and Mrs Swain work as Shoppers.
23. "The Modern Comedy" was brought by a couple driving a Skoda.

Is it a problem to find out everything about everyone from these information?

SHIPS

There are 5 ships in a port.

1. Greek ship leaves at six and carries coffee.
2. Ship in the middle has a black chimney.
3. English ship leaves at nine.
4. French ship with blue chimney is to the left of a ship that carries coffee.
5. Right to the ship carrying cocoa is a ship going to Marseille.
6. Brazilian ship is heading for Manila.
7. Next to the ship carrying rice is a ship with a green chimney.
8. A ship going to Genoa leaves at five.
9. Spanish ship leaves at seven and is to the right of the ship going to Marseille.
10. Ship with a red chimney goes to Hamburg.
11. Next to the ship leaving at seven is a ship with a white chimney.
12. Ship on the border carries corn.
13. Ship with a black chimney leaves at eight.
14. Ship carrying corn is anchored next to the ship carrying rice.
15. Ship to Hamburg leaves at six.

Which ship goes to Port Said? Which ship carries tea?

GARDENS

Five friends have their gardens next to one another, where they grow three kinds of crops: fruits (apple, pear, nut, cherry), vegetables (carrot, parsley, gourd, onion) and flowers (aster, rose, tulip, lily).

1. They grow 12 different varieties.
2. Everybody grows exactly 4 different varieties

3. Each variety is at least in one garden.
4. Only one variety is in 4 gardens.
5. Only in one garden are all 3 kinds of crops.
6. Only in one garden are all 4 varieties of one kind of crops.
7. Pear is only in the two border gardens.
8. Paul's garden is in the middle with no lily.
9. Aster grower doesn't grow vegetables.
10. Rose grower doesn't grow parsley.
11. Nuts grower has also gourd and parsley.
12. In the first garden are apples and cherries.
13. Only in two gardens are cherries.
14. Sam has onions and cherries.
15. Luke grows exactly two kinds of fruit.
16. Tulip is only in two gardens.
17. Apple is in a single garden.
18. Only in one garden next to the Zick's is parsley.
19. Sam's garden is not on the border.
20. Hank grows neither vegetables nor asters.
21. Paul has exactly three kinds of vegetable.

Who has which garden and what is grown where?

Number Puzzles

EASY SAVOURY
A teacher thinks of two consecutive numbers in interval 1 to 10. First student knows one number and the second student knows the second number. Conversation of the students is as follows:
First: I do not know your number.
Second: Neither I know your number.
First: Now I already know.
Will you find all 4 solutions?

SAVOURY
This is definitely one of the hardest number puzzles on this site.
A teacher says: I think of two natural numbers bigger than 1. Try to guess what they are.
First student knows their product and the other one knows their sum.
First: I do not know the sum.
Second: I knew that. The sum is less than 14.
First: I knew that. However, now I already know the numbers.
Second: And so do I.
What were the numbers?

CHILDREN
An easier number puzzle is as follows. Two friends are chatting:
- Peter, how old are your children?
- Well Thomas, there are three of them and the product of their ages is 36.
- That is not enough ...
- The sum of their ages is exactly the number of beers we have drunk today.
- That is still not enough.
- OK, the last thing is that my oldest son wears a red hat.
How many years has each of Peter's children?

BIRTHDAY
The day before yesterday I was 25 and the next year I will be 28. (This is true only one day in a year.) When was I born?

SYMBOL
What mathematical symbol can be put between 5 and 9, to get a number bigger than 5 and smaller than 9?

FRACTION
Can you use all 9 numerals - 1, 2, 3, 4, 5, 6, 7, 8 a 9 - in random order, to create a fraction equalling 1/3 (one third)?

5-DIGIT NUMBER
What 5-digit number has the following features? If we put numeral 1 at the beginning, we get a number three times smaller, than if we gave the numeral 1 behind this number.

9-DIGIT NUMBER
Find a 9-digit number, which you will gradually round off starting with units, then tenth, hundred etc., until you get at the last numeral character, which you do not round off. The rounding alternates (up, down, up ...). After rounding off 8 times, the final number is 500000000. The original number is commensurable by 6 and 7, and there are employed all numbers from 1 to 9 and after rounding four times the sum of the not rounded numeral characters equals 24.

10-DIGIT NUMBER

- Find a 10-digit number, where the first figure defines the count of zeros in this number, the second figure the count of numeral 1 in this number etc. At the end the tenth numeral character expresses the count of the numeral 9 in this number.
- Find a 10-digit number, where the first numeral character expresses the count of numeral 1 in this number, ..., the tenth numeral the count of zeros in this number.

CIPHER
Find the cipher if:

1. Cipher is made of 6 various numeral characters.
2. Even and odd figures alternate, inclusive zero (in this case as an even number).
3. The difference of adjacent numeral characters is always bigger than one.
4. The first two numerals (as one number) as well as the two middle numerals (as one number) are a multiple of the last two numerals (as one number).

What is the cipher? (more than 1 solution)

THE NUMBER PUZZLE

The grid below is to fill with six numbers (3 vertical and 3 horizontal) from the given list. You can use each number more than once. After completing the number puzzle sum up all digits in the grid. This is defined as the score. What is the maximum possible score?

the grid available numbers

```
    1 2 3         -----------------------------------------
4   XXXXX         76438 52998 28666 10570 11045 13902 12655
    X X X         48195 03200 63312 70206 64304 76615 57821
5   XXXXX         90830 40067 62649 78215 82845 09027 04802
    X X X         17182 50221 91337 01209 20420 60789 39543
6   XXXXX         90073 69130 12295 10068 82985 89398 97264
```

Example: Using the numbers 40067 04802 78215 twice

```
40067       4 + 0 + 0 + 6 + 7 +
0 4 8       0 + 4 + 8 +
04802       0 + 4 + 8 + 0 + 2 +
6 0 1       6 + 0 + 1 +
78215       7 + 8 + 2 + 1 + 5 = 73
```

The score is 73 (of course other solutions with higher scores are possible).

MASTER MIND

What is the number replaced by asterisks, if:

- symbol 0 represents a guessed number in the line,
- symbol + represents a guessed number in the line, that is on its right place,
- the result has no number 0,
- no numeral is more than once in the result.

```
6152   +0
4182   00
5314   00
5789    +
-------------
 * * * *
```

1996

Using the numerals 1, 9, 9 and 6, mathematical symbols +, -, x, :, root and brackets create the following numbers:
29, 32, 35, 38, 70, 73, 76, 77, 100 and 1000.
All the numerals must be used in the given order (each just once) and without turning upside down.

100

Using four sevens (7) and a one (1) create the number 100. Except the five numerals you can use the usual mathematical operations (+, -, x, :), root and brackets ().

EQUATION

In the following "equation" 101 - 102 = 1 move one numeral, in order to rectify it.

NUMBER SEQUENCES

There are infinitely many formulas that will fit any finite series. Try to guess the following number in each sequence (using the most simple mathematical operations, because as I mentioned, there is more than one solution for each number sequence).

- 8723, 3872, 2387, ?
- 1, 4, 9, 18, 35, ?
- 23, 45, 89, 177, ?
- 7, 5, 8, 4, 9, 3, ?
- 11, 19, 14, 22, 17, 25, ?
- 3, 8, 15, 24, 35, ?
- 2, 4, 5, 10, 12, 24, 27, ?
- 1, 3, 4, 7, 11, 18, ?
- 99, 92, 86, 81, 77, ?
- 0, 4, 2, 6, 4, 8, ?
- 1, 2, 2, 4, 8, 11, 33, ?
- 1, 2, 6, 24, 120, ?
- 1, 2, 3, 6, 11, 20, 37, ?
- 5, 7, 12, 19, 31, 50, ?
- 27, 82, 41, 124, 62, 31, 94, 47, 142, 71, 214, 107, ?
- 126, 63, 190, 95, 286, 143, 430, 215, 646, 323, 970, ?
- 4, 7, 15, 29, 59, 117, ?
- 2, 3, 2, 3, 2, 4, 2, 3, 2, 3, 2, 5, 2, 3, 2, 3, 2, 4, 2, 3, 2, 3, 2, 5, 2, 3, 2, 3, 2, 4, 2, 3, 2, 3, 2, 5, ?
- 4, 4, 341, 6, 4, 4, 6, 6, 4, 4, 6, 10, 4, 4, 14, 6, 4, 4, 6, 6, 4, 4, 6, 22, 4, 4, 9, 6, ?

Crossing River and Others

SHE-GOAT, WOLF AND CABBAGE
A farmer is returning from market, where he bought a she-goat, a wolf and cabbage. On the way home he must cross a river. His boat is little, allowing to take on it only one of the three things. There can't stay together the she-goat and the cabbage (because the she-goat would eat it), neither the she-goat with the wolf (because she-goat would be bitten .
How shall the farmer get everything on the other side (without any harm)?

CANNIBALS AND MISSIONARIES
Three missionaries and three cannibals wanted to get on the other side of a river. There was a little boat on which can get only two of them. There can never be on one side more cannibals than missionaries because of a possible tragedy.

FAMILY
Parents with two children - son and daughter - came to a wide river. There was no bridge there. The only way to get on the other side was to ask a fisherman if he could lend them his boat. However, the boat could carry only one adult or two children. How does the family get to the other side and returns the boat back to the fisherman?

HUMANS AND MONKEYS
Three humans, one big monkey and two small monkeys are to cross a river:

- Only humans and the big monkey can row the boat.
- At all times, the number of human on either side of the river must be greater or equal to the number of monkeys on that side. (Or else the humans will be eaten by the monkeys!)
- The boat only has room for 2 (monkeys or humans).
- Monkeys can jump out of the boat when it's banked.

DARK PHOBIA
One family wants to get through a tunnel. Dad can make it in 1 minute, mama in 2 minutes, son in 4 and daughter in 5 minutes. Unfortunately, through the tight tunnel can go at once not more than two persons moving at the speed of the slower one.
Can they all make it if they have a torch that lasts only 12 minutes and they are afraid of the dark?

CONDOMS
How to have safe sex without any after-effects with only two condoms.

1. One man with three women.
2. Two men with two women.
3. Three men with one woman.

FLOWERS
How many flowers do I have if all of them are roses except two, all of them are tulips except two, and all of them are daisies except two?

SUBTRACTION
How many times can you subtract the number 2 from the number 32?

ROUND VS. SQUARE
Why is it better for manhole covers to be round rather than square?

THE BARBERSHOP PUZZLE
A traveller arrives in a small town and decides he wants to get a haircut. There are only two barbershops in town - one on East Street and one on West Street. The East Street barbershop is a mess, and the barber has the worst haircut the traveller has ever seen. The West Street barbershop is neat and clean, its barber's hair looks as good as a movie star's.
Which barbershop does the traveller go to for his haircut, and why?

MURDER IN THE DESERT
This is a story about three people (A, B a C) crossing a desert. A hated C and decided to kill him - he

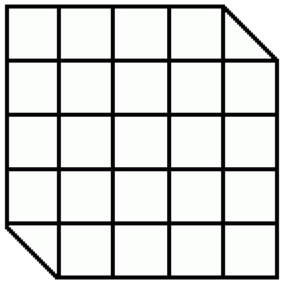
poisoned the water in his sack (it was the only water of C). B also wanted to kill C (not knowing that the water of C had been already poisoned) and so B made a hole into the sack of C and the water spilt out. A few days later C died of thirst.
Who was the murderer - A or B?

THE ELDER TWIN

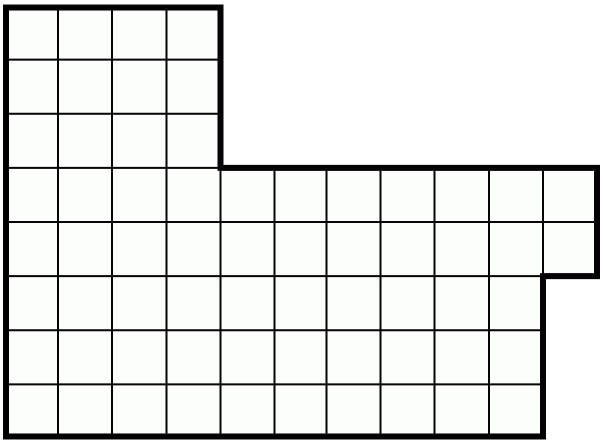
One day Kerry celebrated her birthday. Two days later her older twin brother, Terry, celebrated his birthday. How come?
This puzzle was submitted to Games Magazine's 'How Come' competition in 1992 by Judy Dean. It won.

Geometry Puzzles

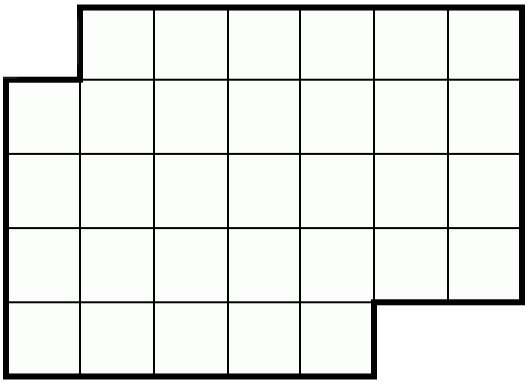
Slice the picture into 2 sections from which you could make a rectangle 6x4 squares.



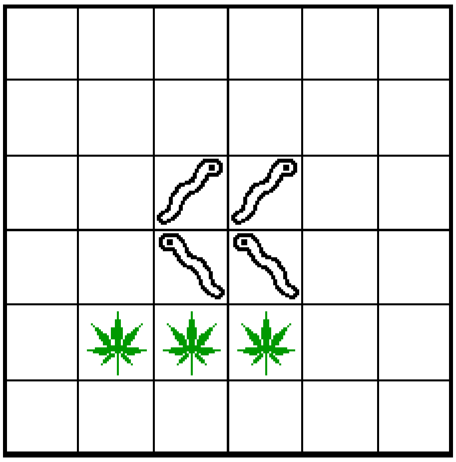
Slice the picture into 2 sections from which you could make a 8x8 square.



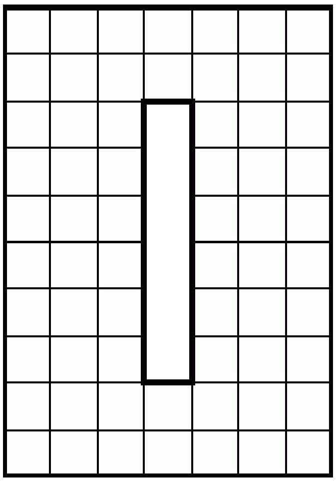
Slice the picture into 2 identical sections.



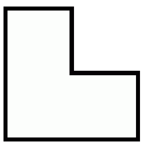
Slice the square into 4 identical sections, so that in each section there is 1 caterpillar with its leaf. One caterpillar will not have a leaf, she is taking a diet.



Slice the rectangle with a hole in its centre into 2 sections so that you could make a square 8x8 - virgin (without that hole in the centre).



Slice the picture into 4 identical sections.



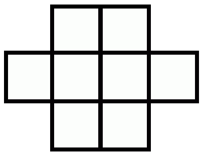
Divide a paper into 8 sections and write numbers on it according to the picture. Your job is to fold it where the lines are so that the numbers are sorted (number 1 will be on the top, 2 under it,..., and the last one will be 8).

1	8	7	4
2	3	6	5

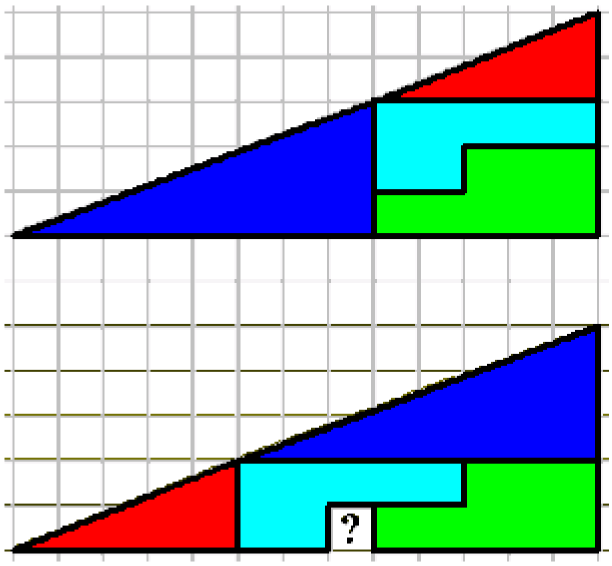
Modification: It is the same objective, just the numbers have changed.

1	8	2	7
4	5	3	6

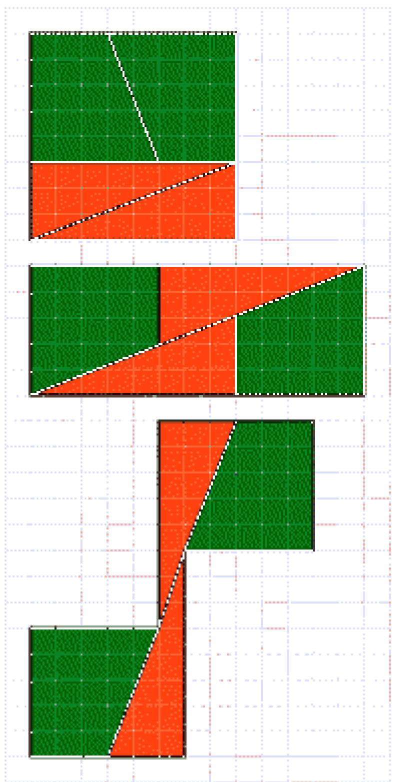
Write the numbers from 1 to 8 into the squares, so that the squares with consecutive numbers do not touch (neither edges nor corners).



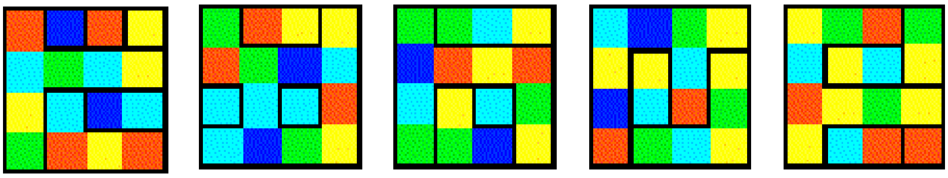
Where does the hole in second triangle come from (the partitions are the same)?



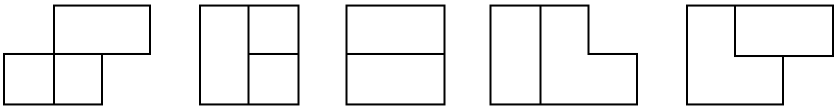
The same principle - moving the same parts - allows creating objects 64, 65 and 63 squares big. This geometric fallacy is also known as '64 = 65 Geometry Paradox'.



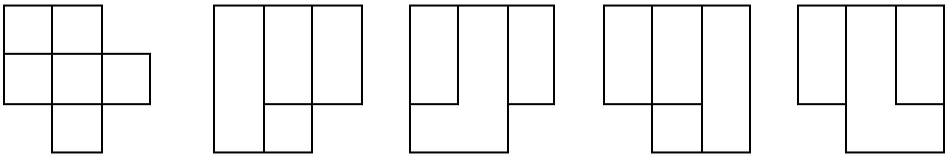
The five images below represent five views (from five of its six sides) of a solid object. This object has been assembled by gluing together several identical small cubes so that at least one face of each small cube is totally adherent to a face of another contiguous small cube. Each black line shown represents a side of the object that is perpendicular to the plane of this page. Draw the sixth view of the object and calculate how many small cubes were used in the construction of the object, as well as its respective colours.



Several identical cubes are fused together to form a solid object. Given the following five external views of such an object, draw the sixth external view. Clockwise or counterclockwise rotations of the sixth view are acceptable, but a mirror image (the sixth side as viewed from inside the solid) is not acceptable.



The five figures shown below represent the appearance of a solid, opaque object as seen from five of its six sides. Each line shown depicts a side of the object that is perpendicular to the plane of this page. The object was constructed by gluing together a number of identical cubes so that at least one face of each added cube precisely and entirely covers and is everywhere contiguous with one face of a previous cube. Draw the sixth view of the object.



Matchstick Puzzles

Try to rectify a mistake by moving a single matchstick, to get the correct equation.

The following equation is made of 11 matches:
XI - V = IV (more solutions)

The following equation is made of 11 matches:
X + V = IV (more solutions)

The following equation is made of 10 matches:
L + L = L (more solutions)

The following equation is made of 12 matches:
VI = IV - III (more solutions)

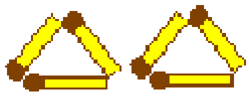
The following equation is made of 14 matches:
XIV - V = XX

The following equation is made of 11 matches:
IX - IX = V

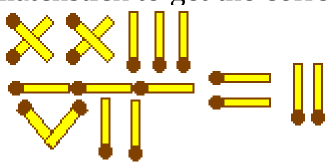
The following equation is made of 12 matches:
X = VIII - II

The following equation is made of 7 matches:
VII = I

Move one matchstick to get 4 identical triangles.

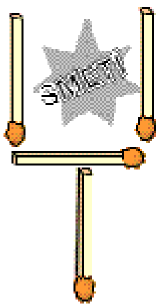


Move one matchstick to get the correct equation.



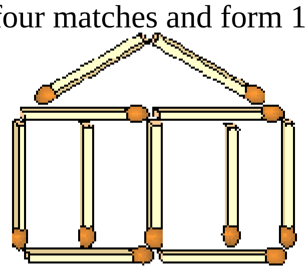
SHOVEL

Move just two matches and remove dust from the shovel.



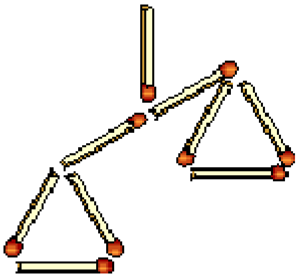
HOUSE

1. Move just two matches to make eleven squares.
2. Move four matches and form 15 squares.



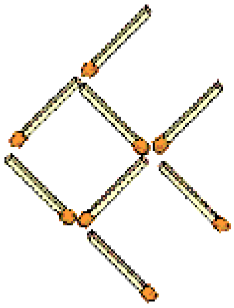
SCALES

Move 5 matches to make the scales balanced.



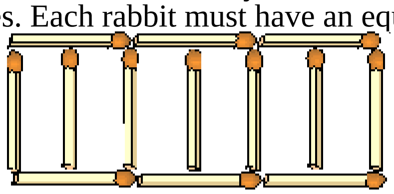
FISH

Move just 3 matches so that the fish swims the other direction.



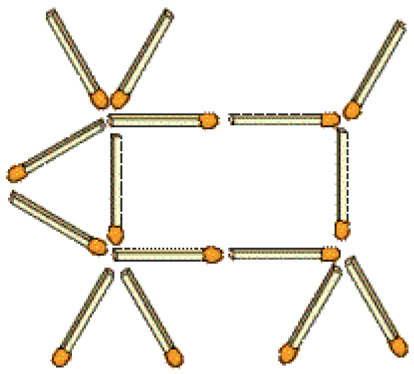
RABBIT HUTCH

In the picture there are little flats for 6 rabbits. Can you build a dwelling for these 6 rabbits with only 12 matches. Each rabbit must have an equally big space.



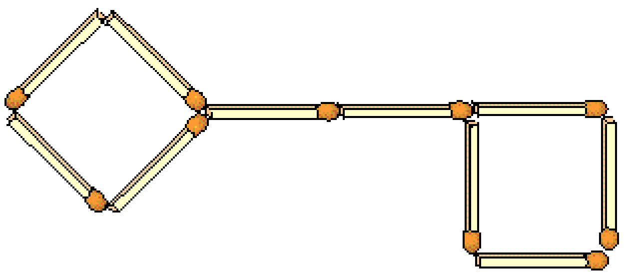
COW

This cow has the following parts: head, body, horns, legs and tail. It is looking to the left. Move two matches so that it is looking to the right.



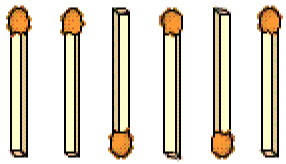
KEY

1. Move four matches so that three squares are created.
2. Move three matches so that two rectangles are created.
3. Move two matches so that two rectangles are created.



TOUCH

Place six matches in such a way, that each match is in touch with all the other five matches.



Algebra Puzzles

Replace the same characters by the same numerals so that the mathematical operations are correct.

```
ABCB - DEFC = GAFB
  :      +      -
 DH  x  AB  =  IEI
-------------------------
GGE + DEBB = DHDG
```

```
IFIB - EBG = CEH
  -      -     +
CCE  /  GD = FE
------------------------
EFF + EED = CBA
```

```
RE + MI = FA
DO + SI = MI
LA + SI = SOL
```

```
  SEND
  MORE
-------------
 MONEY
```

SEVEN + SEVEN + SIX = TWENTY

hint: Z = 4

```
  MOST
  MOST
--------------
 TORZO
```

```
    SINUS
    SINUS
  KOSINUS
-------------------
  TANGENS
```

KAJAK
KAJAK
KAJAK
KAJAK
KAJAK
KAJAK

VESLO

DVA * DVA = ŠTYRI
D + V + A + D + V + A = Š + T + Y + R + Y

$(AA)^B = ABBA$

ALFA + BETA + GAMA = DELTA

ABC + DEF = GHIJ

ABC x DEF = 123 456, if A = 1

ABCD*D = DCBA

ABCD*E = DCBA

ABCDEF*3 = BCDEFA

THC = (T + H + C) x T x H x C

$A^L = LEBKA$

KOV x KOV = DEDKOV

$(J+O+I+N+T)^3 = JOINT$

Paradoxes

LIAR PARADOX (EUBULID OR EPIMENIDES PARADOX)

About this best-known paradox wrote a great stoical logician Chrysippos from Solov 29 books and philosopher Filetos even died because of it (seeking for its solution was killing).

1. A familiar Cretan sails to Greece and says to Greek men, who stand on the waterside: "All Cretans are liars." Did he say the truth or did he lie?
2. A week later, Cretan was sailing there again and said: "All Cretans are liars and all I say is the truth." Although the Greeks ashore hardly found out, what he said the first time, now they were absolutely puzzled.

If somebody says about himself, that he lies, is it truth or lie?

DOUBLE LIAR PARADOX (JOURDAIN'S PARADOX)

This version of the famous paradox was presented by an English mathematician P. E. B. Jourdain in 1913.
The following inscriptions are on a paper:

Back side	Face side
Inscription on the other side is true	Inscription on the other side is not true

BARBER PARADOX (RUSSELL'S PARADOX)

Analogue paradox to the paradox of liar formulated English logician, philosopher and mathematician Bertrand Russell.
There was a barber in a village, who promised to shave everybody, who does not shave himself (or herself).
Can the barber shave himself and keep the mentioned promise?

LAZY-BONES PARADOX

If destiny designed a master plan, which defines everything that is to happen, isn't it useless to for example go to a doctor? If I am ill and it is my destiny to regain health, than I will regain health whether I visit a doctor or I don't. And if I shall not be healthy again, than I will not with or without help.
If I am ill and destiny has a definite plan for me, than it is useless to go anywhere.
How could you question the presented opinion?

My Favourite Sophisms

1. CROCODILE SOPHISM

A slim crocodile living in Nile took a child. Mother begged to give him back. The crocodile could not only talk, he was also a great sophist, and so he stated: "If you guess, what I will do with him, I will return him. However, if you don't guess his fate I'll eat him." What statement shall the mother make to save her child (what about a vicious circle ...)?

2. IS IT POSSIBLE TO GIVE WHAT WE DON'T HAVE?

Sophist: "Yes. Greedy man gives his cash with sorrow. However, he doesn't have the cash with sorrow, so he gives what he doesn't have."

3. WHAT IS BETTER - ETERNAL BLISS OR A SIMPLE BREAD?

What is better than eternal bliss? Nothing. But a slice of bread is better than nothing. So slice of bread is more than eternal bliss.

A few sentences from life

Nobody goes to that restaurant, because it is too crowded.

Don't go near the water, till you have learned how to swim.

The man who wrote such a stupid sentence, can not write at all.

If you get this message, call me, and if you don't get it, don't call.

ADVERTISEMENT: Are you an analphabet? Write a letter and we will send you free of charge instructions how to undo it.

Think about these

- Let's say (hypothetically) there is a bullet, which can shoot through any barrier. Let's say there is also an absolutely bullet-proof armour, and nothing gets through it. What will happen, if such bullet hits such armour?
- Can a man drown in the fountain of eternal life?
- Your mission is to not accept the mission. Do you accept?
- This girl goes into the past and kills her Grandmother. Since her Grandmother is dead the girl was never born, if she was never born she never killed her grandmother and she was born.
- If the temperature this morning is 0 degrees and the Weather Channel says, "it will be twice as cold tomorrow,".... What will the temperature be?
- Answer truthfully (yes or no) to the following question: Will the next word you say be no?
- What happens if you are in a car going the speed of light and you turn your headlights on?
- I conclude with this challenge:
Let the *God Almighty* create a stone, which he *can not* pick up!

LOGIC PUZZLES I.

Bulbs

Keep the first bulb switched on for a few minutes. It gets warm, right? So all you have to do then is ... switch it off, switch another one on, walk into the room with bulbs, touch them and tell which one was switched on as the first one (the warm one) and the others can be easily identified ...

Ball in a Hole

All you have to do is pour some water into the pipe so that the ball swims up on the surface.

The Man in the Elevator

The man is a midget. He can't reach the upper elevator buttons, but he can ask people to push them for him. He can also push them with his umbrella.

Ball

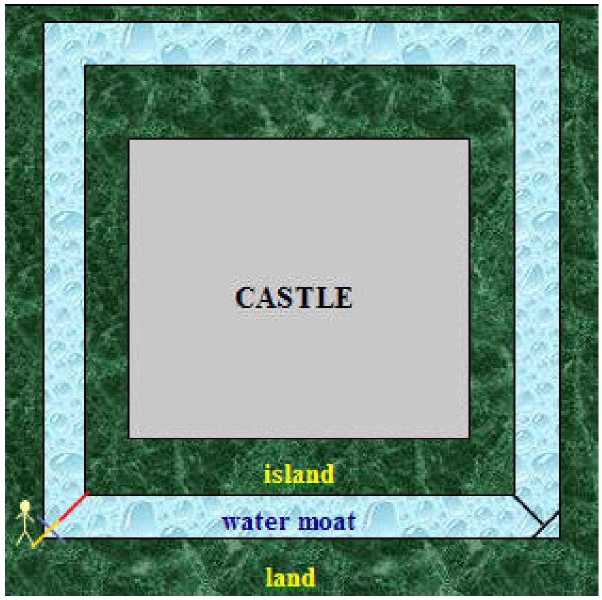
Throw the ball straight up in the air.

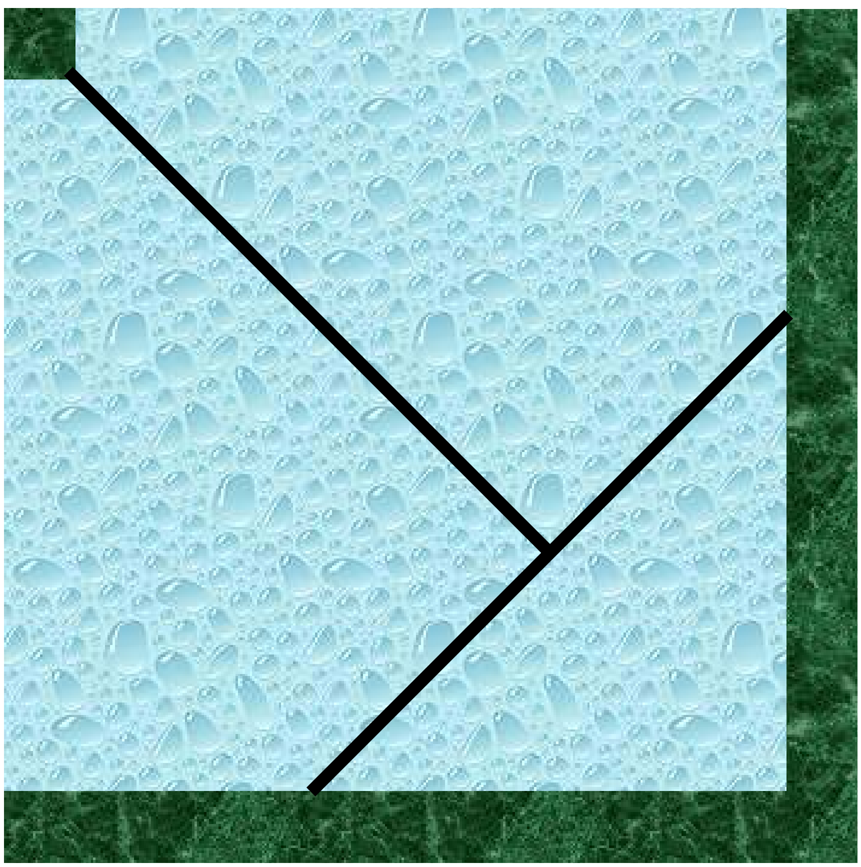
Magnet

You can hang the iron rods on a string and watch which one turns to the north (or hang just one rod).
Gardner gives one more solution: take one rod and touch with its end the middle of the second rod. If they get closer, then you have a magnet in your hand.
The real magnet will have a magnetic field at its poles, but not at its center. So as previously mentioned, if you take the iron bar and touch its tip to the magnet's center, the iron bar will not be attracted. This is assuming that the magnet's poles are at its ends. If the poles run through the length of the magnet, then it would be much harder to use this method.
In that case, rotate one rod around its axis while holding an end of the other to its middle. If the rotating rod is the magnet, the force will fluctuate as the rod rotates. If the rotating rod is not magnetic, the force is constant (provided you can keep their positions steady).

Castle

You can put one foot-bridge over one corner (thus a triangle is created). Then from the middle of this foot-bridge lay another foot-bridge to the edge (corner) of the castle. You can make a few easy equations confirming that this is enough.


CASTLE
island
water moat
land



Biology

The saucer was half full at 11.59 - the next minute there will be twice as many of them there (so full at 12.00).

Sheikh's Heritage

The wise man told them to switch camels.

Philosopher's Clock

Clocks can measure time even when they do not show the right time. You just have to wind the clock up and...

We have to suppose that the journey to the friend and back lasts exactly the same time and the friend has a clock (showing the correct time) - it would be too easy if mentioned in the riddle.

Now there is no problem to figure out the solution, is there?

Masters of Logic Puzzles I. (dots)

The wisest one must have thought like this:

I see all hands up and 2 red dots, so I can have either a blue or a red dot. If I had a blue one, the other 2 guys would see all hands up and one red and one blue dot. So they would have to think that if the second one of them (the other with red dot) sees the same blue dot, then he must see a red dot on the first one with red dot. However, they were both silent (and they are wise), so I have a red dot on my forehead.

Masters of Logic Puzzles II. (hats)

The important thing in this riddle is that all masters had equal chances to win. If one of them had been given a black hat and the other white hats, the one with black hat would immediately have known his color (unlike the others). So 1 black and 2 white hats is not a fair distribution.

If there had been one white and two black hats distributed, then the two with black hats would have had advantage. They would have been able to see one black and one white hat and supposing they had been given white hat, then the one with black hat must at once react as in the previous situation. However, if he had remained silent, then the guys with black hats would have known that they wear black hats, whereas the one with white hat would have been forced to eternal thinking with no clear answer. So neither this is a fair situation.

That's why the only way of giving each master an equal chance is to distribute hats of one color – so 3 black hats.

I hope this is clear enough ☺.

Masters of Logic Puzzles III. (stamps)

B says: "Suppose I have red-red. A would have said on her second turn: 'I see that B has red-red. If I also have red-red, then all four reds would be used, and C would have realized that she had green-green. But C didn't, so I don't have red-red. Suppose I have green-green. In that case, C would have realized that if she had red-red, I would have seen four reds and I would have answered that I had green-green on my first turn. On the other hand, if she also has green-green [we assume that A can see C; this line is only for completeness], then B would have seen four greens and she would have answered that she had two reds. So C would have realized that, if I have green-green and B has red-red, and if neither of us answered on our first turn, then she must have green-red.

"'But she didn't. So I can't have green-green either, and if I can't have green-green or red-red, then I must have green-red.'

So B continues:

"But she (A) didn't say that she had green-red, so the supposition that I have red-red must be wrong. And as my logic applies to green-green as well, then I must have green-red."

So B had green-red, and we don't know the distribution of the others certainly. (Actually, it is possible to take the last step first, and deduce that the person who answered YES must have a solution which would work if the greens and reds were switched -- red-green.)

Head Bands

The first one (he did not see any head bands) thought this way:
The last one is silent, which means, he does not know, ergo at least one of head bands he sees is white. The one in the middle is silent too even though he knows what I already mentioned. If I had a red head band, the second one would have known that he had a white head band. However, nobody says anything, so my head band is not red – my head band is white.

Christmas Tree

There are 2 possible solutions:
1. if angels B and C had aureole of the same color, then angel A must have immediately said his own color (other then theirs),
2. if angels B and C had different colors, then angel A must have been silent and that would have been a signal for angel B, who could know (looking at angel C) what his own color is (the other one then C had).

LOGIC PUZZLES II.

Brick

There is an easy equation which can help:
1 brick = 1 kg + 1/2 brick
And so 1 brick is 2 kg heavy.

Strange Coins

This was just a catch question. One of the coins is really not a nickel because nickel is the other coin.

What is Correct

Of course, adding seven to five makes twelve and not thirteen.

Trains

Of course, when the trains encounter, they will be *approximately* the same distance away from New York. The New York train will be closer to New York by *approximately* one train length because they're coming from different directions. That is, unless you take "meet" to mean "pefectly overlap".

Fly

There is a complicated way counting a sequence. Or simply knowing that if the fly is flying the 2 hours still at the same speed of 75 km/h then it flies a distance of 150 km.

Speeding up

This one has no solution. Unless we are complicating it with relativity theory - time and space. But to keep it simple, you can't reach the desired average speed under the given circumstances.

Wired Equator

It is easy to subtract 2 equations (original perimeter = 2xPIxR, length of wire = 2xPIxR + 2xPIx(new R)) and find out that the result is 10m/(2xPI), which is about 1.6 m. So a smaller man can go under it and a bigger man ducks.

Diofantos

There is an easy equation to reflect the several ages of Diofantos:

$1/6x + 1/12x + 1/7x + 5 + 1/2x + 4 = x$

So the solution (x) is 84 years.

Ahmes's Papyrus

2 equations give a clear answer to the given question:

$5w + 10d = 100$

$7*(2w + d) = 3w + 9d$

Where w is amount of corn for the first worker, d is the difference (amount of corn) between two consecutive workers. So this is the solution:

1st worker = 10/6 measures of corn
2nd worker = 65/6 measures of corn
3rd worker = 120/6 (20) measures of corn
4th worker = 175/6 measures of corn
5th worker = 230/6 measures of corn

Midnight

9 p.m.

Clock

There are a few ways of solving this one. I like the following simple way of thinking. The given situation (when the hour and minute hands overlay) occurs in 12 hours exactly 11 times after the same time. So it's easy to figure out that 1/11 of the clock circle is at the time 1:05:27,273 and so the seconds hand is right on 27,273 seconds. There is no problem proving that the angle between the hours hand and the seconds hand is 131 degrees.

Reservoir

Because there are 24 hours in one day, in one hour fills the first tap 1/48, the second tap 1/72, the third tap 1/96 and the fourth tap fills 1/6 of the reservoir. That is all together (6+4+3+48) / 288 = 61/288. The reservoir will be full in 288/61 hours, which is 4 hours 43 minutes and about 17 seconds.

Car

There are 4 cars needed, including the car with the important letter (which travels to the middle of the desert). Its empty tank must be filled to the top to get to the end of desert. The way between the military base (where the cars and petrol is) and the middle of the desert can be divided into 3 thirds. 3 cars will go in their thirds back and forth and overspilling 1/3 of their tanks. This way the tank of the important car will be filled and the letter will be delivered.

Aeroplane

Divide the way from pole to pole to 3 thirds (from the North Pole to the South Pole 3 thirds and from the South Pole to the North Pole 3 thirds).

1. 2 aeroplanes to the first third, fuel up one aeroplane which continues to the second third and the first aeroplane goes back to the airport.
2. 2 aeroplanes fly again from the airport to the first third, fuel up one aeroplane which continues to the second third and the first aeroplane goes back to the airport.
3. So there are 2 aeroplanes on the second third, each having 2/3 of fuel. One of them fuels up the second one and goes back to the first third, where it meets the third aeroplane which comes from the airport to support it with 1/3 of fuel so that they both can return to the airport. In the meantime, the aeroplane at the second third having full tank flies as far as it can (so over the South Pole to the last third before

the airport).
4. The rest is clear – one (of the two) aeroplane from the airport goes to the first third (the opposite direction as before), shares its 1/3 of fuel and both aeroplanes safely land back at the airport.

Belt

The original length of belt was 96 cm.

Baldyville

There can live maximum of 518 people in the town. By the way, it is clear that one inhabitant must by baldy, otherwise there wouldn't be a single man in the town.

Josephine

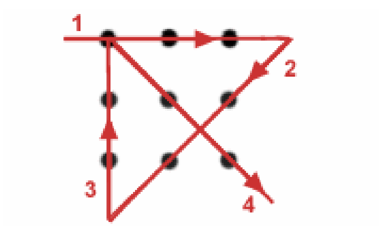
The two questions for scroll #1 were:
1. How many husbands were shot on that fateful night?
2. Why is Queen Henrietta I revered in Mamajorca?

The answers are:
If there are n unfaithful husbands (UHs), every wife of an UH knows of n-1 UH's while every wife of a faithful husband knows of n UHs. [this because everyone has perfect information about everything except the fidelity of their own husband]. Now we do a simple induction: Assume that there is only one UH. Then all the wives but one know that there is just one UH, but the wife of the UH thinks that everyone is faithful. Upon hearing that "there is at least one UH", the wife realizes that the only husband it can be is her own, and so shoots him. Now, imagine that there are just two UH's. Each wife of an UH assumes that the situation is "only one UH in town" and so waits to hear the other wife (she knows who it is, of course) shoot her husband on the first night. When no one is shot, that can only be because her OWN husband was a second UH. The wife of the second UH makes the same deduction when no shot is fired the first night (she was waiting, and expecting the other to shoot, too). So they both figure it out after the first night, and shoot their husbands the second night. It is easy to tidy up the induction to show that the n UHs will all be shot just on the n'th midnight.

Why 1 = 2

The equation is solved the right way, apart from one little detail. There must be stated that x does not equal y, because there would be dividing by zero, which is not defined in maths.

Open Polygon



LOGIC PUZZLES III.

Pears

At first, there were 2 pears on the tree. After the wind blew, one pear fell on the ground. So there where no pears on the tree and there were no pears on the ground.
Another possible solutions: The wind blew so hard that the pears fell of the tree and blew along the ground into the water or hovering in the air in a tornado.

Apples

4 kids get an apple (one apple for each one of them) and the fifth kid gets an apple with the basket still containing the apple.

Sack

Pour the lentils into the innkeeper's sack, bind it and turn inside out. Pour in the peas. Then unbind the sack a pour the lentils back to your sack.

Marine

The marines were standing back to the edge of the ship so they were looking at each other. It does not matter where the ship is (of course it does not apply to the north and South Pole).

Ship Ladder

If the tide is raising water, then it is raising the ship on water, too. So water will reach still the first rung.

Hotel Bill

This is a nice nonsense. Each guest paid $9 because they gave $30 and they were given back $3. The manager got $25 and the difference ($2) has the bellboy. So it is nonsense to add the $2 to the $27, since the bellboy kept the $2.

Hotel

Of course, it is impossible. Into the second room should have gone the 2nd guest, because the 13th guest was waiting in room number 1.

Puzzling Prattle

The two children were so befogged over the calendar that they had started on their way to school on Sunday morning!

Twins

The two babies are two of a set of triplets.

Photograph

I am looking at my son.

One-Way Street

She was walking.

Cost of War

Add up all the injuries, and you find that 100 soldiers suffered a total of 310 injuries. That total means that, at a minimum, 100 soldiers lost 3 body parts, and 10 (the remainder when dividing 310 by 100) must have lost all 4 body parts. (In reality, as many as 70 may have lost all 4 body parts.)

Bavarian

There is exactly as much tonic in the glass of fernet as there is fernet in the glass of tonic.

Just in Time

The letter m.

The Short Ones

- Why should a living man be buried?
- No, it is not legal to get married if you are dead.
- The bear is white since the house is built on the North Pole.
- If you take 2 apples, than you have of course 2.
- The dog can run into the woods only to the half of the wood – than it would run out of the woods.
- The score before any hockey game should be 0:0, shouldn't it?
- A match, of course.
- There are more Chinese men than Japanese men.
- Normal – I wouldn't be very happy if I had all my fingers (10) on one hand.

TRUTH AND LIE
(LOGIC PROBLEMS)

Honestants and Swindlecants I.

It is impossible that any inhabitant of such an island says: „I am a liar.“ An honestant would thus be lying and a swindlecant would be speaking truth. So B must have been lying and therefore he is a swindlecant. And that means that C was right saying B is lying – so C is an honestant. However, it is not clear what is A.

Honestants and Swindlecants II.

Logical disjunction is a statement "P or Q". Such a disjunction is false if both P and Q are false. In all other cases it is true. Note that in everyday language, use of the word "or" can sometimes mean "either, but not both" (e.g., "would you like tea or coffee?"). In logic, this is called an "exclusive disjunction" or "exclusive or" (xor).
So if A was a swindlecant, then his statement would be false (thus A would have to be an honestant and B would have to be a swindlecant). However, that would cause a conflict which implicates that A must be an honestant. In that case at least one part of his statement is true and as it can't be the first one, B must be an honestant, too.

Honestants and Swindlecants III.

There are a few types of questions:

1. **Indirect question:** „Hey you, what would the other guard say, if I asked him where this door leads?“ The answer is always negated.
2. **Tricky question:** „Hey you, does an honestant stand at the door to freedom?“ The answer will be YES, if I am asking an honestant who is standing at the door to freedom, or if I am asking a swindlecant standing again at the same door. So I can walk through the door. A similar deduction can be made for negative answer.
3. **Complicated question:** „Hey you, what would you say, if I asked you ...?“ An honestant is clear, but a swindlecant should lie. However, he is forced by the question to lie two times and thus speak the truth.

Honestants and Swindlecants IV.

The first one must be a swindlecant (otherwise he would bring himself into a liar paradox), and so (knowing that the first one is lying) there must be at least one honestant among them. If the second one is lying, then (as the first one stated) the third one is an honestant, but that would make the second one speak the truth. So the second one is an honestant and C is a swindlecant.

Honestants and Swindlecants V.

It is important to explore the statement as a whole. Truth table of any implication is as follows:

P	Q	P=>Q
truth	truth	**truth**
truth	lie	**lie**
lie	truth	**truth**
lie	lie	**truth**

In this logical conditional („if-then“ statement) *p* is a hypothesis (or *antecedent*) and *q* is a conclusion (or *consequent*).
It is obvious, that the husband is not a Swindlecant, because in that case one part of the statement (Q) „ ... then I am Swindlecant.“ would have to be a lie, which is a conflict. And since A is an Honestant, the whole statement is true.
If his wife was an Honestant too, then the second part of statement (Q) „ ... then I am Swindlecant.“ would have to be true, which is a conflict again. Therefore the man is an Honestant and his wife is a Swindlecant.

Honestants and Swindlecants VI.

This one seems not clear to me. However, the bartender and the man sitting next to the gringo must be one honestant and one swindlecant (not knowing who is who).

1. the bartender must have said: "Yes, I speak the truth" (no matter who he is)
2. the man sitting next to gringo said: "The bartender said yes, but he is a big liar.", which is true only if BOTH parts of the sentence are true (for logical conjuction see http://en.wikipedia.org/wiki/Logical_conjunction)
   - o if it's true - the man is an honestant and the bartender a swindlecant,
   - o if it's false = "he is a big liar" is false - bartender is an honestant and the man is a swindlecant.

Honestants and Swindlecants VII.

It is important to explore the statement as a whole. Truth table of any logical equivalence is as follows:

P	Q	P<=>Q
truth	truth	**truth**
truth	lie	**lie**
lie	truth	**lie**
lie	lie	**truth**

If the man is an Honestant, then the whole statement must be true. One part of it, where he said that he is an honest man is true then and so the other part (about the treasure) must be true, too. However, if he is a Swindlecant, the whole statement is a lie. The part mentioning that he is an honest man is in that case of course a lie. Thus the other part must be truth. So there must be a treasure on the island, no matter what kind of man said the sentence.

Honestants and Swindlecants VIII.

The important thing was what we did not need to know. So if we knew how many people lied we would know the answer. And one more thing – B and D said the same. If all of them lied, there would be 4 possible days to choose from (which one is not clear).
If only one of them spoke the truth, it could be A or C, so 2 possible days (not clear again).
If two of them were honest, it would have to be B and D saying that it was Saturday.
Neither 3 nor all 4 could have been honest because of an obvious conflict.
So it was Saturday.

Honestants and Swindlecants IX.

If the aborigine answered „Yes.", the gringo would not have been able to identify them. That means, the answer had to be „No.", and the one who said that was a liar and the other one was an honest man.

Honestants and Swindlecants X.

„I am a poor swindlecant." An honestant can not say such a sentence, so it is a lie. And that's why only a rich swindlecant can say that.
„I am not a poor honestant." A swindlecant can not say that, because it would be true. And that's why an honestant who is not poor (a rich one) said that.

At the Court I.

Yes, the statement helped him. If he is an honestant, then a swindlecant committed the crime. If he is a swindlecant, then his statement points to an honestant who is guilty. Thus he is again innocent regarding the statement.

At the Court II.

The statement of plaintiff is a lie only if the hypothesis (or antecedent) is true and conclusion (or consequent) is not true. So the solicitor did not help his client at all. He actually said that his client was guilty and there was no accomplice.

At the Court III.

- „I did it – I am guilty."
- There is no such sentence.
- „I am innocent."
- „Either I am an honestant and innocent, or I am a swindlecant and guilty." = „I am either an innocent honestant, or a guilty swindlecant." The court could think this way:
  - If he is an honestant, then his statement is true and he is innocent.
  - If he is a swindlecant, then his statement is a lie and he is neither an innocent

honestant nor a guilty swindlecant. This means that he is an innocent swindlecant.

- If he is normal, then he is innocent since a normal man couldn't have done that.

Pandora's Box I.

The given conditions indicate that only the inscription on the lead box is true. So the ring is in the silver box.

Pandora's Box II.

The ring must be in the golden box, otherwise all the inscriptions would be either true or false.

Lion and Unicorn I.

As there is no day when both of the beings would be lying, at least one of them must have spoken the truth. They both speak the truth only on Sunday. However, the Lion would then be lying in his statement, so it couldn't be said on Sunday. So exactly one of them lied.

If the Unicorn was honest, then it would have to be Sunday – but previously we proved this wrong. Thus only the Lion spoke the truth when he met Alice on Thursday and spoke with the Unicorn about Wednesday.

Lion and Unicorn II.

This conjunction is true only if both parts are true. The first part is true only on Thursday, but the second part is a lie then (Sunday is not a lying day of the Lion). So the whole statement is not true (at least one part is not true) and could be said only on a lying day. Since the second part is a lie on any lying day, the Lion could have made the statement on Monday, on Tuesday and even on Wednesday.

Island Baal

Conjunction used by A is true only if both parts are true. Under the assumption that B is an honest man, then A would be honest too (B says so) and so B would be a liar as A said, which would be a conflict. So B is a liar. And knowing that, B actually said that A is a liar, too. First statement of A is thus a lie and B is not a lying monkey. However, B is lying which means he is not a monkey. B is a lying man. The second statement of A indicates that A is a monkey – so A is a lying monkey.

Truth, Lie and Wisdom

Let's assign a letter to each goddess. We get these sentences.

1. A says: B is Truth.
2. B says: I am Wisdom.
3. C says: B is Lie.

First sentence hints that A is not Truth. Second sentence is not said by Truth either, so C is Truth. Thus the third sentence is true. B is Lie and A is Wisdom.

In the Alps

The only one who is lying for sure is Philip. Hans speaks probably the truth and Emanuel lies. It can be also the other way, but since Hans expressed himself before Emanuel did, then Emanuel's remark (that he does not know whether Hans is lying) is not true.

Coins

"You will give me neither copper nor silver coin." If it is true, then I have to get the gold coin. If it is a lie, then the negation must be true, so "you give me either copper or silver coin", which would break the given conditions that you get no coin when lying. So the first sentence must be true.

Slim Lover

You could say for instance this sentence: „You will give me neither your photo nor a kiss.“

OVERSPILLING, WEIGHING, MEASUREMENT

Overspilling Water I.

Fill the 5-litre bowl and overspill water to the 3-litre bowl, which you empty afterwards. From the 5-litre bowl overspill the 2 remaining litres to the 3-litre bowl. Refill the 5-litre bowl and fill in the 3-litre bowl (with 1 litre), so there stay the 4 required litres in the 5-litre bowl.

Overspilling Water II.

1. pour 5 litres from the 8-litre to the 5-litre bowl,
2. pour 3 litres from the 5-litre to the 3-litre bowl,
3. pour these 3 litres back to the 8-litre bowl,
4. pour the remaining 2 litres from the 5-litre to the 3-litre bowl,
5. pour 5 litres from the 8-litre to the 5-litre bowl,
6. pour the missing 1 litre from the 5-litre to the 3-litre bowl (there should be 4 litres left in the 5-litre bowl),
7. pour the 3 litres back from the 3-litre to the 8-litre bowl (and that's it – in 8-litre bowl 4 litres).

Overspilling Water III.

Three numerals in each number stand for litres in each bowl:
700 - 340 - 313 - 610 - 601 - 241 - 223 (overspilling 6 times)

Overspilling Water IV.

First fill the 9-litre bowl. Then overspill 4 litres to the 4-litre bowl (there are 5 litres in the 9-litre bowl afterwards) and pour out the water from the 4-litre bowl. And again overspill 4 litres to the 4-litre bowl and empty it. Then overspill the remaining litre to the 4-litre bowl but this time keep it there. Fill the 9-litre bowl to the top for the second time and overspill water to fill the 4-litre bowl to the top. Thus the required 6 litres stay in the 9-litre bowl.

Overspilling Water V.

1. Fill the 5-litre bowl, overspill water from it to fill the 4-litre bowl, which you empty afterwards. Overspill the remaining 1 litre to the 4-litre bowl. Refill the 5-litre bowl and overspill water from it to fill the 4-litre bowl (where there is already 1 litre). Thus you are left with 2 litres in the 5-litre bowl.
2. The same principle – this time from the other end. Fill the 3-litre bowl and overspill all of the water to the 4-litre bowl. Refill the 3-litre bowl and fill the 4-litre bowl to the top. And there you have 2 litres in the 3-litre bowl.

Overspilling Water VI.

1. Pour 1 litre from bowl A to bowl C. Thus 4 litres are left in the bowl A and bowl C is full (3 litres).
2. Pour 2 litres from bowl C to bowl B. Doing that you have full bowl B (5 litres) and there is 1 litre left in bowl C.

Weighing I.

If there is only 1 bag with forgeries, then take 1 coin from the first bag, 2 coins from the second bag ... ten coins from the tenth bag and weigh the picked coins. Find out how many grams does it weigh and compare it to the ideal state of having all original coins. The amount of grams (the difference) is the place of the bag with fake coins.
If there is more than 1 bag with forgeries, then there is lots of possible solution. I can offer you this one as an example: 1, 2, 4, 10, 20, 50, 100, 200, 500 and 1000.

Weighing II.

Spike uses 51 gummy drop bears: from the 7 boxes he takes respectively 0, 1, 2, 4, 7, 13, and 24 bears.
The notion is that each box of imitation bears will subtract its number of bears from the total "ideal" weight of 510 grams (1 gram of missing weight per bear), so Spike weighs the bears, subtracts the result from 510 to obtain a number N, and finds the unique

combination of 3 numbers from the above list (since there are 3 "imitation" boxes) that sum to N.
The trick is for the sums of all triples selected from the set S of numbers of bears to be unique. To accomplish this, I put numbers into S one at a time in ascending order, starting with the obvious choice, 0. (Why is this obvious? If I'd started with k > 0, then I could have improved on the resulting solution by subtracting k from each number) Each new number obviously had to be greater than any previous, because otherwise sums are not unique, but also the sums it made when paired with any previous number had to be distinct from all previous pairs (otherwise when this pair is combined with a third number you can't distinguish it from the other pair)--except for the last box, where we can ignore this point. And most obviously all the new triples had to be distinct from any old triples; it was easy to find what the new triples were by adding the newest number to each old sum of pairs.
Now, in case you're curious, the possible weight deficits and their unique decompositions are:
3 = 0 + 1 + 2
5 = 0 + 1 + 4
6 = 0 + 2 + 4
7 = 1 + 2 + 4
8 = 0 + 1 + 7
9 = 0 + 2 + 7
10 = 1 + 2 + 7
11 = 0 + 4 + 7
12 = 1 + 4 + 7
13 = 2 + 4 + 7
14 = 0 + 1 + 13
15 = 0 + 2 + 13
16 = 1 + 2 + 13
17 = 0 + 4 + 13
18 = 1 + 4 + 13
19 = 2 + 4 + 13
20 = 0 + 7 + 13
21 = 1 + 7 + 13
22 = 2 + 7 + 13
24 = 4 + 7 + 13
25 = 0 + 1 + 24
26 = 0 + 2 + 24
27 = 1 + 2 + 24
28 = 0 + 4 + 24
29 = 1 + 4 + 24
30 = 2 + 4 + 24
31 = 0 + 7 + 24
32 = 1 + 7 + 24
33 = 2 + 7 + 24
35 = 4 + 7 + 24
37 = 0 + 13 + 24
38 = 1 + 13 + 24
39 = 2 + 13 + 24

41 = 4 + 13 + 24
44 = 7 + 13 + 24
Note that there had to be (7 choose 3) distinct values; they end up ranging from 3 to 44 inclusive with 7 numbers missing: 4, 23, 34, 36, 40, 42, and 43.

Weighing III.

Similar to the former brain teaser.
I take out 0 (no coin from the first bag), 1 (one coin from the second bag etc.), 2, 4, 7, 13, 24, 44 coins (from the last 8th bag). Each triple is unique enabling an easy way to identify the bags with fake coins (using only 95 coins).

Weighing IV.

It is enough to use the pair of scales just 3 times. Let’s mark the balls using numbers from 1 to 12 and these special symbols:
x? means I know nothing about ball number x;
x< means that this ball is **maybe** lighter then the others;
x> means that this ball is **maybe** heavier then the others;
x. means this ball is “normal”.
At first, I lay on the left pan balls 1? 2? 3? 4? and on the right pan balls 5? 6? 7? 8?.
If there is equilibrium, then the wrong ball is among balls 9-12. I put 1. 2. 3. on the left and 9? 10? 11? on the right pan.
If there is equilibrium, then the wrong ball is number 12 and comparing it with another ball I find out if it is heavier or lighter.
If the left pan is heavier, I know that 12 is normal and 9< 10< 11<. I weigh 9< and 10<. If they are the same weight, then ball 11 is lighter then all other balls.
If they are not the same weight, then the lighter ball is the one up.
If the right pan is heavier, then 9> 10> and 11> and the procedure is similar to the former text.
If the left pan is heavier, then 1> 2> 3> 4>, 5< 6< 7< 8< and 9. 10. 11. 12. Now I lay on the left pan 1> 2> 3> 5< and on the right pan 4> 9. 10. 11.
If there is equilibrium, then the suspicious balls are 6< 7< and 8<. Identifying the wrong one is similar to the former case of 9< 10< 11<
If the left pan is lighter, then the wrong ball can be 5< or 4>. I compare for instance 1. and 4>. If they weigh the same, then ball 5 is lighter the all the others. Otherwise ball 4 is heavier (is down).
If the left pan is heavier, then all balls are normal except for 1> 2> and 3>. Identifying the wrong ball among 3 balls was described earlier.

Weighing V.

Lay one red and one white ball on left pan and one blue and the other white ball on the right pan. If there is equilibrium, then it is clear that there is one heavier and one lighter ball on each side. That’s why comparing white balls is enough to learn everything. However, if at first weighing one side is heavier, then there must be a heavier white ball on that side. The next reasonable step is to compare the already weighed red ball and yet not weighed blue ball. After that, the character of each ball is clear, isn’t it?

Weighing VI.

Divide the 9 balls into 3 groups of 3. Weigh two groups. Thus you find out which group is the heavier ball in. Choose 2 balls from this group and compare their weights. And that's it.

Weighing VII.

It is enough to use a pair of scales 3 times.
Divide the 27 balls to 3 groups, 9 balls in each. Compare 2 groups – the heavier one contains the ball. If there is equilibrium, then the ball is in the third group. Thus we know the 9 suspicious balls.
Divide the 9 balls to 3 groups of 3. Compare 2 groups, and as mentioned above, identify the group of 3 suspicious balls.
Compare 2 balls (of the 3 possibly heavier ones) and you know everything.
So we used a pair of scales 3 times to identify the heavier ball.

Weighing VIII.

There are necessary at least 5 weights to bring into balance any of the 121 possible objects. And they weigh as follows: 1, 3, 9, 27, 81g.

Sand-Glass I.

Turn both sand-glasses. After 4 minutes turn upside down the 4-min sand-glass. When the 7-min sand-glass spills the last grain, turn the 7-min upside down. Then you have 1 minute in the 4-min sand-glass left and after spilling everything, in the 7-min sand-glass there will be 1 minute of sand down (already spilt). Turn the 7-min sand-glass upside down and let the 1 minute go back. And that's it. 4 + 3 + 1 + 1 = 9

Sand-Glass II.

When the test began, the teacher turned both 7min and 11min sand-glasses. After the 7min one spilt its last grain, he turned it upside down (the 11min one is still to spill sand for another 4 minutes). When the 11min sand-glass was spilt, he turned the 7min one upside down for the last time. And that’s it.

Igniter Cords

Start fire on both ends of one igniter cord and on one end of the second igniter cord. The very moment the first cord (where both ends burn) stops burning (that is after 30 minutes), start fire on the other end of the second cord (otherwise it would burn another 30 minutes). Thus the second igniter cord burns just 15 minutes from then. And that is all together 45 minutes.

EINSTEIN'S RIDDLES

Bear

It all happened on the North Pole. When the man shot, he must have been right on the North Pole. Getting it? So it makes sense to assume that the only color the bear could be was WHITE.
So this is it. I've heard another logical solutions (even that there are no bears neither on the North nor on the South Pole), but this one presented makes sense to me. And what about you?

Neighbours

Norwegian	yellow	Dunhill	water	cat
Dane	blue	Blend	tea	horse
Briton	red	Pall Mall	milk	bird
German	green	Prince	coffee	**fish**
Swedish	white	Blue Master	beer	dog

Meeting (meet this challenge)

Daniella and Mathew Black	Shop-Assistants	Trabant	pink	"Mulatka Gabriela"	"We Were Five"
Victoria and Owen Kuril	Doctors	Skoda	brown	"The Modern Comedy"	"Slovacko Judge"
Hannah and Stan Horricks	Agriculturalists	Moskvic	white	"Dame Commissar"	"Mulatka Gabriela"
Jenny and Robert Smith	Warehouse Managers	Wartburg	yellow	"We Were Five"	"The Modern Comedy"
Monica and Alexander Cermak	Ticket-Collectors	Dacia	violet	"Shed Stoat"	"Grandfather Joseph"
Irene a Oto Zajac	Accountants	Fiat	red	"The Seadog"	"Shed Stoat"

Pamela and Paul Swain	Shoppers	Renault	green	"Grandfather Joseph"	"The Seadog"
Veronica and Rick Dvořák	Teachers	Ziguli	blue	"Slovacko Judge"	"Dame Commissar"

Ships

Spanish ship goes to Port Said and French ship carries tea. However, tea can be carried by the Brazilian ship, too, if you understood position ‘to the right’ as anywhere on the right side from the given point (not only right next to).

French	5.00	**tea**	blue	Genoa
Greek	6.00	coffee	red	Hamburg
Brazilian	8.00	cocoa	black	Manila
English	9.00	rice	white	Marseille
Spanish	7.00	corn	green	**Port Said**

Gardens

Hank	pear	apple	cherry	rose
Sam	cherry	onion	rose	tulip
Paul	carrot	gourd	onion	rose
Zick	aster	rose	tulip	lily
Luke	pear	nut	gourd	parsley

NUMBER PUZZLES

Easy Savoury

None of the students can have numbers 1 or 10, since they would guess the other one's number with no problems. I will describe solutions at one end of the interval of numbers 1-10 (the same can be done on the other end).
Information that the second student does not know must be important for the first student. So the first one must expect that the second one has 1 or 3 (if the first one has 2). And as the second student does not know, then he has certainly not 1. So the first pair is 2 and 3.
If the first one had 3, then he would expect the other one to have either 2 or 4. But if the second one had 2 (and the second one would have known that the first one does not have 1), then he would know the number of the first student. However, neither the second student knows the answer – so he has 4. The second pair of numbers is 3 and 4.
Solutions at the other end of interval are 9 and 8 or 8 and 7.

Savoury

The numbers were 2 and 9. Why? Try to think about it ☺.

Children

Let's start with the known product – 36. Write on a sheet of paper the possible combinations giving the product of 36. Knowing that the sum is not enough to be sure, there are two possible combinations with the same sum (1-6-6 a 2-2-9). And as we learned further that the oldest son wears a hat, it is clear that the correct combination of ages is 2-2-9, where there is exactly one of them the oldest one.

Birthday

He was born on December 31st and spoke about it on January 1st.

Symbol

decimal point – 5.9

Fraction

5832/17496 = 1/3

5-Digit Number

Using an easy equation: $3(x+100000) = 10x+1$ we find out that the number is 42857.

9-Digit Number

473816952 – if rounding changes the next numeral character

10-Digit Number

- Sum of all numerals must be ten because each numeral stands for the count of other numerals and because this number shall have ten numerals. Beginning to choose reasonable numerals for the first figure you can come across the correct number: 6210001000.
- 2100010006.

Cipher

The possible 2 last numerals are as follows: 03, 05, 07, 09, 14, 16, 18, 25, 27, 29 and 30. At least two multiples less than 100 (this condition is already accomplished), which consist of even and odd numeral (respecting all other conditions) are for 03, 07, 09 and 18 as follows:
03 – 27, 63, 69, 81
07 – 49, 63
09 – 27, 63, 81
18 – 36, 72, 90
There are 5 numbers that can be made of these pairs of numerals to create the cipher: 692703, 816903, 496307, 816309 and 903618. (If we assume, that also in the number 903618 is accomplished the requirement to alternate even and odd numbers, despite the opposite order.)

The Number Puzzle

This one is not verified – I used 2 numbers 39543 and 89398. And this is what the grid looks like:

8	9	3	9	8
9		9		9
3	9	5	4	3
9		4		9
8	9	3	9	8

So the total score is 147.

Master Mind

6741

1996

29 = $-1+[9]+[[9]^{6}]$
32 = (1:[9])x96
35 = -19+(9x6)
38 = 19:[9]x6
70 = $(1+[9])^{[9]}+6$
73 = 19+(9x6)
76 = 1+(9x9)-6
77 = -19+96

100 = 1+[9]+96
1000 = $(1+9)^{(9-6)}$
I used [brackets] as the symbol for root.

100

100 = 177-77 = (7+7)x(7+(1:7))
I do not know other solutions.

Equation

Move the numeral 2 half a line up to achieve $101-10^2=1$.

Number Series

- 8723, 3872, 2387, ? **7238 (moving of numerals)**
- 1, 4, 9, 18, 35, ? **68 (x*2+2, +1, +0, -1, -2)**
- 23, 45, 89, 177, ? **353 (x*2-1)**
- 7, 5, 8, 4, 9, 3, ? **10, 2 (two series – every second number: 7, 8, 9, 10 a 5, 4, 3, 2)**
- 11, 19, 14, 22, 17, 25, ? **20, 28 (two series – every second number: 11, 14, 17, 20 a 19, 22, 25, 28)**
- 3, 8, 15, 24, 35, ? **48 (x+5, +7, +9, +11, +13)**
- 2, 4, 5, 10, 12, 24, 27, ? **54, 58 (x*2, +1, *2, +2, *2, +3, *2, +4)**
- 1, 3, 4, 7, 11, 18, ? **29 (a+b=c, b+c=d, c+d=e …)**
- 99, 92, 86, 81, 77, ? **74 (x-7, -6, -5, -4, -3)**
- 0, 4, 2, 6, 4, 8, ? **6 (x+4, -2, +4, -2, +4, -2)**
- 1, 2, 2, 4, 8, 11, 33, ?
- 1, 2, 6, 24, 120, ? **720 (x*2, *3, *4, *5, *6)**
- 1, 2, 3, 6, 11, 20, 37, ?
- 5, 7, 12, 19, 31, 50, ? **81 (a+b=c, b+c=d, c+d=e …)**
- 27, 82, 41, 124, 62, 31, 94, 47, 142, 71, 214, 107, ? **322, 161 (x*3+1, /2, *3+1, /2 …)**
- 126, 63, 190, 95, 286, 143, 430, 215, 646, 323, 970, ? **485, 1456 (x/2, *3+1, /2, *3+1 …)**
- 4, 7, 15, 29, 59, 117, ? **235 (x*2-1, *2+1, *2-1 …)**
- 2, 3, 2, 3, 2, 4, 2, 3, 2, 3, 2, 5, 2, 3, 2, 3, 2, 4, 2, 3, 2, 3, 2, 5, 2, 3, 2, 3, 2, 4, 2, 3, 2, 3, 2, 5, ? **2, 3, 2, 3, 2, 4, 2, 3, 2, 3, 2, 5**
- 4, 4, 341, 6, 4, 4, 6, 6, 4, 4, 6, 10, 4, 4, 14, 6, 4, 4, 6, 6, 4, 4, 6, 22, 4, 4, 9, 6, ? **4, 4**

CROSSING RIVER AND OTHERS

She-goat, Wolf and Cabbage

Take the she-goat to the other side. Go back, take cabbage, unload it on the other side where you load the she-goat, go back and unload it. Take the wolf to the other side where you unload it. Go back for the she-goat. That's it.

Cannibals and Missionaries

1 cannibal and 1 missionary there, missionary back. 2 cannibals there, 1 cannibal back. 2 missionaries there, 1 missionary and 1 cannibal back. 2 missionaries there, 1 cannibal back. This one cannibal takes the remaining cannibals to the other side.

Family

First go the children. Son comes back, and father goes on the other side to his daughter. Then daughter goes back to pick her brother up and they both go to the other side to the father. Son comes back to give the boat to mother who goes to the other side (to father and daughter). Daughter jumps in and goes to her brother so they can both return to their parents. Daughter gets off and son gives the boat back on the first side of the river to the fisherman, who goes on the other side. There the daughter jumps in and goes to her brother to take him back to parents where she (where the whole family meets at last) returns the boat to the fisherman. The boat crossed the river 13 times.

Humans and Monkeys

The three columns represent the left bank, the boat, and the right bank respectively. The < or > indicates the direction of motion of the boat.

HHHMmm		.
HHHm	Mm>	.
HHHm	<M	m
HHH	Mm>	m
HHH	<M	mm
HM	HH>	mm
HM	<Hm	Hm
Hm	HM>	Hm
Hm	<Hm	HM
mm	HH>	HM
mm	<M	HHH
m	Mm>	HHH
m	<M	HHHm
.	Mm>	HHHm
.	.	HHHMmm

Dark Phobia

First mom and dad – 2 minutes. Dad comes back – 3 minutes, both children go to mom – 8 minutes. Mom comes to dad – 10 minutes and they both get to their children – 12 minutes.

Condoms

1. Use both condoms on the first woman. Take off the outer condom (turning it inside-out in the process) and set it aside. Use the inner condom alone on the second woman. Put the outer condom back on. Use it on the third woman.
2. First man takes both condoms (c1 and c2), makes love to the first woman, takes off c2 and passes it on to the second man, who pleases the first woman, too. First man does it to the second woman using c1 and afterwards he takes c1 off and the second man stretches c1 over c2 and ...
3. First man uses both condoms. Take off the outer condom (do NOT reverse it) and have second man use it. First man takes off the inner condom (turning it inside-out). Third man puts on this condom, followed by second man's condom.

Flowers

There are 2 solutions:
Three flowers: rose, tulip, daisy.
Two flowers: carnation, geranium.

Subtraction

Once. After you subtract 2 from 32, you subtract 2 from 30, from 28, and so on.

Round vs. Square

You can turn a square manhole cover sideways and drop it down the diagonal of the manhole. You cannot drop a round manhole cover down the manhole. Therefore, round manhole covers are safer and more practical than square ones.

The Barbershop Puzzle

The traveler goes to have his hair cut at the barbershop on East Street. He figures that since there are only two barbershops in town the East Street barber must have his hair cut by the West Street barber and vice versa. So if the traveler wants to look as good as the West Street barber (the one with the good haircut), he'd better go to the man who cuts the West Street barber's hair - the East Street barber.
By the way, the reason the West Street barbershop is so clean and neat is that it seldom gets customers.

Murder in the Desert

Well, this is a hard one. In my opinion, there is no clear solution. Each point of view is correct, somehow. Most of the people would say that A is the murderer. Solicitor of B would stress 2 things:
1. to take away poisoned water from someone does not mean killing him,
2. B just made C live longer, even if he did not mean to (the poison might have killed C earlier).
However, solicitor of A could present the following argument:

"How can be A be punished for committing a murder by poisoning C, if C did not swallow a single drop of poison."
Raymond M. Smullyan pointed out the moral, legal and logical point of view. It is morally clear that both A and B are guilty of homicide attempt. Legally, 2 different courts could judge them in 2 different ways. And logic gives us the opportunity to write a whole book on this topic.

The Elder Twin

At the time she went into labor, the mother of the twins was travelling by boat. The older twin, Terry, was born first early on March 1st. The boat then crossed the International Date line (or any time zone line) and Kerry, the younger twin, was born on February the 28th. In a leap year the younger twin celebrates her birthday two days before her older brother.
This puzzle was submitted to Games Magazine's 'How Come' competition in 1992 by Judy Dean. It won.

NEW

Letter Bourse

	A	**B**	**C**	**D**			
C			C	D	B	A	
	A			B	D	C	**C**
	D	B		A	C		**C**
	B	A	D	C			**C**
C		C	B		A	D	
C	C	D	A			B	
	C		**A**	**C**	**A**		

					B		
	B	C	E	A		D	
	C	A	D	E	B		**B**
E	E	B		D	A	C	
E		E	C	B	D	A	**A**
D	D		A	C	E	B	
	A	D	B		C	E	
			B	**C**	**C**		

		B	**B**		**D**			
D	D	B		E		A	C	**C**
A	A	E	B		D	C		**C**
D		D		C	E	B	A	
	E		C	D	A		B	**B**
A		A	D	B	C	E		**E**

	B	C	A			D	E	**E**
	C		E	A	B		D	
	C	**C**	**E**		**B**	**D**		

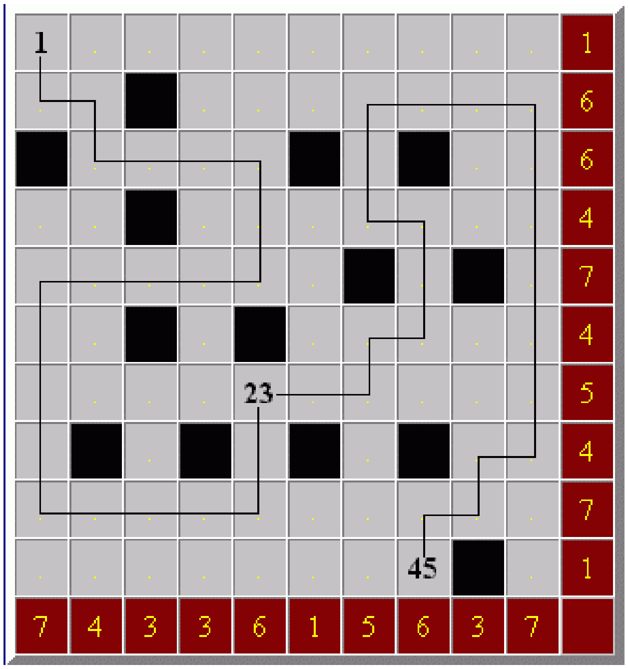
Domino Hunt

		5	3	3	3	2		
		6	5	0	6	6		
2	0	5	4	1	3	4	4	5
3	6	6	1	5	1	0	6	5
3	5	6	1	1	2	2	4	2
1	1	3	2	5	4	4	3	4
		0	6	0	1	2		
		4	0	0	0	2		

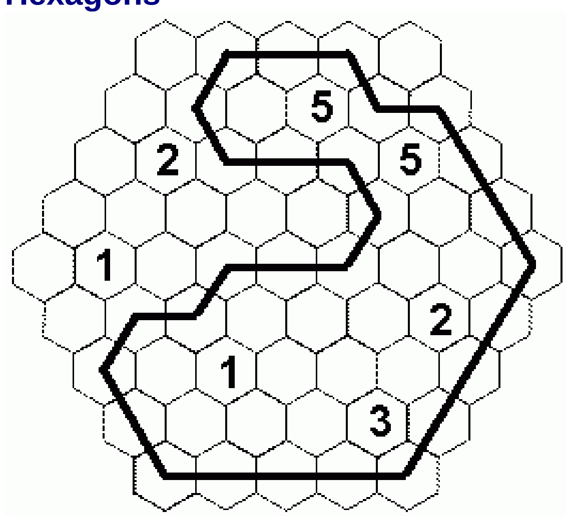
Crisscross

		1	**3**	**5**
	2	**6**	**0**	**1**
	3	**5**	**6**	
4	**9**	**1**		
5	**1**			

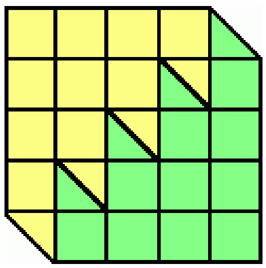
Nessie

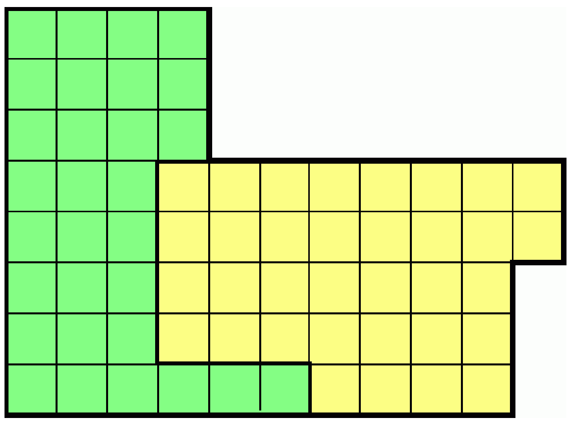


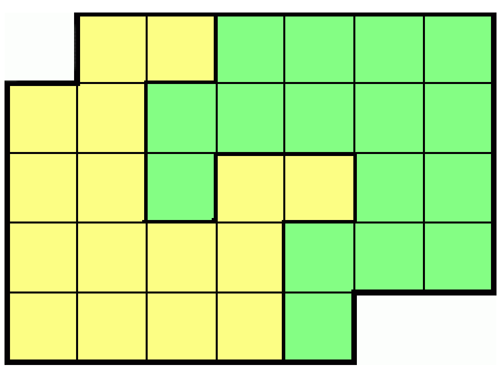
Hexagons

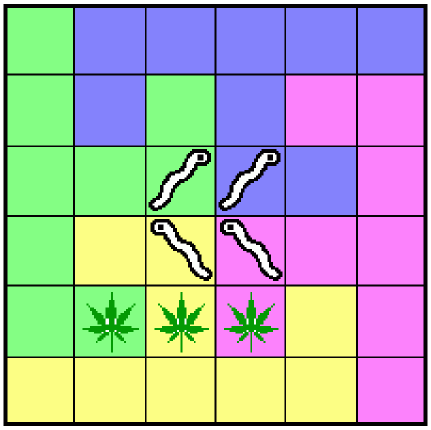


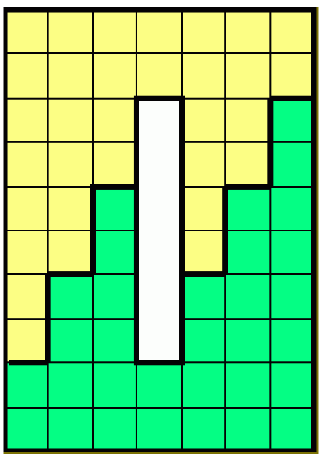
GEOMETRY PUZZLES

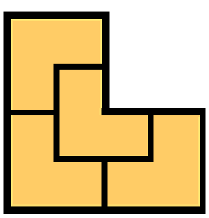


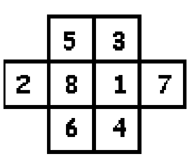




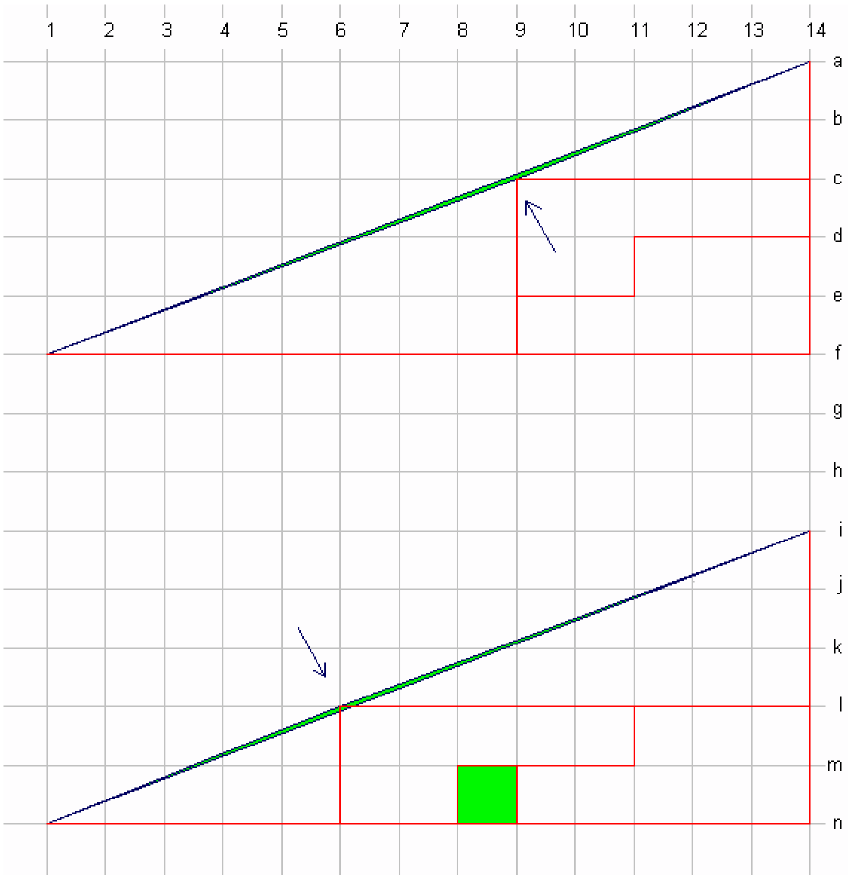







5
3
2
8
1
7
6
4

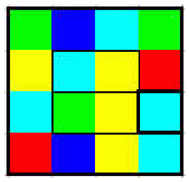
It looks like a triangle, because a thick line was used. Hypotenuse of the composite triangle is actually not a straight line – it is made of two lines. Forth cusps are where the arrows point (c9, l6).

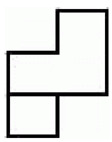


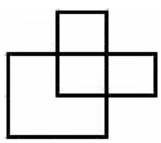
The 64 =65 paradox arises from the fact that the edges of the four pieces, which lie along the diagonal of the formed rectangle, do not coincide exactly in direction. This diagonal *is not* a straight segment line but a small *lozenge* (diamond-shaped figure), whose acute angle is

$$\arctan 2/3 - \arctan 3/8 = \arctan 1/46$$

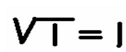
which is less than 1° 15' . Only a very precise drawing can enable us to distinguish such a small angle. Using analytic geometry or trigonometry, we can easily prove that the area of the "hidden" lozenge is equal to that of a small square of the chessboard.

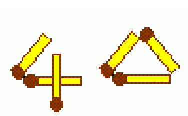


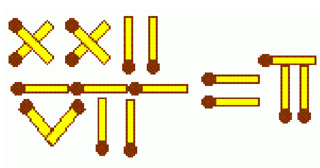




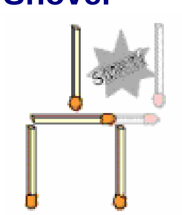
PUZZLES WITH MATCHES

XI - V = IV (more solutions)	X - VI = IV	or	XI - V = VI	or	XI - VI = V
X + V = IV (more solutions)	IX - V = IV	or	X - VI = IV		
L + L = L (more solutions)	C - L = L	or	L + I = LI		
VI = IV – III (more solutions)	VI = IX – III	or	VI = IV + II		
XIV - V = XX	XV + V = XX				
IX - IX = V	IX - IV = V				
X = VIII – II	X - VIII = II				
VII = I					



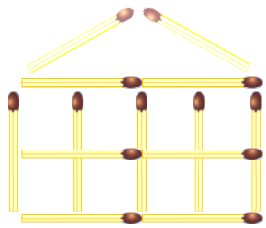


Shovel



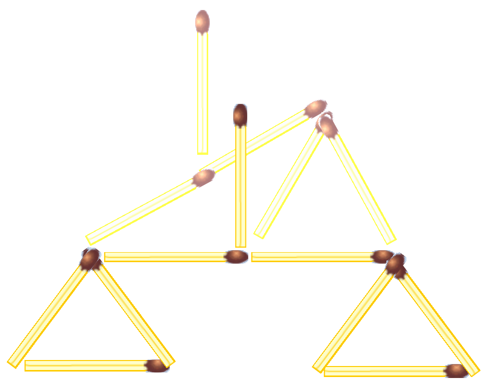
House

1. eleven squares

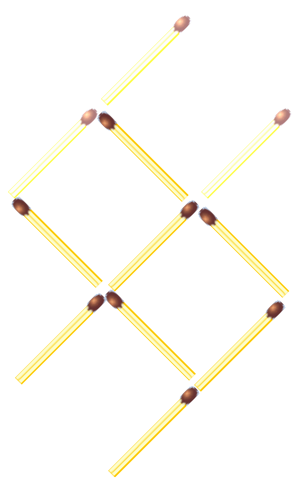


2. fifteen squares

Scales



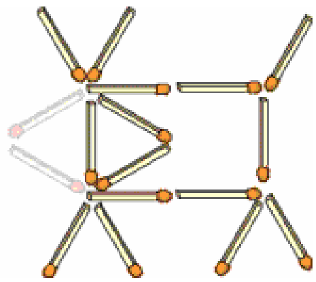
Fish



Rabbit Hutch

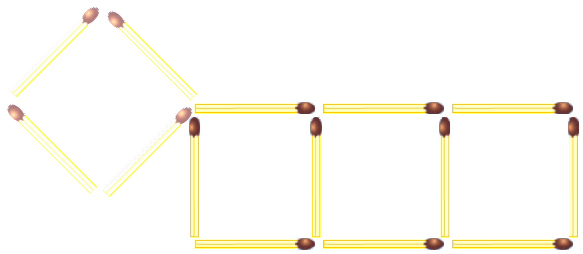
Not finished picture

Cow

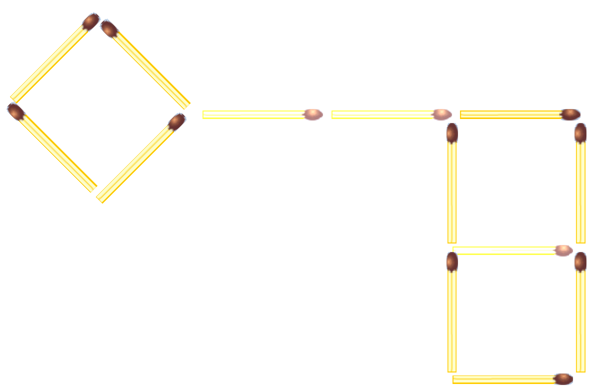


Key

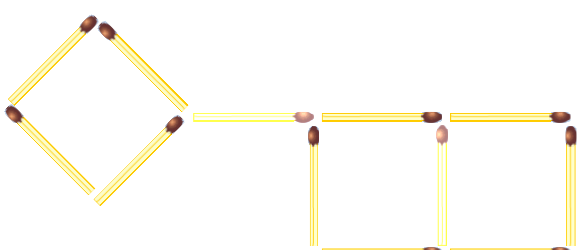
1. three squares



2. two rectangles

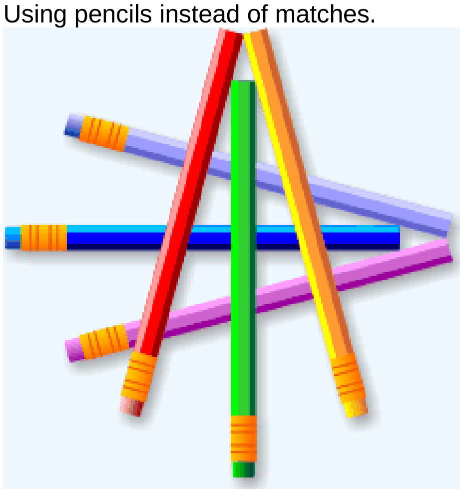


2. two rectangles

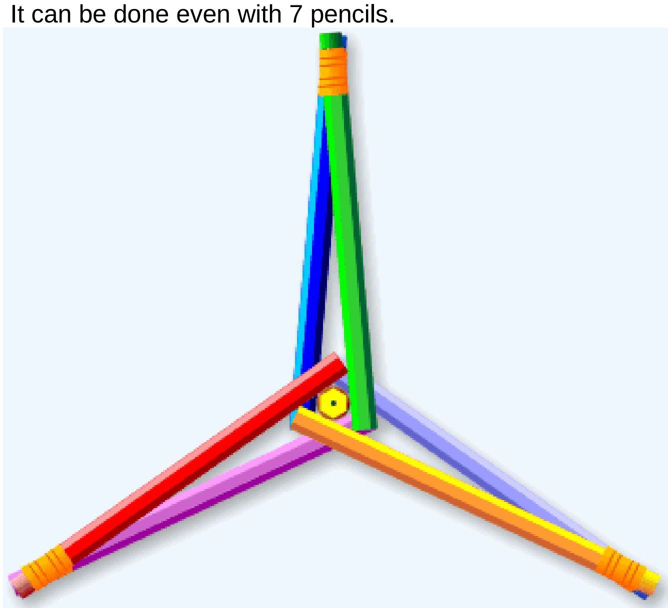


Touch

Using pencils instead of matches.



It can be done even with 7 pencils.



ALGEBRA PUZZLES

ABCB - DEFC = GAFB

: + -

DH x AB = IEI

GGE + DEBB = DHDG

A=3, B=8, C=0, D=1, E=4, F=5, G=2, H=7, I=6

3808 - 1450 = 2358

: + -

17 x 38 = 646

= = =

224 + 1488 = 1712

IFIB - EBG = CEH

- - +

CCE / GD = FE

EFF + EED = CBA

A=9, B=7, C=8, D=6, E=4, F=3, G=2, H=5, I=1

1317 - 472 = 845

- - +

884 / 26 = 34

----

433 + 446 = 879

RE + MI = FA

DO + SI = MI

LA + SI = SOL

27 + 56 = 83

40 + 16 = 56

93 + 16 = 109

SEND
MORE

MONEY
9567 + 1085 = 10652

SEVEN + SEVEN + SIX = TWENTY
68782 + 68782 + 650 = 138214

MOST
MOST

TORZO
6271 + 6271 = 12542

    SINUS
    SINUS
KOSINUS

TANGENS
58725
58725
3958725

4076175

KAJAK
KAJAK
KAJAK
KAJAK
KAJAK
KAJAK

VESLO

15451*6=92706

DVA * DVA = ŠTYRI

D + V + A + D + V + A = Š + T + Y + R + Y

209 * 209 = 43681

2 + 0 + 9 + 2 + 0 + 9 = 4 + 3 + 6 + 8 + 1

$(AA)^B$= ABBA

11^3 = 1331

ALFA + BETA + GAMA = DELTA

5795 + 6435 + 2505 = 14735 or

5305 + 2475 + 6595 = 14375

ABC + DEF = GHIJ

437 + 589 = 1026

743 + 859 = 1602

ABC x DEF = 123 456, if A = 1

192 x 643 = 123456

ABCD*D = DCBA

1089*9=9801

ABCD*E = DCBA

2178*4=8712

ABCDEF*3 = BCDEFA

285714*3=857142 or 142857*3=428571

THC = (T + H + C) x T x H x C

135 = (1 + 3 + 5) x 1 x 3 x 5

A^L= LEBKA

5^7=78125

KOV x KOV = DEDKOV

376*376=141376

$(J+O+I+N+T)^3$= JOINT

$(1+9+6+8+3)^3$=19683