## SA019192 Il berretto di Anna

1. In a dark room there are three bonnets, two red ones and a white one. Anne and Brigitte take one each, put it on and leave the room, Anne first, then Brigitte.
2. Brigitte can see the colour of Anne’s bonnet but Anne can’t see the colour of Brigitte’s bonnet.
3. Brigitte says : “ I am not sure what the colour of my bonnet is “. Anne answers : “ So I know the colour of mine “.
4. ***What colour is Anne's bonnet? Explain why.***
5. **SA019293 Non così veloce!**
6. Henry is driving on a four-lane road on which the speed is limited to 110 km per hour. He notices that:
7. • When the speedometer reads 351,4, the digital watch reads 10.10 am ;
8. • When the speedometer reads 369,4; the digital watch reads 10.19 am .
9. Henry then makes a quick mental calculation and concludes that he is driving at an average speed of 120 km/hour. Yet Henry has been very careful: the speedometer had never went beyond 110 .
10. **FIrst expose Henry's calculation**.
11. **Then explain why it is possible that Henry may not have been speeding, although the dashboard instruments are all in perfect working order.**

## SA019394 Cercate l'errore

1. Consider the four pieces of information, as follows: three of them are true and one is false.
2. 1. Audrey is older than Béatrice.
3. 2. Clément is younger than Béatrice.
4. 3. The sum of ages of Béatrice and Clément is twice the age of Audrey.
5. 4. Clément is older than Audrey.
6. **Determine who is the youngest, who is the oldest. Explain**.

## SA019495 La mappa incompleta

# 

Baron Münchhausen was awarded land for his bravery. He had a map drawn up indicating his castle and the boundary separating his land from the King’s. The Royal Surveyor confirmed that the map was correct.

During a peasants’ revolt, after the castle was burnt to the ground, all that remained was the following document. According to the fragment that was left, the peasants claim that their village doesn’t belong to the Baron’s estate and now they refuse to pay him any taxes.

The Baron is of a different

opinion…

**Who is right? Explain your** **Answer**

**SA019596 *Sale e zucchero***

# 

1. In Paul’s kitchen a sugar bowl and a salt bowl are placed side by side. These two containers have the same size, the same shape and their contents reach the same level.
2. Paul, who is a bit of joker, takes a full spoon of sugar from the sugar bowl and puts it into the salt bowl. Then he mixes the whole.
3. On hearing his mother’s coming, quickly he puts a spoon of this mixture in the sugar bowl, in order to have the same level in each of the containers.
4. **Is there now more salt in the sugar bowl than sugar in the salt bowl? Explain your answer.**

## SA019697 Rivelatore di bugie

1. On planet MB52 there are only two tribes: one tribe that is always telling the truth and one tribe who is always lying.
2. A space traveller is looking for a guide among those who are always telling the truth in order to visit the MB52. He asks the first inhabitant he meets: «Which tribe do you belong?»
3. Of course the man answers: «I am always telling the truth».
4. In doubt the traveller sends him to ask another native which tribe he belongs to. The first inhabitant comes back and tells the traveller: «He told me he is always saying the truth».
5. ***Can the traveller take the first inhabitant met on planet MB52 as a guide or not? Explain your answer.***

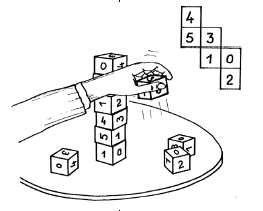
## 

## SA019798 Rivelatore di bugie

# David the magician is going on stage and is showing the audience three big boxes.

1. There are two rabbits drawn on one of the three boxes, two doves on another one and a rabbit and a dove on the last one.
2. Blindfolded David asks one of the member of the audience to put two rabbits into one box, two doves into another box and finally a rabbit and a dove into the last box so that the content of each box does not correspond to its drawing.
3. Then David announces that taking one single animal out of only one of the three boxes is enough for him to find out the content of each box.
4. **Explain his reasoning***.*

## SA019899 Giochi di società



Peter has built a tower by piling ten identical cubes on a table. Here is the design of one of them.

1. Peter tells you the number written on the top-side of the tower and asks you: "what is the sum of the numbers written on all visible sides of the tower?"
2. ***How will you go about it? Explain your answer* .**

**SA019900 Due pesi, due misure**

Antoine has got 4 apparently identical marbles called A, B, C and D. 3 of them have a similar mass, and the fourth marble has got a different one.

He doesn’t know if this marble is heavier or lighter than the others.

Antoine has only got scales that enable him to compare masses and he has to determine which marble is different from the others in a maximum of 2 weighings.

**How does he have to proceed?**

## SA010001 Basta un’occhiata

1. Genevieve shows her friend Anne a magic trick. With her back to Anne, she
2. gives her the following instructions :
3. «Lay out 13 tokens numbered 0 to 12 in a straight line, setting them in decreasing order from left to right.
4. Then turn them face down to hide the numbers written on them.
5. To the right of those already laid out but along the same line, add twelve more tokens picked at random with their faces down.
6. End by moving to the left end of the line some of the tokens that have just been added.»
7. Genevieve then turns round, facing a line of 25 identical tokens. She picks one and it tells her how many tokens have been moved by Anne.
8. **Explain what the trick is**

# **SA010102 Selezione di campioni**

1. A football field is divided into four sections. Each section contains the same number of players. Wanting to test them to scout out new young talent, the coach moves 5 players from the 1st to the 2nd section, 3 from the 3nd to the 4th and 6 from the 4th to the 1st.
2. Then he takes 4 players from each section off the field.
3. **If, in total, 24 players are left, can you calculate how many players are now in each section?**

# **..\..\..\..\MSF\sujets\2002-2003\entraînement\Ex1.jpg**

# **SA010203 Senza perdere la faccia**

1. The Möbius strip is presented in the figure. It has got amazing geometric properties.
2. To make such a Möbius strip with a rectangular band of paper ABCD, you must link side AD to side BC… but be careful A must coincide exactly with C and B with D.
3. Now cut out such a Möbius strip. Color one side. ***What do you observe ?***
4. Draw the median line of the strip. Cut the strip on that line. ***What do you notice ?***

**SA010405 In marcia**

****

At the start of a twenty-kilometer-long walking race there were 35 competitors.

During the competition, the judges gave 82 warnings for irregular walking.

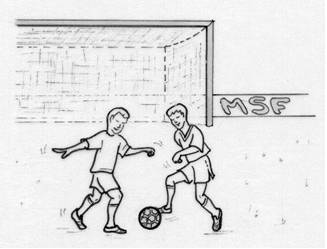
Any walker is eliminated at his third warning.

The walkers who haven't been eliminated have all finished the race.

***What is the maximum number of walkers at the end of the competition?***

***What is the minimum number? Justify.***

**SA010506 Campioni in erba**



Alan, Ben, Charles, Dennis and Eliot's football training session is over.

Mr Small, who comes to get the children after their training, is being given the report by his son.

*"I scored three goals less than Alan did; Charles three more than Dennis; Alan five less than Charles and Ben three more than I did."*

***Grade the children according to the number of goals they have scored. Justify.***

# **SA010607 Mezzo vuoto o mezzo pieno?**

Filled up to the cork, a bottle has a capacity of one liter.

A 'little devil' ( or a 'bad boy') came across. He drank some of the liquid before recorking the bottle carefully.

His mum would like to know whether there is more or less than half a liter of liquid in the bottle, without any calculation and without opening it.

How can she do?

***Describe the method and justify.***

# **SA010708 Ma dove andiamo?**

A teacher presents his 25 pupils a school travel plan to Athens, Berlin or Cordoba, as they prefer. He then asks each pupil to classify the three destinations in order of preference.

The chart (opposite/below/above) indicates the score.

|  |  |
| --- | --- |
| A B C | 4 |
| A C B | 4 |
| B A C | 6 |
| B C A | 2 |
| C A B | 4 |
| C B A | 5 |

Considering this chart, he proposes to take the class to Cordoba.

However one pupil mentions that 14 votes to 11 place Athens before Cordoba. So he asks for a travel to Athens.

The class being convinced, they agree on the changing of travel destination.

Then one pupil, who would have liked to go to Berlin, says: ‘…

**Imagine the continuation of the story.**

***SA010809 Chissà se ce la fa !***

***Figura solo decorativa.
Rappresenta una mano che sorregge un lucchetto a combinazione.***

Chantal wants to use the bike her friend has lent her. Unfortunately, she has forgotten the anti-theft code which has three numbers.

Patiently and methodically she tries to find the combination again.

Each attempt takes her about 2 seconds.

Chantal thinks she has little chance to find the correct combination in less than 30 minutes.

Do you agree with her? Justify.

# **SA010910 Per ricordare**

# **Ex 1 Aide mémoire**

# Grandpa has three daughters : Anne, Béatrice and Chloé.

# He has six grandchildren : four boys (Emile, François, Gilles, Hector) and two girls (Irène, Jeanne).

# Grandpa cannot now remember the names of

# - Béatrice’s children but, on the other hand, he remembers clearly that

# of his three daughters, Béatrice has the most children.

# - Anne does not have a daughter

# - Jeanne has two brothers and no sister

# - Irène has no sister and no brother

# - Gilles has a brother but no sister

# - Emile has a sister. Hector has a sister.

# **Help Grandpa to remember the names of Béatrice’s children.**

SA011011 In scena!

100 children at a holiday camp live in groups of 5 in 20 tents. For the farewell concert each group has to sing a song or act out a short play. In each tent the choice between the two options is made on a majority vote.

According to a survey made a few days earlier we know that 40% of the children prefer acting to singing; for the others it’s the opposite.

What are the minimum and maximum values for the number of songs performed? Explain your answer.

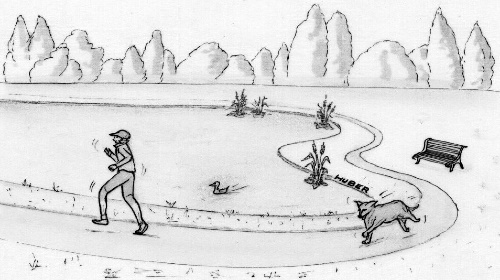
#### **SA011112 Cronometro a stoppino**



The porter of a castle has to open the main gates in exactly 6 hours time. To measure the time passing he has 3 candles: the big one burns itself out in 4 hours, the middle-sized one in 3 hours and the small one in 1 hour. It is not possible to know precisely when a candle would be half-used or one third used, or a quarter ….

***How will he be able to do it ?***

#### **SA011213 Giro del cane**

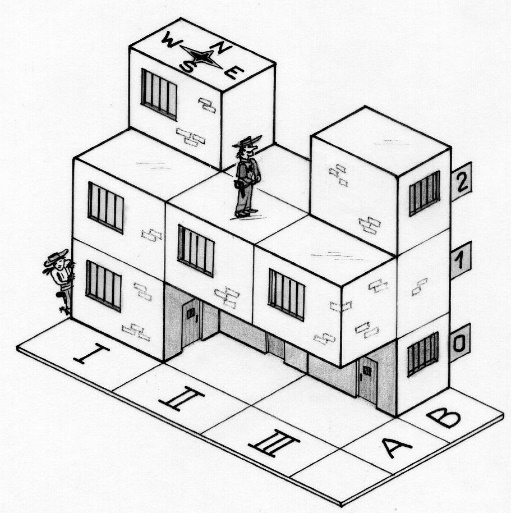
My dog and I set out together to go round the lake. We left at the same time from the same starting point, we both took the same path in the same direction and we travelled at a constant speed.

But my dog goes much faster than I do and he passed me once before we arrived back at the same time at the starting point.

***What if my dog had gone round the lake at the same speed but in the other direction, how many times would he have passed me? Explain your answer.***

**SA011314 I fratelli Dalton**

#### 

The Dalton Brothers are four ruthless outlaws from the Wild West. Three of the four, Bill, Grat and Emmett, have been imprisoned. Each one is locked up on his own in one of the 12 cells of the prison shown here. Each cell has only one window.

In order to set his brothers free the fourth brother, Bob, uses this information :

* The window of Bill’s cell faces south.
* Bill is on the floor above Grat.
* The window of Grat’s cell faces east.
* Emmett is on the 2nd floor in a cell which lies more to the west than Grat’s cell.
* There is just one cell beneath Bill’s.

On the diagram you can see the prison warder at position (2, A, II).

***Help Bob set his brothers free by finding the position of each brother. Justify your answer***

# **SA011415 Dov’è il ritratto?**

# Once upon a time there was a beautiful princess who had three caskets: A, B and C. She had put her portrait into one of the caskets.

# Anyone who wished to marry her had to find out which casket contained her portrait.

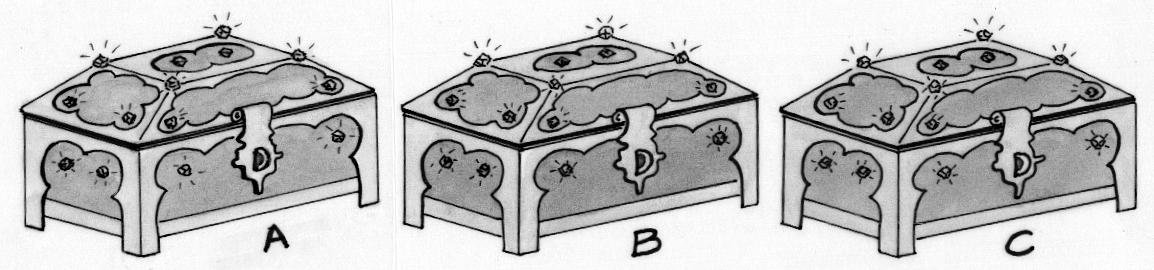
# A sentence was written on each casket:

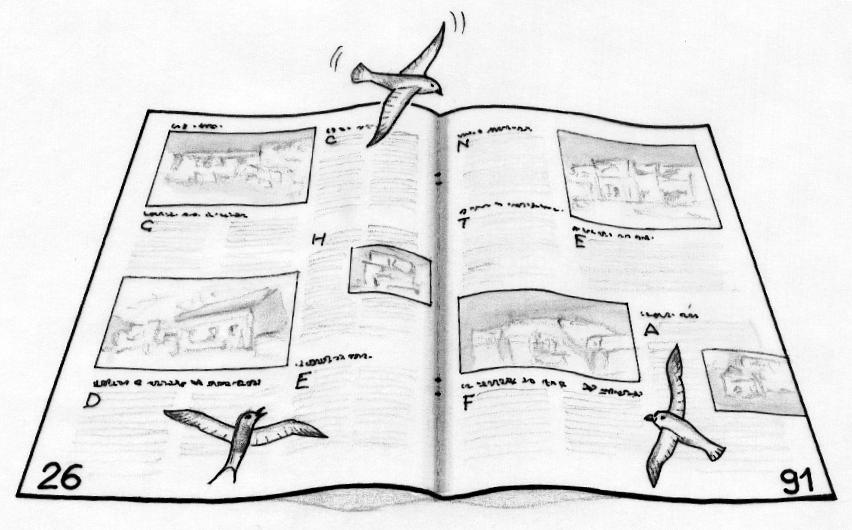
# Casket A:  “The portrait is not here.”

# Casket B:  “The portrait is here.”

# Casket C:  “The portrait is not inside casket B.”

# **Only one of these three sentences is true. Find out which casket contains the portrait. Justify your answer**.





**SA011516 Le pagine volanti**

The sheets of pages of a magazine were badly stapled together and have now come apart.

Here is one complete sheet. You can see the page numbers 26 and 91 at the bottom of each page on the sheet. On every sheet of the magazine there are 4 pages.

The cover page and the back page of the magazine are numbered as the first page and the last page.

***How many sheets are there between pages 26 and 91 ?***

***Work out the total number of pages in the magazine. Explain your answer using a minimum of 30 words.***

**SA011617 Più o meno**

Peter put six cards down on the table.

All of them have an identical back and on the other side they respectively show +1, +2, +3, -1, -2, -3.

Then Peter suggests the following game to his friend Paul: they both simultaneously

turn up one card. If the product of the two numbers is positive, Paul wins. If the product is negative,

Peter is the winner.

After a few games, Paul notices that Peter wins more often. So, in order to increase his chances of success, he proposes that Peter should take away one card with a negative number and then start the game again with the five cards.

**Is Paul right ? Justify your answer**.

**SA011718 Cronometro a stoppino**

The porter of a castle has to open the main gates in exactly 6 hours time. To measure the time passing he has 3 candles: the big one burns itself out in 4 hours, the middle-sized one in 3 hours and the small one in 1 hour. It is not possible to know precisely when a candle would be half-used or one third used, or a quarter …. How will he be able to do it?

**SA011819 Chi vede chi?**

**** Three clowns, Anatole, Michel and Thomas, keep three red hats and two green hats in their dressing-room.

Before going on stage they each need to put on a hat.

The clowns cannot find the light switch and the dressing-room is in darkness. Each clown picks a hat at random and puts it on his head. They leave the dressing-room and go on stage.

Each clown is asked if he can work out the colour of his hat.

Anatole looks at the two others and says “No”.

Then Michel looks at the two others and says “No”.

Finally Thomas, who is actually blind, replies “Yes”.

***Explain how this blind clown was able to work out the colour of his hat. What is it?***

**SA011920** Bike and Run

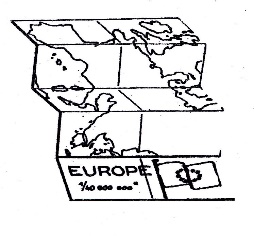
**** Chloe and Lucille want to take part in their first “Bike and Run” event that covers a route of 27 km. This is a sports event in which one person runs while the other rides a bicycle. Both contestants use the same bicycle, taking turns as needed.

Each time one of the girls dismounts, she leaves the bicycle at the side of the road and continues on foot. When her teammate arrives on foot, she mounts the bike and continues cycling.

Chloe runs at a speed of 8 km/h and cycles at 20 km/h, while Lucille runs at 10 km/h and cycles at 16 km/h.

***How can the girls plan so that they cross the finish line at the same time? How long does it take them to complete their route?***

**SC019192 L'Europa a volo d'uccello**

Professor trgulix, a topnotch surveyor, is interested in Europian cities. He knows a few direct distances between cities, as the crow flies.

From Strasbourg to Constance (Germany) 151 kms

From Constance to Padus (Italy) 320 kms

From Padua to Brussels (Belgium) 813 kms

From Brussels to Luxembourg 196 kms

From Luxembourg to Sarrenbruken (germany) 53 kms

From sarrenbruken to Strasbourg 93 kms

He claims to be the only one who is able to calculate the direct cuorse from Strasbourg to Luxembourg within using a map.

**Could you solve the problem? Explain your answer.**

**SC019293 Cifre alla mano**

A few months ago, the Luxemburg Euro MP's, exasperated by the rivalry between Strasburg and Brussels over the issue of the European Parliament's seat decided to submit the application of the Gran Duchy's capitale. Immediately consulted upon the matter, the 518 Euro MP's ranked the 3 cities in order of decreasing preference. Here are the results of the ballot:

* Brussels - Luxemburg - Strasburg 142 MP's
* Luxemburg - Strasburg - Brussels 116 MP's
* Strasburg - Luxemburg - Brussels 91 MP's
* Strasburg - Brussels - Luxemburg 78 MP's
* Brussels - Strasburg - Luxemburg 52 MP's
* Luxemburg - Brussels - Strasburg 39 MP's

A famous Luxemburg newspaper insisted that the European Parliament's seat be transferred to Luxemburg, putting forward the fact that a majority of Euro MP's preferred Luxemburg to Strasburg. Show that this argument was well-founded.

**Show then how, with the results of the same ballot, one could as well support the application of Brussels then that of Strasburg**

# **SC019394 L'autobus**

To get to University, Sylvia can take bus n. 3 or bus n. 7.

A bus runs every 15 minutes on each bus route. Buses n. 3 always leave 5 minutes after buses n. 7.

Sylvia often goes to University, at very different times and she always catches the first bus that comes by.

**Which is the bus route Sylvia uses most frequently? Explain your answer**

**SC019495 Gioco di magia**

A game of 32 cards is made of 8 cards of different values in each of the 4 suits.

Arsene, the magician asks his friends to choose cards at random, one by one from the pack of 32 cards and to place them in a pile face down on the table.

At a given moment chosen by Arsene, the draw stops. He then declares that there are at least 3 cards of the same value in the pile (for example 3 sevens, 3 queens…).

Arsene knows the smallest number of cards that his friends must pile up to be sure of never making a mistake.

**What is this number? Explain your answer**

**SC019596 Un giorno con due notti?**

On the 15th and 16th of August 1995, the superjet Concorde achieved a complete revolution of the Earth in 31 hours and 27 minutes. Surprisingly its passengers claim that they attended 2 sunsets and 2 sunrises during the flight.

**Explain this phenomenon.**

To make things easier, let’s admit that the plane took off at 11 a.m. (local time) and travelled at a constant speed above the equator before coming back to its departure place 30 hours later.

**SC019798 “Vince il pari”**

Margot has got an even number of coins in one hand and an odd number of coins in the other one.

In order to find which hand the even number of coins is in, Nicolas Chuquet says: « Multiply the number of coins of the right hand by two, add it to the number of coins of the left hand and give me the result ».

***Explain Nicolas Chuquet’s method.***

**SC019899 Fac-simile**

****

Gaston can’t do his maths homework. Here it is:

“Let ABCD be a rectangle and [DE] a segment which is the prolongation of [AD].

Without taking any measurements, construct a second rectangle DEFG whose area is the same as ABCD’s”.

Then Gaston calls Etienne who has had no trouble finding a solution.

**Say what instruction for constructing the second rectangle Etienne should give Gaston and how he should go about explaining to his friend that the areas of ABCD and DEFG are equal**.

**SC019900 Domino sulla scacchiera**

Two black squares are removed from opposite corners of a chessboard. See diagram opposite. 30 dominoes are then laid on the remaining squares. Each domino occupies exactly two squares. So two remaining squares are uncovered.

**Say whether or not these squares are the same colour. Justify your answer**

**SC010001 Tocca a te**

# Nick fans out in front of Francis a deck of twenty-five cards all of which are different. Nick then asks Francis to pick one without showing its face.C:\WINDOWS\TEMP\SATE336.TMP

1. Nick then sets out the first five cards in a line and places the next five on top of the first five until he gets five five-card packs.
2. Francis is then asked to point at the pack that includes the card he first picked. The next thing Nick does is to collect the five packs, placing the one Francis pointed at in the middle of the full pack. He then deals out the cards as before until he gets the five five-card packs again.
3. For the second time, Francis is asked to point at the pack that includes the card he had originally picked. Nick is then able to show him which card it was.
4. ***Explain the trick.***

**SC010102 Alibis***.*

A crime was committed in a hotel between 10.00 p.m. and 10.15 p.m. and the attack lasted 7 minutes.

There are 4 suspects: Andrea, Bruce, Camilla, Dimitri. They are all staying in 4 different rooms and here are their statements to the police about their time table between 10.00 p.m. and 10.15 p.m. :

Andrea: « First Bruce paid me a visit for 3 minutes, then came Dimitri who stayed for 4 minutes ; finally Camilla called me on the phone.»

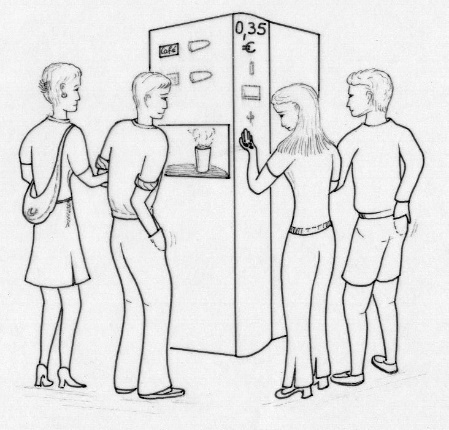
Bruce: « I went to see Andrea, then Dimitri, and with the click of the mouse, I sent an e-mail.»

Camilla: « I watched the news on TV until 10.05 p.m.. Then I called Andrea for 5 minutes.»

Dimitri: «I went to see Andrea, then Bruce came to see me for 3 minutes.»

**After checking on all these statements, the police inspector found the culprit. How did he manage ?**

## SC010203 Pausa caffè

Four students wish to have a cup of coffee during their break and have very little change. A cup costs 35 euro cents. The machine has no change left, the people in charge have just come to empty it.

Albert has a 1 euro coin and a 5 cents coin.

Bernard has a 50 cents coin and a 5 cents coin.

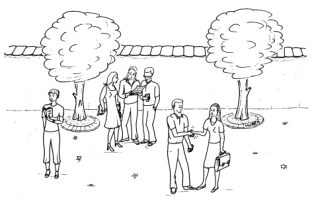
Claudia has a 20 cents coin and two 10 cents coins.

Daniela has two 20 cents coins.

Each of them wants his coffee and his change. The machine serves one person at a time and gives back change only when it has some.

***How are they going to manage***

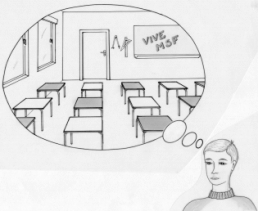
**SC010304 Buon giorno!**

6 people meet. Some of them shake hands to say hello.

Of course, no one says hello to himself and people don’t greet the same person twice!

**Prove that in any case at least two persons have shaken the same number of hands.**

**SC010405 Cambiate posto!**

In a classroom there are 5 rows of 5 indi-vidual tables. The teacher asks his 25 pupils to change seats obeying the following or-der: each pupil will either take the seat in front or behind the seat he occupies or take the one on his right or left. Peter knows that his teacher often plays jokes. He imagines that the tables have two colours alternately, just like the squares of a checkerboard…

"What you ask us to do is impossible, he then exclaimed, and I can prove it!"

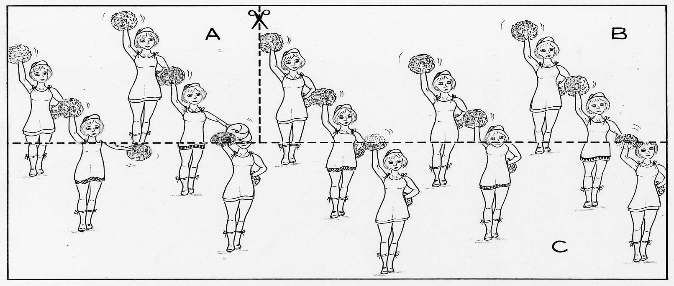
**Write Peter's thought process, which proves that such a movement is impossible.**

**SC010506 Ragazze Pom - pom**

Cut out the figure on the adjoined document along the dotted lines. Then swap A with B. Stick the new view of the group on your work-sheet.

This experiment is done to try and prove that 13 = 12, but of course, this “demonstration” is wrong.

Find the fault and explain precisely what the trick i

****

# **SC010607 Turni al lavello**

9 adults and 16 teenagers are spending holidays in a holiday centre.

During their stay, 68% of these people have to do the washing-up.

The teenagers understand that at least half of them have to do the washing-up. But they think that at least 2 adults are going to help them.

**Are the teenagers right? Justify.**

**SC010708 Forza, scappiamo!**

It is a dark and moonless night. Juliet, Rob, Tony and Sophie are being chased by dangerous bandits. In order to escape they have to cross a precipice on a footbridge which is in a very bad state. It can hold the weight of two persons only.

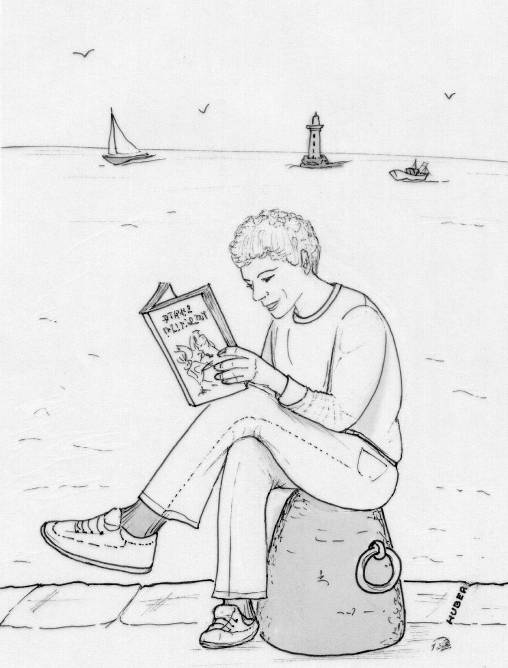
A light is absolutely needed to cross. The four friends have only got one lantern which will go out in half an hour.Descrittiva
Rappresenta la passerella sul precipizio percorsa da due persone con la lanterna. Le altre due stanno aspettando sedute. 

Juliet is quick; she can cross the footbridge in one minute. Rob needs two minutes to do that. Tony is slow: ten minutes will be necessary. Sophie is even slower: she will need twenty minutes.

If two friends cross together, they will move according to the rhythm of the slowest.

The four of them managed to cross in less than thirty minutes.

**Explain their strategy**

****

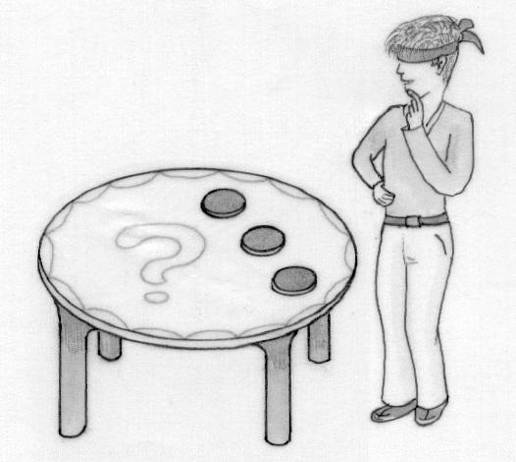
**SC010809 A ritmo di crociera**

Peter has to read a book during his holidays. He calculates that he must read 30 pages a day to succeed.

The first days of holidays, he doesn’t keep to this speed: he reads 15 pages a day. Anyway Peter thinks that he can keep this speed until halfway through the book, if he reads the second half at 45 pages every day.

What do you think of the way he reasons? Explain.

**SC010**91**0** **Matemagia**

You show a volunteer from the audience 3 tokens.The three tokens each have a black side and a coloured side : red for one, green for another and blue for the last one.The 3 tokens are laid in a line with their coloured sides showing and the black side down.

You ask your volunteer to choose one of the three colours and keep his choice secret. You make sure that you have noticed the colour of the middle token.

You are now blindfolded. You ask your volunteer to change round the positions of the colours he has not chosen. And then to turn the 3 tokens over.

You now see the black sides.

The blindfold is removed. You ask your volunteer to move the tokens around as he likes but you keep your eyes on the one which was in the middle.

You turn one token over and then you announce the colour of the token chosen by your volunteer.

**How do you do it?**

**SC011011 Appuntamento da Khan**

****

# Marco and Polo have to travel 20 km to reach Khan’s house. They have just one pair of rollerblades that they can use.

# They want to reach their friend’s house as quickly as they can.

# On foot, Marco and Polo both walk at a constant speed of 5 km/h.

# On rollerblades they both move at a constant speed of 20 km/h

# Fortunately the two friends have the same shoe size!

# How should they plan so that they both reach Khan’s house as quickly as possible?

# How long will that take them?

# **SC011112 Senza dubbio**

# **Ex 1 Sans doute**

# Laszlo has just texted Nicole:

# “I’m sure that in your village you can find two people who have their birthday on the same day.”

# “Obviously”, replies Nicole,” when you know that there are more than 400 people living in our village! I’ve read that in Hungary, your own country, there are more than 10 million mobile phones. So I’m certain that you could find 2 Hungarians who have their birthday on the same day and also have the same PIN for their mobile phone.”

# “Obviously”, replies Laszlo, “when you know that a PIN code has 4 digits.”

# **Explain the logic of Laszlo and Nicole’s argument.**

**SC011213 Chi vede chi?**

Three clowns, Anatole, Michel and Thomas, keep three red hats and two green hats in their dressing-room.

Before going on stage they each need to put on a hat.

The clowns cannot find the light switch and the dressing-room is in darkness. Each clown picks a hat at random and puts it on his head. They leave the dressing-room and go on stage.

Each clown is asked if he can work out the colour of his hat.

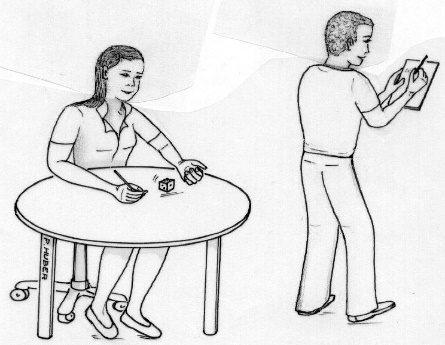
Anatole looks at the two others and says “No”.

Then Michel looks at the two others and says “No”.

Finally Thomas, who is actually blind, replies “Yes”.

***Explain how this blind clown was able to work out the colour of his hat.***

#### **SC011314 Domande essenziali**



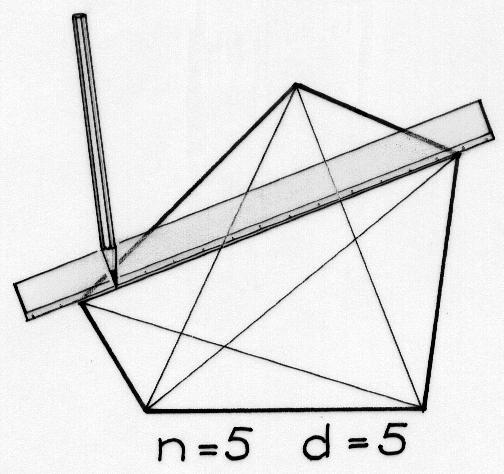
Claude has just thrown a six-sided dice and set his friend Herbert the challenge of guessing the outcome of the throw. Herbert will write down a list of questions on a sheet of paper and he will give that to Claude. Claude will answer each of these questions with yes or no.

Herbert is to work out the result of the throw by asking the smallest possible number of questions.

***What is the minimum number of questions that Herbert must ask?***

***Provide a list of questions he could write on his sheet. Justify your claim that this list will allow him to determine with absolute certainty the outcome of the throw.***

**SC011415**  **I poligoni di Camille**

After she had drawn a few diagrams, Camille noticed that a triangle has no diagonals, that a quadrilateral has two and that a pentagon has five.

She tries to work out how many diagonals the polygons with 6, 7 and 8 vertices would have. She thinks she has found the formula that gives the number of diagonals for a polygon with *n* vertices:

***How many diagonals does a polygon with 6, 7 or 8 vertices have?***

***Show that Camille’s formula is correct.***

***Can a polygon have 100 diagonals? Explain your answer.***

**SC011516 La cioccolata calda**

Anatole, Benjamin and Chloe have just come back home after skiing. Their mum asks them:

“Does everyone want hot chocolate?”

Anatole replies first and says: “I don’t know.”

Benjamin answers next and also says: “I don’t know.”

Chloe has been listening to her brothers and she answers: “Yes!”

Their mother gives each of them a mug of hot chocolate.

***Explain the three answers***

**SC011617 Tutti seduti**

 The meeting room for a conference has been set out with nine rows of chairs. There are the same number of chairs in each row.

For the first session all of the conference delegates

are there and the room is two-thirds full.

For the second session only three quarters of the delegates have signed up to attend.

To avoid having too many empty seats the conference organisers want to remove some chairs. They will remove complete rows of chairs.

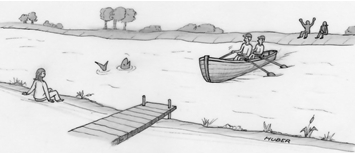
***How many complete rows of chairs should they remove and still be sure that every delegate who attends has a seat? Justify your answer.***

**SC011718 Esperti e maldestri**

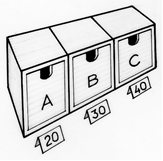
Aline, Hélène, Zoé, Pierre and Jules want to cross a river as quickly as possible. They have a rowing boat available which holds a maximum of three people.

Aline and Pierre are experienced rowers. On their own or with both of them together they can cross in two minutes. Unfortunately the others are so clumsy that with one of them on board the crossing takes eight minutes.

***What is the fastest time that the five friends can take to get to the other side of the river? Explain your answer.***



# **SC011819 Il biglietto vincente**

** Three opaque boxes marked A, B and C are placed side by side. It is known that one box contains two €10 notes, a second contains two €20 notes, and the third box contains one €10 note and one €20 note.

A label is placed in front of each box showing how much the box contains. A little rascal shuffles the labels so that they no longer correspond to the amounts in the boxes.

***Explain how, by only taking a single note from a chosen box, you can deduce the amounts in each box.***