Interesting Brainteaser Problems

(Compiled by A. S. Inan)

Problem # 1. Three men and a hotel. Three men checked into a hotel and decided to share a single room. The hotel manager gave them a total price of $30. The men split the cost evenly by paying $10 each. However, the manager realized that it was a Monday night, which meant the hotel had a special rate: rooms were only $25. He had overcharged the three men $5. He immediately called the bellboy, gave him the $5 and told him to return it to the men. When the bellboy took the $5 back, the men were so pleased at the bellboy's honesty that they tipped the bellboy $2 of the $5 he returned and each kept $1 for himself. So, initially, there were $30. The men paid a total of $27. The bellboy got $2. It adds up to $29. Where did the extra $1 go?

(Source: I don't know.)

Problem # 2. The ages of Tony's sons.

"I have three sons," Tony told his friend, Peter.

"How old are they?" Peter asked.

"I will make this a math problem for you to figure out," Tony said.

"Go ahead," Peter responded.

"The product of their ages is 36," Tony said.

"You need to tell me more," Peter requested.

"The sum of their ages is equal to the number of that house you see right across the street," Tony stated.

Peter recorded the number of the house and started working on the problem. A little bit later, he said,

"I can't be exactly sure about your sons' ages. You need to provide me one more hint."

"Okay," Tony responded, "my oldest son is 4.5 feet tall."

With this hint, Peter was able to figure out the exact ages of Tony's sons.

What were the ages of Tony's sons?

(Source: I don't know.)

Problem # 3. Wolf, goat, and cabbage. (This problem dates back to 8th Century writings.) A man has to take a wolf, a goat, and some cabbage across a river. His rowboat has enough room for the man plus either the wolf or the goat or the cabbage. If he takes the cabbage with him, the wolf will eat the goat. If he takes the wolf, the goat will eat the cabbage. Only when the man is present are the goat and the cabbage safe from their enemies. All the same, the man carries wolf, goat, and cabbage across the river. How?

(Source: I came across multiple sources. One of them is ***The Moscow Puzzles: 359 Mathematical Recreations***, Boris A. Kordemsky (edited by Martin Gardner), p. 4, Charles Scribner's Sons, 1972.)

Problem # 4. Finding the odd billiard ball using a balance. There are 12 billiard balls which all weigh the same, except for one that is either lighter or heavier than the other 11 balls. The challenge is to single out the odd billiard ball using a balance. However, the rule is that you can only use the balance 3 times. How do you find the odd billiard ball?
(Source: I don't know.)

Problem # 5. Three wise men lined up facing the same direction. Three men are seated along a straight line all looking in the same direction such that the man in the back can see the other two, the man in the middle can only see the one in the front, and the man in the front can't see either of the other two men. All three men are blindfolded. The men are told that each will get a hat from a bin which contains 5 hats total, 3 white and 2 black in color. Next, 3 hats are arbitrarily drawn out of the bin and placed on the men's heads. The blindfolds are then removed and each man is asked to figure out the color of his hat. The man at the back says:
"I do not know which color hat I am wearing."
Next, the man in the middle who heard this response says the same thing. The man in the front who heard both responses says:
"I know which color hat I am wearing!"
Which color hat is the man in the front wearing and how did he determine it?
(Source: I came across multiple sources. One of them is ***The Joy of Mathematics: Discovering Mathematics All Around You***, Theoni Pappas, p. 190, Wide World Publishing/Tetra, Revised Edition, 1989.)

Problem # 6. Five apples. Five apples are in a basket. How do you divide them among five girls so that each girl gets one apple, but one apple remains in the basket?
(Source: ***The Moscow Puzzles: 359 Mathematical Recreations***, Boris A. Kordemsky (edited by Martin Gardner), p. 3, Charles Scribner's Sons, 1972.)

Problem # 7. In the year 1900. A correspondent, in 1930, posed the following question:
"A man's age at death was one twenty-ninth of the year of his birth. How old was he in the year 1900?"
The reader may think, at first sight, that there is insufficient data for an answer, but he or she will prove to be wrong.
(Source: ***536 Curious Problems & Puzzles***, Henry Ernest Dudeney (edited by Martin Gardner), p. 13, Charles Scribner's Sons, 1967.)

Problem # 8. De Morgan's age. When asked about his age, the famous English mathematician Augustus de Morgan responded:
"I was x years old in the year x^2."
If De Morgan died in 1871, what year was he born?
(Source: ***In Mathematical Circles***, H. Eves, Boston: Prindle, Weber and Schmidt, 1969.)

Problem # 9. The age of Professor Inan's student. Influenced by Augustus De Morgan, one of Professor Inan's students informed him that she will be x years old in the year x^2. How old is this student now?
(Source: Inan.)

Problem # 10. The number of the house. A long street in Europe has the houses with all the odd numbers on one side and the houses with all the even numbers on the other side, as typically done in many countries throughout the world. (a) If a man lives in an odd-numbered house such that the sum of the odd numbers of all the houses on one side of his house is equal to the sum of the odd numbers of all the houses on the other side of his house, find the total number of odd-numbered houses on his street and the number of his house. Assume that the man's house number is greater than 25 and less than 51. (b) Repeat the same problem for even-numbered houses. In this case, assume that the man's house number is greater than 50 and less than 100.
(Source: I don't know.)

Problem # 11. Odds of a second boy. A woman has two children. If one of her children is a boy, what are the odds that the other child is also a boy?
(Source: I don't know.)

Problem # 12. The three doors (Monty Hall) puzzle. This well-known Monty Hall probability problem is based on a television show of the 1960's and 1970's called ***Let's Make a Deal***. Show host, Monty Hall, would ask a contestant to pick one of three doors. Behind one of the three doors was a large prize. Behind the other two doors were lesser prizes, sometimes a group of goats grazing on fresh hay. Once the contestant picked a door, Monty would open one of the remaining two doors that did not have the large prize and then offer the contestant a chance to switch doors. Should the contestant switch?

Problem # 13. Six 1s are 24? Use only six 1s and three plus signs in a row in such a way that they add up to 24.
(Source: I don't know.)

Problem # 14. Birthday paradox. A famous Italian composer died shortly after his eighteenth birthday–at the age of 76 years old! How on earth could that be? (Hint: He was born in Pesaro, Italy, in February 1792 and wrote the famous opera called ***The Barber of Seville***.)
(Source: ***Math Puzzles & Games***, Michael Holt, Vol. 1, p. 4, Barnes & Noble Books, 1996.)

Problem # 15. Cow, goat, and goose. A cow and a goat can eat the contents of a pasture in 30 days, while a cow and a goose can do it in 40 days, and a goat and a goose in 60 days. If a cow, a goat and a goose eat all together, how long does it take for them to eat the contents of the pasture?
(Source: ***Peter Pamper's Puzzles & Posers***, compiled and edited by Philip Haber, p. 28, Question # 107 (modified), Peter Pamper Press, 1963.)

Problem # 16. A horse and a mule. A horse and a mule were traveling together heavily laden with bags of golden trinkets. After a time, the mule complained to the horse that his load was too heavy.
"What is wrong with you?" said the horse. "You shouldn't complain, for had I taken one of your bags, I would have had to carry twice as many. On the other hand, if you would agree to take one of mine, we'll both carry the same number of bags."
How many bags did each have?
(Source: ***Peter Pamper's Puzzles & Posers***, compiled and edited by Philip Haber, p. 36, Question # 134, Peter Pamper Press, 1963.)

Problem # 17. Four consecutive numbers totaling to 150. Find four consecutive numbers totaling to 150.
(Source: Inan.)

Problem # 18. Black versus brown cows. Four black cows and three brown cows give as much milk in five days as three black cows and five brown cows give in four days. Which kind of cow provides more milk, black or brown?
(Source: ***101 Puzzles in Thought & Logic***, C. R. Wylie, Jr., Puzzle # 21, Dover Publications, 1957.)

Problem # 19. A tricky catch. Three men on a fishing trip stopped by a river and fished until darkness. They put their catch in a bucket, had a quick meal and went to sleep. When one of the fishermen woke up early next morning, the other two were still asleep. He counted the fish in the bucket, realized that the number could not be divided by three, threw one fish back into the river, took one third of what was left, and left quietly. When the second man woke up, he did not notice that the first one was already gone. So, he counted the fish, saw the number was not divisible by three, threw one fish into the river and left with his "third". Believe it or not, the same thing happened to the third fisherman. Upon waking up, he did not notice that the other two had already left, so he counted the fish, threw one fish into the river, took one third of the remaining fish and went home. How many fish were originally in the bucket? (Find the smallest possible answer.)
(Source: I don't know.)

Problem # 20. Ages of the husband and wife. At the time of his marriage, a man found his wife's age to be four fifths of his. After eight years of marriage, he found her age to be five sixths of his. Find their ages at the time they got married.
(Source: Inan.)

Problem # 21. Difference between double and half. Find the number such that the difference between its double and half is 150.
(Source: Inan.)

Problem # 22. A fraction. The numerator of a fraction is less than its denominator by 9. However, if 1 is subtracted from the denominator, the fraction would equal to 1/2. What is the fraction?
(Source: Inan.)

Problem # 23. Two numbers. Find the two numbers such that their sum equals 4 times their difference and their product equals 9 times their ratio.
(Source: Inan.)

Problem # 24. Two shoemakers. A shoemaker can make a luxury shoe in 7.5 hours and another shoemaker can make it in 5 hours. If they work together 10 hours each day, how long will it take them to make a total of 100 luxury shoes?
(Source: Inan.)