TestFunda Puzzles-of-the-week

Book 1

> WE ALL FIT LIKE PIECES OF A PUZZLE. EVERYBODY'S INPUT AND THEIR JOURNEYS AND WHERE THEY'VE BEEN HELP PUT THAT PUZZLE TOGETHER.
> — MELODY THORNTONZZ

Table of Contents

ANSWERS

PREFACE

For the past couple of years, CAT and other MBA entrance exams have shown a trend towards questions testing a student's ability to apply Mathematical Principles and Analytical Reasoning to solve problems. The unpredictable nature of CAT has ensured that most students are never fully prepared to ace the exam. This is because students limit their preparation to just the learning and practice of core concepts of Mathematics, Verbal Ability and Data Interpretation & Logical Reasoning. However, to bell the CAT, divergent thinking is required which is why experts also recommend solving an eclectic mix of Puzzles, Crosswords, Riddles and Brain Teasers. These enhance the problem-solving skills of CAT aspirants and encourage them to think out-of-the-box.

We, at TestFunda.com, feel that solving puzzles not only helps sharpen one's logical acumen, but also gives immense pleasure and satisfaction. The puzzles in this book will give students that extra edge and confidence needed to be ready for any surprise that CAT might throw their way.

We are sure that our readers will benefit greatly from these books. They shall provide a much-needed break from long study hours as well as high-quality cerebral recreation.

Puzzle #01: The Gold Chain

A wealthy man needed to pay the mason building his house. He was running low on cash, so he decided to pay the mason with a gold chain with 7 links. The mason's fee was equivalent to one gold link a day. The wealthy man needed to pay the mason each day, as otherwise he would stop working. If he overpaid, the mason might run away with the extra payment.

The wealthy man did not want to make too many cuts in the chain as he wanted it back once he had the cash to pay the mason in cash. What is the minimum number of cuts that the wealthy man needs to make in the chain?

Puzzle #02: Two Horses in a Race

A king was dying and devised a strange plan to determine which one of his twin sons would inherit the throne. He told his sons to ride their horses in a race, and whichever horse crossed the finish line LAST would win the throne for its owner. His sons didn't know what to do, and wandered aimlessly for days. Neither of them wanted to cross the finish line first. Finally they met a sage who gave them some advice. Immediately, the brothers leapt onto the horses and galloped towards the finish line. What was the advice?
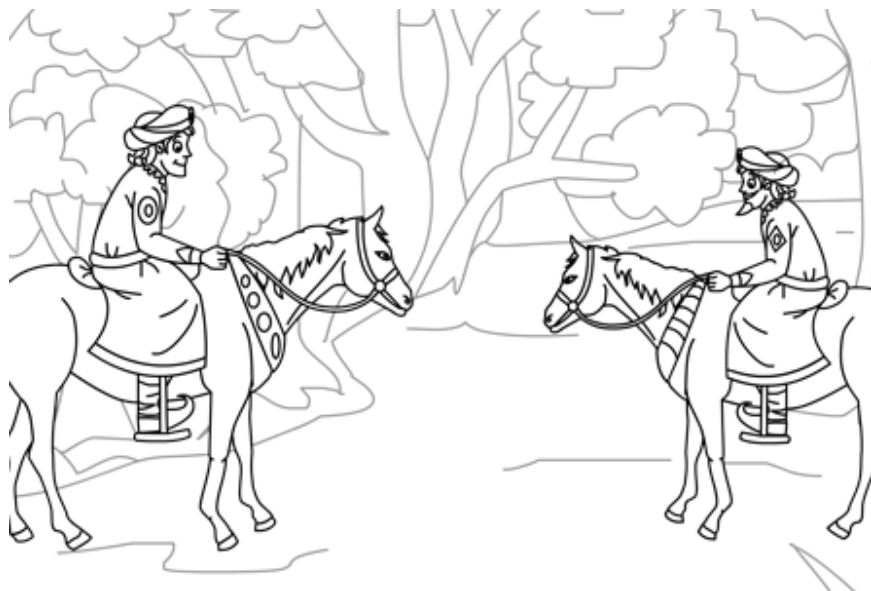
Puzzle #03: Two Jars with Marbles

Once, Birbal was returning from a visit to a far land when his ship capsized. He was taken prisoner by a mad king in a distant land who had heard of Birbal's intelligence. The king wanted to see how intelligent Birbal really was. He gave Birbal two large jars - one with 50 red marbles and the other with 50 white marbles. He allowed Birbal to move the marbles around between two jars. The only condition was that each of the 100 marbles should finally be accounted for in one of the two jars.

After Birbal finished, he would be blindfolded and the two jars will be shaken. Then the king will chose one of the jars at random and give that jar to Birbal. Birbal will have to pick one marble out of that jar. If he picks a white marble, he will be set free and sent home in comfort; if he picks a red marble, he will be given 100 lashes and thrown in a boat without food or water.

What should Birbal do to maximize his chances of picking a white marble?

Puzzle #04: Timing with Ropes

You have two ropes, each of which takes two hours to burn if lit at one end. These ropes are not homogeneous and some parts of the rope burn more quickly than the other parts. If you cut the rope into half, you cannot assume that the half rope will take one hour to burn.

Use these ropes to measure 1hr 30 min.
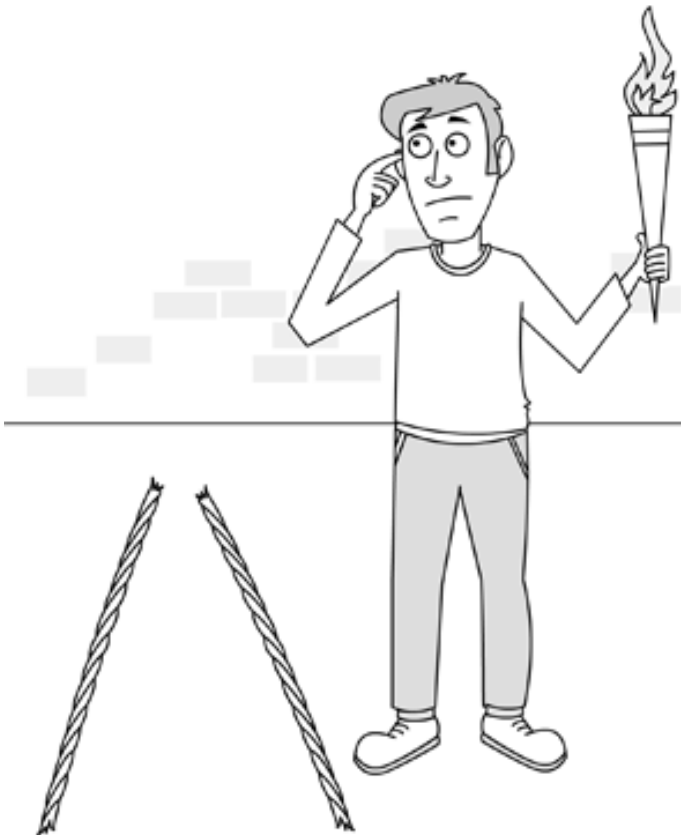
Puzzle #05: Three Scientists with Hats

Three scientists went on an expedition in the Amazon forests where they were captured by cannibals. The cannibal chief liked having fun, so he devised a game that gave the scientists a chance to survive! He took them to a tent where he had 3 white hats and two black hats (no points for guessing where he got the hats from!). He then put one hat on the head of each of the scientists (since there were 5 hats, 2 hats remained unused). There is no light in the tent and there is no way the scientists can see or figure out which hat is which.

He told the scientists that they have to walk out of the tent in a queue, and then any one of them has to guess the colour of the hat on top of HIS head. They are to stand so that the third scientist can see the colour of the hats on the two scientists in front of him. The middle one can only see the colour of the hat on the scientist in front of him. The first scientist cannot see anyone's hat. The scientists were given 10 minutes inside the tent to discuss their strategy. Once they walk out, the only thing any one of them is allowed to say is "The colour of my hat is ...." If the colour is correct they will all be set free. If the colour is wrong or anyone says or does anything else, all of them will be cooked and eaten!

The scientists went out, they stood there for some time, and then one of them said "The colour of my hat is ....!" What colour was his hat?
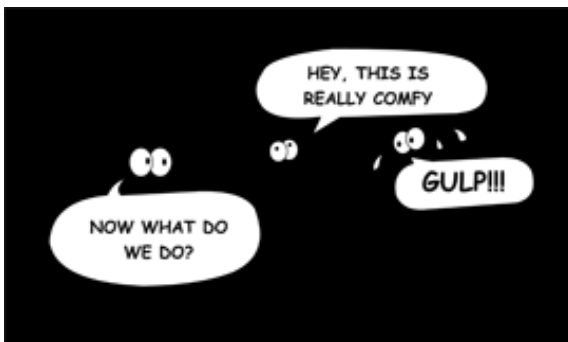
Puzzle #06: The Game Show with the Goats

You have reached the final of a game show. You are just one step away from a shiny new car. The host shows you three closed doors. Behind one of these doors is the new car; behind the other two are goats. The host knows which room contains the car.

You are asked to choose a door. After that, the host opens one of the two OTHER doors - one, which he knows, definitely has a goat. Now the host gives you a choice - you can stay with the door you selected or switch to the remaining unopened door by paying 500 rupees. Should you switch? Why?
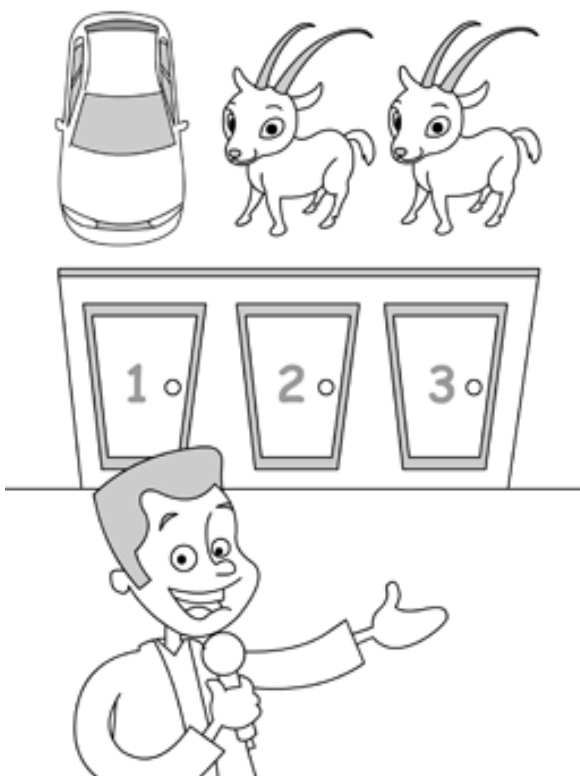
Puzzle #07: The Rope Trick

An acrobat thief entered an ancient temple to steal treasure. Inside the temple he saw a huge room with straight walls and no windows. The ceiling of the temple was 100 metres high. In the centre of the ceiling there were two hooks a metre apart. From each of the two hooks, a thick gold rope was hanging. Each rope reached the floor of the temple. There was nothing else in the room and the thief had nothing but a knife with him.

He would like to steal as much of the gold rope as possible. He can easily climb up the rope, but he cannot jump down from more than 7 metres above the ground.

How much rope can he steal?

![Test Funda logo]

Puzzle #08: Dragon and the Poisoned Wells

A dragon and a knight live on an island. There are seven poisoned wells on the island. These wells are numbered from 1 to 7. If someone drinks from a well, he can only neutralize the poison by drinking from a higher-numbered well. Well number 7 is located at the top of a very high mountain on the island and only the dragon can reach it.

One day the dragon told the knight that he wanted the island all for himself and that they should have a duel. He set the following conditions. Each of them has to bring a glass of water to the duel. Then, they are supposed to exchange the glasses, and drink from the other's glass.

The dragon thought that the knight was doomed to die. But the knight devised a clever plan so that he will live and the dragon will die. What was his plan?
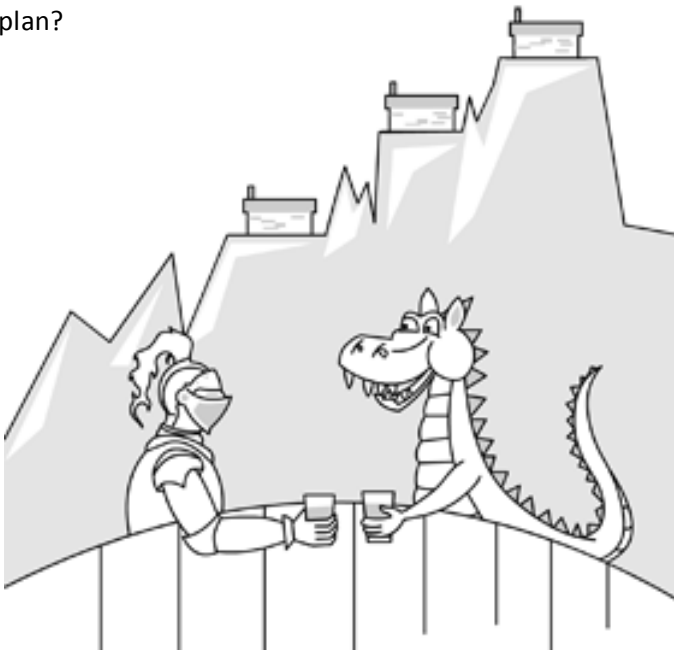
Puzzle #09: Never Ask a Woman her Age

Six women have gathered at a friend's house for afternoon tea. While they are chatting, the doorbell rings. There is a census officer at the door who wants to note down their ages. The women are scandalized at the thought of revealing their true ages. Then the census officer offers a compromise. He says that his requirement will be fulfilled if he can get the average age of the women. Can you think of a way by which the census officer can know the average age of the women without any of them knowing anyone else's age?

Condition 1 – The women need to know the average age that the census officer puts in his report.

Condition 2 – The women are really paranoid - they do not want anyone else to know the numerical value of their ages, even if you cannot match the age with the actual person.

Puzzle #10: Secret Documents

A businessman in one city needs to send secret documents to his business associate in another city. There are spies trying to get hold of these documents. The documents need to be sent in a case. If the documents are sent in an unlocked case then the documents will be stolen. Anything else in an unlocked case will also get stolen. Both of them have many locks and many cases. Neither of them has the keys to the other person's locks. How does the businessman send the documents?
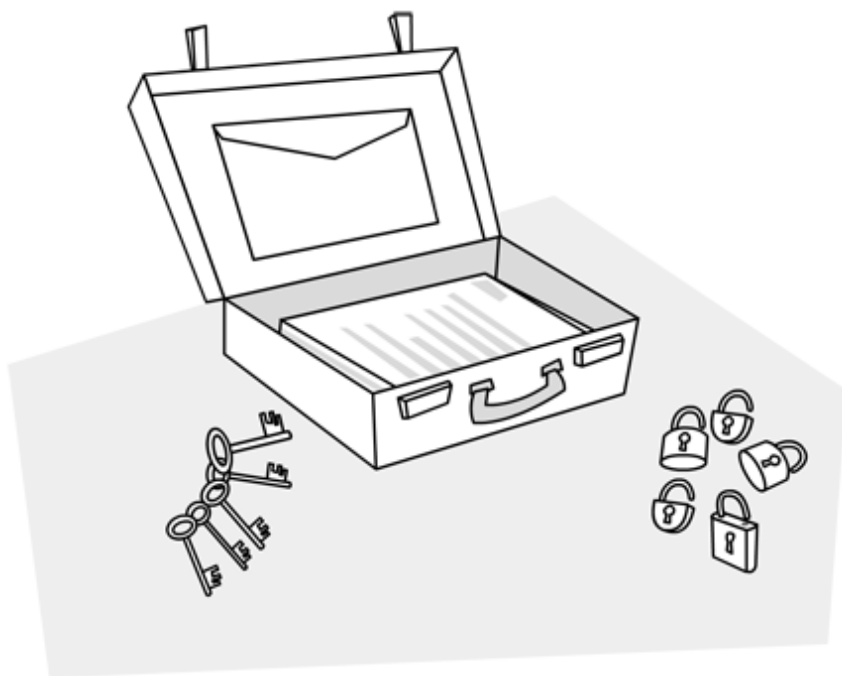
Puzzle #11: Ancient Treasure

Lara Croft has just unearthed a pair of ancient treasure rooms. According to the legend, one of the rooms is filled with unimaginable treasure and the other has a fire breathing dragon that will eat anyone who opens that door. One room has a silver door studded with diamonds and the other room has a gold door studded with rubies.

Each of the doors has an inscription on top. The inscriptions say:
Silver Door: This room contains the fire breathing dragon.
Gold Door: One of the inscriptions on these two doors is true.

Which door should Lara open?
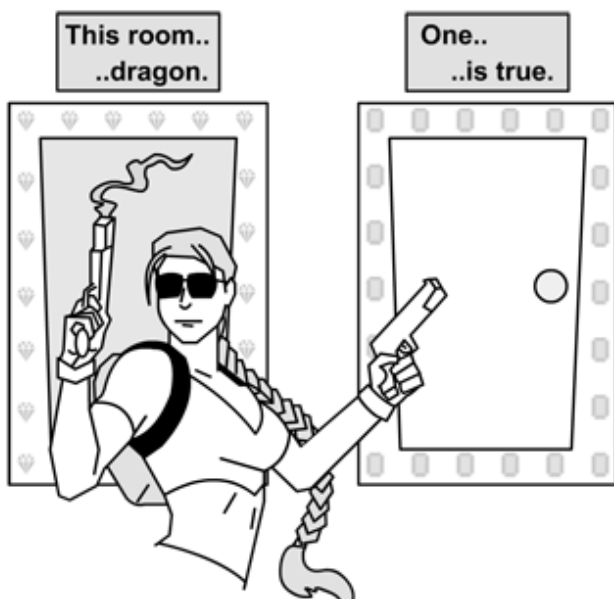
Puzzle #12: Crossing the Desert

You have to cross a large desert that is 1,000 km long. You have a horse and 3,000 apples. The horse can carry a maximum of 1,000 apples at any time. For every kilometer that the horse needs to travel, it eats one apple before it can start moving. What is the maximum number of uneaten apples that the horse can transport to the other end of the desert? Please provide detailed explanations with your answer.

Puzzle #13: The Game Show - Take Two

Your best friend is at a game show and he has just answered the final question to win the grand prize. For the prize he is shown two envelopes, each of which has some money inside (more than zero). The host informs him that one envelope contains twice the amount of money contained in the other envelope. He is asked to choose one of the envelopes. The envelope your friend chooses is opened and it contains a cheque for Rs. 1 crore (Rs. 10 million).

The host then tells your friend that he can choose to pay Rs. 5 lacs (Rs. 0.5 million) to get the option to exchange the envelope he picked with the unopened envelope. Your friend thinks that the other envelope will either have Rs. 2 crore (Rs. 20 million) or Rs. 50 lacs (Rs. 5 million) and he starts doing calculations on probability and expected values, but he is thoroughly confused. He uses the "Phone-a-friend" facility to call you up as you are the mathematics wizard. What should you advise your friend to do? Please provide complete explanation with your answer.

Puzzle #14: The Indistinguishable Tablets

Anand has a special medical condition for which he has been prescribed two very expensive medicines by his doctor. These medicines come in the form of tablets. Tablets of both the medicines look and feel identical and cannot be distinguished from each other. Anand needs to take exactly one tablet of each type every day.

One day, while Anand was taking his medicine out, two tablets of the second medicine popped out and got mixed with the one tablet of the first medicine he already had in his hand. Now there is no way to tell these three tablets apart. Can you find a solution where Anand can use these tablets without throwing them away?

People who work crossword puzzles know that if they stop making progress, they should put the puzzle down for a while - Marilyn vos Savant

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Puzzle #15: The Wisest of Them All

Prime Minister of Einsteinia died in a tragic accident. The King of Einsteinia had to choose the new Prime Minister from the core council consisting of three extremely intelligent advisors. The King wanted to make the wisest of them the new Prime Minister. He devised a plan to test their intelligence. He put a sticker on the forehead of each of the three advisors. Each sticker was either black or white in colour. Each of the three advisors could see the colour of the stickers on the forehead of the other two but not his own forehead.

The king then told them that anyone who could see at least one white sticker should raise his hand. All three of them raised their hands. He then asked them to deduce the colour of the sticker on their own foreheads. The first one to do so correctly would be made the new Prime Minister. Anyone making an incorrect guess would be beheaded. After sometime, one of them said - "The colour of the sticker on my forehead is ...." What was the colour of the sticker on his forehead? Please provide detailed justification for your answer.

ANSWERS

Puzzle #01: The Gold Chain

The man needs to make only one cut - on the third link. So he ends up with three pieces: 1 link (the one that was cut), 2 links joined together and 4 links joined together.

Day 1: give the single cut link

Day 2: give the piece with 2 links and take back the single link

Day 3: give the single link

Day 4: give the piece with 4 links and take back the pieces with 1 and 2 links

Day 5: give the single link

Day 6: give the piece with 2 links and take back the single link

Day 7: give the single link

Discuss the solution with TestFunda users.

Puzzle #02: Two Horses in a Race

The sage told them to switch horses and whoever finishes first wins the throne (since they swapped their horses, the person whose horse would have reached the finish line last would be the winner!).

Discuss the solution with TestFunda users.

Puzzle #03: Two Jars with Marbles

Birbal leaves one white marble in the first jar and transfers the rest to the second jar. The probability of drawing a white marble from the first jar is 1 (100%). The probability of drawing a white marble from the second jar is 49/99.

Given that either of the two jars is equally likely to be picked up, the combined probability is (0.5 x 1) + (0.5 x 49/99) = 74/99. That's a 74.75% chance of drawing a white marble.

Discuss the solution with TestFunda users.

Puzzle #04: Timing with Ropes

Puzzle Solution:

Set fire to both ends of one rope. At the same time, set fire to one end of the other rope. The rope lit from both ends will take one hour to burn completely (it is burning at twice the rate). Just as it finishes burning, the other rope would have burned for one hour with one hour remaining. Now light this rope from the other end as well, so that the remaining part burns in 30 minutes.

Discuss the solution with TestFunda users.
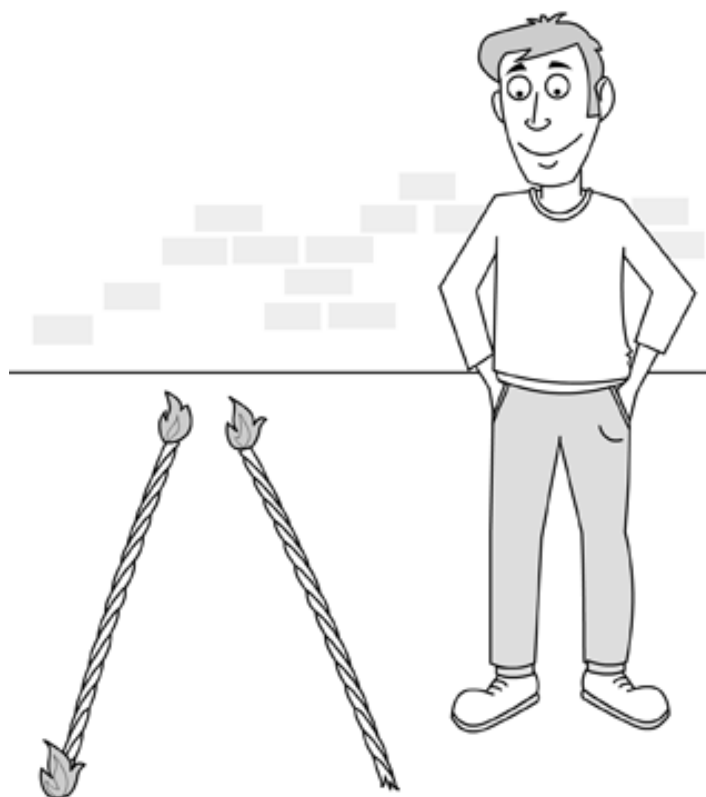
Puzzle #05: Three Scientists with Hats

The colour was white!

If the last scientist saw two black hats ahead of him, he would know that his hat had to be white. If he kept quiet for a fixed time, it would indicate to the scientists ahead of him that at least one of the other two had a white hat.

Now the second scientist would know that there was at least one white hat between him and the first scientist. If the first one has a black hat, then he himself should have a white hat. But he kept quiet. So, the first scientist knew that he had a white hat.

Using the strategy explained above, at least one of the scientists will always be able to correctly predict the colour of the hat on his head (whatever be the distribution of hats!)

Discuss the solution with TestFunda users.

Puzzle #06: The Game Show with the Goats

Most people (including many mathematics professors at Ivy League colleges) get this one wrong. The instinctive reaction is to not switch, as it will not change the probability of winning - that answer is wrong!

One possible way to explain it is to answer the following questions:

Q: When you first pick a door, are you more likely to pick the car or the goat?
A: The goat. The probability of picking the goat is 2/3.

Q: What is the probability of picking the car?
A: 1/3.

Q: So, is the car more likely to be behind your first choice door or one of the others?
A: One of the others. That probability is 2/3.

Q: If I now eliminate one of the other two doors and give you the option of changing, what should you do?
A: You should switch, as the probability of the car being behind the remaining door is 2/3.

[Discuss](#) the solution with TestFunda users.

Puzzle #07: The Rope Trick

He can steal all the rope! And there are two different ways of doing it!!!

Solution 1:

He climbs up one rope, cuts the second one right at the top near the hook, and drops it down. He then climbs down and ties one end of the cut rope to the still hanging rope. He then carries the free end of the cut rope in his hand and climbs back up the first rope.

At the top, he loops the free end he is holding through the other hook (like in threading a needle!). So, now he has the free end of the rope hanging through the second hook. He keeps pushing the rope through the second hook till the knot he tied reaches the top, near the second hook. Now he has a looped rope (with two sides) hanging from the second hook. He shifts from the first rope to the looped rope, holding both sides of the loop (so that the he does not slide down!). He then cuts the first rope from the top near the hook and lets it drop to the floor.

So, he has a 200 metre rope looped through the hook such that both the ends reach the floor. He climbs down holding both the sides of the looped rope and once at the bottom, he pulls down the looped rope!

Solution 2:

This trick is used by the rock climbers and mountaineers! The trick is to use a special knot that can be united by pulling on one end of the knot. Pulling on the other end, make the knot tighter. Read More.

The thief climbs up one rope, cuts the second one right at the top near the hook, without dropping it down. He then ties the end of the rope he cut to the hook with the special type of knot. One end of this knot can be pulled without loosening the knot (end A). Pulling on the other end of the knot (end B) will un-tie the knot. He ties the knot so that end A is the longer end, almost reaching the ground, while the end B is only

about a couple of metres long. He then shifts to the long end (end A) of the rope he just tied.

He then cuts the first rope at the top without dropping it down. He then ties the cut end securely to the end B (the short end) of the rope. He climbs down (still holding onto end A) and jumps off the rope about 2-3 metres from the ground. He then pulls the rope tied to end B so that the knot comes lose. He then pulls the whole rope down!

Discuss the solution with TestFunda users.
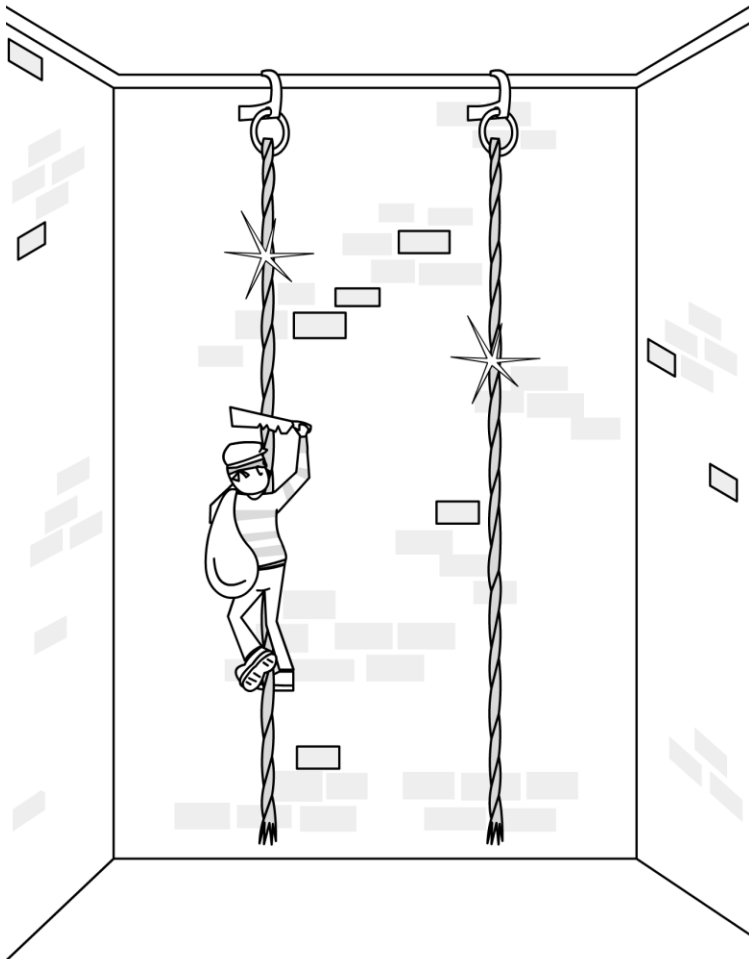
Puzzle #08: Dragon and the Poisoned Wells

The knight got a glass of plain water to the duel. He himself drank from well number 1 before coming to the duel.

The dragon brought poisoned water from the well number 7 to the duel.

At the duel, the knight drank from the poisoned water from well 7 (that the dragon had got) and that neutralized the poisoned water he had drunk from well 1 before the duel.

The dragon drank the plain un-poisoned water from the glass and then rushed to the well number 7, drank from it and died. He wrongly assumed that the knight brought poisoned water from one of the lower-numbered wells and that the water from well number 7 will neutralize it.

Discuss the solution with TestFunda users.

Puzzle #09: Never ask a Woman her Age

Solution 1: They divide the women into two groups of 3 each. Each woman in the first group adds 1 (or some other common number) to her age and each woman in the second group subtracts 1 from her age. Each of them secretly writes down this number (after adding or subtracting 1 from the age) on a piece of paper, folds it and then drops it in a bowl. All the papers are opened and average of the numbers on them taken. This average is the average age of the women.

Solution 2: The census officer whispers a random number in the ear of one of the women. She adds her age to that number and whispers the sum in the ear of the second woman. The second woman adds her age to this number and whispers the sum in the ear of the third woman. And so on. The sixth woman tells the final sum to the census officer. He subtracts the original random number from this sum and divides the difference by 6 to obtain the average age.

Discuss the solution with TestFunda users.

Puzzle #10: Secret Documents

The businessman puts the documents in the case, locks it and sends the case to his associate. He keeps the key to the lock with himself. The business associate, when she receives the case, puts her own lock on the case (in addition to the lock already on it) and sends it back. She also keeps the key to her own lock with herself. When the businessman gets the case, he removes his own lock and sends the case back. Once the associate receives the case again, she can unlock it with her key and retrieve the documents.

Discuss the solution with TestFunda users.

Puzzle #11: Ancient Treasure

Let us look at the inscription on the gold door. It can either be correct or be wrong.

Case 1: The inscription is true. Then the inscription on the gold door has to be true. That means that the inscription on the silver door is untrue - silver room contains the treasure!

Case 2: The inscription is false. Then either both the inscriptions are false or both are true. Both cannot be true as that is inconsistent. That means that both inscriptions are false. Again, the treasure is in the silver room.

Discuss the solution with TestFunda users.

Puzzle #12: Crossing the Desert

Divide the journey into three legs:
Leg 1: ending at point A, which is 200 km from the starting point.
Leg 2: ending at point B, which is 333 km further away from point A.
Leg 3: of 467 km ending at the other end of the desert.

Leg 1: Start with transporting 1000 apples to Point A. The horse will consume 200 apples on the way to point A. Deposit 600 apples at point A and return with the remaining 200 apples to the origin. After the 3rd trip you will end up with 600+600+800 = 2000 apples at point A.

Leg 2: Now start transporting 1000 apples from point A to point B. Horse will consume 333 apples on the way, deposit 334 apples at point B and return to A for another trip. After two trips you will end up with 334+667 = 1001 apples at point B.

Leg 3: Load the horse with 1000 apples; give it 1 apple at the start of this leg. The horse will consume 467 apples on the way to the other end of the desert. You will end up with 1001-467 = 534 apples at the other end of the desert.

Discuss the solution with TestFunda users.

Puzzle #13: The Game Show - Take Two

Let us assume that the first envelope contains "m" amount of money. Most people will think that there is an equal chance that the other envelope will contain either 2m or m/2 amount of money. So, the expected value is (50% x 2m) + (50% x m/2) = 1.25m. So they will think that it is better to switch the envelope. Wait! If after switching to the second envelope you are given the same option, then again the expected value of money in first envelope is 1.25 times the amount of money in the second envelope!

There is a fallacy in the above assumptions. While there are only two envelopes - one with m and the other with 2m, your calculations are assuming three envelopes - with m, 2m and m/2 amount of money! The problem becomes clear if you start thinking in terms of only m and 2m. So, let us say that the two envelopes contain "m" and "2m" amount of money. There is an equal chance of your friend picking up either of the envelopes.

Case 1: He picked up the envelope with "m". Then the gain from switching is New Amount - Initial Amount) = 2m-m

Case 2: He picked up the envelope with "2m". Then the gain from switching is New Amount - Initial Amount) = m-2m

Since both are equally likely, the expected gain is 50% * (m-2m) + 50% * (2m-m) = 0. So he should stick to the envelope he chose in the first attempt.

We know that this problem will lead to a lot of debate. For further reading, we suggest the following articles:

www.philosophyetc.net

www.maa.org

Wikipedia

Discuss the solution with TestFunda users.

Puzzle #14: The Indistinguishable Tablets

Let us call the two medicines A and B.

Anand divides the three mixed-up tablets into two piles in the following manner. He picks up each of the three tablets one by one and cuts them into two equal pieces. He puts each of the two cut pieces into two separate piles. After cutting all the three tablets, he has two piles with three halves each. Each pile contains 0.5 tablet of medicine A and 1.0 tablet of medicine B.

He then takes a new tablet of medicine A and cuts it into two equal pieces. He puts one piece in each of the two piles. Now he has two piles - each with 4 halves totalling up to 1.0 tablet of each of the medicines. He eats one pile today and saves the second pile for tomorrow.

[Discuss](#) the solution with TestFunda users.
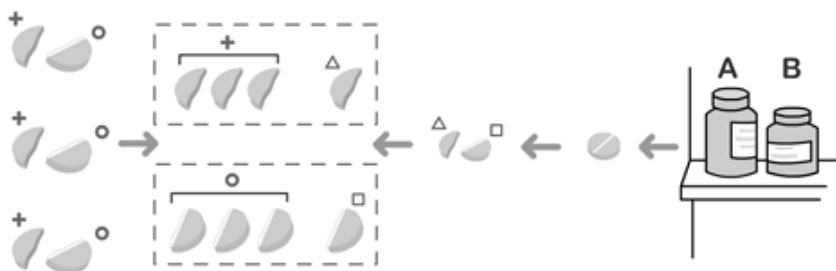
Puzzle #15: The Wisest of Them All

The colour of the sticker was white. There are four cases:

Case A: All of them had black stickers.
Case B: Two of them had a black sticker and one had a white sticker.
Case C: Two of them had a white sticker and one had a black sticker.
Case D: All of them had white stickers.

Cases A and B are ruled out as all three of them raised their hands - so all of them could see at least one white sticker. So we are left with cases C and D.

Case C: The two advisors with white stickers will think this way - the other advisor with the white sticker has also raised his hand - so he can see a white sticker. Since the third advisor has a black sticker, I must be the one with the white sticker. So, the wiser of these two will be able to reason it first and then say the colour of his sticker.

Case D: Each of them can see two white stickers. Each one will think that either I have a white (case D) or a black sticker (case C). If after a few moments none of them said the colour then the wisest of them will realize that, his sticker colour cannot be black. The reasoning is that if his colour was black then it has to be case C. In case C one of the other two can easily guess his colour according the logic of case C presented above. So, he will know that it is case D and his colour is white.

There is another interesting interpretation of the problem. The King should be wise and fair and give an equal chance to all three. So, in the above scenarios, only case which is fair to each one is case D - when all three of them had a white sticker! So, again the colour is white.

Discuss the solution with TestFunda users.

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