Exercise-1

1. Mr. Smith was the owner of a very successful firm. He stayed in a huge mansion. One day he was murdered in his mansion. The visitors to his mansion were Aakarsh, Rajat and Craig.

   A. The killer, who was one of the three visitors, arrived at the mansion later than at least one of the other 2 visitors.

   B. One of the three visitors was a scientist. He arrived at the mansion earlier that at least one of the other 2 visitors.

   C. The scientist arrived at the mansion at midnight.

   D. Neither Aakarsh nor Rajat arrived at the mansion after midnight.

   E. The earlier arriver of Rajat and Craig was not the scientist.

   F. The later arriver of Aakarsh and Craig was not the killer.

   Identify the killer. Provide a detailed explanation along with your answer.

2. Here's a secret code that you need to decipher. Hint: Use all your devices to figure out what we mean.

   A3Q9Z6A11Q5 Z5Q3A9Q8Q3Z4Q3 A1A9A9 Q5A6A1Q5 Q6Q9Q7 A2Q3Q3. Q2A6A1Q5 Q6Q9Q7 A2Q3Q3 Q8A2Z6A11Q5 A1A9Q2A1Q6A2 Q2A6A1Q5 Q6Q9Q7 A5Q3Q5Z9

3. Edwin retired last week from the post of a judge in the Supreme Court. He believed completely in numerology and, hence, his wife's name also fulfilled certain conditions in numerology.

   1. Her name has a product that is the same as the product for "Judge". (The product for judge is J*U*D*G*E)
   2. Her name does not have a single letter of the alphabet common with the word "Judge".
   3. Her name did not contain the third letter of the English alphabet as he considered 3 to be an unlucky number for him.
   4. If the first and second letters in her name were interchanged, the letters in her name would be arranged in the alphabetical order.

   Use A = 1, B = 2 and so on.

   What was his wife's name? Provide a detailed explanation along with your answer.

Solutions

1.

Aakarsh was the killer.

From 2 & 3, the scientist arrived at midnight and at least one of the three visitors arrived after midnight. Then, from 4, Craig arrived aafter midnight. So, Craig was not the scientist. Then, from 4 & 5, Rajat was not the scientist. So, from 2, Aakarsh was the scientist. Then, from 6, Craig was not the killer. Then, from 1 & 4, Aakarsh arrived after Rajat and Aakarsh was the killer.

2.

Don't believe all that you see. What you see isn't always what you get.

The message can be easily decoded using a QWERTY keyboard. Each latter-number pair represents a letter/symbol. The first character of a letter is always Q, A or Z, specifying which row on a QWERTY keyboard the letter is on. The number succeeding the letter is the position of the letter on a QWERTY keyboard from left to right along the row. For example, A1 is 'A', A2 is 'S', A3 is 'D' and so on.

3.

FANNY.

From 1, the name of his wife had a product of 10*21*4*7*5.

From 2, her name does not contain G(7) or U(21). So it has to contain N(14) twice. Dividing the product by 14 twice, leaves 10*3*5 as the remainder.

From 2, her name doesn't have E(5) or J(10). It cannot have a T(20). Also, it cannot have I(15).

So, it can have Y(25). On dividing y 25, we get 2*3.

From 3, her name cannot have C(3). Hence, her name has an F(6).

In the alphabetical order, the letters spelled FNNY. The only other letter that the name can contain is A(1). This also leaves the product unaltered.

So, from 4, his wife's name is Fanny.

Exercise-2

Carnival Dice Game

A Classic Puzzle by Sam Loyd

The following dice game is very popular at fairs and carnivals, but since two persons seldom agree on the chances of a player winning, I offer it as an elementary problem in the theory of probability. On the counter are six squares marked 1, 2, 3, 4, 5, 6. Players are invited to place as much money as they wish on any one square. Three dice are then thrown. If your number appears on one die only, you get your money back plus the same amount. If two dice show your number, you get your money back plus twice the amount you placed on the square. If your number appears on all three dice, you get your money back plus three times the amount. Of course if the number is not on any of the dice, the operator gets your money. To make this clearer with an example, suppose that you bet 1 dollar on No. 6. If one die shows a 6, you get your dollar back plus another dollar. If two dice show 6, you get back your dollar plus two dollars. If three dice show 6, you get your dollar back plus three dollars. A player might reason: the chance of my number showing on one die is 1 / 6, but since there are three dice, the chances must be 3 / 6 or 1 / 2, therefore the game is a fair one. Of course this is the way the operator of the game wants everyone to reason, for it is quite fallacious. Is the game favorable to the operator or the player, and in either case, just how favorable is it?

The St. Patrick's Day Parade

A Classic Puzzle by Sam Loyd

During a recent St. Patrick's Day parade an interesting and curious puzzle developed. The Grand Marshall issued the usual notice setting forth that "the members of the Honorable and Ancient Order of Hibernians will parade in the afternoon if it rains in the morning, but will parade in the morning if it rains in the afternoon". This gave rise to the popular impression that rain is to be counted as a sure thing on St. Patrick's Day. Casey boasted that he "had marched for a quarter of a century in every St. Patrick's Day parade since he had become a boy". I will pass over the curious interpretations which may be made of the above remark, and say that old age and pneumonia having overtaken Casey at last, he had marched on with the immortal procession. When the boys met again to do honor to themselves and St. Patrick on the 17th of March, they found that there was a vacancy in their ranks which it was difficult to fill. In fact, it was such an embarrassing vacancy that it broke up the parade and converted it into a panic-stricken funeral procession. The lads, according to custom, arranged themselves ten abreast, and did march a block or two in that order with but nine men in the last row where Casey used to walk on account of an impediment in his left foot. The music of the Hibernian band was so completely drowned out by spectators shouting to ask what had become of "the little fellow with the limp", that it was deemed best to reorganize on the basis of nine men to each row, as eleven would not do. But again Casey was missed, and the procession halted when it was discovered that the last row came out with but eight men. There was a hurried attempt to form with eight men in each row; again with seven, and then with five, four, three, and even two, but it was found that each and every formation always came out with a vacant space for Casey in the last line. The, although it strikes us as a silly superstition, it became whispered through the lines that every time they started off, Casey's "dot and carry one" step could be heard. The boys were so firmly convinced that Casey's ghost was marching that no one was bold enough to bring up the rear. The Grand Marshall, however, was a quick-witted fellow who speedily laid out that ghost by ordering the men to march in single file; so, if Casey did follow in spirit, he brought up the rear of the longest procession that ever did honor to his patron saint. Assuming that the number of the men in the parade did not exceed 7,000, can you determine just how many men marched in the procession?

Milkman's Puzzle

A Classic Puzzle by Sam Loyd

Honest John says: "What I don't know about milk is scarcely worth mentioning," but he was flabbergasted one day when each of two ladies asked him for two quarts of milk. One lady had a five-quart pail and the other had a four-quart pail. John had only two ten-gallon cans, each full of milk. How did he measure out exactly two quarts of milk for each lady? It is a juggling trick pure and simple, devoid of trick or device, but it calls for much cleverness to get two quarts of milk into those two pails without making use of any receptacles other than the two pails and the two full cans.

Dividing His Flocks

A Classic Puzzle by Sam Loyd

A Western rancher, finding himself well advanced in years, called his boys together and told them that he wished to divide his herds between them while he yet lived. "Now, John," he said to the eldest, "you may take as many cows as you think you could conveniently care for, and your wife Nancy may have one ninth of all the cows left." To the second son he said, "Sam, you may take the same number of cows that John took, plus one extra cow because John had the first pick. To your good wife, Sally, I will give one ninth of what will be left." To the third son he made a similar statement. he was to take one cow more than the second son, and his wife was to have one ninth of those left. The same applied to the other sons. Each took one cow more than his next oldest brother, and each son's wife took one ninth of the remainder. After the youngest son had taken his cows, there were none left for his wife. Then the rancher said: "Since horses are worth twice as much as cows, we will divide up my seven horses so that each family will own livestock of equal value." The problem is to tell how many cows the rancher owned and how many sons he had.

The Damaged Engine

A Classic Puzzle by Henry Ernest Dudeney

We were going by train from Anglechester to Clinkerton, and an hour after starting an accident happened to the engine. We had to continue the journey at three-fifths of the former speed. It made us two hours late at Clinkerton, and the driver said that if only the accident had happened fifty miles farther on the train would have arrived forty minutes sooner. Can you tell from that statement just how far it is from Anglechester to Clinkerton?

The Man and the Dog

A Classic Puzzle by Henry Ernest Dudeney

"Yes, when I take my dog for a walk," said a mathematical friend, "he frequently supplies me with some interesting puzzle to solve. One day, for example, he waited, as I left the door, to see which way I should go, and when I started he raced along to the end of the road, immediately returning to me; again racing to the end of the road and again returning. He did this four times in all, at a uniform speed, and then ran at my side the remaining distance, which according to my paces measured 27 yards. I afterwards measured the distance from my door to the end of the road and found it to be 625 feet. Now, if I walk 4 miles per hour, what is the speed of my dog when racing to and fro?"

Crossing the River

A Classic Puzzle by Henry Ernest Dudeney

During the Turkish stampede in Thrace, a small detachment found itself confronted by a wide and deep river. However, they discovered a boat in which two children were rowing about. It was so small that it would only carry the two children, or one grown person. How did the officer get himself and his 357 soldiers across the river and leave the two children finally in joint possession of their boat? And how many times need the boat pass from shore to shore?

Solutions to puzzles

Carnival Dice Game

Solution

Out of the 216 equally probable ways the dice may be thrown, you will win on only 91 of them, lose on 125. So your chance of winning at least as much as you bet is 91 / 216, your chance of losing 125 / 216. If the dice always showed different numbers, the game would be a fair one. Suppose all the squares covered with a dollar. The operator would, on each roll that showed three different numbers, take in three dollars and pay out three. But on doubles he makes a dollar and on triples he makes two dollars. In the long run, for every dollar wagered by a player, regardless of how he places the money, and in what amounts, he can expect to lose about 7.8 cents. This gives the operator a profit of 7.8 percent on each dollar bet.

The St. Patrick's Day Parade

Solution

The number of men when Casey was alive must be a multiple of 2, 3, 4, 5, 6, 7, 8, 9 and 10. We take the least common multiple, 2520, then subtract 1 to get the number of members without Casey. This could be the answer were it not for the catch phrase, "as eleven would not do". Since 2,519 is divisible by 11 we have to go the the next highest multiple, 5040, then subtract 1 to get 5039. Since this is not divisible by 11, and since higher multiples will give answers above 7,000, we conclude that 5039 is the only correct answer.

Milkman's Puzzle

Solution

Call one ten-gallon (40 quarts) milk can A and the other B, then proceed as follows:

	Can A		Can B		4 pail	5 pail
	40	40	0	0		
Fill 5 pail from can A.	35	40	0	5		
Fill 4 pail from 5 pail, leaving 1 quart in 5 pail.	35	40	4	1		
Empty 4 pail into can A.	39	40	0	1		
Pour the quart from 5 pail into 4 pail.	39	40	1	0		

Fill 5 pail from can A.	34	40	1	5
Fill 4 pail from 5 pail, leaving 2 quarts in 5 pail.	34	40	4	2
Empty 4 pail into can A.	38	40	0	2
Fill 4 pail from can B.	38	36	4	2
Pour from 4 pail into can A until A is filled, leaving 2 quarts in 4 pail.	40	36	2	2

Each pail now holds two quarts, can A is full, and can B is missing 4 quarts.

Dividing His Flocks

Solution

The rancher had seven sons and fifty-six cows. The eldest son took two cows, and his wife took six. The next son took three cows, and his wife five. the next son took four and his wife four, and so on down to the seventh son who took eight cows, leaving none for his wife. Curiously, each family now has eight cows, so each took one of the seven horses to make their livestock of equal value.

The Damaged Engine

Solution

The distance from Anglechester to Clinkerton must be 200 miles. The train went 50 miles at 50 m.p.h. and 150 miles at 30 m.p.h. If the accident had occurred 50 miles farther on, it would have gone 100 miles at 50 m.p.h. and 100 miles at 30 m.p.h.

The Man and the Dog

Solution

The dog's speed was 16 miles per hour. The following facts will give the reader clues to the general solution. The distance remaining to be walked side by side with the dog was 81 feet, the fourth power of 3 (for the dog returned four times), and the distance to the end of the road was 625 feet, the fourth power of 5. Then the difference between the speeds (in miles per hour) of man and dog (that is, 12) and the sum of the speeds (20) must be in the same ratio, 3 to 5, as is the case.

Crossing the River

Solution

The two children row to the opposite shore. One gets out and the other brings the boat back. One soldier rows across; soldier gets out, and child returns with boat. Thus it takes four crossings to get one man across and the boat brought back. Hence it takes four times 358, or 1432 journeys, to get the officer and his 357 men across the river and the children left in joint possession of their boat.

Exercise-3

1) A cuboid with dimensions l, b and h is painted on surface and then cut into cubes of 1cm3 sizes. Now how many cubes have none of the faces painted, how many cubes have one face painted, how many cubes have two faces painted and how many cubes have three faces painted.

Answer:

No of cubes with no face (side) painted is (l-2)(b-2)(h-2)

No of cubes with one face (side) painted is 2(l-2)(b-2) + 2(b-2)(h-2) + 2(l-2)(h-2)

No of cubes with two face (sides) painted is 4(l-2) + 4(b-2) + 4(h-2)

No of cubes with three face (sides) painted is 8 (always constant)

No of cubes with four or more faces (sides) painted is zero.

If problem statement says its cube instead of cuboid with k cm sides. Then the answers will be $(k-2)^3$, $6(k-2)^2$, 12(k-2), 8 and zero respectively.

2) I want to weigh weights from 1 to 100Kgs(all integer weights only) using a common balance. What is the minimum no. of weights i require to do the job and what are those?

Ans : Minimum number of weights required are 5.

These are 1,3,9,27,81 kgs.

3) A blindfolded man is asked to sit in the front of a carrom board. The holes of the board are shut with lids in random order, i.e. any number of all the four holes can be shut or open.

Now the man is supposed to touch any two holes at a time and can do the following.

- **Open the closed hole.**
- **Close the open hole.**
- **Let the hole be as it is.**

After he has done it, the carrom board is rotated and again brought to some position. The man is again not aware of what are the holes which are open or closed.

How many minimum number of turns does the blindfolded man require to either open all the holes or close all the holes?

Note that whenever all the holes are either open or close, there will be an alarm so that the blindfolded man will know that he has won.

Answer

The blindfolded man requires 5 turns.

1. Open two adjacent holes.
2. Open two diagonal holes. Now atleast 3 holes are open. If 4th hole is also open, then you are done. If not, the 4th hole is close.
3. Check two diagonal holes.
    - If one is close, open it and all the holes are open.

    - If both are close, open any one hole. Now, two holes are open and two are close. The diagonal holes are in the opposite status i.e. in both the diagonals, one hole is open and one is close.
4. Check any two adjacent holes.
    - If both are open, close both of them. Now, all holes are close.
    - If both are close, open both of them. Now, all holes are open.
    - If one is open and one is close, invert them i.e. close the open hole and open the close hole. Now, the diagonal holes are in the same status i.e. two holes in one diagonal are open and in other are close.
5. Check any two diagonal holes.
    - If both are open, close both of them. Now, all holes are close.
    - If both are close, open both of them. Now, all holes are open.

4) In the middle of the confounded desert, there is the lost city of "Ash". To reach it, I will have to travel overland by foot from the coast. On a trek like this, each person can only carry enough rations for five days and the farthest we can travel in one day is 30 miles. Also, the city is 120 miles from the starting point.

What I am trying to figure out is the fewest number of persons, including myself, that I will need in our Group so that I can reach the city, stay overnight, and then return to the coast without running out of supplies.

How many persons (including myself) will I need to accomplish this mission?

Answer

Total 4 persons (including you) required.

It is given that each person can only carry enough rations for five days. And there are 4 persons. Hence, total of 20 days rations is available.

1. **First Day** : 4 days of rations are used up. One person goes back using one day of rations for the return trip. The rations remaining for the further trek is for 15 days.
2. **Second Day** : The remaining three people use up 3 days of rations. One person goes back using 2 days of rations for the return trip. The rations remaining for the further trek is for 10 days.
3. **Third Day** : The remaining two people use up 2 days of rations. One person goes back using 3 days of rations for the return trip. The rations remaining for the further trek is for 5 days.
4. **Fourth Day** : The remaining person uses up one day of rations. He stays overnight. The next day he returns to the coast using 4 days of rations.

Thus, total 4 persons, including you are required.

5) We were going by train from Anglechester to Clinkerton, and an hour after starting an accident happened to the engine. We had to continue the journey at three-fifths of the former speed. It made us two hours late at Clinkerton, and the driver said that if only the accident had happened fifty miles farther on the train would have arrived forty minutes sooner. Can you tell from that statement just how far it is from Anglechester to Clinkerton?

Answer:

The distance from Anglechester to Clinkerton must be 200 miles. The train went 50 miles at 50 m.p.h. and 150 miles at 30 m.p.h. If the accident had occurred 50 miles farther on, it would have gone 100 miles at 50 m.p.h. and 100 miles at 30 m.p.h.

Exercise-5

1. The Rice Girls.

The Rice Girls are a new pop group from the Orient. Their nicknames are Old Rice (the eldest), Cold Rice (never gives anything away), Gold Rice (all rings and bangles), Bold Rice (the leader), and Told Rice (the youngest, at 18, and always bossed around). Mai Tai comes from China and is not best friends with Free Lee, who is from Taiwan. The girl from Japan is 20, a year older than the girl addicted to jewelry. Bold Rice and Gold Rice are the best of friends. Wee Pee is 3 years older than Yum Yum. Although the girls are all different ages the eldest is still only 22. Wing Ding is younger than Cold Rice. Mai Tai is 2 years older than the leader who is older than girl from Korea.

What is the name of the girl from Java?

2 Football.

Four local teams decided to stage an all-play-all soccer tournament. They chose Green, Red, Blue, and Yellow as their colours. The losers were from Tripham and they had 3 players injured in the tournament, 1 fewer than the Green team, though the team from Foulmere had the most injured. The Red team's home ground was Ditchling and their leading scorer was Fred Hacker who was to become one of their team's 2 injuries. Neighbouring teams Foulmere and Bootingly came second and third in the tournament respectively. Joe Kilmore, leading scorer on the Blue team disliked both the Quagmire and Hardacre grounds where he had to play away fixtures. Sid Spoiler, Tripham's leading scorer was happiest on his home ground, Hardacre. The Red team won.For which team was Bill De'ath the leading scorer?

3. Dinner Party.

Mary and John throw a small dinner party for two other married couples, Sarah and Paul, and Betty and Mike. Mary decides that it would be nice if husbands all sat opposite their wives on the round, 6-seater table. John insists that men and women should alternate. If Betty sits on the right of Paul, who sits on the left of Sarah?

4 Amateur Dramatics.

The Much Waffling Amateur Dramatic Society can never agree on anything. Of the 5 weekday evenings available for rehearsal Tarquin prefers Friday, Cedric can't manage Thursday, and the player whose favourite role is King Lear prefers Wednesday. Cedric cannot bear to play King Lear or Macbeth. They can't even agree on what to drink in the bar afterwards. Arabella annoys them all by insisting on Champagne while the player whose favourite role is Ophelia is content with Sherry. Whisky is regarded as the only appropriate drink for the Scotsman who plays Macbeth. The player who prefers Monday rehearsals drinks Pernod. Lavinia's rehearsal preference is one day after Cedric's.What is the sex of the Bacardi drinker and whose favourite role is Portia?

5. Punk Chart Toppers

The top five songs on the punk rock scene remain mystifying to the older generation. The new entry Extreme Loathing from the group Death by Decibels didn't make it to number one this week, though it was above Hate, Hate, Hate, sung by Brandon Bubo, which was nevertheless not fifth. Frank Fester, the lead singer of The Sex Preachers, was arraigned

for drug abuse but his group still made the number three slot. Last week's number one, In Your Face, was replaced by new chart-topper Incitement to War, while the haunting balad, What's The Point? fell below the song performed by The Sewer Rats. Vince Vomit is not the lead singer of the group, Pain Threshold, but he finished higher in the chart than Duncan Drain who did not sing the beat number, In Your Face, which was not recorded by the group Pelvic Thrust. Which group is it, that finished second, for which Pete Pustule is the lead singer?

6. Prison.

Her Majesty's prison at Dungenham is for short-term offenders. They have their exercise day on Friday. The long-term offenders at Cellfield call their governor Dracula. The prison whose governor is nicknamed Attila has 275 inmates. Lockham is the only prison for female offenders and it is visited by a person called Cringe. The prison with 103 inmates has its exercise day on Wednesday, but the visiting parson's name is not Blather. The prison whose governor is nicknamed Scrooge has its exercise day earlier in the week than the one with 230 inmates. The high-security prison has a governor nicknamed Napoleon. Klink is the prison visited by the parson called Waffle, while person Lamb is not the one who visits the prison with its exercise day on Tuesday. There are more inmates at Cellfield than at Klink and no one has their exercise day on Thursday.Given that there are 700 prisoners in all, which prison has the least inmates?

1 Rice Girls. Wee Pee, nicknamed Cold Rice, is the girl from Java.

2 Football. Bill De'ath was leading scorer for Bootingly, the Green team.

3 Dinner Party. Clockwise: John, Betty, Paul, Mary, Mike, Sarah. So John is on the left of Sarah.

4 Amateur Dramatics. The Bacardi drinker plays King Lear and is therefore male. Portia is Arabella's favourite role (since there are only two women and Ophelia prefers Sherry).

5 Punk Charts. Pete Pustule sings with Death by Decibels. Note that Duncan Drain and Brandon Bubo can sing for either The Sewer Rats or Pain Threshold.

6 Lockham has 92 inmates, the least of the four. The complete solution is

Prison	Inmates	Governor	Exercise	Parson	Style
Klink	103	Napoleon	Wednesday	Waffle	High Security
Lockham	92	Scrooge	Monday	Cringe	Women's
Dungenham	275	Attila	Friday	Lamb	Short-term
Cellfield	230	Dracula	Tuesday	Blather	Long-term