**DAY 1 ASSIGNMENT – 10/03/2025**

1. A bear starting from the point P, walked one-mile due south, then he changed direction and walked one-mile due east. Then he turned again to the left and walked one-mile due north and arrived at point P he started from what was the colour of the bear?

**SOLUTION:**

White.

The only place on Earth where a bear could walk one mile south, one mile east, and one mile north and return to the same point is the North Pole. The only bears found there are polar bears, which are white.

2. Two towns A and B are 3 kms apart. It is proposed to build a new school serving 100 students in town A and 50 students in town B. How far from town A should the school be built if the total travel distance by all 150 students is to be as small as possible?

**SOLUTION:**

200 km from Town A

A : B = 100 : 50 = 2 : 1

Divide the total distance by 3 km in a ratio 2:1

Consider the school is 2 km from A: 100×2= 200 km

50×1= 50 km

Total travel distance = 200 + 50 = 250 km

Consider the school is 1 km from A: 100×1= 100 km

50×2= 100 km

Total travel distance = 100 + 100 = 200 km

Therefore, the school should be built 1 km from Town A to minimize total travel distance.

**Algorithm:**

Step 1: Get the distance between town A and town B along with the number of students.

Step 2: Divide the total distance according to the ratio.

Step 3: Using Guess and Check, get the distance.

3. A traveller arrives at a hotel, he has no money but only a silver chain consisting of 6 links. He uses one link to pay for each day spent at the hotel but the hotel manager agrees to accept no more than one broken link.  
How should the traveller cut up the chain in order to settle the amount with the hotel manager on a daily basis?

**SOLUTION:**

Minimum Links to Cut

To pay daily with only one broken link, we use the binary system:

Payments:

Day 1 → Give 1-link piece

Day 2 → Take back 1-link piece, give 2-link piece

Day 3 → Give 1-link piece along with 2-link piece

Day 4 → Take back 1-link and 2-link pieces, give 4-link piece

Day 5 → Give 1-link piece along with 4-link piece

Day 6 → Take back 1-link piece, give 2-link and 4-link pieces

General case:

The minimum cuts required for n days is ⌊log2​n⌋.

Application to 100 Days

Minimum cuts: ⌊log 100⌋=6

4. Rearrange the letters in the words new door to make one word.

**SOLUTION:**

"One Word”. Rearranging "new door" gives "one word".

5. Do divide and conquer: 6 5 1 4 3 2

**SOLUTION:**

Given: 6, 5, 1, 4, 3, 2

Step-by-step:

* Split: (6, 5, 1) | (4, 3, 2)
* Further split: (6 | 5,1) | (4 | 3,2)
* Sort & Merge: (1, 5, 6) | (2, 3, 4)
* Final Merge: 1, 2, 3, 4, 5, 6

**Algorithm:**

Begin

Step 1: If the array has one or zero elements, it is already sorted. Return it.

Step 2: Divide the array into two halves:

Left half: arr[0:mid]

Right half: arr[mid:n]

Step 3: Sort both halves recursively using Merge Sort.

Step 4: Merge the two sorted halves:

Compare elements from both halves and insert them into a new sorted array.

Step 5: Return the final sorted array.

End

6. Draw flowchart for calculating simple interest.

SOLUTION:

S.I. = P\*N\*R

100

Read value of P, N, R

Print S.I.

**ALGORITHM:**

Begin

Step 1: Read the values of Principal (P), Rate of interest (R), and Time period (T).

Step 2: Apply the formula: SI = (P × R × T) / 100

Step 3: Store the calculated Simple Interest (SI).

Step 4: Display the result.

End