**Exercise 1:**

1. **The Bear Problem :**

Solution: The bear is white.

Algorithm:

1. Start at point P.
2. Walk 1 mile due south.
3. Walk 1 mile due east.
4. Walk 1 mile due north and arrive back at point P.
5. The only place on Earth where such a path is possible is near the North Pole.
6. The only bear species found in the North Pole is the polar bear.
7. **Optimal School Location**

Solution: The school should be built 1 km from town A.

Algorithm:

1. Let the distance between towns A and B be d = 3 km.
2. Let the number of students in A be 100 and in B be 50.
3. Define x as the distance from A where the school is built.
4. Compute total travel distance: Total Distance=100×x+50×(3−x)
5. Compute the equation for x.
6. **Paying with a Chain of Links**

Solution: The school should be built 1 km from town A.

Algorithm:

1. Traveler has n links and must pay 1 link per day.
2. Hotel manager accepts only one broken link at a time.
3. Use a binary payment strategy by cutting at powers of 2.
4. Minimum cuts needed:
   * For 100 days 🡪7 cuts (1, 2, 4, 8, 16, 32, 37).
5. General formula: log2​(n)
6. **Rearranging new door**

Solution: Rearranging 'new door' gives 'one word'.

**Algorithm:**

1. Take the letters from "new door".
2. Rearrange them to form a meaningful word.
3. The answer is "one word".

**5. Divide and Conquer Sorting (Descending Order)**

Solution: Sorted list = 1, 2, 3, 4, 5, 6

**Algorithm (Merge Sort-based Approach):**

1. Given numbers: 6, 5, 1, 4, 3, 2
2. Divide the array into smaller parts recursively.
3. Sort each part in descending order.
4. Merge back to form a sorted array.

Sorted Output: 6, 5, 4, 3, 2, 1

**6. Flowchart for Simple Interest Calculation**

**Algorithm:**

1. Start
2. Input Principal (P), Rate (R), Time (T)
3. Compute Simple Interest (SI) = (P × R × T) / 100
4. Display SI
5. End