13. A gym trainer recorded weights lifted by each member throughout the week. How can you analyze improvements over time?

```
weights = {'John': [50, 55, 60], 'Amy': [30, 35, 40]}
improvement = {p: weights[p][-1] - weights[p][0] for p in weights}
print("Weight improvements:", improvement)
```

```
Weight improvements: {'John': 10, 'Amy': 10}
```

14. A bank wants to count how many transactions exceeded $10,000. How can this be calculated efficiently?

```
amounts = [9000, 15000, 12000, 5000]
count = len([a for a in amounts if a > 10000])
print("Transactions over $10,000:", count)
```

```
Transactions over $10,000: 2
```

15. A travel agency collects ratings from 1 to 5 stars. How would you calculate how many customers gave a full 5-star rating?

```
ratings = [5, 4, 3, 5, 5]
count_5 = ratings.count(5)
print("Number of 5-star ratings:", count_5)
```

```
Number of 5-star ratings: 3
```

16. A gaming company logs how long players spent on each level. How can you find the shortest and longest level durations?

```
durations = [12, 7, 9, 15]
print("Shortest duration:", min(durations))
print("Longest duration:", max(durations))
```

```
Shortest duration: 7
Longest duration: 15
```

17. A school records daily attendance as present (1) or absent (0). How can you calculate the attendance percentage?

```
attendance = [1, 1, 0, 1, 1]
percentage = sum(attendance) / len(attendance) * 100
print("Attendance percentage:", percentage)
```

```
Attendance percentage: 80.0
```

18. A shop tracks customer visits for 60 consecutive days. How can you organize this into weeks and find the busiest week?

```
visits = list(range(1, 61))
weeks = [sum(visits[i:i+7]) for i in range(0, 60, 7)]
busiest = weeks.index(max(weeks)) + 1
print("Busiest week number:", busiest)
```

```
Busiest week number: 8
```

19. A delivery app stores delivery times in minutes. How would you find the fastest, slowest, and average delivery times?

```
times = [12, 15, 10, 20]
print("Fastest:", min(times))
print("Slowest:", max(times))
print("Average:", sum(times)/len(times))
```

```
Fastest: 10
Slowest: 20
Average: 14.25
```

20. An online class system tracks how long each student stayed logged in. How can you identify the top 5 most active students?

```
times = {'A': 120, 'B': 90, 'C': 150, 'D': 100, 'E': 80, 'F': 60}
top5 = sorted(times, key=times.get, reverse=True)[:5]
print("Top 5 active students:", top5)
```

```
Top 5 active students: ['C', 'A', 'D', 'B', 'E']
```

21. A call center logs the duration of each call made during a day. How can you calculate the average call time?

```
calls = [3, 4, 5, 6]
print("Average call time:", sum(calls)/len(calls))
```

```
Average call time: 4.5
```

22. A bookstore tracks daily sales of 10 books. How can you determine the best and worst selling books?

```
sales = {'Book1': 100, 'Book2': 250, 'Book3': 75}
print("Best selling book:", max(sales, key=sales.get))
print("Worst selling book:", min(sales, key=sales.get))
```

```
Best selling book: Book2
Worst selling book: Book3
```

23. A car rental company records fuel consumption data for each vehicle. How can you find which vehicle is most fuel efficient?

```
cars = {'CarA': (500, 50), 'CarB': (600, 40)}
eff = {c: d/f for c, (d, f) in cars.items()}
print("Most fuel efficient:", max(eff, key=eff.get))
```

```
Most fuel efficient: CarB
```

24. A warehouse tracks inventory levels in different sections. How can you identify the section with the most and least stock?

```
stock = {'A': 100, 'B': 50, 'C': 150}
print("Most stock:", max(stock, key=stock.get))
print("Least stock:", min(stock, key=stock.get))
```

```
Most stock: C
Least stock: B
```

25. A university tracks student performance over 4 semesters. How can you compare average performance across semesters?

```
scores = {'Sem1': [80, 85], 'Sem2': [75, 70], 'Sem3': [90, 95]}
avg = {s: sum(scores[s])/len(scores[s]) for s in scores}
print("Semester averages:", avg)
```

```
Semester averages: {'Sem1': 82.5, 'Sem2': 72.5, 'Sem3': 92.5}
```

26. A retail shop tracks hourly foot traffic. How can this be grouped by day and used to find peak shopping times?

```
traffic = {'09:00': 10, '10:00': 25, '11:00': 30}
print("Peak shopping hour:", max(traffic, key=traffic.get))
```

```
Peak shopping hour: 11:00
```

27. A farming lab collects soil pH levels across different regions. How can you find regions with the most acidic and most alkaline soil?

```
ph = {'Region1': 5.2, 'Region2': 7.0, 'Region3': 8.1}
print("Most acidic:", min(ph, key=ph.get))
print("Most alkaline:", max(ph, key=ph.get))
```

```
Most acidic: Region1
Most alkaline: Region3
```

28. A fitness tracker records heart rate every second. How can you summarize heart rate trends over a 10-minute session?

```
hr = list(range(60, 180))  # 120 seconds
minutes = [sum(hr[i:i+60])//60 for i in range(0, len(hr), 60)]
print("Heart rate per minute:", minutes)
```

```
Heart rate per minute: [89, 149]
```

29. A railway company records train delays in minutes. How can you calculate the average delay while ignoring on-time trains?

```
delays = [0, 5, 10, 0, 20]
valid = [d for d in delays if d > 0]
print("Average delay:", sum(valid)/len(valid))
```

```
Average delay: 11.666666666666666
```

30. A taxi service tracks the number of trips completed by each car over a week. How can you find which taxi was most active?

```
trips = {'Taxi1': 50, 'Taxi2': 70, 'Taxi3': 45}
print("Most active taxi:", max(trips, key=trips.get))
```

```
Most active taxi: Taxi2
```

1. A weather station collected temperature readings every hour for a week. How would you determine which day was the hottest on average?

```
daily_temps = {'Mon': [25, 28, 30], 'Tue': [26, 31, 29]}
hottest = max(daily_temps, key=lambda d: sum(daily_temps[d])/len(daily_temps[d]))
print("Hottest day on average:", hottest)
```

```
Hottest day on average: Tue
```

2. An online store tracked monthly sales of five products over six months. How can you find which product had the highest total sales?

```
sales = {'A': [10, 20], 'B': [15, 25], 'C': [5, 10]}
top_product = max(sales, key=lambda p: sum(sales[p]))
print("Product with highest total sales:", top_product)
```

```
Product with highest total sales: B
```

3. A hospital recorded the number of patients visiting each day for a month. What method would you use to find the day with the fewest visits?

```
visits = {'2024-01-01': 15, '2024-01-02': 7, '2024-01-03': 10}
fewest_day = min(visits, key=visits.get)
print("fewest visit:",fewest_day)
```

```
fewest visit: 2024-01-02
```

4. A student has marks from eight different subjects. How can the student figure out the subject they scored the highest and lowest in?

```
marks = {'Math': 88, 'English': 92, 'History': 76}
best = max(marks, key=marks.get)
worst = min(marks, key=marks.get)
```

```
print("Highest in:", best)
print("Lowest in:", worst)
```

```
Highest in: English
Lowest in: History
```

5. A social media analyst is examining daily likes on a post. How can they find the average likes for each week?

```
likes = [50, 60, 55, 70, 65, 80, 75, 90, 85, 100, 95, 110, 105, 120]
weeks = [likes[i:i+7] for i in range(0, len(likes), 7)]
weekly_avg = [sum(week)/len(week) for week in weeks]
print("Weekly average likes:", weekly_avg)
```

```
Weekly average likes: [65.0, 100.71428571428571]
```

6. A company wants to increase all employee salaries by 10%. How would you apply this change to a list of salary figures?

```
salaries = [30000, 40000, 50000]
new_salaries = [s * 1.10 for s in salaries]
print("Updated salaries:", new_salaries)
```

```
Updated salaries: [33000.0, 44000.0, 55000.00000000001]
```

7. A city has hourly rainfall data for a month. How can you group this data by day to find which day had the most rain?

```
rain = {'Mon': [2, 5], 'Tue': [1, 8], 'Wed': [4, 1]}
most_rain_day = max(rain, key=lambda d: sum(rain[d]))
print("Day with most rain:", most_rain_day)
```

```
Day with most rain: Tue
```

8. Two cricket teams' scores are stored separately. How can you combine the scores to compare individual performances?

```
team1 = [45, 60, 75]
team2 = [50, 65, 70]
combined = list(zip(team1, team2))
print("Combined team scores:", combined)
```

```
Combined team scores: [(45, 50), (60, 65), (75, 70)]
```

9. A teacher recorded test scores of five students over three tests. How can you identify the student with the highest overall average?

```
scores = {'Alice': [80, 90, 85], 'Bob': [78, 70, 75]}
top_student = max(scores, key=lambda s: sum(scores[s])/len(scores[s]))
print("Top student:", top_student)
```

```
Top student: Alice
```

10. A smart meter logs power usage every 15 minutes. How can this data be split into daily sections for analysis?

```
data = list(range(96*3))  # 3 days of 15-min logs
days = [data[i:i+96] for i in range(0, len(data), 96)]
print("Data split into", len(days), "days")
```

11. A factory monitors machine temperature every hour. How can you find the maximum temperature recorded each day?

```
temps = {'Mon': [22, 24, 28], 'Tue': [25, 26, 29]}
max_temp = {day: max(temps[day]) for day in temps}
print("Max temperature per day:", max_temp)
```

```
Max temperature per day: {'Mon': 28, 'Tue': 29}
```