

# [Solution] CP01

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## 1 [Solution] Class Partipation 01

### 1.1 01. Mass and Weight

Scientists measure an object's mass in kilograms and its weight in newtons. If you know the amount of mass of an object in kilograms, you can calculate its weight in newtons with the following formula:

**\*\***

$\text{weight} = \text{mass} * 9.8$

**\*\*** Write a program that asks the user to enter an object's mass, and then calculates its weight. If the object weighs more than 500 newtons, display a message indicating that it is too heavy. If the object weighs less than 100 newtons, display a message indicating that it is too light.

```
[1]: mass = float(input("Enter object mass in Kilograms (KG): "))
weight = mass * 9.8
if weight > 500:
    print("Object is too heavy")
elif weight < 100:
    print("Object is too light")
```

```
Enter object mass in Kilograms (KG): 100
Object is too heavy
```

### 1.2 02. Hot Dogs Cookout Calculator

Assume that hot dogs come in packages of 10, and hot dog buns come in packages of 8. Write a program that calculates the number of packages of hot dogs and the number of packages of hot dog buns needed for a cookout, with the minimum amount of leftovers. The program should ask the user for the number of people attending the cookout and the number of hot dogs each person will be given. The program should display the following details: \* The minimum number of packages of hot dogs required \* The minimum number of packages of hot dog buns required \* The number of hot dogs that will be left over \* The number of hot dog buns that will be left over

```
[2]: number_of_people = int(input("Enter number of people: "))
number_of_hotdogs_per_person = int(input("Enter number of hot dogs: "))

HOTDOGS_PER_PACKAGE = 10
BUNS_PER_PACKAGE = 8
```

```

num_dogs = number_of_people * number_of_hotdogs_per_person

if num_dogs / HOTDOGS_PER_PACKAGE == num_dogs // HOTDOGS_PER_PACKAGE:
    min_hot_dog_paks = num_dogs // HOTDOGS_PER_PACKAGE
    leftover_dogs = 0
else:
    min_hot_dog_paks = num_dogs // HOTDOGS_PER_PACKAGE + 1
    leftover_dogs = HOTDOGS_PER_PACKAGE - num_dogs % HOTDOGS_PER_PACKAGE

if num_dogs / BUNS_PER_PACKAGE == num_dogs // BUNS_PER_PACKAGE:
    min_bun_paks = num_dogs // BUNS_PER_PACKAGE
    leftover_buns = 0
else:
    min_bun_paks = num_dogs // BUNS_PER_PACKAGE + 1
    leftover_buns = BUNS_PER_PACKAGE - num_dogs % BUNS_PER_PACKAGE

print("Minimum number of packages of hot dogs required =", min_hot_dog_paks)
print("Minimum number of packages of hot dog buns required =", min_bun_paks)
print("Number of hot dogs left over =", leftover_dogs)
print("Number of hot dogs buns left over =", leftover_buns)

```

```

Enter number of people: 10
Enter number of hot dogs: 1
Minimum number of packages of hot dogs required = 1
Minimum number of packages of hot dog buns required = 2
Number of hot dogs left over = 0
Number of hot dogs buns left over = 6

```

### 1.3 03. Miles Per Gallon

Drivers are concerned with the mileage obtained by their automobiles. One driver has kept track of several tankfuls of gasoline by recording miles driven and gallons used for each tankful. Develop a sentinel-controlled-repetition script that prompts the user to input the miles driven and gallons used for each tankful. The script should calculate and display the miles per gallon obtained for each tankful. After processing all input information, the script should calculate and display the combined miles per gallon obtained for all tankfuls (that is, total miles driven divided by total gallons used).

- Enter the gallons used (-1 to end): 12.8
- Enter the miles driven: 287
- The miles/gallon for this tank was 22.421875
- Enter the gallons used (-1 to end): 10.3
- Enter the miles driven: 200
- The miles/gallon for this tank was 19.417475
- Enter the gallons used (-1 to end): 5
- Enter the miles driven: 120
- The miles/gallon for this tank was 24.000000

- Enter the gallons used (-1 to end): -1
- The overall average miles/gallon was 21.601423

```
[3]: counter = 0;
total = 0;

while True:
    gallons = float(input( "Enter the gallons used, (-1 to end): " ))

    if gallons == -1 and total > 0:

        overallAverage = total / counter
        print( "\nThe overall average miles/gallon was ", overallAverage )
        break

    elif gallons == -1 and total==0:

        print("No gallons were entered")
        break

    miles = float(input("\nEnter the miles driven: " ))

    tankAverage = miles / gallons
    print( "\nThe miles per gallon for this tank was", tankAverage )

    total += tankAverage
    counter += 1
```

Enter the gallons used, (-1 to end): 10

Enter the miles driven: 100

The miles per gallon for this tank was 10.0

Enter the gallons used, (-1 to end): 20

Enter the miles driven: 10

The miles per gallon for this tank was 0.5

Enter the gallons used, (-1 to end): -1

The overall average miles/gallon was 5.25

## 1.4 04. Software Sales

A software company sells a package that retails for \$99. Quantity discounts are given according to the following table:

Quantity	Discount
10–19	10%
20–49	20%
50–99	30%
100 or more	40%

Write a program that asks the user to enter the number of packages purchased. The program should then display the amount of the discount (if any) and the total amount of the purchase after the discount.

```
[4]: RETAIL_PRICE = 99
quantity = int(input("Enter quantity purchased: "))

if quantity < 10:
    discount = 0
elif quantity >= 10 and quantity < 20:
    discount = 0.1
elif quantity >= 20 and quantity < 50:
    discount = 0.2
elif quantity >= 50 and quantity < 100:
    discount = 0.30
else:
    discount = .40

sub_total = RETAIL_PRICE * quantity
total_discount = sub_total * discount
total = sub_total - total_discount

print("Sub Total: ",sub_total)
print("Total discount: ",total_discount)
print("Discount: ",total)
```

```
Enter quantity purchased: 100
Sub Total: 9900
Total discount: 3960.0
Discount: 5940.0
```

## 1.5 05. Shipping Charges

The Fast Freight Shipping Company charges the following rates:

Weight of Package	Rate per Pound (Dollar)
2 pounds or less	1.50
Over 2 pounds but not more than 6 pounds	3.00
Over 6 pounds but not more than 10 pounds	4.00
Over 10 pounds	4.75

Write a program that asks the user to enter the weight of a package and then displays the shipping charges.

```
[5]: weight = float(input("Enter the weight of the package in pounds: "))

if weight <= 2:
    rate = 1.50
elif weight > 2 and weight <=6:
    rate = 3.0
elif weight > 6 and weight <=10:
    rate = 4.0
elif weight > 10:
    rate = 4.75

shipping = weight * rate
print("Shipping charge: ",shipping)
```

```
Enter the weight of the package in pounds: 450
Shipping charge: 2137.5
```

## 1.6 06. Body Mass Index

Write a program that calculates and displays a person's body mass index (BMI). The BMI is often used to determine whether a person is overweight or underweight for his or her height. A person's BMI is calculated with the following formula:

**\*\***

$$\text{BMI} = \text{weight} * 703 / \text{height}^2$$

**\*\***

where weight is measured in pounds and height is measured in inches. The program should ask the user to enter his or her weight and height and then display the user's BMI. The program should also display a message indicating whether the person has optimal weight, is underweight, or is overweight. A person's weight is considered to be optimal if his or her BMI is between 18.5 and 25. If the BMI is less than 18.5, the person is considered to be underweight. If the BMI value is greater than 25, the person is considered to be overweight.

```
[6]: weight = float(input("Enter your weight in pounds: "))
height = float(input("Enter your height in inches: "))

BMI = weight * 703 / height**2

if BMI >= 18.5 and BMI <= 25:
    print("Your BMI is optimal")
elif BMI < 18:
    print("You are underweight")
elif BMI > 25:
    print("You are overweight")
```

```
Enter your weight in pounds: 25
Enter your height in inches: 40
You are underweight
```

```
[ ]:
```