

Sheet of 20 Complex Expressions (With Variables and Problem Context)

1. Temperature Conversion:

celsius = 30

fahrenheit = (9 / 5) * celsius + 32 - 5 / 2

Question: Convert celsius to Fahrenheit and evaluate the expression.

2. Sales Calculation:

price = 150

discount = 20

tax = 5

final_price = price - (price * discount / 100) + tax ** 2 // 3

Question: Calculate the final_price after applying discount and tax.

3. Area of a Complex Shape:

radius = 7

side = 4

area = (3.14 * radius ** 2) + (side ** 2 - 2 * side + 5 % 2)

Question: Calculate the area of a complex shape (circle + modified square).

4. Monthly Budget Calculation:

income = 5000

rent = 1200

groceries = 300

savings = income - (rent + groceries * 2) // 3 + (savings_percentage := 10)

Question: Compute the savings from the monthly income after rent and groceries with a 10% savings rate.

5. Profit/Loss Calculation:

cost_price = 200

selling_price = 180

profit_loss = (selling_price - cost_price) * 2 + cost_price // 5 - 3 ** 2

Question: Find the total profit or loss from the selling price and cost price.

6. Physics Problem - Velocity:

distance = 100

time = 5

velocity = distance / time + 2 ** 2 - 5 * 3 // 2

Question: Calculate the velocity of a moving object.

7. Inventory Calculation:

initial_stock = 500

sold_units = 123

restock = 50

current_stock = initial_stock - sold_units + restock ** 2 // 10 + 7 % 3

Question: Compute the current_stock after sold units and restock.

8. Exam Marks Calculation:

total_marks = 500

marks_obtained = 430
bonus = 5
percentage = (marks_obtained + bonus) * 100 / total_marks - 3 // 2
Question: Calculate the student's percentage including a bonus of 5 marks.

9. Compound Interest:

principal = 1000
rate = 5
time = 2
interest = principal * (1 + rate / 100) ** time - 5 * 3 + 7 % 2
Question: Compute the compound interest using the given formula with adjustments.

10. Acceleration of a Car:

initial_velocity = 10
final_velocity = 50
time = 5
acceleration = (final_velocity - initial_velocity) / time + 5 % 3 * 4
Question: Calculate the acceleration of the car.

11. GPA Calculation:

credits = 18
points = 75
gpa = (points / credits) + (extra_credit := 2) ** 2 // 3 + 10 % 3
Question: Find the GPA with an extra credit adjustment.

12. Employee Salary Calculation:

base_salary = 2000
overtime = 5
deductions = 100
final_salary = base_salary + (overtime * 20) - deductions // 2 + 10 % 4
Question: Calculate the final_salary after overtime and deductions.

13. Shopping Bill Calculation:

items = 10
item_price = 30
discount = 15
total = (items * item_price - discount) + discount // 3 * 2
Question: Compute the total shopping bill after applying the discount.

14. Distance Between Two Points:

x1 = 3
y1 = 4
x2 = 6
y2 = 8
distance = ((x2 - x1) ** 2 + (y2 - y1) ** 2) ** 0.5 + 5 // 2
Question: Find the distance between two points on a plane.

15. Work Efficiency Calculation:

total_work = 100

work_done = 70
efficiency = (work_done / total_work) * 100 + 5 * 2 // 3
Question: Compute the work efficiency in percentage.

16. Electricity Bill Calculation:

units = 250
rate = 5
surcharge = 50
bill = (units * rate) + surcharge // 2 * 3 + 7 % 4

Question: Calculate the total electricity bill after adding the surcharge.

17. Body Mass Index (BMI) Calculation:

weight = 70 # kg
height = 1.75 # meters
bmi = weight / height ** 2 + 10 % 3 * 2 // 1

Question: Compute the BMI of a person and adjust using the remainder operator.

18. Loan Payment Calculation:

loan_amount = 5000
interest_rate = 7
time = 3
emi = (loan_amount * interest_rate / 100 * time) // 12 + 5 % 2 * 3

Question: Calculate the EMI (equated monthly installment) for the loan.

19. Savings Growth Calculation:

savings = 2000
growth_rate = 10
years = 5
growth = savings * (1 + growth_rate / 100) ** years // 2 + 7 % 3

Question: Calculate the growth in savings over a period of 5 years.

20. Running Race - Time to Finish:

distance = 100 # meters
speed = 8 # meters/second
time_to_finish = distance / speed + 10 % 2 * 3 // 1

Question: Compute the time taken to finish the race.

Instructions for Students:

1. **Step 1:** Identify variables and their values.
2. **Step 2:** Apply operator precedence rules, including parentheses, exponentiation, multiplication, division, modulus, and addition/subtraction.
3. **Step 3:** Ensure correct associativity for operators of equal precedence.
4. **Step 4:** Solve step by step and cross-check each operation for accuracy.

This structured context will help students practice both solving expressions and understanding how they apply to real-world scenarios