
C++ Questions

Question-1: A newly-discovered specie is under research. At time $t = 0$ hours, a scientist puts one hundred specified specie ($A_0=100$) into a favorable growth medium. He wants to compute how many more specie will be after six hours. Assuming exponential growth, the growth constant k for the bacteria is 0.25/hr. The requirement is to create a generic program that runs for an ample range of values of these parameters. Ask the user for the parameters, then you create a more general program, which would work for larger range of values. Write a C++ program for it. [Hint: Include library `cmath` to use `pow()` function]

The amount of specified specie A after an elapsed time t (starting at $t_0=0$) is as follows:

$$A = A_0 e^{kt}$$

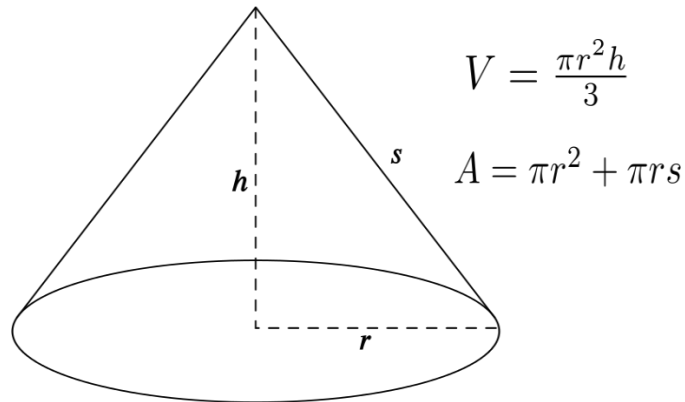
Question-2: Acidity or alkalinity of a substance is defined according to the formula $\text{pH} = -\log[\text{H}^+]$ where $[\text{H}^+]$ refers to the hydrogen ion concentration in moles per liter and \log is the natural logarithm. Solutions with a pH value of less than 7 are acidic; solutions with a pH value of greater than 7 are basic; solutions with a pH of 7 (such as pure water) are neutral. Suppose that you test your program with apple juice and find that the hydrogen ion concentration is $[\text{H}^+] = 0.0003$. Find the pH value for the apple juice and display it. Write a C++ program for it. [Hint: Include library `cmath` to use `log` function]

Question-3: In a college, some students are in a difficulty. They are running out of time and they have to perform an experiment to prepare a solution that contains certain chemical. They are provided with 250 milliliters of a solution having 14% of that chemical. In this solution, they have to further add another solution that has 54% of that chemical. Take the amount of this solution as 2 liters which should be entered by the user and declare it as an integer. Convert it into milliliters. A programmer is a helper too! You as a programmer should help the students to determine the total quantity of chemical in the newly formed combined solution. Write a C++ program for it and display the output. [Hint: An equation will be formed and, you will have to solve it]

Question-4: A cricket game is to be held in a stadium and there are five seating categories available for the audience. Class A seats cost \$20, Class B seats cost \$15, Class C seats cost \$10, and Class D seats cost \$5. You should design a C++ program that asks how many tickets for each class of seats were sold and finally display the income generated income corresponding to ticket sales. Also format your dollar amount in fixed-point notation, with two decimal places of precision, and always display decimal point.

Question-5: Find the solution of a quadratic equation $ax^2+bx+c = 0$. Write a C++ program for it. Your program should take $a = 2$, $b = 3$ and $c = 4$ as inputs from the user. Set $R = \text{SQRT}(b^2-4ac)$. Calculate $X1$ as $(-b+R)/(2a)$ and $X2$ as $(-b-R)/(2a)$. Print a , b , c , $X1$ and $X2$. [Hint: Include library `cmath` to use `sqrt()` function]

Question-6: What's left unsaid, the picture says it all ! Write a C++ program to calculate the volume (V) and area (A) of the cone as illustrated below. Take $h = 5$, $s = 7$ and $r = 4$ as user inputs in double data type. Declare pie value as constant.



Question-7: The average July high temperature is 85 degrees Fahrenheit in New York City, 88 degrees Fahrenheit in Denver, and 106 degrees Fahrenheit in Phoenix. Write a C++ program that calculates and reports what the new average July high temperature would be for each of these cities if temperatures rise by 2 percent.

Question-8: The Yukon Widget Company manufactures widgets that weigh 12.5 pounds each. Write a C++ program that calculates how many widgets are atcted on a pallette, based on the total weight of the pallette. The program should ask the user how much the pallette weighs by itself and with the widgets stacked on it. It should then calculate and display the number of widgets stacked on the pallette.

Question-9: Ali bought 750 shares of stock at a price of \$35.00 per share. He must pay her stockbroker a 2 percent commission for the transaction. Write a C++ program that calculates and displays the following:

- The amount paid for the stock alone (without the commission)
- The amount of the commission
- The total amount paid (for the stock plus the commission)

Question-10: Digital colors can be represented as a combination of red, green, and blue, with an alpha value specifying how opaque they are. Each value is one byte, and thus in the range of 0 to 255. Instead of having 4 one-byte values, the colors can be stored in one unsigned int of 4 bytes. The single number is a sum of the alpha value multiplied by 16,777,216; the red multiplied with 65,536; the green with 256; and blue. Write a C++ program that represents the color (128, 255, 128, 64), where the first value is the alpha value.

Question-11: A vineyard owner is planting several new rows of grape vines, and need to know how many grapevines to plant in each row. She has determined that after measuring the length of a future row, she can use the following formula to calculate the number of vines that will fit in the row, along with the trellis end-post assemblies that will need to be constructed at each end of the row?

$$V = \frac{R - 2E}{S}$$

The terms in the formula are:

V is the number of grapevines that will fit in the row.

R is the length of the row, in feet.

E is the amount of space, in feet, used by an end-post assembly.

S is the space between vines, in feet.

Write a program that makes the calculation for the vineyard owner. The program should ask the user to input the following:

- The length of the row, in feet
- The amount of space used by an end-post assembly, in feet
- The amount of space between the vines, in feet

Once the input data has been entered, the program should calculate and display the number of grapevines that will fit in the row.

Question-12: Last month Joe purchased some stock in Acme Software, Inc. Here are the details of the purchase:

- The number of shares that Joe purchased was 1,000.
- When Joe purchased the stock, he paid \$45.50 per share.
- Joe paid his stockbroker a commission that amounted to 2 percent of the amount he paid for the stock.

Two weeks later, Joe sold the stock. Here are the details of the sale:

- The number of shares that Joe sold was 1,000.
- He sold the stock for \$56.90 per share.
- He paid his stockbroker another commission that amounted to 2 percent of the amount he received for the stock.

- The amount of money Joe paid for the stock.
- The amount of commission Joe paid his broker when he bought the stock.
- The amount that Joe sold the stock for.
- The amount of commission Joe paid his broker when he sold the stock.
- Display the amount of profit that Joe made after selling his stock and paying the two commissions to his broker. (If the amount of profit that your program displays is a negative number, then Joe lost money on the transaction.)

1. Use input statement (using cin object) for taking input for character(s) of pattern.
2. Print pattern with single output statement (single cout object)
3. Print pattern using multiple output statements (using multiple cout objects)

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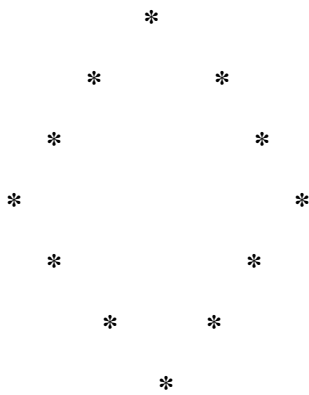
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D)



E)

