

IT Number:

Machine Number:

Lab:



SLIIT
ACADEMY

Sri Lanka Institute of Information Technology

Higher Diploma
in
Information Technology

Mid Examination
Year 1, Semester 2 (2019)

June Intake

Version A

Object Oriented Programming (JAVA)
(IT1108)

Duration: 1 Hour

Instructions to Candidates:

- ◆ This is a closed book examination.
- ◆ This paper contains 2 questions on 3 pages without the cover page.
- ◆ Create a Directory on the **HOME** directory with your **IT Number** and save all your programs in the folder.
- ◆ Read all questions before answering.
- ◆ The total marks obtainable for this examination is **30**.
- ◆ Use only the **VI** as the text editor.

Question 1

(20 Marks)

Write a java-method called *CalcSnailLaw* which calculate index of refraction in a material as a double value. The method should take three parameters as the user input (index of refraction in material b-float, angle of light relative to normal to the barrier in material a-int, angle of light relative to normal to the barrier in material-int). The formula to calculate the index of refraction in a material is as follows :

$$\text{index of refraction in material a } (n_a) = \frac{n_b \sin \theta_a}{\sin \theta_b}$$

n_b = index of refraction in material b.

θ_a = angle of light relative to normal to the barrier in material a.

θ_b = angle of light relative to normal to the barrier in material b.

Write a main method to take the index of refraction in material b of the source, angle of light relative to normal to the barrier in material a, angle of light relative to normal to the barrier in material b as user input and find the index of refraction in material (n_a) by calling *CalcSnailLaw*. based on the calculated index of refraction determine the type of the material as follows

Index of refraction	Type of the material
Between 1.02 and 1.03	Air
Between 1.03 and 1.05	Water
Between 1.05 and 1.06	Crown glass
1.06>	Unknown

Hint: Use the scanner class to get the inputs from the user

Sample Input:

Enter the index of refraction in material b: 1.05

Enter the angle of light relative to normal to the barrier in material
a: 60

Enter the angle of light relative to normal to the barrier in material
b: 60

Sample Output:

index of refraction in material 1.0499999523162842

rounded answer: 1.05

Material is water

Note: -round the index of refraction to two decimal points.

Marking Criteria

Criteria	Marks	Marks Obtained
Proper class structure and main method	2	
Importing the Scanner class and their usage	2	
Reading user input	2	
Calling the method with correct parameters	2	
correct method header with correct parameters marks	2	
Rounding the answer	4	
Calculate the answer	2	
Deciding the answer based on the calculation using nested if else statements	2	
Final output with compiled ByteCode	2	
Total Marks	20	

Question 2**(10 Marks)**

Write a java program which takes two numbers as inputs using command line arguments. Your program should print average sum of inverse tan numbers between them with the increment of 10 degrees.

Sample Input: 30 60

Sample Output: Sum = $(\tan^{-1} 30 + \tan^{-1} 40 + \tan^{-1} 60)/3 = 2.062735686665109$

Note: -No rounding is required.

Hint: -use Math.atan() method for inverse function

Marking Criteria

Criteria	Marks	Marks Obtained
Proper class structure and main method	2	
Usage of the command line arguments	2	
Conversions of datatypes	2	
Calculating the answer with loops	3	
Final output with compiled ByteCode	1	
Total Marks	10	

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Version B

Object Oriented Programming (JAVA)
(IT1108)

Duration: 1 Hour

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- ◆ Read all questions before answering.
- ◆ The total marks obtainable for this examination is **30**.
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Question 1

(20 Marks)

Write a java method called *CalSnailAngle* which calculate angle of light relative to normal to the barrier in a material as a float value. The method should take three parameters as the user input (index of refraction in material a -float, index of refraction in material b-float, angle of light relative to normal to the barrier in material b-int). The formula to angle of light relative to normal to the barrier in a material is as follows:

$$\text{angle of light relative to normal to the barrier in material a } (\theta_a) = \sin^{-1} \frac{n_a \sin \theta_b}{n_b}$$

n_a = index of refraction in material b.

n_b = index of refraction in material a.

θ_b = angle of light relative to normal to the barrier in material b.

Write a main method to take the index of refraction in material a of the source, index of refraction in material b. angle of light relative to normal to the barrier in material b as user input and find the angle of light relative to normal to the barrier in material a (θ_a) by calling *CalSnailAngle*. based on the calculated angle determine the type of Angle

Index of refraction	Type of Angle
0-30	Low Angle
31-45	Moderate Angle
46-90	High Angle
91 >	Unknown

Hint: use `Math.asin()` method to calculate sine inverse values

Hint: Use the scanner class to get the inputs from the user

Sample Input:

Enter the index of refraction in material b: 1.5

Enter the index of refraction in material a :2

Enter the angle of light relative to normal to the barrier in material
b: 90

Sample Output:

Angle of light relative to normal to the barrier in material a
0.73487914

Rounded answer 0.74

Angle is Low Angle

Note: -round the angle of light relative to normal to the barrier in material a to two decimal points.

Marking Criteria

Criteria	Marks	Marks Obtained
Proper class structure and main method	2	
Importing the Scanner class and their usage	2	
Reading user input	2	
Calling the method with correct parameters	2	
correct method header with correct parameters marks	2	
Rounding the answer	4	
Calculate the answer	2	
Deciding the answer based on the calculation using nested if else statements	2	
Final output with compiled ByteCode	2	
Total Marks	20	

Question 2**(10 Marks)**

Write a java program which takes two numbers as inputs using command line arguments. Your program should print sum of inverse tan numbers between them with the increment of 10 degrees.

Sample Input: 30 60

Sample Output: $\text{Sum} = \tan^{-1} 30 + \tan^{-1} 40 + \tan^{-1} 50 + \tan^{-1} 60 = 6.188207059995328$

Note: -No rounding is required.

Hint: use `Math.atan()` method to calculate tan inverse values

Marking Criteria

Criteria	Marks	Marks Obtained
Proper class structure and main method	2	
Usage of the command line arguments	2	
Conversions of datatypes	2	
Calculating the answer with loops	3	
Final output with compiled ByteCode	1	
Total Marks	10	