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CSCS-1 #0105

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Test 1: IOAA Document

**Data Input**

|  |  |  |
| --- | --- | --- |
| Variable name | C++ Data Type | Remarks/Comments |
| a | double | a side for the tetrahedron |
| b | double | b side for the tetrahedron |
| c | double | c side for the tetrahedron |
| d | double | d side for the tetrahedron |
| e | double | e side for the tetrahedron |
| f | double | f side for the tetrahedron |

**Data Output**

|  |  |  |
| --- | --- | --- |
| Variable name | C++ Data Type | Remarks/Comments |
| dollars | int | Whole dollars part of “totalPrice” |
| cents | int | Whole cents part of “totalPrice” |
| totalArea | double | TotalSurfArea |

**Computational Aid and Other Variables**

|  |  |  |
| --- | --- | --- |
| Variable name | C++ Data Type | Remarks/Comments |
| P1 | double | Surface area of P1 in tetrahedron |
| P2 | double | Surface area of P2 in tetrahedron |
| P3 | double | Surface area of P3 in tetrahedron |
| P4 | double | Surface area of P4 in tetrahedron |
| totalPrice | double | Cost to paint |
| roundedPennies | int | Derived from “totalPrice” |

**Global Constants**

|  |  |  |
| --- | --- | --- |
| Variable name | C++ Data Type | Remark |
| costPaint | double | The cost of painting 10 square inch is 1 cent |

**Analysis**

|  |  |  |
| --- | --- | --- |
| Math Formulae | C++ Formulae | Remark |
| 1⁄2(a+b+c) | (a+b+c) / 2.0 | P1 |
| 1⁄2(c+d+e) | (c+d+e) / 2.0 | P2 |
| 1⁄2(b+d+f) | (b+d+f) / 2.0 | P3 |
| 1⁄2(a+e+f) | (a+e+f) / 2.0 | P4 |
| √𝑃1(𝑃1 − 𝑎)(𝑃1 − 𝑏)(𝑃1 − 𝑐) + √𝑃2(𝑃2 − 𝑐)(𝑃2 − 𝑑)(𝑃2 − 𝑒) + √𝑃3(𝑃3 − 𝑏)(𝑃3 − d)(𝑃3 − 𝑓) + √𝑃4(𝑃4 − 𝑎)(𝑃4 − 𝑒)(𝑃4 − 𝑓) | sqrt(P1\*(P1-a)\*(P1-b)\*(P1-c))+  sqrt(P2\*(P2-c)\*(P2-d)\*(P2-e))+  sqrt(P3\*(P3-b)\*(P3-d)\*(P3-f))+  sqrt(P4\*(P4-a)\*(P4-e)\*(P4-f)) | totalArea,  Total surface Area (inch2) |
| totalArea\*costPaint | totalArea\*costPaint | totalPrice, it is calculated by pennies. |

\*Calculation of dollars and cents from total price

roundedPennies = static\_cast<int>(totalPrice + 0.5)

dollars = roundedPennis / 100

cents = roundedPennis % 100

**Algorithm**

1. Add all the #include directives, declare global constants
2. declare a as double
3. declare b as double
4. declare c as double
5. declare d as double
6. declare e as double
7. declare f as double
8. declare P1 as double
9. declare P2 as double
10. declare P3 as double
11. declare P4 as double
12. declare totalArea as double
13. declare totalPrice as double
14. declare roundedPrnnies as int
15. declare dollars as int
16. declare cents as int
17. print greeting message
18. prompt user for six values a, b, c, d, e, and f
19. get and store input into variable a, b, c, d, e, and f
20. P1 = (a+b+c) / 2.0
21. P2 = (c+d+e) / 2.0
22. P3 = (b+d+f) / 2.0
23. P4 = (a+e+f) / 2.0
24. totalArea = sqrt(P1\*(P1-a)\*(P1-b)\*(P1-c))+sqrt(P2\*(P2-c)\*(P2-d)\*(P2-e))+

sqrt(P3\*(P3-b)\*(P3-d)\*(P3-f))+sqrt(P4\*(P4-a)\*(P4-e)\*(P4-f))

1. Print, “Total surface area”, totalArea, EOL
2. totalPrice = totalArea \* costPaint
3. roundedPennis = static\_cast<int>(totalPrice + 0.5)
4. dollars = roundedPennis / 100
5. cents = roundedPennis % 100
6. Print, “Painting cost”, dollars, “and”, cents, EOL
7. print good-bye message