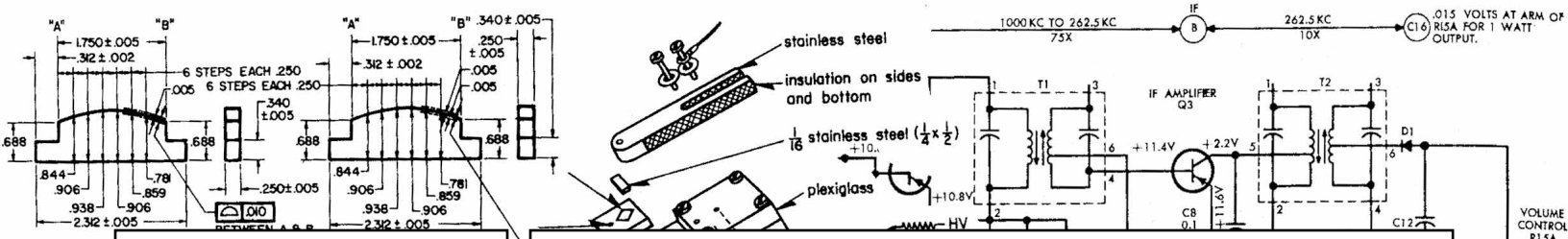


Tie Breaker: Points scored on Stated and Geometry Problems

+_____ +_____ +_____

5x(Last Problem Attempted)	+	+	+
7x(Number Incorrect)	−	−	−
2x(Number Incorrect SDs)	−	−	−
TOTAL SCORE			

UIL Calculator Applications

Test 22I

(State)

DO NOT OPEN THE TEST UNTIL INSTRUCTED TO BEGIN

I. Calculator Applications rules and scoring—See UIL Constitution

II. How to write the answers

A. For all problems except stated problems as noted below—write three significant digits.

1. Examples (* means correct but not recommended)

Correct: 12.3, 123, 123.*, 1.23x10*, $1.23\text{x}10^{0}$*, $1.23\text{x}10^{1}$, $1.23\text{x}10^{01}$, .0190, 0.0190, $1.90\text{x}10^{-2}$

Incorrect: 12.30, 123.0, $1.23(10)^{2}$, $1.23\cdot10^{2}$, $1.230\text{x}10^{2}$, $1.23*10^{2}$, 0.19, $1.9\text{x}10^{-2}$, $19.0\text{x}10^{-3}$, 1.90E-02

2. Plus or minus one digit error in the third significant digit is permitted.

B. For stated problems

1. Except for integer, dollar sign, and significant digit problems, as detailed below, answers to stated problems should be written with three significant digits.

2. Integer problems are indicated by (integer) in the answer blank. Integer problems answers must be exact, no plus or minus one digit, no decimal point or scientific notation.

3. Dollar sign ($) problems should be answered to the exact cent, but plus or minus one cent error is permitted. Answers must be in fixed notation. The decimal point and cents are required for exact-dollar answers.

4. Significant digit problems are indicated by underlined numbers and by (SD) in the answer blank. See the UIL Constitution and Contest Manual for details.

III. Some symbols used on the test

A. Angle measure: rad means radians; deg means degrees.

B. Inverse trigonometric functions: arcsin for inverse sine, etc.

C. Special numbers: π for 3.14159 ...; e for 2.71828 ...

D. Logarithms: Log means common (base 10); Ln means natural (base e); exp(u) means e^{u}.

22I-1. 79.7 + 74.9 – 99.6 ---------- 1=_____

22I-2. (–7.14 – 2.64)/(–4.48) + 1.32 ---------- 2=_____

22I-3. (9.63 + 29 – 13.6)/(–3.67) + 5.42 ---------- 3=_____

22I-4. $\frac{(0.26)(0.666 - 0.135 + 0.151)}{(-0.0645)(0.684)}$ ---------- 4=_____

22I-5. $\frac{\{(0.686 - 0.203 + \pi)/(-6.82)\}}{\{(8.51)(1.66)/(-4.68)\}}$ ---------- 5=_____

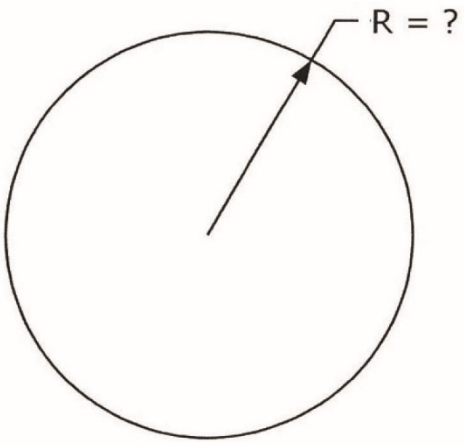
22I-6. What is 32.5 times 7π? ---------- 6=_____

22I-7. What is the negative square root of the product of 6.97 and 0.0413? ---------- 7=_____

22I-8. What is the remainder of 3710 divided by the product of 0.586 and π? 8=_____

22I-9.

CIRCLE

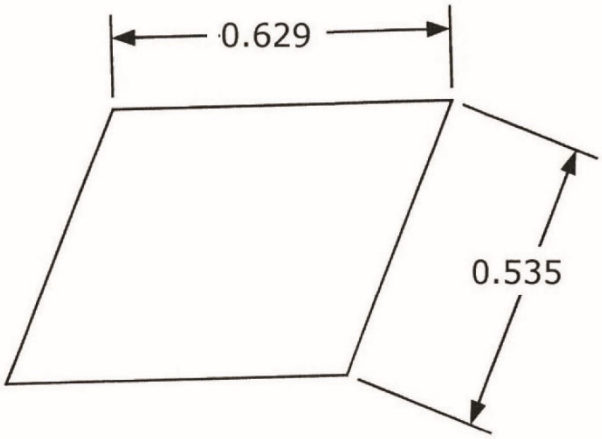


Area = 341

22I-9 =_____

22I-10.

PARALLELOGRAM



Perimeter = ?

22I-10 =_____

22I-11. $\dfrac{(0.908)(\pi) - (-0.348)(-6.7) + 2.1}{-70 + (8.71)(-4.26)}$ ---------- 11=_____

22I-12. $\dfrac{-35.1 + 24.3}{(0.958)(5.28)(-7.88\text{x}10^{-7})} + (903 + 1220)(988 - 642)$ ---------- 12=_____

22I-13. $\dfrac{8.15\text{x}10^{5} + 8.17\text{x}10^{5}}{(-0.707)(-0.974) + 1.27} + \dfrac{6550 - 5790 + 6460}{(9.86\text{x}10^{-5})(85.4)}$ ---------- 13=_____

22I-14. $\dfrac{614 + 294 - 710}{(0.481)(-0.61)} - \dfrac{(2.65\text{x}10^{5})(6.46\text{x}10^{-4} + 1.79\text{x}10^{-4})}{0.801 + 0.763 - 1.93}$ --------- 14=_____

22I-15. $\dfrac{(117 + 186)}{2.26 - 11} + \dfrac{-4.87}{83 + 141} + \dfrac{(0.939)(959 - 116)}{(-426)(0.127)}$ ---------- 15=_____

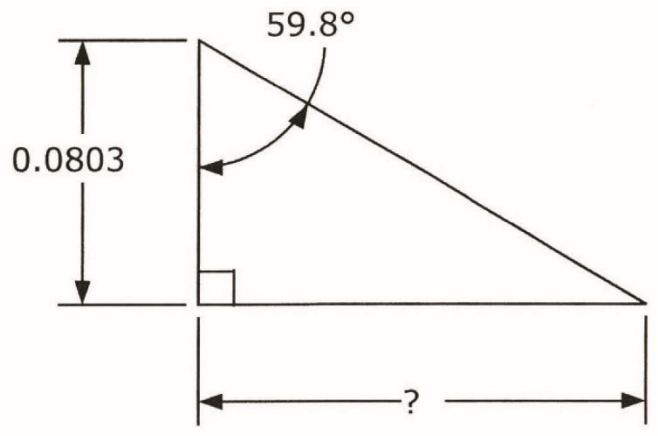
22I-16. How big is Texas compared to Rhode Island? That is, what is the ratio of their areas, a number greater than one, if the areas are 268,596 mi^2 and 1,214 mi^2, respectively?---------- 16=_____

22I-17. What is the percent decrease in the rates of COVID hospitalizations of children (0.45%) and the general population (4.5%)? ----- 17=_____%

22I-18. If a gold chain has a mass of 20 g, what is the mass of the same chain made from stainless steel? Density of gold and stainless steel are 19.3 g/cm^3 and 7.95 g/cm^3, respectively. ---------- 18=_____g

22I-19.

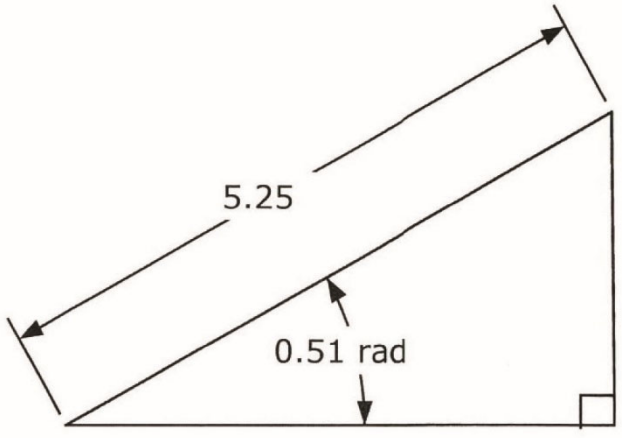
RIGHT TRIANGLE



22I-19 =_____

22I-20.

RIGHT TRIANGLE



Area = ?

22I-20 =_____

22I-21. $\frac{1}{0.946 + 1.34} + \frac{1}{1.37 - 2.52} + \frac{1}{(0.955)}$ ---------- 21=_____

22I-22. $\left[\frac{(0.971)(0.149)}{\pi} + 0.0055\right]^2 + \sqrt{9.95 \times 10^{-8}}$ ---------- 22=_____

22I-23. $[-81.3 + \sqrt{2550}]^2 \times [333 + 617]^2 \times \sqrt{365/161}$ ---------- 23=_____

22I-24. $\frac{\sqrt{0.705 + 0.266 + (0.156)/(0.52)}}{-0.0486 + 0.0131}$ ---------- 24=_____

22I-25. $\left[\frac{0.471 + 0.444 + \sqrt{0.192/0.881}}{-443 + 300}\right]^2$ ---------- 25=_____

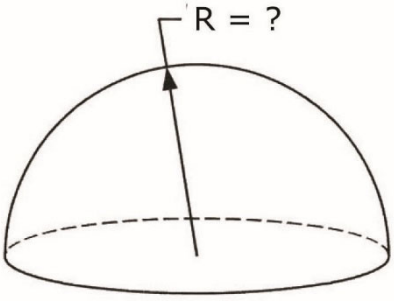
22I-26. Oodaaq Island, whose land area is 1270 ft^2, is a gravel bank in northern Greenland reported to be currently the northmost landmass on earth. If its latitude is 83°40' N, how far is it from the North Pole? ---------- 26=_____ mi(SD)

22I-27. Donnie wants to spend exactly $35 on a meal in a restaurant. If the tip is 15% of the total including tax, and tax is 8.125%, what is the maximum menu price of his meal? ---------- 27=$_____

22I-28. A pegboard has peg holes spaced in a 1 in square array that runs vertically and horizontally. A 15-in long saw is to be hung horizontally using two pegs. If perfectly horizontal, any number of peg holes along a 15-in long row could be pegged. However, it is desired to hang the saw at 7° from horizontal. How many horizontal peg holes over should the second the peg be placed if it is raised 1 in vertically? ---------- 28=_____ integer

22I-29.

HEMISPHERE

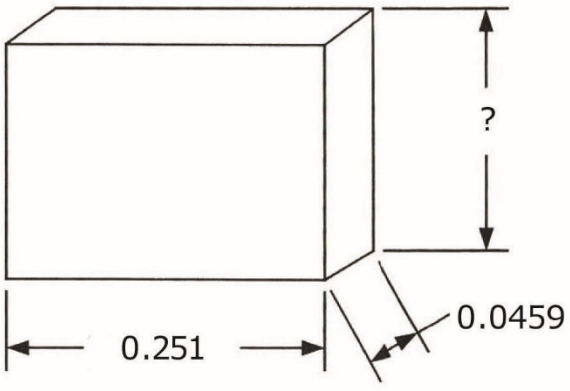


Total Surface Area = 7.11

22I-29 =_____

22I-30.

RECTANGULAR SOLID



Volume = 0.00216

22I-30 =_____

22I-31. $\dfrac{(6.79\text{x}10^{-4} + 9.08\text{x}10^{-4})^2}{\sqrt{72.3 - 28}} + \dfrac{1.79\text{x}10^{-8}}{\sqrt{7.70\text{x}10^{-4} + 0.00213}}$ ---------- 31=_____

22I-32. $\sqrt{\dfrac{4.48}{\sqrt{76.8 + 38.8}}} \text{ x } \left[\dfrac{1}{(3.49 - 0.777)^2} + \dfrac{1}{(10.9 + 2.61)^2}\right]$ --------- 32=_____

22I-33. $\dfrac{(4.31\text{x}10^5)^2(4.65\text{x}10^{-12} + 2.89\text{x}10^{-12})}{22.6 + (-0.32)(-83.2)} + \dfrac{1}{\dfrac{1}{0.00714} + \dfrac{1}{(-0.0238)}}$ 33=_____

22I-34. $\dfrac{[0.00121/(0.292 + 0.962) + 1/(673)]^{1/2}}{(900 + 998)^2 \text{ x } \sqrt{628 - (434)}}$ ---------- 34=_____

22I-35. $\dfrac{\dfrac{1}{0.904} + \dfrac{3.78\text{x}10^5}{(420 + 165)^2} - \dfrac{\sqrt{3.17\text{x}10^{23}}}{(-7.14\text{x}10^5)^2}}{(-1.42\text{x}10^5 + 2.43\text{x}10^5)^2 + (-1.08\text{x}10^{10})}$ ---------- 35=_____

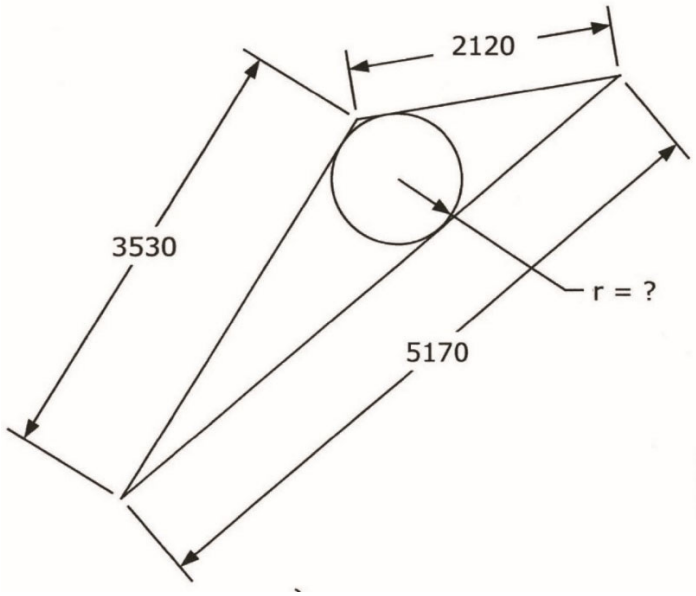
22I-36. The planet Pluto is 39.5 AU from the sun. An AU is the sun-earth average distance, 8 light-minutes. The speed of light is 300,000 km/s. How long does it take light to travel from the sun to Pluto? ---------- 36=_____ hr

22I-37. A pound of 3-in long deck screws costs $3.98, and a 10-lb box costs $35.28. What is the lowest cost if 18 lbs of screws are needed? -------- 37=$_____

22I-38. Corpus Christi lies on the same latitude as Mt. Everest, 28°N. There is an 11-hr time difference between the two locations. What is the percent error in the distance estimated as the line of constant latitude and the actual distance, 8566 mi? ---------- 38=_____ %

22I-39.

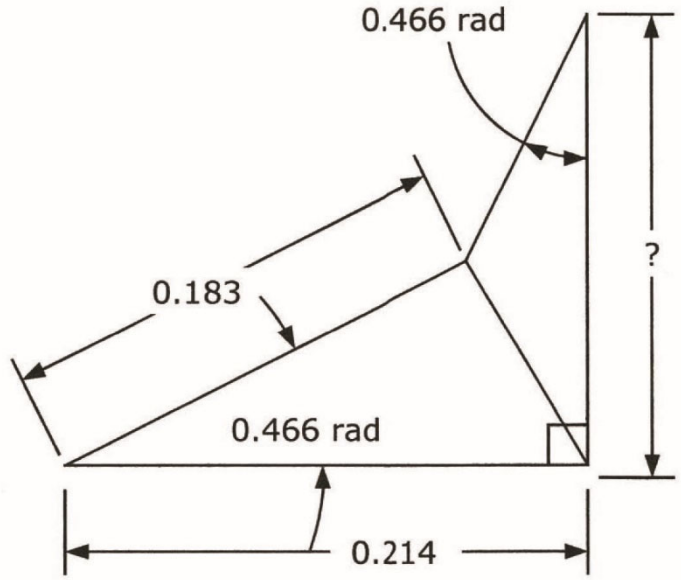
CIRCLE AND SCALENE TRIANGLE



22I-39 =_____

22I-40.

SCALENE TRIANGLES



22I-40 =_____

22I-41. $\dfrac{10^{-(2.52 - 4.7)}}{0.0714 + 0.0273}$ ---------- 41=_____

22I-42. $-0.00705\, e^{0.404} + (-0.00429)\, e^{-0.184}$ ---------- 42=_____

22I-43. $(-0.00771 - 0.0142)\, \text{Ln}\{(-0.00897)(-0.00699)\}$ ---------- 43=_____

22I-44. $(-36.1 + 137)^{-(0.734 + 0.992)}$ ---------- 44=_____

22I-45.(deg) $\dfrac{\cos\{(38.8°)/(8.72)\}}{\sin\{71.9° - 98.5°\}}$ ---------- 45=_____

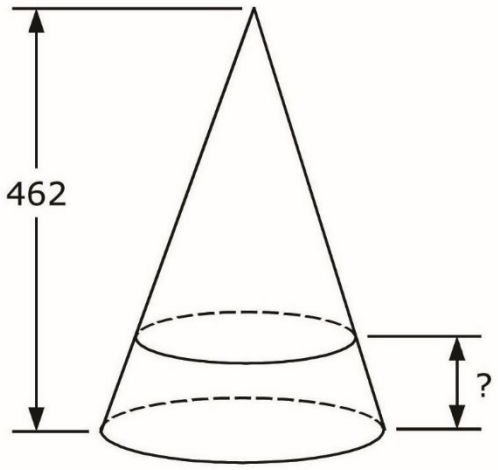
22I-46. A chicken farmer gets a small, 1.94 in egg from a young chicken and a larger 2.3 in egg from a mature hen. If a recipe calls for 3 large eggs, how many small ones should be cracked? ---------- 46=_____integer

22I-47. Temperature decreases with elevation near the earth's surface. Values are: (0 km, 16°C), (2 km, 0°C), (3 km, -8°C) and (4 km, -15°C). What is the temperature at an elevation of 6 km? ---------- 47=_____°C

22I-48. Solve for h (greater than 8) if ln(2(h-7)) = h-8. ---------- 48=_____

22I-49.

CONES AND FRUSTUM

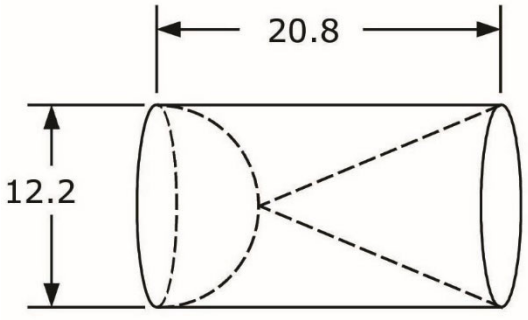


Volume(Small Cone) = Volume(Frustum)

22I-49 =_____

22I-50.

CYLINDER WITH HEMISPHERICAL AND CONICAL CAVITIES



Volume = ?

22I-50 =_____

22I-51. $\dfrac{10^{(0.597)} \times 10^{-(0.87)} + 0.833}{10^{(0.548 + 0.978)}}$ ---------- 51=_____

22I-52. $\dfrac{(-0.00564 - 0.00472)\, e^{(0.269)(3.63)}}{e^{-(8.84 - 1.56)}}$ ---------- 52=_____

22I-53. $\dfrac{(0.415)\,\mathrm{Log}(-0.99 + 2.61)}{\mathrm{Log}(0.976) - (0.513)(0.124)}$ ---------- 53=_____

22I-54. $\dfrac{(1.42\times10^{-4} + 2.39\times10^{-4})^{-0.861}}{(9.50\times10^{-4})^{-(0.941 + 0.328)}}$ ---------- 54=_____

22I-55.(rad) $\dfrac{\arctan\{9.41 + (9.05)(0.818)\}}{\arcsin\{(7480 + 2200)/35800\}}$ ---------- 55=_____

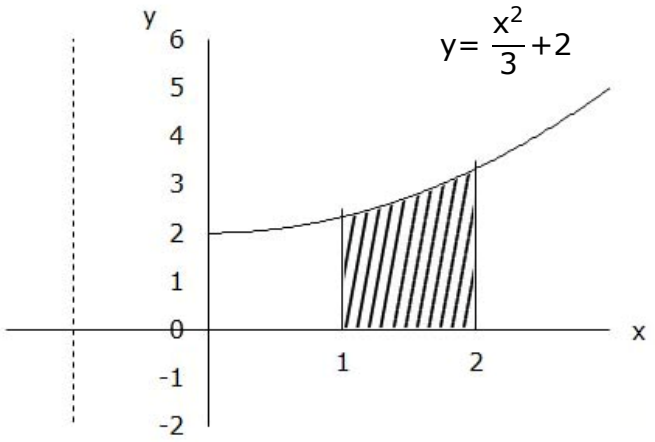
22I-56. Calculate the value of x at the maximum for the curve
$y = -6x^2+13x-5$. ---------- 56=_____

22I-57. A 50-in long piece of twine is cut into two pieces. One piece forms a circle and the other an equilateral triangle. What is the ratio of lengths, a number greater than one, if the combined area is maximized? ---- 57=_____

22I-58. Solve for T_{12} if $T = \begin{bmatrix}0.1 & 0.6\\ 0.6 & -0.5\end{bmatrix}\begin{bmatrix}0.7 & 1.2\\ 1.2 & 0.1\end{bmatrix}$ ---------- 58=_____

22I-59.

SOLID OF REVOLUTION (x = -2)

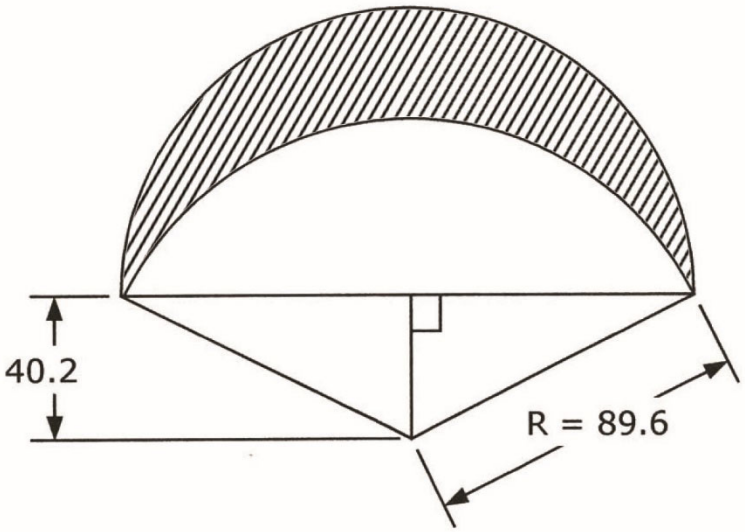


Volume = ?

22I-59 =_____

22I-60.

SEMICIRCLE AND SECTOR
Hatched Area = ?



22I-60 =_____

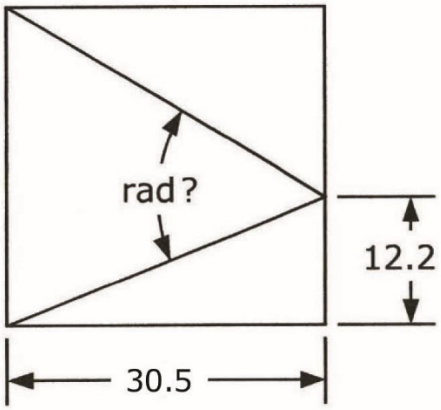
22I-61. A tapered candle is 8 in long with diameters of 0.75 in and 0.5 in. If the first inch of length burns in 1.5 hr, what is the candle's total burn time? Assume the last inch of the candle length is discarded without burning. ---------- 61=_____ hr

22I-62. The odds of being dealt four aces in five-card poker is 1/54,145. What is this number raised to the -23,639 power? ---------- 62=_____

22I-63. Sandy stands 45 ft from a 20-ft tall wall. She fires a projectile with a vertical release height of 5 ft that just clears the wall. What was the projectile release velocity? ---------- 63=_____ mph

22I-64.

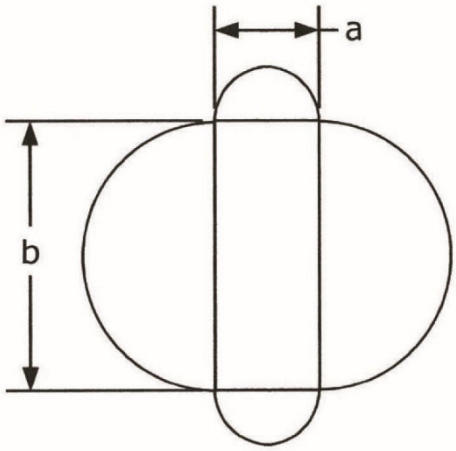
SQUARE



22I-64 =_____

22I-65.

SEMICIRCLES AND RECTANGLE



Area(All Semicircles)- Area(Rectangle)

$= 3.79a^2$

$\frac{b}{a} = ?$

22I-65 =_____

22I-66. $\dfrac{\left\{e^{0.352} + e^{-0.352}\right\}^2}{\sqrt{e^{(76.6)(0.546)} \times \left(1/e^{(7.48)}\right)}}$ ---------- 66=_____

22I-67. $(0.69)10^{\text{Log}[(1.99)(0.995)]} + \{(12.8)(0.926)\}^{1/2}$ ---------- 67=_____

22I-68. (deg) $\left\{\cos^2(30.4°) - \sin^2(30.4°)\right\} \times \dfrac{\tan(30.4°)}{1 - \tan^2(30.4°)}$ ---------- 68=_____

22I-69. $1 + 0.58 + (0.58)^2 + \dfrac{(0.58)^4}{8} - \dfrac{(0.58)^5}{15}$ ---------- 69=_____

22I-70. $\dfrac{(-53.7)}{(-0.285)} - \dfrac{(-7.45)}{(0.228)^2} \text{Ln}\left[\dfrac{(-0.0412)^2 + (5.36\text{x}10^{-4})}{(5.13) + \sqrt{28.1}}\right]$ ---------- 70=_____

22I-1 = 55.0
= 5.50×10^{1}

22I-2 = 3.50
= 3.50×10^{0}

22I-3 = -1.40
= -1.40×10^{0}

22I-4 = -4.02
= -4.02×10^{0}

22I-5 = 0.176
= 1.76×10^{-1}

22I-6 = 715
= 7.15×10^{2}

22I-7 = -0.537
= -5.37×10^{-1}

22I-8 = 0.439
= 4.39×10^{-1}

22I-9 = 10.4
= 1.04×10^{1}

22I-10 = 2.33
= 2.33×10^{0}

22I-11 = -0.0245
= -2.45×10^{-2}

22I-12 = 3.44×10^{6}

22I-13 = 1.69×10^{6}

22I-14 = -77.5
= -7.75×10^{1}

22I-15 = -49.3
= -4.93×10^{1}

22I-16 = 221
= 2.21×10^{2}

22I-17 = 90.0
= 9.00×10^{1}

22I-18 = 8.24
= 8.24×10^{0}

22I-19 = 0.138
= 1.38×10^{-1}

22I-20 = 5.87
= 5.87×10^{0}

22I-21 = 0.615
= 6.15×10^{-1}

22I-22 = 0.00297
= 2.97×10^{-3}

22I-23 = 1.29×10^{9}

22I-24 = -31.8
= -3.18×10^{1}

22I-25 = 9.34×10^{-5}

22I-26 = 440
= 4.4×10^{2} (2SD)

22I-27 = $28.15

22I-28 = 8 integer

22I-29 = 0.869
= 8.69×10^{-1}

22I-30 = 0.187
= 1.87×10^{-1}

22I-31 = 7.11×10^{-7}

22I-32 = 0.0912
= 9.12×10^{-2}

22I-33 = 0.0387
= 3.87×10^{-2}

22I-34 = 9.87×10^{-10}

22I-35 = -1.85×10^{-9}

22I-36 = 5.27
= 5.27×10^{0}

22I-37 = $67.12

22I-38 = 17.5
= 1.75×10^{1}

22I-39 = 524
= 5.24×10^{2}

22I-40 = 0.183
= 1.83×10^{-1}

22I-41 = 1530
= 1.53×10^{3}

22I-42 = -0.0141
= -1.41×10^{-2}

22I-43 = 0.212
= 2.12×10^{-1}

22I-44 = 0.000348
= 3.48×10^{-4}

22I-45 = -2.23
= -2.23×10^{0}

22I-46 = 5 integer

22I-47 = -31.0
= -3.10×10^{1}

22I-48 = 9.68
= 9.68×10^{0}

22I-49 = 95.3
= 9.53×10^{1}

22I-50 = 1380
= 1.38×10^{3}

22I-51 = 0.0407
= 4.07×10^{-2}

22I-52 = -39.9
= -3.99×10^{1}

22I-53 = -1.17
= -1.17×10^{0}

22I-54 = 0.128
= 1.28×10^{-1}

22I-55 = 5.52
= 5.52×10^{0}

22I-56 = 1.08
= 1.08×10^{0}

22I-57 = 1.65
= 1.65×10^{0}

22I-58 = 0.180
= 1.80×10^{-1}

22I-59 = 61.6
= 6.16×10^{1}

22I-60 = 4420
= 4.42×10^{3}

22I-61 = 14.8
= 1.48×10^{1}

22I-62 = $3.86 \times 10^{111,896}$

22I-63 = 38.2
= 3.82×10^{1}

22I-64 = 0.921
= 9.21×10^{-1}

22I-65 = 2.69
= 2.69×10^{0}

22I-66 = 1.57×10^{-7}

22I-67 = 4.81
= 4.81×10^{0}

22I-68 = 0.436
= 4.36×10^{-1}

22I-69 = 1.93
= 1.93×10^{0}

22I-70 = -1020
= -1.02×10^{3}