Name _____

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 22H

(Region)

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}.

22H-1. $(-0.951 \times 0.411) + 0.208$ ---------- 1=_____

22H-2. $(44.2 + 29.8 - 24.7) \times 34.8$ ---------- 2=_____

22H-3. $(-5.46 - 5.42 + 21.5) \times (0.583) - 18.2$ ---------- 3=_____

22H-4. $\{(75.3 - 22.4 + 40.6)(-54)(78.2)\} - 3.18 \times 10^5$ ---------- 4=_____

22H-5. $\dfrac{\{(0.067 - 0.0278 + 0.145)/(-0.0833)\}}{\{(0.0794)(0.0493)/(0.0208)\}}$ ---------- 5=_____

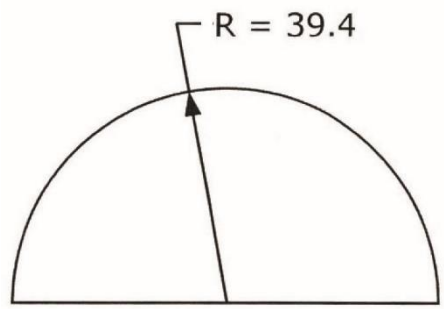
22H-6. What is the sum of 14.2 and 9.63? ---------- 6=_____

22H-7. What is 2.82^3 minus 53.2? ---------- 7=_____

22H-8. Solve for negative r if 0.0995 times r equals 9750 divided by r. ------- 8=_____

22H-9.

SEMICIRCLE



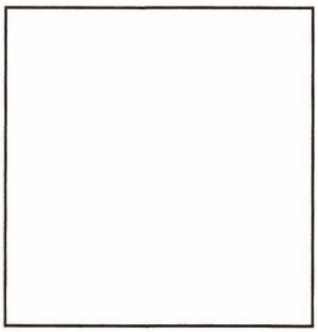
Area = ?

22H-9 =_____

22H-10.

SQUARE

Area = 3.34



Perimeter = ?

22H-10 =_____

22H-11. $\dfrac{(0.344 + 0.124)(-0.84 + 1.96)}{(-1.69)(0.758)(2190 - 10400)}$ ---------- 11=_____

22H-12. $\dfrac{\{3.96\text{x}10^{-6} + (0.0425)(-0.00677)(-0.0262)\}}{(0.391 + 1.37)(-0.0792)(\pi + 1.24)}$ ---------- 12=_____

22H-13. $\dfrac{2.00\text{x}10^{5} + 3.72\text{x}10^{5}}{(-2.36)(-0.193) + 1.93} + \dfrac{6050 - 4150 + 15400}{(-0.0145)(-2.79)}$ ---------- 13=_____

22H-14. $\dfrac{(51.2 + 30.1)(6.21 + 9.74)(70.3 - 642)}{(5.99 + 3.62)(9.69)\{(6.15)/(\pi)\}}$ ---------- 14=_____

22H-15. $\dfrac{(65400 + 58200 - 90100)(0.115 - 0.0179 - 0.0381)}{(0.0376)(-0.0728)(-0.00766)(2.55 + 1.46 + 5.78)}$ ---------- 15=_____

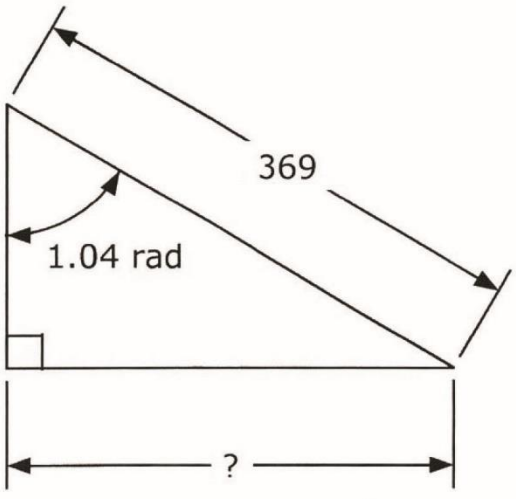
22H-16. How long would it take to type Shakespeare's play *Romeo and Juliet* if the typing speed was 75 words/min? There are 24,545 words in the play. ---------- 16=_____hr

22H-17. Wanda buys four taxable items costing $2.99, $14.50, 8.75 and $3.00. If the tax rate is 8.125%, how much does she pay? ---------- 17=$_____

22H-18. It's estimated that there are 10^{19} insects in the world. There are 7.67 billion people. If the insects were divvied up among the people, how many would you get? ---------- 18=_____

22H-19.

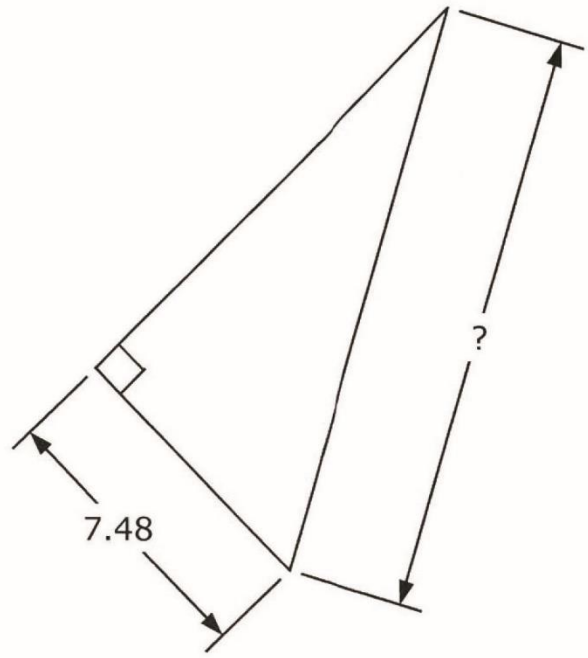
RIGHT TRIANGLE



22H-19 =_____

22H-20.

RIGHT TRIANGLE



Area = 50.4

22H-20 =_____

22H-21. $\sqrt{\frac{(3.62)(9.89)}{486 + 478}} + 0.0719$ ---------- 21=_____

22H-22. $\frac{1}{-0.901 + 1.81} + \frac{1}{0.794 - 0.929} + \frac{1}{(0.822)}$ ---------- 22=_____

22H-23. $(3.46)(4.2) + \sqrt{(495)/(6.91)} + [(0.671)(5.26)]^2$ ---------- 23=_____

22H-24. $(-873)(-5.52 \times 10^{-4})\sqrt{(-0.534)^2/0.661} + 1/\sqrt{7.47 + 7.68}$ -------- 24=_____

22H-25. $\frac{\sqrt{1.54 + 0.461 + (44.7)/(57.7)}}{7.35 + 6.78}$ ---------- 25=_____

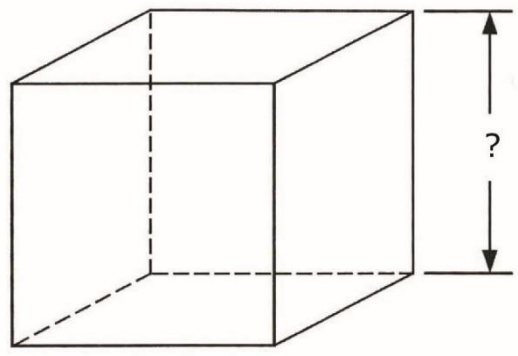
22H-26. Hat size is the head circumference divided by π. What is the percent error in hat size if a hat chart lists a size 7½ hat for a head circumference of 23½ in? ---------- 26=_____%

22H-27. According to US Executive Order 10834, a US flag has an aspect ratio of 1.9 with the length of the 7 short stripes equal to 60% of the length of the 6 long stripes. What percentage of the surface area is red? ---- 27=_____%

22H-28. World population was 3.683 billion people in 1970 and 6.922 billion in 2010. Assuming compound growth, in what year will the population just exceed 10 billion? ---------- 28=_____integer

22H-29.

CUBE

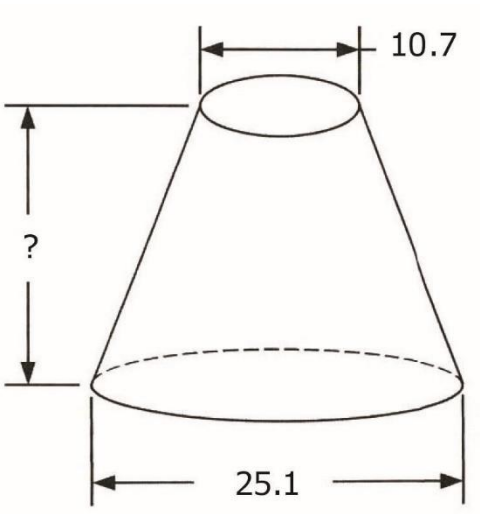


Total Surface Area = 1860

22H-29 =_____

22H-30.

FRUSTUM



Volume = 5040

22H-30 =_____

22H-31. $\sqrt{\dfrac{1/(416-254)}{(121)(3.49+2.6)^2}} + (60.9)^2(3.34\text{x}10^{-7})$ ---------- 31=_____

22H-32. $\left[\dfrac{-4.02\text{x}10^6}{8.65\text{x}10^6 + 6.63\text{x}10^6} + 0.5\right] \text{x} \left\{353 + (-24.9)^2 - \sqrt{9.17\text{x}10^5}\right\}$ 32=_____

22H-33. $\dfrac{\sqrt{(4.01\text{x}10^{-4})/\left\{(3.63\text{x}10^{-4})/\sqrt{8.01\text{x}10^{-4}}\right\}}}{0.108 + (0.966)(1.61)} + \{0.00289 + 0.013\}^{1/2}$ 33=_____

22H-34. $\dfrac{(6.96)^2 + \sqrt{2140}}{\sqrt{(0.133)(-12.8)^2}} + \dfrac{\sqrt{\sqrt{(7.99\text{x}10^6)(0.405)}}}{-6.6 + 9.22}$ ---------- 34=_____

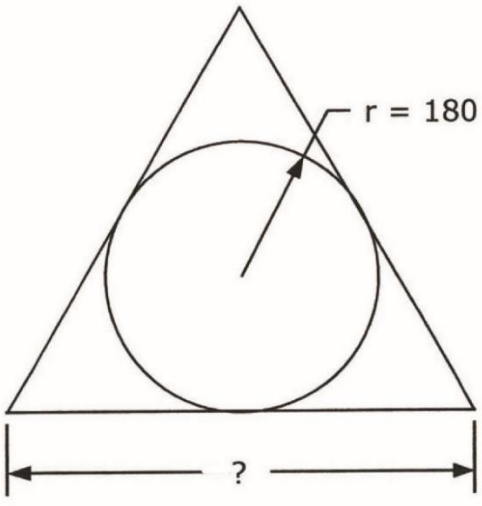
22H-35. $\dfrac{\left[\dfrac{-0.715}{426}\right]^2 + \sqrt{\dfrac{(0.476)(0.43)}{(1.21\text{x}10^{11})}} + (1.92\text{x}10^{-5})}{0.35 + \sqrt{(-0.294)(-0.781)}}$ ---------- 35=_____

22H-36. The product of three, consecutive integers equals -857,280. What is their sum? ---------- 36=_____integer

22H-37. Both Nairobi, Kenya and Singapore lie on the equator. Nairobi's longitude is 36°49'02"E, and Singapore is at 103°50'E. How far apart are they? ---------- 37=_____mi(SD)

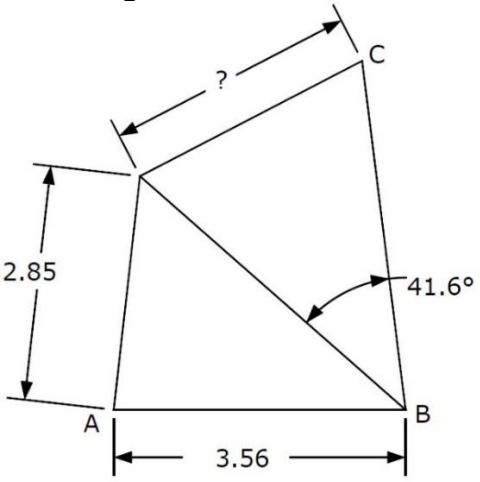
22H-38. A 3-in wide rectangular picture frame was made using an 8-ft long piece of lumber that is 0.75 in by 3 in. The ratio of the outside frame height to width was 1.62, approximately the Golden Ratio. The blade used to cut the frame had a kerf of 0.05 in, and the entire board was used. What is the visible area for a picture mounted in the frame? ---------- 38=_____in^2

22H-39.
CIRCLE AND EQUILATERAL TRIANGLE



22H-39 =_____

22H-40.
SCALENE AND ISOSCELES TRIANGLE
Angle ABC is bisected



22H-40 =_____

22H-41. $(2.27\text{x}10^{6})(-4.32\text{x}10^{6})10^{\{3.34\text{x}10^{6}/1.05\text{x}10^{6}\}}$ ---------- 41=_____

22H-42. $27.8\ e^{0.813} + (23.1)\ e^{-0.875}$ ---------- 42=_____

22H-43. $(17.8 - 95.4)\ \text{Ln}\{(-36.8)(-81.9)\}$ ---------- 43=_____

22H-44. $(1.31)^{3} + (9.92 - 6.31)^{0.665}$ ---------- 44=_____

22H-45.(deg) $\dfrac{\cos\{(49.4°)/(8.76)\}}{\sin\{123° - 457°\}}$ ---------- 45=_____

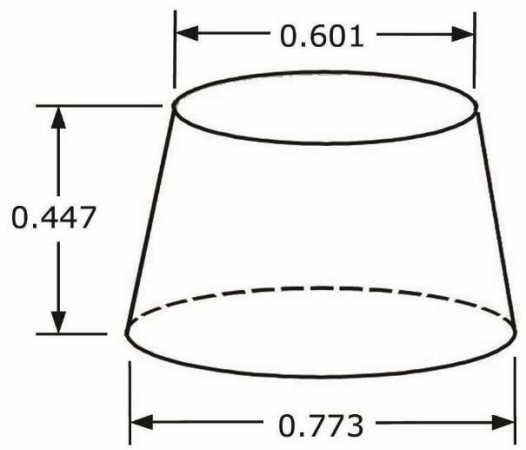
22H-46. A series of garbage pails scales geometrically. A 96-gal garbage pail runs $169.97. What is the cost of a 45-gal garbage pail? ---------- 46=$_____

22H-47. The sperm whale is 52 ft long and weighs 45 tons. The same data are provided for the fin whale (88 ft, 76 ton) and blue whale (100 ft, 130 ton). Estimate the weight of the right whale which is 64 ft long. -------- 47=_____ton

22H-48. Solve for f if $2f^{5}+30f = 5f^{3}+19$. ---------- 48=_____

22H-49.

FRUSTUM

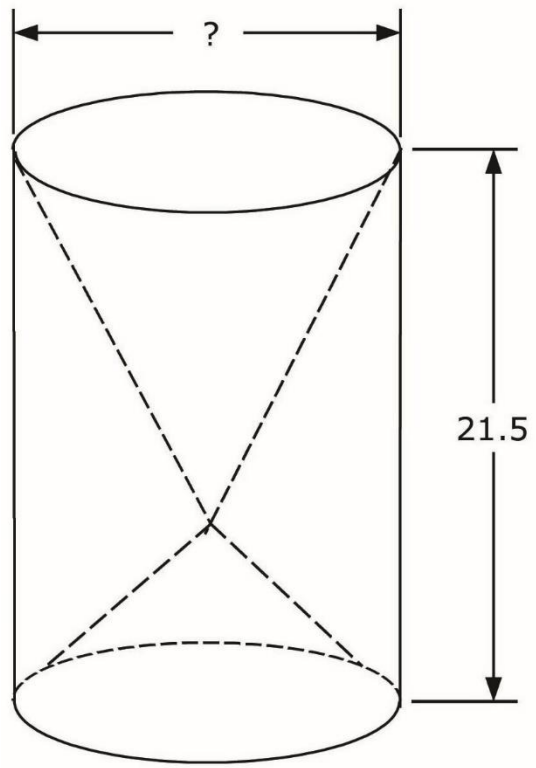


Total Surface Area = ?

22H-49 =_____

22H-50.

CYLINDER WITH CONICAL CAVITIES



Volume = 2500

22H-50 =_____

22H-51. $10^{+(0.825)} + 10^{-(0.49)} + \left[10^{(0.501/0.861)} - 10^{(0.303)}\right]^{1/2}$ - 51=_____

22H-52. $\dfrac{1 + e^{+\{0.942 + (0.696)(1.81)\}}}{(5.56)(6.46 - e^{(-0.86)})}$ ---------- 52=_____

22H-53. $\dfrac{(9.29\text{x}10^{-4} + 0.00244)\,\text{Log}\{1/9.82\text{x}10^{-4}\}}{\text{Log}\{(9.38\text{x}10^{-4})/(9.70\text{x}10^{-4} + 0.00114)\}}$ ---------- 53=_____

22H-54. $\dfrac{(5.98)^{0.246} - (4.8)^{-0.278}}{-74400 + 12400}$ ---------- 54=_____

22H-55.(rad) $\dfrac{\arcsin\{(-4.79\text{x}10^{-4})(-2.15\text{x}10^{-4})/(3.41\text{x}10^{-7})\}}{-1.84\text{x}10^{-7} + (-3.77\text{x}10^{-4})(7.98\text{x}10^{-4})}$ ---------- 55=_____

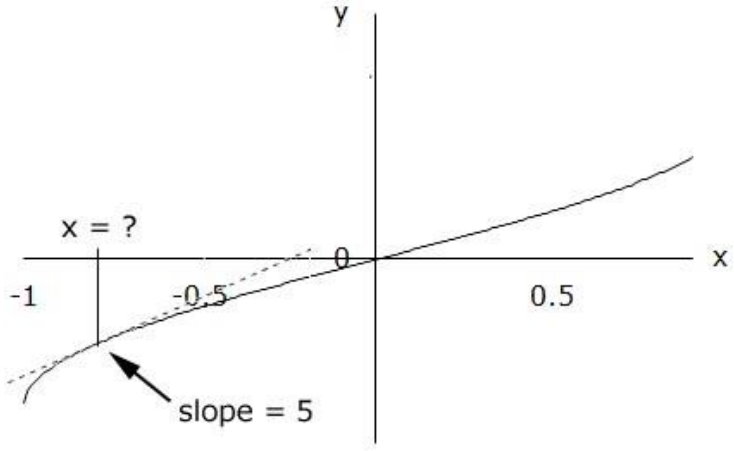
22H-56. Calculate the value of y at the minimum of the function $y = 2x^3\text{-}80x^2\text{-}400x\text{+}20{,}000$. ---------- 56=_____

22H-57. Hugh installs caps on an assembly line, at a rate of R caps/hr. It is desired to install lots of caps as quickly as possible, but if he goes too fast, he starts making mistakes that ruin the product. In fact, the number of parts N produced in time t (hr) is $N = (R - 0.0054R^2)t$. What install rate R maximizes productivity? ---------- 57=_____ caps/hr

22H-58. Calculate the determinant of $\begin{bmatrix} 9 & 18 & -6 \\ -18 & 10 & 1 \\ -6 & 1 & 11 \end{bmatrix}$. ---------- 58=_____

22H-59.

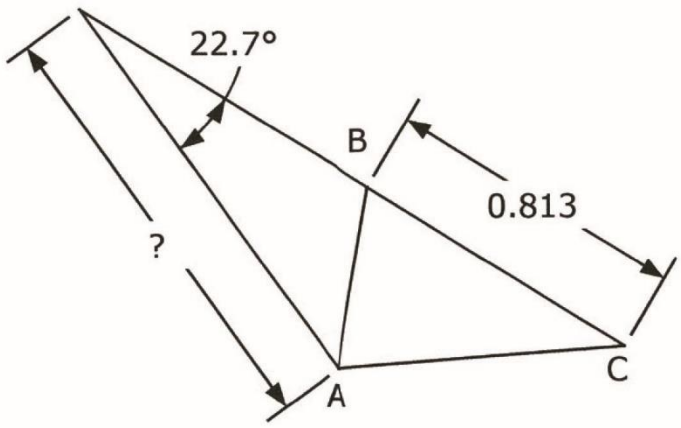
$y = 3\text{Sin}^{-1}(x)$



22H-59 =_____

22H-60.

SCALENE TRIANGLES



Area (ΔABC) = 0.198

22H-60 =_____

22H-61. For an experiment, Dr. Ross is locked in a 10-ft cube. His lung capacity is 5 liters. About 5% of breathed air is converted to carbon dioxide. His average respiration rate is 16 breaths/min. Air is 19.5% oxygen. If the situation becomes dangerous when the oxygen level drops to 14%, how long can Dr. Ross work before having to leave the cube? ------- 61=_____hr

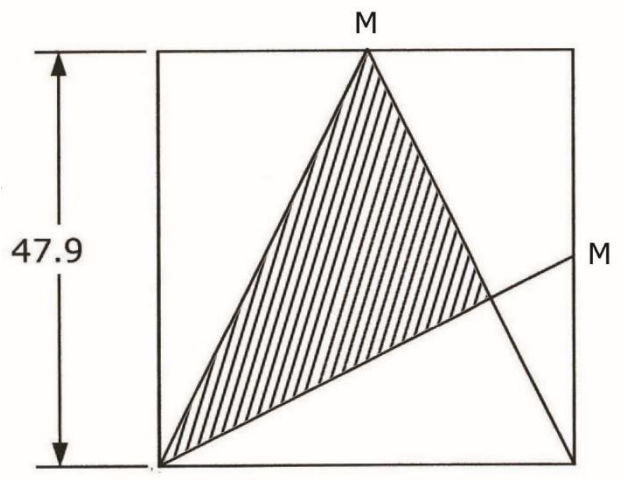
22H-62. The odds of being struck by lightning is 1/ 114,195. What are the odds of being struck by lightning 1000 times? ---------- 62=_____

22H-63. A projectile is fired at 100 mph with a release angle of 18° relative to horizontal. It falls 40 ft short of the target. What is the corrected angle (<45°) to hit the target? ---------- 63=_____deg

22H-64.

SQUARE AND ISOSCELES TRIANGLE

M = midpoint

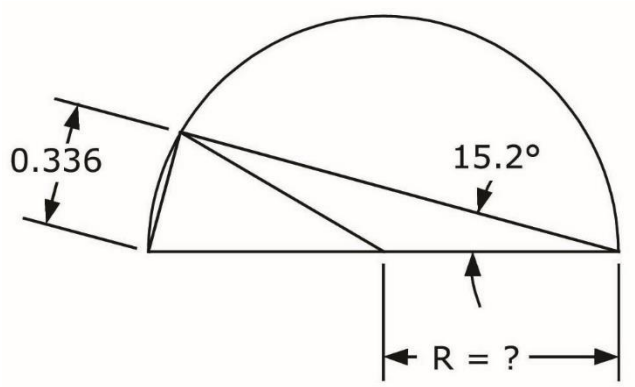


Hatched Area = ?

22H-64 =_____

22H-65.

SEMICIRCLE



22H-65 =_____

22H-66. $10^{2.42} \times \sqrt{\dfrac{(10^{9.59})(10^{0.968})}{(10^{-7.79})(10^{0.621})}}$ ---------- 66=_____

22H-67. $(0.987)10^{\text{Log}[(\pi)(0.522)]} + \{(2.83)(0.926)\}^{1/2}$ ---------- 67=_____

22H-68. $(\text{deg})\sqrt{1 + \left[\dfrac{\cos(129°)}{\sin(129°)}\right]^2} \times \dfrac{\cos(-75.7°)}{\sin(-75.7°)}$ ---------- 68=_____

22H-69. $1 + (0.52) + \dfrac{(0.52)^2}{2} + \dfrac{(0.52)^3}{6} + \dfrac{(0.52)^4}{24}$ ---------- 69=_____

22H-70. $(\text{rad})\dfrac{(15.3)(-0.272) - \text{Ln}\left\{(0.00198) + (-1.14)e^{(-6.46)}\right\}}{\arcsin\{(37)/(40.2 + 2800)\}}$ ------ 70=_____

22H-1 = -0.183
= -1.83×10^{-1}

22H-2 = 1720
= 1.72×10^{3}

22H-3 = -12.0
= -1.20×10^{1}

22H-4 = -713000
= -7.13×10^{5}

22H-5 = -11.8
= -1.18×10^{1}

22H-6 = 23.8
= 2.38×10^{1}

22H-7 = -30.8
= -3.08×10^{1}

22H-8 = -313
= -3.13×10^{2}

22H-9 = 2440
= 2.44×10^{3}

22H-10 = 7.31
= 7.31×10^{0}

22H-11 = 4.98×10^{-5}

22H-12 = -1.88×10^{-5}

22H-13 = 667000
= 6.67×10^{5}

22H-14 = -4070
= -4.07×10^{3}

22H-15 = 9.63×10^{6}

22H-16 = 5.45
= 5.45×10^{0}

22H-17 = $31.62

22H-18 = 1.30×10^{9}

22H-19 = 318
= 3.18×10^{2}

22H-20 = 15.4
= 1.54×10^{1}

22H-21 = 0.265
= 2.65×10^{-1}

22H-22 = -5.09
= -5.09×10^{0}

22H-23 = 35.5
= 3.55×10^{1}

22H-24 = 0.573
= 5.73×10^{-1}

22H-25 = 0.118
= 1.18×10^{-1}

22H-26 = 0.264
= 2.64×10^{-1}

22H-27 = 41.5
= 4.15×10^{1}

22H-28 = 2033 integer

22H-29 = 17.6
= 1.76×10^{1}

22H-30 = 19.0
= 1.90×10^{1}

22H-31 = 0.00241
= 2.41×10^{-3}

22H-32 = 3.65
= 3.65×10^{0}

22H-33 = 0.232
= 2.32×10^{-1}

22H-34 = 36.5
= 3.65×10^{1}

22H-35 = 2.81×10^{-5}

22H-36 = -285 integer

22H-37 = 4630
= 4.63×10^{3} (3SD)

22H-38 = 290
= 2.90×10^{2}

22H-39 = 624
= 6.24×10^{2}

22H-40 = 3.02
= 3.02×10^{0}

22H-41 = -1.49×10^{16}

22H-42 = 72.3
= 7.23×10^{1}

22H-43 = -622
= -6.22×10^{2}

22H-44 = 4.60
= 4.60×10^{0}

22H-45 = 2.27
= 2.27×10^{0}

22H-46 = $79.67

22H-47 = 51.0
= 5.10×10^{1}

22H-48 = 0.675
= 6.75×10^{-1}

22H-49 = 1.74
= 1.74×10^{0}

22H-50 = 14.9
= 1.49×10^{1}

22H-51 = 8.35
= 8.35×10^{0}

22H-52 = 0.299
= 2.99×10^{-1}

22H-53 = -0.0288
= -2.88×10^{-2}

22H-54 = -1.46×10^{-5}

22H-55 = -633000
= -6.33×10^{5}

22H-56 = -10100
= -1.01×10^{4}

22H-57 = 92.6
= 9.26×10^{1}

22H-58 = 4190
= 4.19×10^{3}

22H-59 = -0.800
= -8.00×10^{-1}

22H-60 = 1.26
= 1.26×10^{0}

22H-61 = 6.49
= 6.49×10^{0}

22H-62 = 2.25×10^{-5058}

22H-63 = 20.2
= 2.02×10^{1}

22H-64 = 688
= 6.88×10^{2}

22H-65 = 0.641
= 6.41×10^{-1}

22H-66 = 1.92×10^{11}

22H-67 = 3.24
= 3.24×10^{0}

22H-68 = -0.328
= -3.28×10^{-1}

22H-69 = 1.68
= 1.68×10^{0}

22H-70 = 336
= 3.36×10^{2}