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 24A

(Invitational A)

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, (0.190)

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}.

24A-1. $(-7.13 + 43.6) \times 4.45$ ---------- 1=_____

24A-2. $(80.8 \times 83.6) - (1890 - 2460)$ ---------- 2=_____

24A-3. $(-5.39 - \pi - 1.21 + 0.336) \times (2.94)$ ---------- 3=_____

24A-4. $\dfrac{6280 + 8740 - 2010}{(-4.8)(2.59)(-4.35)}$ ---------- 4=_____

24A-5. $\dfrac{\{(778 - 677 + 1240)/(-521)\}}{\{(233)(-353)/(561)\}}$ ---------- 5=_____

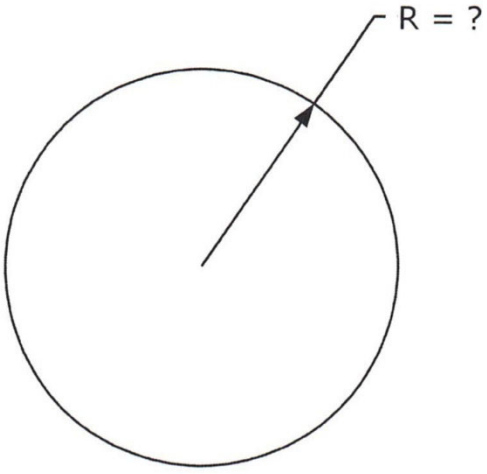
24A-6. What is 4710 divided by 9.82? ---------- 6=_____

24A-7. What is the cube root of the result of 41.9 minus 17.8π? ---------- 7=_____

24A-8. A printer prints one page every 6 seconds. How many pages can be printed in 4 minutes? ---------- 8=_____ integer

24A-9.

CIRCLE

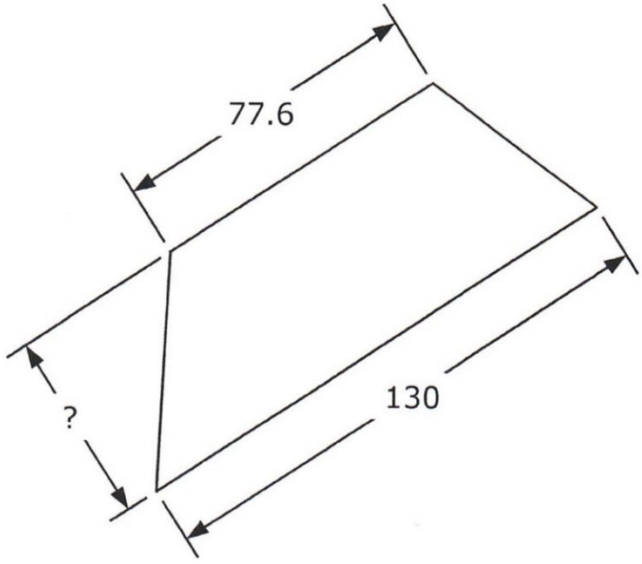


Circumference = 680

24A-9 =_____

24A-10.

TRAPEZOID



Area = 4940

24A-10 =_____

24A-11. $\dfrac{(-95.3)(-28.1) + (-65.7)(-53.4)}{-10.5 + 3.39 - (-8.58)(0.468)}$ ---------- 11=_____

24A-12. $\dfrac{5.64 + 4.69}{(0.107)(9.68)(1.47\text{x}10^{-6})} + (846 + 7370)(830 - 576)$ ---------- 12=_____

24A-13. $\dfrac{(-0.735)(224 - 201)\{-57.8 - (-9.99)(3.69)\}}{(6.89 + 6.39)(4.82 - 15.1)}$ ---------- 13=_____

24A-14. $\dfrac{(13.6 + 13.3)(5.56 + 6.76)(13.2 - 67)}{(-1.39 + 1.2)(\pi)\{(-7.81)/(-0.0638)\}}$ ---------- 14=_____

24A-15. $\dfrac{25400 + 1.41\text{x}10^{5} - (19100 + 41400)(2.22 - 1.55)}{(-631)(-786)(961)(754 - 2060 + 6880)}$ ---------- 15=_____

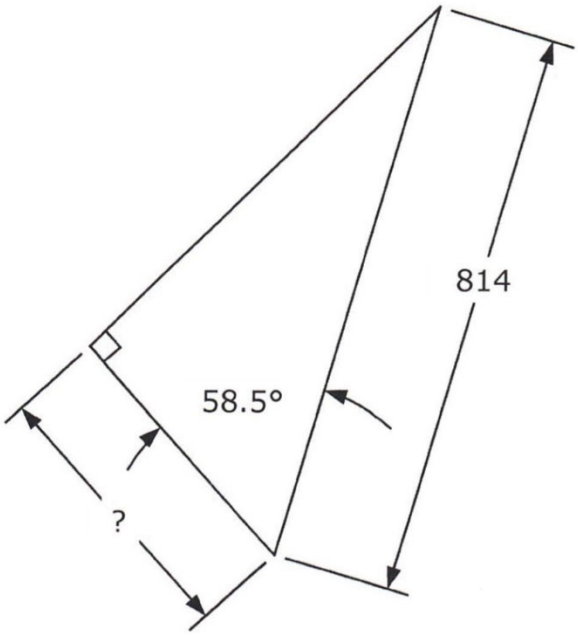
24A-16. Marilyn wants a ham and cheese sandwich on rye. She goes to the grocery store to buy the ingredients: lettuce, $1.64; tomato, $1.10; ham, $5.71; cheese, $3.10; bread, $4.14, mayonnaise, $1.46, and relish, $2.78. How much did she spend on groceries? ---------- 16=$_____

24A-17. There are 2 million car accidents each year. On average there are 232.8 million licensed drivers. Assuming on average that 1.79 cars are involved in an accident and no drivers are involved in more than one accident annually, what fraction of drivers are involved in a car accident annually? ---------- 17=_____%

24A-18. Half of the US 332 million population drink 12 oz of coffee daily. How many tanker trucks would this represent, if a tanker truck capacity is 7,500 gallons? ---------- 18=_____

24A-19.

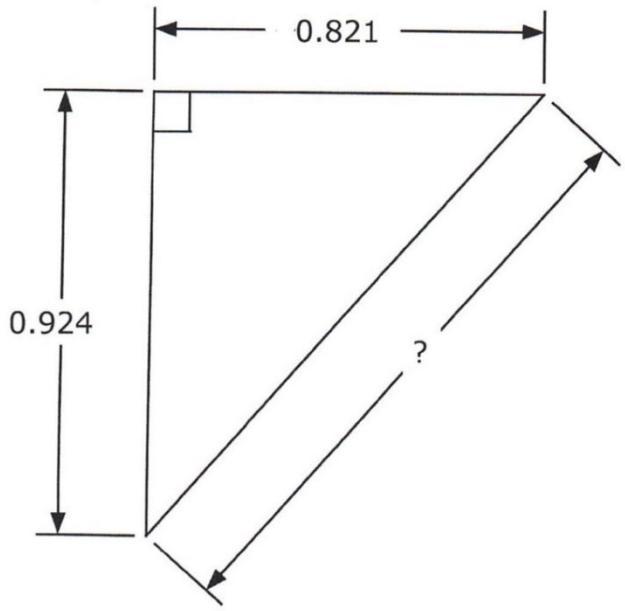
RIGHT TRIANGLE



24A-19 =_____

24A-20.

RIGHT TRIANGLE



24A-20 =_____

24A-21. $\frac{1}{2.95 + 4.6} + \frac{1}{\pi - 18.2} + \frac{1}{(5.37)}$ ---------- 21=_____

24A-22. $\frac{-0.638 + 1/(-1.39)}{1/(0.589) + 1.76} + \frac{1}{(-2.25)}$ ---------- 22=_____

24A-23. $\left[-90.4 + \sqrt{6130}\right]^2 \times [487 + 1250]^2 \times \sqrt{0.858/0.269}$ ---------- 23=_____

24A-24. $(14.4)(5.26) + \sqrt{(779)/(6.41)} + [(0.54)(6.9)]^2$ ---------- 24=_____

24A-25. $\left[\frac{4.57 + 3.88 + \sqrt{0.91/0.126}}{-8.84 + 8.39}\right]^2$ ---------- 25=_____

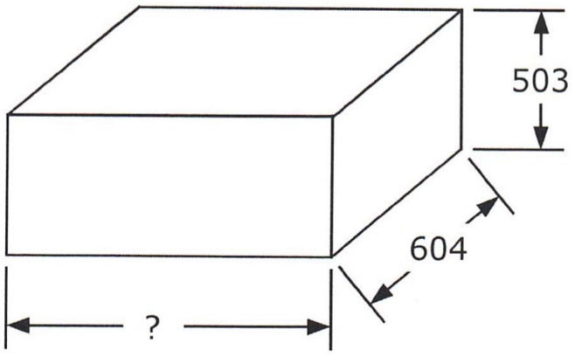
24A-26. An uninflated spherical 15 in diameter balloon is inflated at a constant volume rate. If it was 6 in in diameter after 2 s, what is the total time required to completely fill the balloon? ---------- 26=_____ s

24A-27. Liam's parents measure his growth annually. When he was 5 years old, his height was 3 ft 7.52 in. A year later, his height increased by 1.74 in. How tall was Liam on his 6th birthday? ---------- 27=_____ ft(SD)

24A-28. The surface area of a sphere is increased by 4%. What is the percent change in volume? ---------- 28=_____ %

24A-29.

RECTANGULAR SOLID

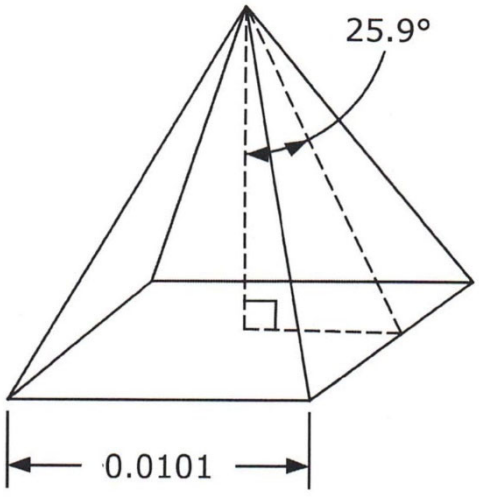


Total Surface Area = 3.21×10^6

24A-29 =_____

24A-30.

SQUARE PYRAMID



Volume = ?

24A-30 =_____

24A-31. $\sqrt{\dfrac{9.5}{\sqrt{59.1 + 58.7}}} \times \left[\dfrac{1}{(6.34 - 3.67)^2} + \dfrac{1}{(25.9 + 11)^2}\right]$ ---------- 31=_____

24A-32. $\sqrt{\dfrac{1/(437 - 230)}{(110)(1.23 + 0.142)^2}} + (8.88\text{x}10^5)^2(6.66\text{x}10^{-15})$ ---------- 32=_____

24A-33. $\dfrac{[0.00208/(0.839 + 0.897) + 1/(274)]^{1/2}}{(187 + 323)^2 \times \sqrt{1740 - (-844)}}$ ---------- 33=_____

24A-34. $\dfrac{(6.81)^2 + \sqrt{987}}{\sqrt{(670)(-32.5)^2}} + \dfrac{\sqrt{\sqrt{(2670)(0.507)}}}{-607 + 685}$ ---------- 34=_____

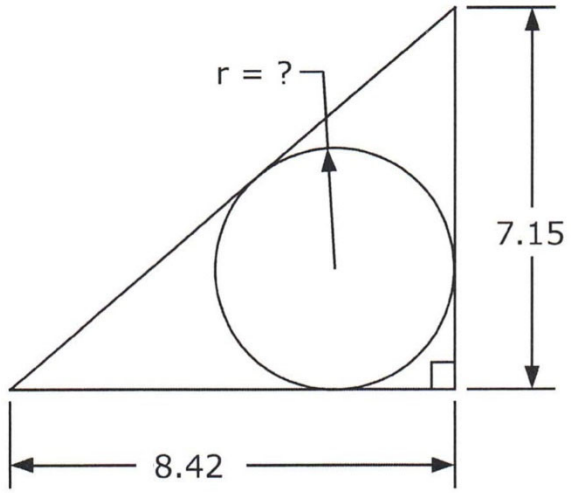
24A-35. $\dfrac{\left[\dfrac{(-0.0255 + 0.0026)}{(958 + 1340)}\right]^2 + \sqrt{\dfrac{4.28\text{x}10^{-21} + 1.18\text{x}10^{-20}}{\sqrt{0.22}}}}{\{(0.00553)/(0.0491)\}^2}$ --------- 35=_____

24A-36. As a New Year's Resolution, on January 1, 2023, Charlie went on a diet. Her starting weight was 163 lbs. She averaged 3 lb loss each week. What is the percent decrease in her weight on March 6? ---------- 36=_____%

24A-37. Ninety percent of Cobalt-60 decays in 17.48 yr. What is its half life? 37=_____yrs

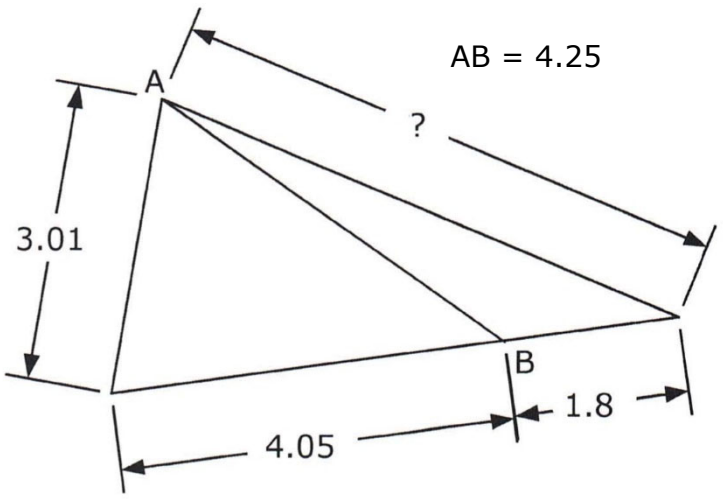
24A-38. A bulldozer scoop holds 2 cubic yards of dirt. Because the dirt is muddy, 15% of the dirt in the first scoop permanently adheres to the scoop, reducing its capacity. For the second scoop, 15% of dirt in the remaining capacity permanently adheres. This loss of capacity continues for subsequent scoops. What is the most dirt the bulldozer can deliver before the scoop is completely filled with mud? ---------- 38=_____cu. yd

24A-39.
RIGHT TRIANGLE AND INSCRIBED CIRCLE



24A-39 =_____

24A-40.
SCALENE TRIANGLES



24A-40 =_____

24A-41. $\dfrac{10^{-(3.46 - 4.9)}}{0.348 + 0.229}$ ---------- 41=_____

24A-42. $0.0864\, e^{0.832} + (0.0822)\, e^{-0.122}$ ---------- 42=_____

24A-43. $(-8.32)\text{Log}\left\{(\pi)(0.544 + 1/0.835)\right\}$ ---------- 43=_____

24A-44. $(2.25)^3 + (12.4 - 2.5)^{2.11}$ ---------- 44=_____

24A-45.(deg) $\{(-0.0432)\sin(-76°)\} \times \{(-0.0187)\cos(-130°)\}$ ---------- 45=_____

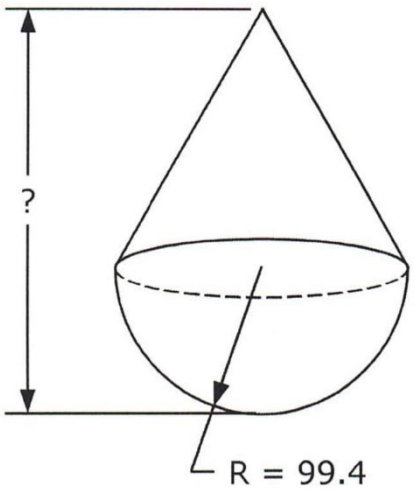
24A-46. A box can hold 850 rocks that are 0.73 in long. How many 0.03 in long grains of sand could be poured into the empty box? ---------- 46=_____

24A-47. The population of Mali, Africa has grown linearly since 1990. Population data are (1990, 8.95 million), (2000, 11.2 million), (2010, 15.5 million), (2020, 21.2 million). Estimate the year when the population becomes 30 million people. ---------- 47=_____ integer

24A-48. (rad) For what nonzero negative value of p does $(6p)\sin(p/\pi) = p^4$? - 48=_____

24A-49.

HEMISPHERE AND CONE

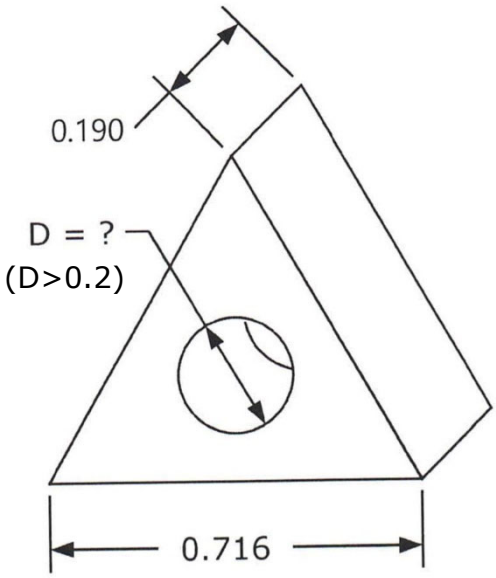


Total Surface Area (Hemisphere) = Total Surface Area (Cone)

24A-49 =_____

24A-50.

EQUILATERAL TRIANGLE PRISM WITH CYLINDRICAL CAVITY



Total Surface Area = 0.906

24A-50 =_____

24A-51. $10^{+(0.256)} + 10^{-(0.371)} + \left[10^{(0.665/0.837)} - 10^{(0.316)}\right]^{1/2}$ 51=_____

24A-52. $\dfrac{1 + e^{+\{0.639 + (0.273)(7.17)\}}}{(6.52\text{x}10^{-6})(5.98 - e^{(-0.505)})}$ ---------- 52=_____

24A-53. $(4.58\text{x}10^{-4})\ \text{Ln}\left[\dfrac{9.93\text{x}10^{-4} + (8.19\text{x}10^{-4})(0.879)}{2.56\text{x}10^{-4} + 7.47\text{x}10^{-4}}\right]$ ---------- 53=_____

24A-54. $\dfrac{(7.69)^{0.913} - (5.88)^{-0.96}}{-2.68 + 0.447}$ ---------- 54=_____

24A-55.(rad) $\dfrac{\arctan\{8.8 + (9.58)(0.601)\}}{\arcsin\{(3.51 + 1.89)/16.6\}}$ ---------- 55=_____

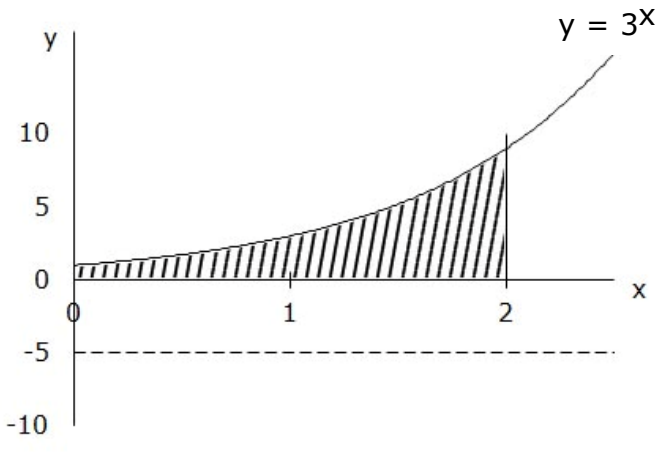
24A-56. (rad) The curve y = xcosx is integrated from zero to x_1, where $0<x_1<2\pi$. The area equals zero. What is nonzero x_1? Consider area below the x axis to be negative. ---------- 56=_____

24A-57. Frieda drives at 70 mph due south from Friona to Muleshoe, 28 mi away. Five minutes later, Mike leaves Muleshoe at 55 mph driving due east to Earth, 18.3 mi away. What is their straight-line distance of closest approach? ---------- 57=_____ mi

24A-58. Calculate the product of the determinants of $\begin{bmatrix}-3 & 7\\ 14 & 9\end{bmatrix}$ and $\begin{bmatrix}4 & -12\\ 2 & 17\end{bmatrix}$. --- 58=_____

24A-59.

SOLID OF REVOLUTION (y = −5)

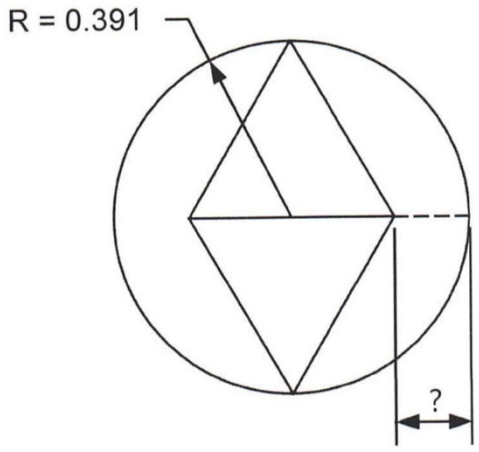


Volume = ?

24A-59 =_____

24A-60.

IDENTICAL EQUILATERAL TRIANGLES AND CIRCLE



24A-60 =_____

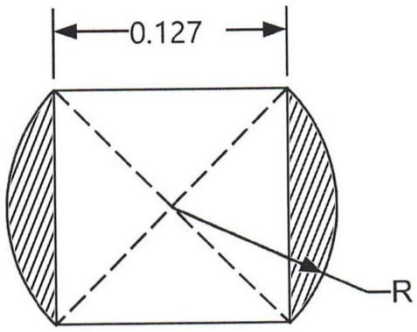
24A-61. Phyllis drives at 55 mph from Hondo to Brenham. How fast should she drive back to Hondo if she wants to average 62 mph for the entire trip? ---------- 61=_____mph

24A-62. What is $614{,}601^{-4{,}323}$? ---------- 62=_____

24A-63. A diver runs off a 10-m high platform directly over the pool's edge. What is the diver's running velocity if they splash into the water 4 m from the pool edge? ---------- 63=_____mph

24A-64.

SQUARE AND IDENTICAL SEGMENTS

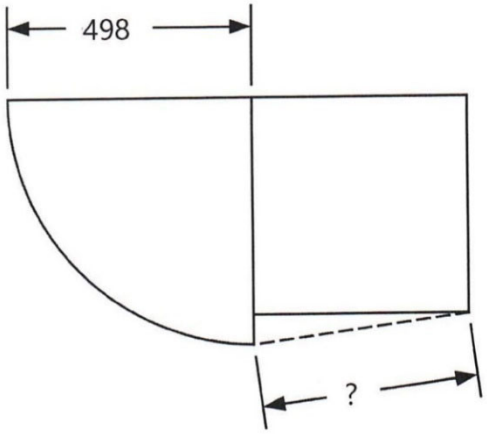


Hatched Area = ?

24A-64 =_____

24A-65.

SQUARE AND QUARTER CIRCLE



Quarter Circle Area = Square Area

24A-65 =_____

24A-66. $\dfrac{\left\{e^{0.692} + e^{-0.692}\right\}^2}{\sqrt{e^{(80.3)(0.158)} \times \left(1/e^{(9.45)}\right)}}$ ---------- 66=_____

24A-67. (rad) $\dfrac{\sin(27.8)}{\cos(27.8)}\sqrt{1 - \{\sin(0.183 \times 4.42)\}^2}$ ---------- 67=_____

24A-68. (rad) $\dfrac{98.2}{6(0.258)}\left\{(-0.426) + (-0.0509)\sin(-1.35)\right\}^5$ ---------- 68=_____

24A-69. $(0.33) - \dfrac{(0.33)^2}{2} + \dfrac{(0.33)^3}{3} - \dfrac{(0.33)^4}{4}$ ---------- 69=_____

24A-70. (rad) $\dfrac{\arctan\left\{e^{-(0.827)(0.999)\sqrt{(-1.88)/(-4.12)}}\right\}}{(-9.76)\sqrt{(1.89)(1.05)(9.73)}}$ ---------- 70=_____

24A-1 = 162
= 1.62×10^{2}

24A-2 = 7320
= 7.32×10^{3}

24A-3 = −27.7
= -2.77×10^{1}

24A-4 = 241
= 2.41×10^{2}

24A-5 = 0.0176
= 1.76×10^{-2}

24A-6 = 480
= 4.80×10^{2}

24A-7 = −2.41
= -2.41×10^{0}

24A-8 = 40 integer

24A-9 = 108
= 1.08×10^{2}

24A-10 = 47.6
= 4.76×10^{1}

24A-11 = −2000
= -2.00×10^{3}

24A-12 = 8.87×10^{6}

24A-13 = −2.59
= -2.59×10^{0}

24A-14 = 244
= 2.44×10^{2}

24A-15 = 4.74×10^{-8}

24A-16 = $19.93

24A-17 = 1.54
= 1.54×10^{0}

24A-18 = 2080
= 2.08×10^{3}

24A-19 = 425
= 4.25×10^{2}

24A-20 = 1.24
= 1.24×10^{0}

24A-21 = 0.252
= 2.52×10^{-1}

24A-22 = −0.837
= -8.37×10^{-1}

24A-23 = 7.90×10^{8}

24A-24 = 101
= 1.01×10^{2}

24A-25 = 613
= 6.13×10^{2}

24A-26 = 31.3
= 3.13×10^{1}

24A-27 = 3.772
= 3.772×10^{0} (4SD)

24A-28 = 6.06
= 6.06×10^{0}

24A-29 = 1180
= 1.18×10^{3}

24A-30 = 3.54×10^{-7}

24A-31 = 0.132
= 1.32×10^{-1}

24A-32 = 0.0101
= 1.01×10^{-2}

24A-33 = 5.27×10^{-9}

24A-34 = 0.170
= 1.70×10^{-1}

24A-35 = 2.24×10^{-8}

24A-36 = 17.1
= 1.71×10^{1}

24A-37 = 5.26
= 5.26×10^{0}

24A-38 = 11.3
= 1.13×10^{1}

24A-39 = 2.26
= 2.26×10^{0}

24A-40 = 5.71
= 5.71×10^{0}

24A-41 = 47.7
= 4.77×10^{1}

24A-42 = 0.271
= 2.71×10^{-1}

24A-43 = −6.14
= -6.14×10^{0}

24A-44 = 138
= 1.38×10^{2}

24A-45 = 0.000504
= 5.04×10^{-4}

24A-46 = 1.22×10^{7}

24A-47 = 2043 integer

24A-48 = −1.36
= -1.36×10^{0}

24A-49 = 272
= 2.72×10^{2}

24A-50 = 0.232
= 2.32×10^{-1}

24A-51 = 4.27
= 4.27×10^{0}

24A-52 = 411,000
= 4.11×10^{5}

24A-53 = 0.000245
= 2.45×10^{-4}

24A-54 = −2.80
= -2.80×10^{0}

24A-55 = 4.53
= 4.53×10^{0}

24A-56 = 2.33
= 2.33×10^{0}

24A-57 = 13.7
= 1.37×10^{1}

24A-58 = −11500
= -1.15×10^{4}

24A-59 = 343
= 3.43×10^{2}

24A-60 = 0.165
= 1.65×10^{-1}

24A-61 = 71.0
= 7.10×10^{1}

24A-62
= $8.15 \times 10^{-25,025}$

24A-63 = 6.27
= 6.27×10^{0}

24A-64 = 0.00460
= 4.60×10^{-3}

24A-65 = 445
= 4.45×10^{2}

24A-66 = 1.24
= 1.24×10^{0}

24A-67 = −0.354
= -3.54×10^{-1}

24A-68 = −0.479
= -4.79×10^{-1}

24A-69 = 0.285
= 2.85×10^{-1}

24A-70 = −0.00670
= -6.70×10^{-3}