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 24H

(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}.

24H-1. $(-48.4/9.14) + 1.62$ ---------- 1=_____

24H-2. $(0.716 + 0.00641) \times (-0.748) - 0.554$ ---------- 2=_____

24H-3. $(0.0199 - 0.0192 + 0.0322 + 0.015)/(0.643)$ ---------- 3=_____

24H-4. $\dfrac{3770 + 9780 - 5570}{(-9.31)(3.32)(5.57)}$ ---------- 4=_____

24H-5. $\dfrac{94300 + 48600}{(636)(-642)(-168)} + 0.00779 - 0.00336$ ---------- 5=_____

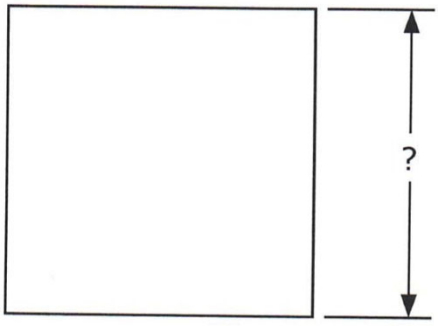
24H-6. What is the result of subtracting 642 from $693\sqrt{2}$? ---------- 6=_____

24H-7. What is the positive square root of the product of 7.37 and 0.391? ---- 7=_____

24H-8. A 30 oz jar of mayonnaise costs $4.58. What is the cost per oz? ------ 8=_____ $/oz

24H-9.

SQUARE

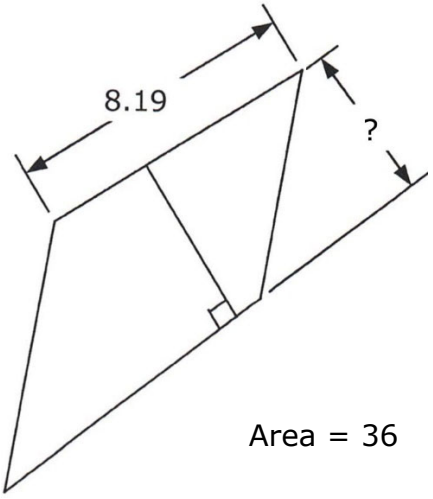


Area = 31.1

24H-9 =_____

24H-10.

PARALLELOGRAM



Area = 36

24H-10 =_____

24H-11. $\dfrac{(-724 + 228)(-494 + 1720)}{(\pi)(0.152)(3710 - 5150)}$ ---------- 11=_____

24H-12. $\dfrac{-1.83 + 1.15}{(0.757)(1.49)(-6.83\text{x}10^{-7})} + (879 + 1570)(510 - 277)$ ---------- 12=_____

24H-13. $\dfrac{(-3.58\text{x}10^{-5} - 4.79\text{x}10^{-5})\{9.19 + (5.84)(0.548)\}}{(7.73)(-0.584 + 0.22)(-0.365)(1.64)}$ ---------- 13=_____

24H-14. $\dfrac{(8470 + 1850 - 1680)(0.00795 + 0.0125 - 0.00583)}{(\pi - 1.62)(9.12)(8.72 - 5.58)}$ ---------- 14=_____

24H-15. $\dfrac{(0.612 + 2.25)}{7.27 - 8.13} + \dfrac{-0.725}{98.8 + 263} + \dfrac{(0.833)(669 - 637)}{(-187)(0.137)}$ ---------- 15=_____

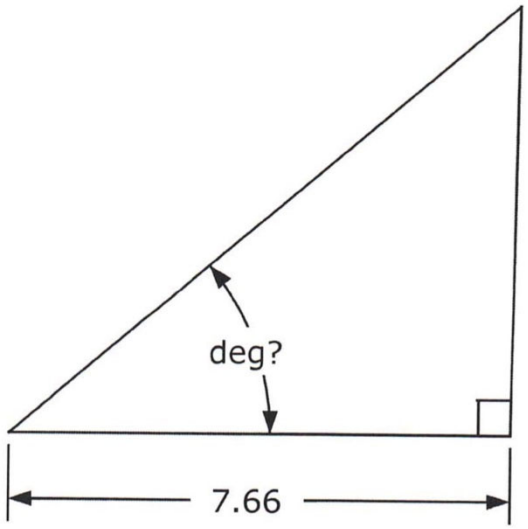
24H-16. A lawyer charges $350/hr. Trial prep requires 78 hr of legal time, and the trial is three 8-hr days. How much are the legal fees? ---------- 16=$_____

24H-17. The world land speed record was set by Andy Green driving a twin turbofan jet-powered car. The speed was 763.035 mph over one mile in October 1997. How long would it take to travel 1 mi at this speed? --------- 17=_____s(SD)

24H-18. The product of two consecutive, odd, negative numbers is 20,735. What is their sum? ---------- 18=_____integer

24H-19.

RIGHT TRIANGLE

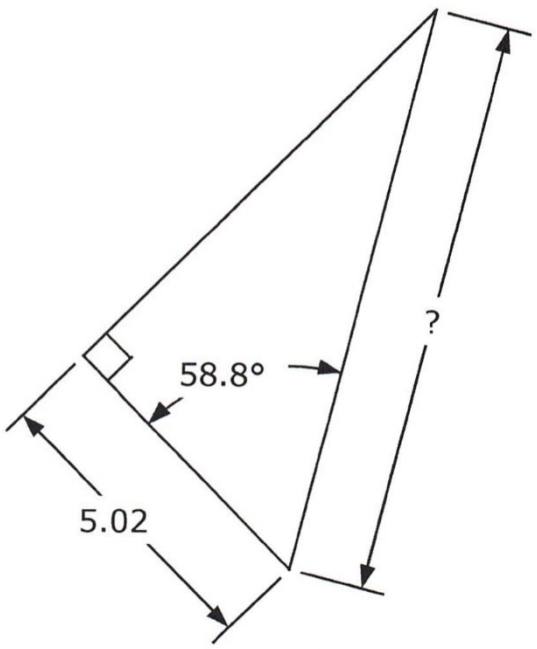


Area = 25.1

24H-19 =_____

24H-20.

RIGHT TRIANGLE



24H-20 =_____

24H-21. $\dfrac{2.87 + 1/(0.318)}{1/(0.336) + 7.13} + \dfrac{1}{(0.451)}$ ---------- 21=_____

24H-22. $\left[\dfrac{\sqrt{1.35 - 0.138}}{5.94} + \dfrac{(0.807)}{7.36}\right]^2$ ---------- 22=_____

24H-23. $(-149)(-0.394) + \sqrt{(2650)/(9.56)} + \left[(0.727)(\pi)\right]^2$ ---------- 23=_____

24H-24. $\dfrac{\sqrt{0.819 + 0.221 + (0.266)/(0.423)}}{0.909 + 0.126}$ ---------- 24=_____

24H-25. $\left[\dfrac{2.34 + 1.35 + \sqrt{0.553/0.349}}{245 + 245}\right]^2$ ---------- 25=_____

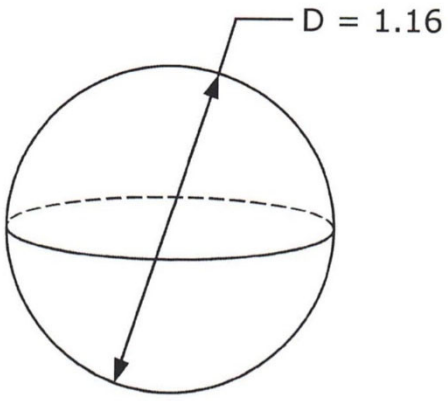
24H-26. A study found that American adults consume an average of 17 teaspoons of added sugar every day. What is the percent error in assuming this totals to 60 lbs of sugar per adult annually? The density of sugar is 1.59 g/cm^3. ---------- 26=_____%

24H-27. Jenny hand paints an 8-ft section of fence in 1.1 hr, but it only takes her 13 min to spray paint it. She started painting a 147-ft fence but at some point gave up and switched to spray painting, completing the entire job in 10 hr. What fraction of the fence was hand painted? ---------- 27=_____%

24H-28. An 11-in long candle is tapered, 0.5 in in diameter at the bottom and 0.25 in in diameter at the top. What is the positive burn rate if the candle is completely consumed in 8 hr? ---------- 28=_____in^3/hr

24H-29.

SPHERE

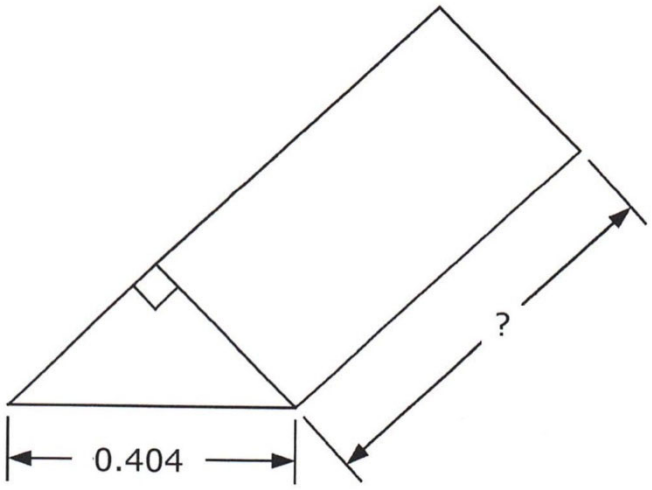


Total Surface Area = ?

24H-29 =_____

24H-30.

RIGHT ISOSCELES TRIANGLE PRISM



Volume = 0.0285

24H-30 =_____

24H-31. $\sqrt{\dfrac{1/(577 - 299)}{(544)(1.58 + 0.735)^2}} + (-7.00\text{x}10^{-6})^2(9.26\text{x}10^{6})$ ---------- 31=_____

24H-32. $\dfrac{(-9.07 + 10.1)^2}{\sqrt{40.5 - 28.5}} + \dfrac{1}{\sqrt{4.75 + 7.88}}$ ---------- 32=_____

24H-33. $\dfrac{\sqrt{(0.239)/\left\{(0.233)/\sqrt{0.145}\right\}}}{0.0905 + (0.767)(8.28)} + \{0.00236 + 0.00939\}^{1/2}$ -------- 33=_____

24H-34. $\dfrac{[3.57\text{x}10^{-5}/(0.779 + 0.274) + 1/(26700)]^{1/2}}{(97400 + 1.59\text{x}10^{5})^2 \text{ x } \sqrt{6.36\text{x}10^{5} - (-95200)}}$ ---------- 34=_____

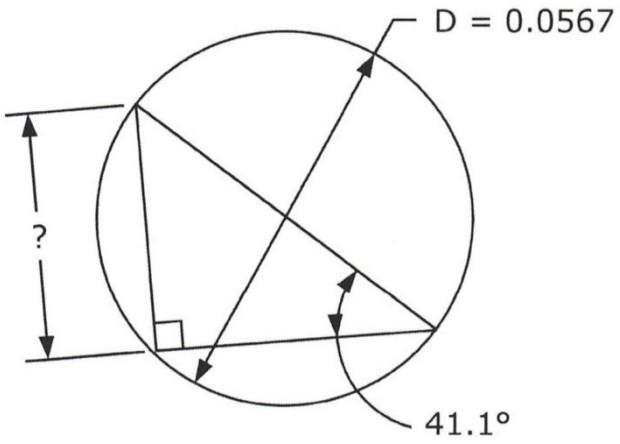
24H-35. $\dfrac{\dfrac{1}{-19.5} + \dfrac{-6010}{(296 + 226)^2} - \dfrac{\sqrt{2.89\text{x}10^{8}}}{(-879)^2}}{(-9840 + 12400)^2 + (-8.08\text{x}10^{6})}$ ---------- 35=_____

24H-36. A car drives at 31 mph. It passes a parked car. After a 5 s delay, the parked car accelerates at a constant value. It catches up to the moving car 0.424 mi from where it was parked. What was the parked car's acceleration? ---------- 36=_____ ft/s^2

24H-37. Centrifugal force F equals $m\omega^2R$, where ω is the angular velocity of a mass m moving along an arc of radius R. If a 3500-lb_m car traveling at 50 mph skids when the centrifugal force equals 600 lb_f, what is the turning radius to initiate the skid? 1 lb_f = 32.174 lb_m ft/s^2. ---------- 37=_____ ft

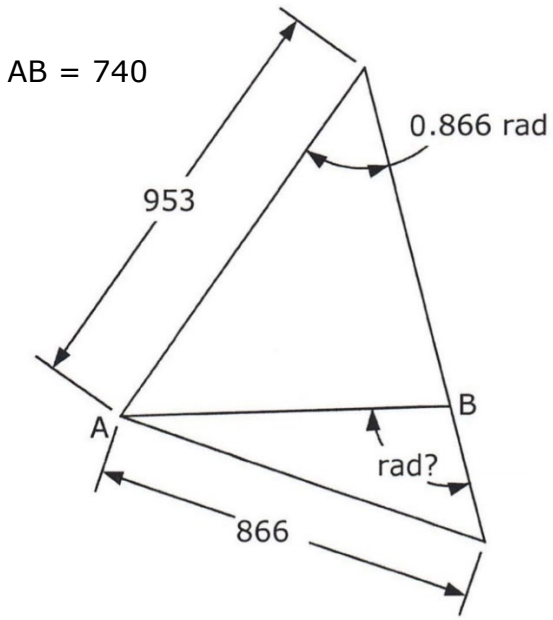
24H-38. What is the length of the line segment defined by the intersection of the line y = −3x+4 and the circle $x^2+y^2 = 236$? ---------- 38=_____

24H-39.
RIGHT TRIANGLE AND CIRCUMSCRIBED CIRCLE



24H-39 =_____

24H-40.
SCALENE TRIANGLES



24H-40 =_____

24H-41. $10^{-\{(0.62 - 0.681)/(0.619 + 0.547)\}}$ ---------- 41=_____

24H-42. $\dfrac{e^{+0.303} + e^{-0.675}}{(6.56\text{x}10^{-6} + 2.72\text{x}10^{-4})}$ ---------- 42=_____

24H-43. $\dfrac{0.525 - 0.839}{\text{Log}(0.0309 + 0.00757)}$ ---------- 43=_____

24H-44. $(0.261)^{3} + (16.6 - 14.6)^{0.609}$ ---------- 44=_____

24H-45.(deg) $\dfrac{\cos\{(44.6°)/(6.95)\}}{\sin\{113° - 143°\}}$ ---------- 45=_____

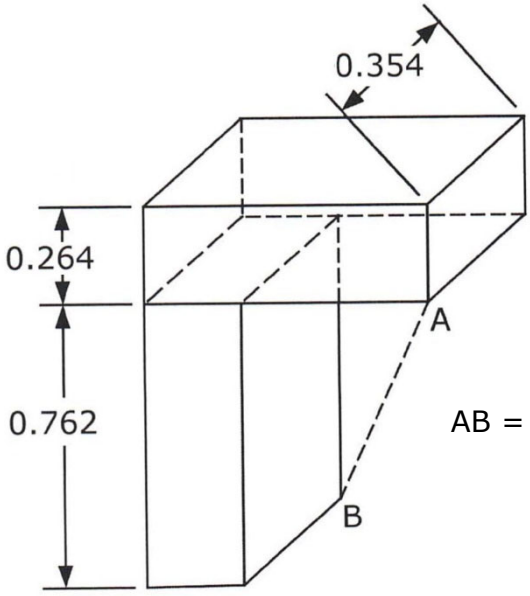
24H-46. How many 8-ft long beach towels are needed to just cover the same area as 25 5-ft bath towels? Assume towels have similar shape and that they may be cut to fit the area. ---------- 46=_____integer

24H-47. A gift shop ran an unadvertised sale for one week. Their daily income from Monday through Thursday was $255, $410, $425, and $595, respectively. Estimate the Friday income. ---------- 47=$_____

24H-48. For what value of r greater than 1 does $r^{(r-3)} = 75.7$? ---------- 48=_____

24H-49.

IDENTICAL RECTANGULAR SOLIDS

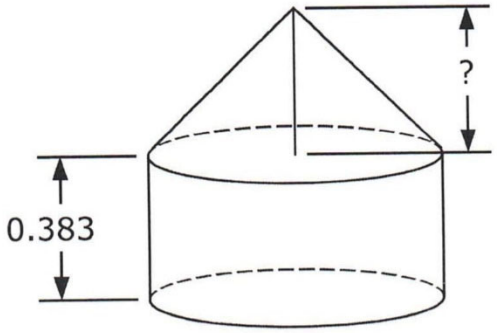


AB = ?

24H-49 =_____

24H-50.

CYLINDER AND CONE



Volume(Cone) = $\frac{1}{3}$[Volume(Cylinder)]

24H-50 =_____

24H-51. $10^{+(0.459)} + 10^{-(0.33)} + \left[10^{(0.293/0.723)} - 10^{(0.365)}\right]^{1/2}$ -- 51=_____

24H-52. $\dfrac{400 + e^{(3.98 + 3.52)}}{0.691 - e^{-(0.451 - 0.464)}}$ ---------- 52=_____

24H-53. $\dfrac{\text{Log}\left\{1.91\text{x}10^{7} + (5280)(7650)\right\}}{4.45 - \text{Log}\{(91.1)/(0.0962)\}}$ ---------- 53=_____

24H-54. $\dfrac{1}{(0.752)^{(-0.245)}} + (0.74 + 0.721)^{(0.212 - 0.409)}$ ---------- 54=_____

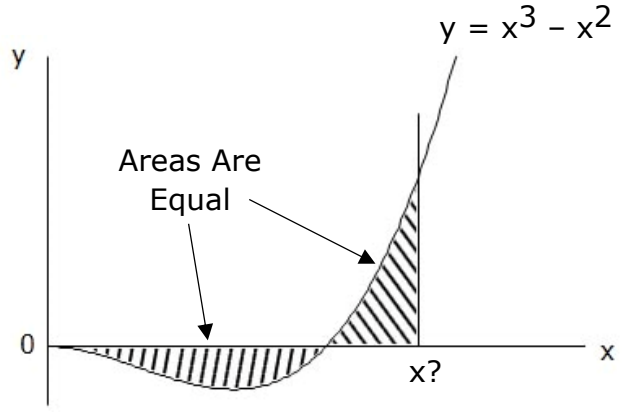
24H-55.(rad) $\dfrac{\arcsin\{(0.127)(0.724)/(0.134)\}}{-0.0794 + (0.377)(-0.865)}$ ---------- 55=_____

24H-56. What is the area between the curve $f(x) = -3x^2+9$ and the x axis? 56=_____

24H-57. A farmer constructs a pen of constant area A_0 using as little fencing as possible. The shape of the pen looks like this: ▭◗, a D by h rectangle attached to one semicircular end of diameter D. What is the ratio of the rectangle side dimensions that minimizes the perimeter, a number greater than 1? ---------- 57=_____

24H-58. What is m if the sum of the determinants of $\begin{bmatrix} 4 & -m \\ 5 & 20 \end{bmatrix}$ and $\begin{bmatrix} 3m & 6 \\ 6 & 12 \end{bmatrix}$ equals 3? ---------- 58=_____

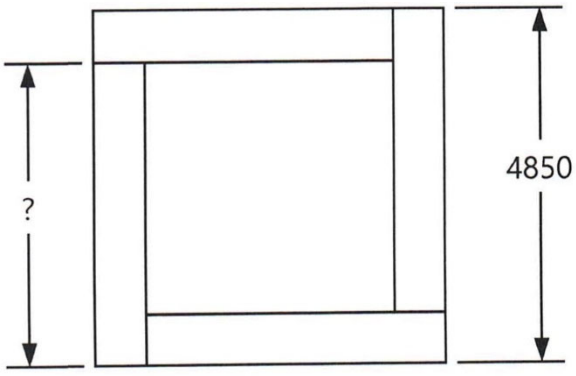
24H-59.



24H-59 =_____

24H-60.

SQUARES AND
FOUR IDENTICAL RECTANGLES



Small Square Area = ½ Large Square Area

24H-60 =_____

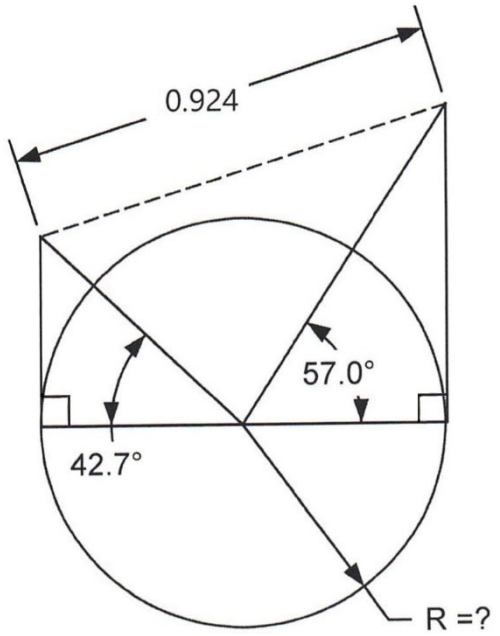
24H-61. The temperature in Bordj El Houasse in the Sahara Desert in June ranges sinusoidally from a maximum of 101.3°F to a low of 76.5°F 12 hours later. What is the minimum time interval between the minimum temperature and 86°F? ---------- 61=_____hr

24H-62. The odds of winning the Texas Powerball jackpot are 1/25,827,165. What is this number raised to the 27,600th power? ---------- 62=_____

24H-63. Dirk throws a penny off the top of the Texas State Capitol Building with a velocity of 28 mph and a release angle of 64° relative to horizontal. It hits the ground in 5.63 s. What is the Capitol elevation? ---------- 63=_____ft

24H-64.

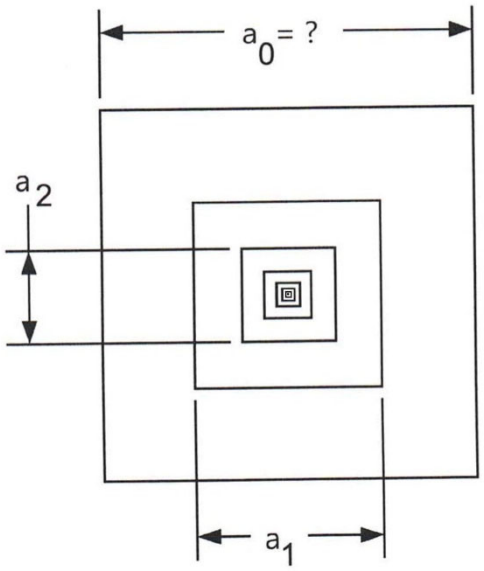
CIRCLE AND RIGHT TRIANGLES



24H-64 =_____

24H-65.

INFINITE NUMBER OF SQUARES



$a_i = \frac{1}{2} a_{i-1}$

Sum of all Square Perimeters = 3520

24H-65 =_____

24H-66. $\text{Log}(3.17) + \text{Log}(3.86) + \text{Log}(9.67) + \text{Log}\left[\frac{(1.21)}{(3.86)}\right]$ ---------- 66=_____

24H-67. $(3.62)10^{\text{Log}[(3.4)(0.153)]} + \{(27.2)(0.926)\}^{1/2}$ ---------- 67=_____

24H-68. (rad) $(8.67)\left[\frac{\cos(-4.38)}{(-4.38)} + \frac{\cos(5.66)}{(5.66)}\right]$ ---------- 68=_____

24H-69. $1 + (0.759) + \frac{(0.759)^2}{2} + \frac{(0.759)^3}{6} + \frac{(0.759)^4}{24}$ ---------- 69=_____

24H-70. (rad) $e^{(8.97)\left[\frac{(5.56)\sin(3.85) - (2.51)\cos(-1.22)}{(9.76)\sqrt{(5.56)^2 + (2.51)^2}}\right]}$ ---------- 70=_____

24H-1 = −3.68
= -3.68×10^{0}

24H-2 = −1.09
= -1.09×10^{0}

24H-3 = 0.0745
= 7.45×10^{-2}

24H-4 = −46.4
= -4.64×10^{1}

24H-5 = 0.00651
= 6.51×10^{-3}

24H-6 = 338
= 3.38×10^{2}

24H-7 = 1.70
= 1.70×10^{0}

24H-8 = 0.153
= 1.53×10^{-1}

24H-9 = 5.58
= 5.58×10^{0}

24H-10 = 4.40
= 4.40×10^{0}

24H-11 = 884
= 8.84×10^{2}

24H-12 = 1.45×10^{6}

24H-13 = −0.000616
= -6.16×10^{-4}

24H-14 = 2.90
= 2.90×10^{0}

24H-15 = −4.37
= -4.37×10^{0}

24H-16 = $35,700.00

24H-17 = 4.71800 (6SD)
= 4.71800×10^{0}

24H-18 = 288 integer

24H-19 = 40.5
= 4.05×10^{1}

24H-20 = 9.69
= 9.69×10^{0}

24H-21 = 2.81
= 2.81×10^{0}

24H-22 = 0.0870
= 8.70×10^{-2}

24H-23 = 80.6
= 8.06×10^{1}

24H-24 = 1.25
= 1.25×10^{0}

24H-25 = 0.000102
= 1.02×10^{-4}

24H-26 = −7.24
= -7.24×10^{0}

24H-27 = 37.1
= 3.71×10^{1}

24H-28 = 0.157
= 1.57×10^{-1}

24H-29 = 4.23
= 4.23×10^{0}

24H-30 = 0.698
= 6.98×10^{-1}

24H-31 = 0.00156
= 1.56×10^{-3}

24H-32 = 0.588
= 5.88×10^{-1}

24H-33 = 0.205
= 2.05×10^{-1}

24H-34 = 1.50×10^{-16}

24H-35 = 6.25×10^{-8}

24H-36 = 2.29
= 2.29×10^{0}

24H-37 = 975
= 9.75×10^{2}

24H-38 = 30.6
= 3.06×10^{1}

24H-39 = 0.0373
= 3.73×10^{-2}

24H-40 = 1.77
= 1.77×10^{0}

24H-41 = 1.13
= 1.13×10^{0}

24H-42 = 6690
= 6.69×10^{3}

24H-43 = 0.222
= 2.22×10^{-1}

24H-44 = 1.54
= 1.54×10^{0}

24H-45 = −1.99
= -1.99×10^{0}

24H-46 = 10 integer

24H-47 = $680.00

24H-48 = 5.53
= 5.53×10^{0}

24H-49 = 0.977
= 9.77×10^{-1}

24H-50 = 0.383
= 3.83×10^{-1}

24H-51 = 3.82
= 3.82×10^{0}

24H-52 = −6860
= -6.86×10^{3}

24H-53 = 5.28
= 5.28×10^{0}

24H-54 = 1.86
= 1.86×10^{0}

24H-55 = −1.86
= -1.86×10^{0}

24H-56 = 20.8
= 2.08×10^{1}

24H-57 = 2.00
= 2.00×10^{0}

24H-58 = −1.00
= -1.00×10^{0}

24H-59 = 1.33
= 1.33×10^{0}

24H-60 = 4140
= 4.14×10^{3}

24H-61 = 5.10
= 5.10×10^{0}

24H-62
= $4.81 \times 10^{-204,574}$

24H-63 = 302
= 3.02×10^{2}

24H-64 = 0.441
= 4.41×10^{-1}

24H-65 = 440
= 4.40×10^{2}

24H-66 = 1.57
= 1.57×10^{0}

24H-67 = 6.90
= 6.90×10^{0}

24H-68 = 1.89
= 1.89×10^{0}

24H-69 = 2.13
= 2.13×10^{0}

24H-70 = −592
= -5.92×10^{2}