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 19H

(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}.

19H-1. (3.5 + 8.24) x 3.24 ---------- 1=_____

19H-2. (0.311 + 1.84) x (3.8) – 51.2 ---------- 2=_____

19H-3. $\frac{(60.6)(-52.3)(86.5)}{-72.1} + 2240$ ---------- 3=_____

19H-4. $\frac{8670 + 52600 - 51200}{(-0.955)(-0.542)(-0.765)}$ ---------- 4=_____

19H-5. $\frac{(824 + 429 - 708)(120)}{(-969)(-804)(-229)}$ ---------- 5=_____

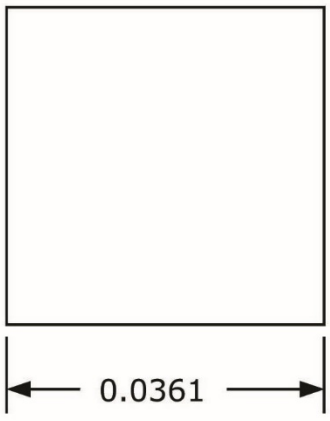
19H-6. What is the positive difference of 0.792 and 0.415? ---------- 6=_____

19H-7. Calculate the product of 43 and half of 93.2. ---------- 7=_____

19H-8. Calculate the cube root of the product of -0.936 and -230. ---------- 8=_____

19H-9.

SQUARE

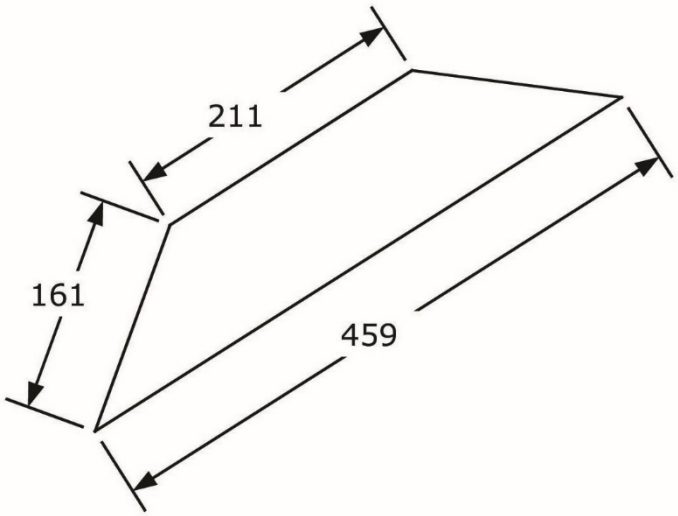


Perimeter = ?

19H-9 =_____

19H-10.

ISOSCELES TRAPEZOID



Area = ?

19H-10 =_____

19H-11. $\dfrac{(9.45 + \pi)(-3.58 - 1.79 + 1.91)}{(1.91)(-7.64) - 10.4}$ ---------- 11=_____

19H-12. $\dfrac{2.36 + 1.43}{(0.836)(4.37)(2.87\text{x}10^{-7})} + (992 + 3660)(662 - 230)$ ---------- 12=_____

19H-13. $\dfrac{(0.893)(221 - 119)\{0.723 - (-0.771)(-0.438)\}}{(0.076 + 0.0703)(0.463 - 0.696)}$ ---------- 13=_____

19H-14. $\dfrac{(9110 + 6290 - 4040)(0.00402 + 0.0113 - 0.0105)}{(-2.92 - 0.91)(-9.46)(2.28 - 0.664)}$ ---------- 14=_____

19H-15. $\dfrac{(59700 + 27900 - 2.59\text{x}10^{5})(0.836 - 0.617 - 3.11)}{(0.0576)(0.0774)(0.0628)(5.25 + 3.66 + 4.18)}$ ---------- 15=_____

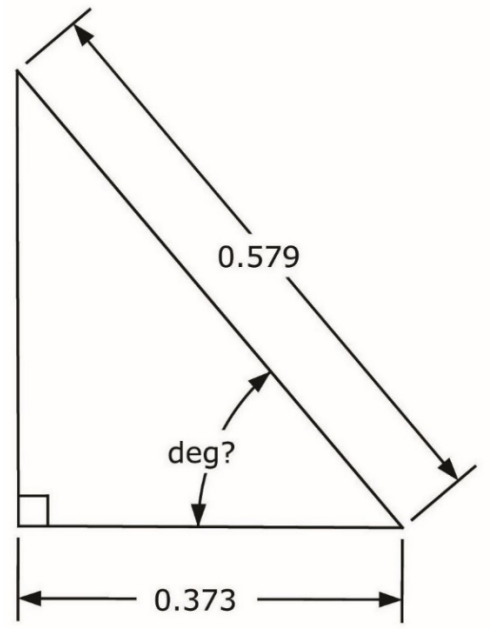
19H-16. Huazhong University has a campus population of 53,200 persons who each eat three meals daily on campus. There are 33 restaurants on campus. How many meals on average are served by each restaurant? -------- 16=_____

19H-17. Lena buys four taxable items priced at $2.55, $1.77, $2.99 and $0.85. If the sales tax is 8.125%, how much change does she get from a $10 bill? ---------- 17=$_____

19H-18. What is the percent increase in speed when comparing human velocity, 15 mph, with a cheetah, the fastest land animal, 70 mph? ---------- 18=_____%

19H-19.

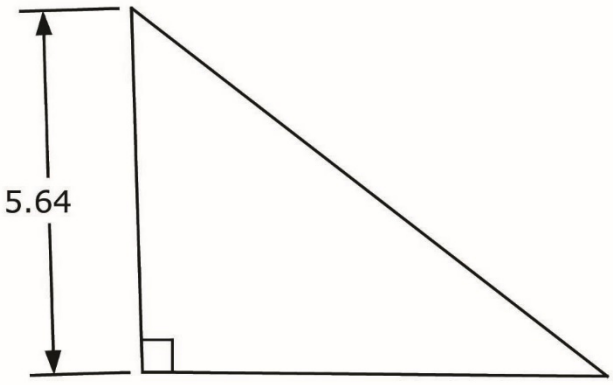
RIGHT TRIANGLE



19H-19 =_____

19H-20.

RIGHT TRIANGLE



Area = 20.4

Hypotenuse = ?

19H-20 =_____

19H-21. $\left[\frac{(0.695)(0.27)}{-7.66} + 0.013\right]^2 + \sqrt{2.49\text{x}10^{-9}}$ ---------- 21=_____

19H-22. $\left[\frac{\sqrt{2.07 - 1.99}}{-6.73} + \frac{(-0.171)}{4.94}\right]^2$ ---------- 22=_____

19H-23. $\left[\frac{\pi + 0.625 + \sqrt{0.805/0.293}}{40.5 + 22.5}\right]^2$ ---------- 23=_____

19H-24. $(47.4)(0.0185)\sqrt{(-0.53)^2/0.274} + 1/\sqrt{0.541 + 1.11}$ ---------- 24=_____

19H-25. $\left[-39.2 + \sqrt{1530}\right]^2 \text{ x } \left[114 + 219\right]^2 \text{ x } \sqrt{\pi/1.7}$ ---------- 25=_____

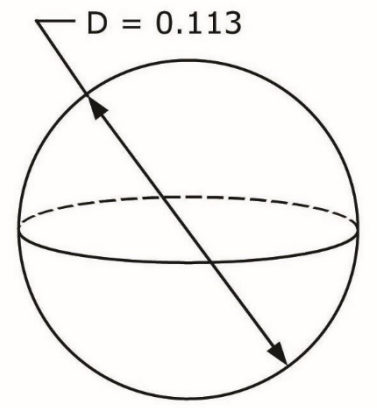
19H-26. In 2015, Krispy Kreme doughnuts had annual domestic revenue of $470 million. Assume the average doughnut cost was $1.05, and doughnut sales accounted for all revenue. With 325.7 million people in the US in 2015, on average, one in how many people had one Krispy Kreme doughnut daily? ---------- 26=_____

19H-27. Aldeberan, the brightest star in the constellation Taurus, is 65 light years from earth and has a diameter of 6.122x10^7 km. If the speed of light is 299,792,458 m/s, what is the celestial angle subtended by Aldeberan as seen from the earth? ---------- 27=_____ rad(SD)

19H-28. A wheelchair ramp is 4 ft wide and has a maximum rise of 1 in per foot of horizontal run. There is a 5 ft horizontal landing after every 16 ft of sloped ramp. How many 4 ft by 8 ft sheets of plywood are needed for the floor of a ramp for traversing 58 vertical in of total rise? ---------- 28=_____ integer

19H-29.

SPHERE

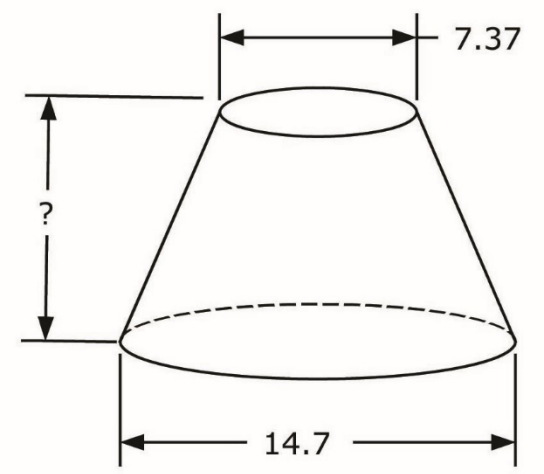


Total Surface Area = ?

19H-29 =_____

19H-30.

FRUSTUM



Volume = 900

19H-30 =_____

19H-31. $\sqrt{\dfrac{1/(624-467)}{(223)(1.5+0.399)^2}} + (-4.28)^2(4.62\text{x}10^{-5})$ ---------- 31=_____

19H-32. $\dfrac{1}{0.00143} + \dfrac{1}{\sqrt{2.49\text{x}10^{-6}}} + \dfrac{(9.96+23.4-17)^2}{\sqrt{2.66-2.34}}$ ---------- 32=_____

19H-33. $\dfrac{[(9.14\text{x}10^{-4} - 2.76\text{x}10^{-4})(0.832/0.476)]^{1/2}}{(1.21)^2 + (0.71+1.01)^2 + 1.08}$ ---------- 33=_____

19H-34. $\dfrac{(\pi)^2 + \sqrt{1.53}}{\sqrt{(5.54\text{x}10^{-4})(-98)^2}} + \dfrac{\sqrt{\sqrt{(1.70\text{x}10^{-12})(0.164)}}}{6.05\text{x}10^{-4} + 6.93\text{x}10^{-4}}$ ---------- 34=_____

19H-35. $\dfrac{\left[\dfrac{(1.12\text{x}10^5 + 62500)}{(809+1740)}\right]^2 + \sqrt{\dfrac{1.38\text{x}10^7 + 3.98\text{x}10^7}{\sqrt{0.955}}}}{\left\{(2.47\text{x}10^5)/(3.62\text{x}10^5)\right\}^2}$ ---------- 35=_____

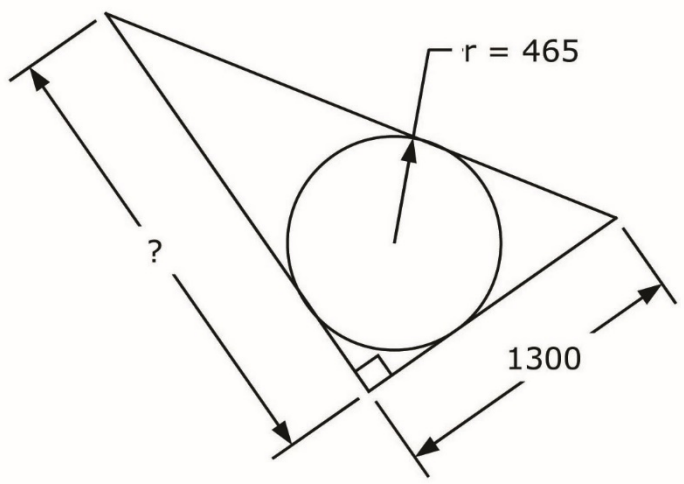
19H-36. If knowledge doubles every 13 months, on average what is the percent increase in knowledge in one day? ---------- 36=_____%

19H-37. Dallas and Baghdad, Iraq lie on a line of constant latitude, ~33°N. Dallas lies at 96°48′ west, and Baghdad is 44°23′ east. What is the smaller length of the longitudinal arc between the two cities? ---------- 37=_____mi

19H-38. Calculate the positive value of x for the intersection of the line passing through the point (2,-6) with the circle $(x-1)^2 + y^2 = 12$. ---------- 38=_____

19H-39.

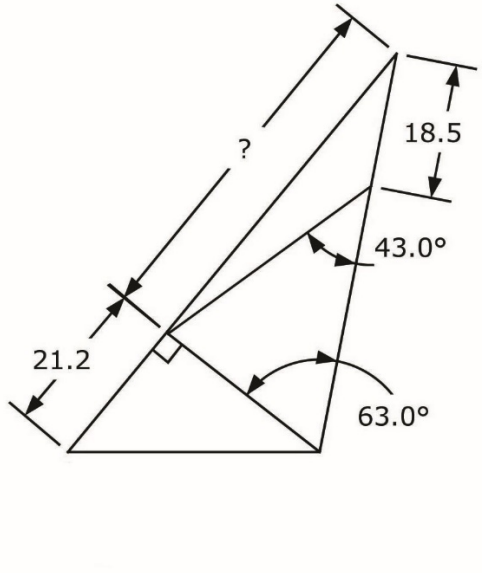
RIGHT TRIANGLE AND CIRCLE



19H-39 =_____

19H-40.

RIGHT AND SCALENE TRIANGLES



19H-40 =_____

19H-41. $\dfrac{10^{-(3.63 - 6.64)}}{-462 + 406}$ ---------- 41=_____

19H-42. $\dfrac{e^{+0.722} + e^{-0.568}}{(-443 + 3270)}$ ---------- 42=_____

19H-43. $(6.58 - 15.4)\ \mathrm{Ln}\{(-1.26)(-0.931)\}$ ---------- 43=_____

19H-44. $(-1.83\text{x}10^{-5} + 2.03\text{x}10^{-5})^{-(0.72 + 0.709)}$ ---------- 44=_____

19H-45. (deg) $\{(55800)\sin(-32.4°)\} \times \{(71500)\cos(-44.7°)\}$ ---------- 45=_____

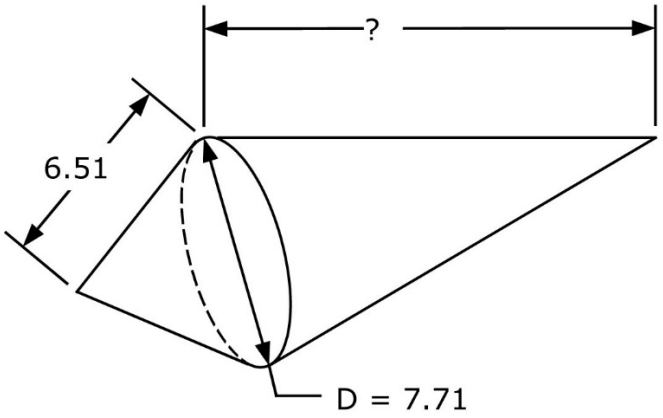
19H-46. A shirt with a 14-in neck costs $37.99. Based on the fabric cost, how much should a shirt with an 18-in neck cost? ---------- 46=$_____

19H-47. Bamboo grows exponentially according to $h = A10^{(Bt)}$, where h is the height (in), t is time (days) and A and B are constants. Data in (days, in) are (5, 11), (9, 19), (12, 37), (15, 68) and (16, 107). What was the initial height of the bamboo? ---------- 47=_____in

19H-48. (rad) What is v if sin(v) = v-1? ---------- 48=_____

19H-49.

CONES

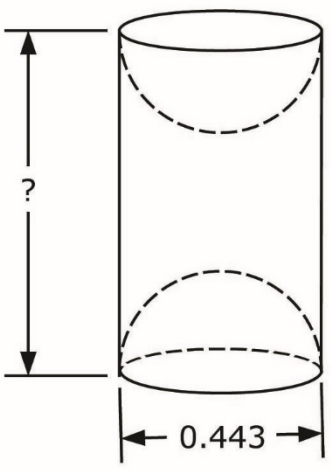


Total Volume = 338

19H-49 =_____

19H-50.

CYLINDER WITH HEMISPHERICAL CAVITIES



Total Surface Area = 1.67

19H-50 =_____

19H-51. $\dfrac{(-6.75)\ 10^{-(9.23\ -\ 2.59)}}{-4.3\ +\ 3.5}$ ---------- 51=_____

19H-52. $\dfrac{72.1\ +\ e^{(3.56\ +\ 1.48)}}{0.723\ -\ e^{-(0.258\ -\ 0.919)}}$ ---------- 52=_____

19H-53. $\dfrac{\mathrm{Log}\left\{2.26\text{x}10^{-5}\ +\ (0.00529)(0.00602)\right\}}{16.9\ -\ \mathrm{Log}\{(48.6)/(0.0681)\}}$ ---------- 53=_____

19H-54. $\dfrac{1}{(0.555)^{(-0.345)}}\ +\ (0.384\ +\ 0.882)^{(0.433\ -\ 0.983)}$ ---------- 54=_____

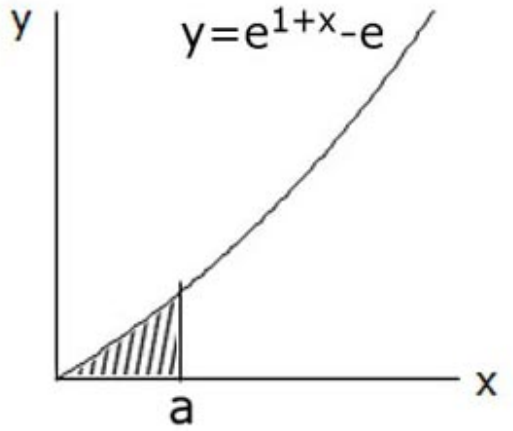
19H-55. (rad) $\arctan\left[\dfrac{(3170)(0.934)}{(6.25)(26.6)}\right]\ +\ (0.547)(1.19)$ ---------- 55=_____

19H-56. Calculate the area enclosed by the curve $y = -3x^2+100x+300$ and the x axis. ---------- 56=_____

19H-57. A ship heads north at 20 mph, and another ships leaves the same point at the same time heading east at 9 mph. What is the magnitude of their relative velocity after 4.5 hr? ---------- 57=_____ mph

19H-58. What is H_{12} if **H** = **KL**, **K** = $\begin{bmatrix} 12 & -18 \\ -18 & 34 \end{bmatrix}$ and **L** = $\begin{bmatrix} -7 & 4 \\ 4 & 19 \end{bmatrix}$? ---------- 58=_____

19H-59.

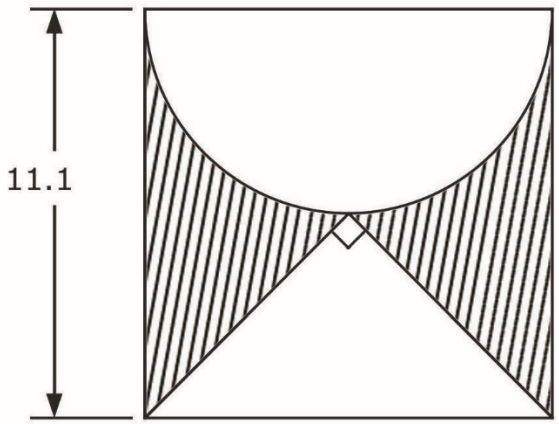


Hatched Area = 500
a = ?

19H-59 =_____

19H-60.

SQUARE, ISOSCELES TRIANGLE AND SEMICIRCLE



Hatched Area = ?

19H-60 =_____

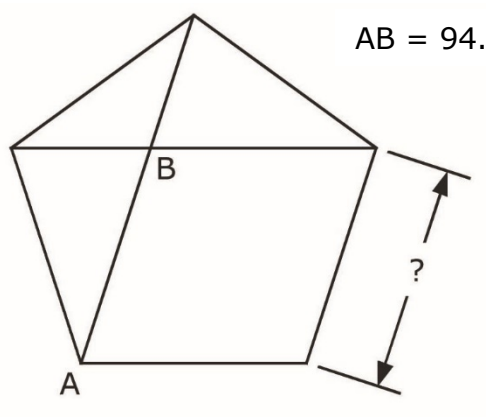
19H-61. How many minutes after 4:39 do the minute and hour hands of a clock align? ---------- 61=_____min

19H-62. What is $6540^{180,240}$? ---------- 62=_____

19H-63. A ball is lofted such that its maximum increase in height, 8.5 meters, is attained at a horizontal distance 13.6 meters from the thrower. What was the release angle relative to the horizontal? ---------- 63=_____deg

19H-64.

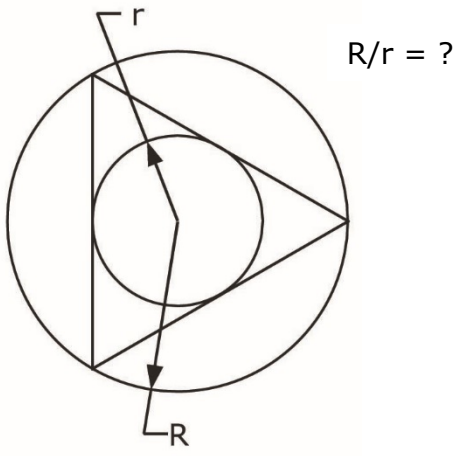
REGULAR PENTAGON



19H-64 =_____

19H-65.

CIRCLES AND EQUILATERAL TRIANGLE



19H-65 =_____

19H-66. $\dfrac{\sqrt{e^{-(0.559 + 0.916)}}}{\left\{e^{(0.571 - 0.127)}\right\}^2} \times \sqrt[3]{(8.78)^2}$ ---------- 66=_____

19H-67. $(92.8 - 73.9)^2 + (\pi + 39.8)e^{\mathrm{Ln}(0.236)}$ ---------- 67=_____

19H-68. (rad) $\dfrac{98.2}{6(-5.36)}\left\{(-0.00519) + (-0.00184)\sin(\pi)\right\}^5$ ---------- 68=_____

19H-69. $(0.59) - \dfrac{(0.59)^2}{2} + \dfrac{(0.59)^3}{3} - \dfrac{(0.59)^4}{4}$ ---------- 69=_____

19H-70. $\dfrac{1}{\sqrt{(99.8)^2 - (1050)}}\ \mathrm{Ln}\left\{\dfrac{(392) - \sqrt{(99.8)^2 - (1050)}}{(392) + \sqrt{(99.8)^2 - (1050)}}\right\}$ ---------- 70=_____

DO NOT DISTRIBUTE TO STUDENTS BEFORE OR DURING THE CONTEST!

19H-1 = 38.0
= 3.80×10^{1}

19H-2 = -43.0
= -4.30×10^{1}

19H-3 = 6040
= 6.04×10^{3}

19H-4 = -25400
= -2.54×10^{4}

19H-5 = -0.000367
= -3.67×10^{-4}

19H-6 = 0.377
= 3.77×10^{-1}

19H-7 = 2000
= 2.00×10^{3}

19H-8 = 5.99
= 5.99×10^{0}

19H-9 = 0.144
= 1.44×10^{-1}

19H-10 = 34,400
= 3.44×10^{4}

19H-11 = 1.74
= 1.74×10^{0}

19H-12 = 5.62×10^{6}

19H-13 = -1030
= -1.03×10^{3}

19H-14 = 0.935
= 9.35×10^{-1}

19H-15 = 1.35×10^{8}

19H-16 = 4840
= 4.84×10^{3}

19H-17 = $1.18

19H-18 = 367
= 3.67×10^{2}

19H-19 = 49.9
= 4.99×10^{1}

19H-20 = 9.17
= 9.17×10^{0}

19H-21 = 0.000182
= 1.82×10^{-4}

19H-22 = 0.00587
= 5.87×10^{-3}

19H-23 = 0.00741
= 7.41×10^{-3}

19H-24 = 1.67
= 1.67×10^{0}

19H-25 = 1080
= 1.08×10^{3}

19H-26 = 266
= 2.66×10^{2}

19H-27 =
9.955×10^{-8} (4SD)

19H-28 = 10 integer

19H-29 = 0.0401
= 4.01×10^{-2}

19H-30 = 9.08
= 9.08×10^{0}

19H-31 = 0.00366
= 3.66×10^{-3}

19H-32 = 1810
= 1.81×10^{3}

19H-33 = 0.00607
= 6.07×10^{-3}

19H-34 = 5.37
= 5.37×10^{0}

19H-35 = 26000
= 2.60×10^{4}

19H-36 = 0.175
= 1.75×10^{-1}

19H-37 = 8180
= 8.18×10^{3}

19H-38 = 4.13
= 4.13×10^{0}

19H-39 = 2100
= 2.10×10^{3}

19H-40 = 45.8
= 4.58×10^{1}

19H-41 = -18.3
= -1.83×10^{1}

19H-42 = 0.000929
= 9.29×10^{-4}

19H-43 = -1.41
= -1.41×10^{0}

19H-44 = 1.39×10^{8}

19H-45 = -1.52×10^{9}

19H-46 = $62.80

19H-47 = 3.53
= 3.53×10^{0}

19H-48 = 1.93
= 1.93×10^{0}

19H-49 = 16.9
= 1.69×10^{1}

19H-50 = 0.757
= 7.57×10^{-1}

19H-51 = 1.93×10^{-6}

19H-52 = -187
= -1.87×10^{2}

19H-53 = -0.304
= -3.04×10^{-1}

19H-54 = 1.69
= 1.69×10^{0}

19H-55 = 2.17
= 2.17×10^{0}

19H-56 = 29,400
= 2.94×10^{4}

19H-57 = 21.9
= 2.19×10^{1}

19H-58 = -294
= -2.94×10^{2}

19H-59 = 5.25
= 5.25×10^{0}

19H-60 = 44.0
= 4.40×10^{1}

19H-61 = 48.3
= 4.83×10^{1}

19H-62 = $5.41 \times 10^{687,719}$

19H-63 = 51.3
= 5.13×10^{1}

19H-64 = 94.8
= 9.48×10^{1}

19H-65 = 2.00
= 2.00×10^{0}

19H-66 = 0.838
= 8.38×10^{-1}

19H-67 = 367
= 3.67×10^{2}

19H-68 = 1.15×10^{-11}

19H-69 = 0.454
= 4.54×10^{-1}

19H-70 = -0.00520
= -5.20×10^{-3}