

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 19F (District)

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.*, 1.23×10*, 1.23×10^{0*}
1.23×10¹, 1.23×10⁰¹, .0190, 0.0190, 1.90×10⁻²

Incorrect: 12.30, 123.0, 1.23(10)², 1.23·10², 1.230×10²,
1.23*10², 0.19, 1.9×10⁻², 19.0×10⁻³, 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 .

19F-1. $(8.56/3.21) + 1.37$ ----- 1= _____

19F-2. $(0.343 - 0.0348)/(-0.119) + 1.59$ ----- 2= _____

19F-3. $(-41.1 - 4.64 + 7.11 + 0.582)/(-25)$ ----- 3= _____

19F-4. $\frac{(1670 - 1290)}{\{(-8.49)/(-4.77)\}} + (158 - 29.1)$ ----- 4= _____

19F-5. $\frac{\{(0.00273 - 0.00206 + 0.00336)/(-0.0181)\}}{\{(0.0916)(-0.015)/(-0.0878)\}}$ ----- 5= _____

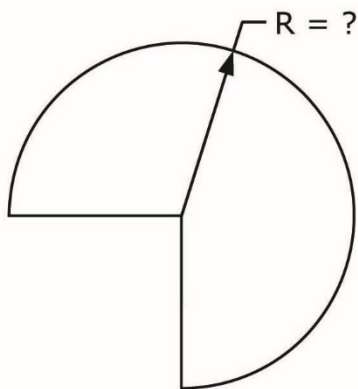
19F-6. What is the sum of 83.1, 26.5 and 28.9? ----- 6= _____

19F-7. Calculate 513 raised to the power 0.41. ----- 7= _____

19F-8. What is the cube root of 4.26, raised to the power π ? ----- 8= _____

19F-9.

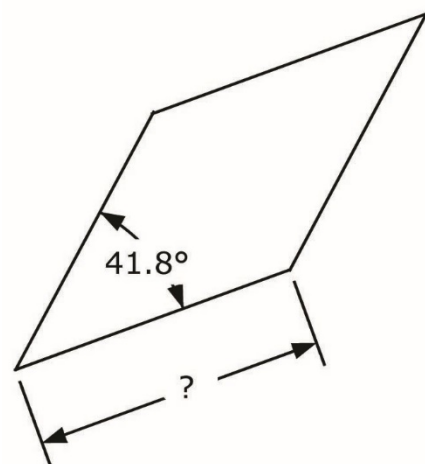
THREE QUARTER CIRCLE



19F-9 = _____

19F-10.

RHOMBUS



19F-10 = _____

19F-11. $\frac{(-5.49)(-1.24) + (1.66)(8.44)}{-3.18 + 1.58 - (-2.59)(0.79)}$ ----- 11=_____

19F-12. $\frac{-694 + 194}{(0.136)(1.19)(-0.00193)} + (854 + 2130)(368 - 191)$ ----- 12=_____

19F-13. $\frac{(0.462)(200 - 88.1)\{-0.53 - (0.928)(-0.553)\}}{(0.73 + 0.227)(-0.246 - 0.936)}$ ----- 13=_____

19F-14. $\frac{(70.8 + 64.2)(1.57 + 1.97)(46.8 - 79.3)}{(\pi + 0.767)(-8.65)\{(-8.15)/(3.64)\}}$ ----- 14=_____

19F-15. $\frac{(96500 + 95000 - 1.30 \times 10^5)(0.988 - 0.921 - \pi)}{(-0.0168)(-6.71)(-4.65)(7.62 + 7.51 + 33.6)}$ ----- 15=_____

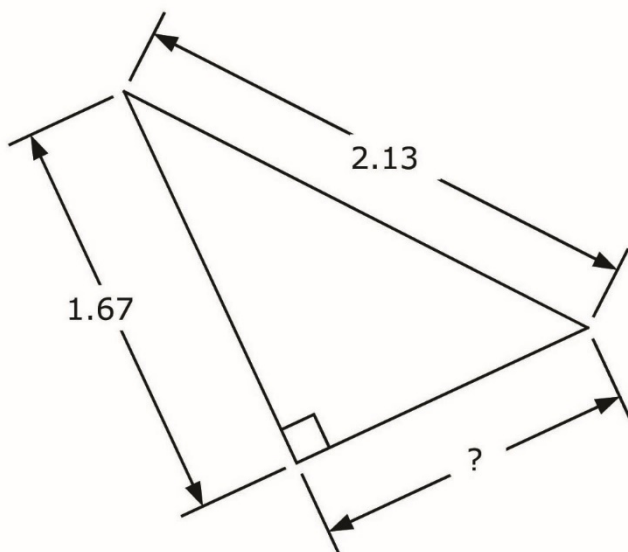
19F-16. A gallon of paint covers 250 ft^2 . How many gallons are needed to paint five walls, each of which is 12 ft by 14 ft? ----- 16=_____ gal

19F-17. The largest star sapphire in the world is the Sri Lankan Star of Adam which weighs 146.6 g and is worth \$175 million. What is its value per ounce? ----- 17=_____ \$/oz

19F-18. A worker shovels a total of 3 "yards" of mulch into a wheelbarrow. A "yard" of mulch is actually a cubic yard. How long does the shoveling take if a shovel holds 130 in^3 of mulch, and he moves a shovel-full into the wheelbarrow every 4.8 s? ----- 18=_____ hr

19F-19.

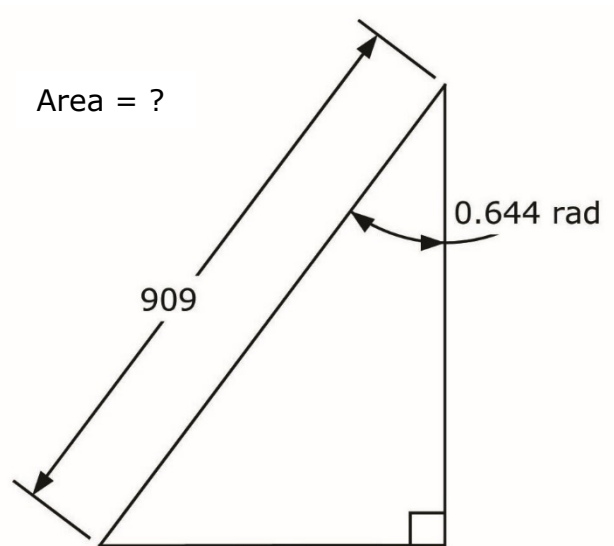
RIGHT TRIANGLE



19F-19 = _____

19F-20.

RIGHT TRIANGLE



19F-20 = _____

19F-21. $\left[\frac{\sqrt{0.754 - 0.31}}{3.49} + \frac{(1.34)}{9.16} \right]^2$ ----- 21=_____

19F-22. $\sqrt{\frac{(1.88)(5.93)}{832 + 803}} + 0.063$ ----- 22=_____

19F-23. $(-3.27)(-0.146)\sqrt{(-0.105)^2/0.903} + 1/\sqrt{292 + 554}$ ----- 23=_____

19F-24. $\frac{\sqrt{7.92 + \pi + (3)/(0.376)}}{-0.211 + 0.0689}$ ----- 24=_____

19F-25. $\left[\frac{1.25 + 1.15 + \sqrt{0.69/0.602}}{-548 + 224} \right]^2$ ----- 25=_____

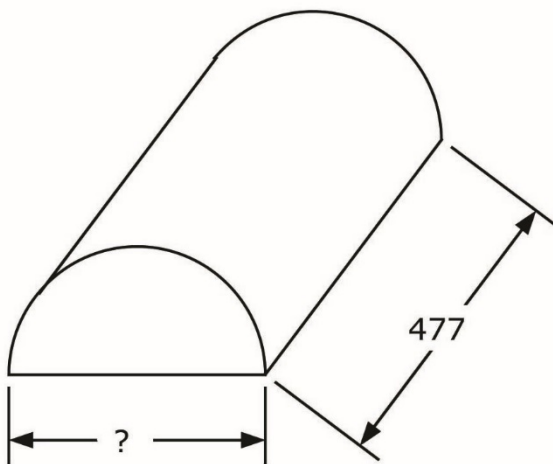
19F-26. If the product of two consecutive, negative, even integers is 2400, what is the smaller (i.e., most negative) number? ----- 26=_____ integer

19F-27. A ball is dropped from a height of 39 in and recovers 88% of its height on the rebound. After how many total bounces does the ball height drop just below 8 in? ----- 27=_____ integer

19F-28. "All the tea in China" can mean a large amount of money. In 2016, annual tea production was 2.41 million metric tons. If the cost of loose tea is \$41/lb, and a metric ton is 1000 kg, what is the annual dollar value of all the tea in China? Answer with three significant digits. ----- 28=_____

19F-29.

SEMICYLINDER

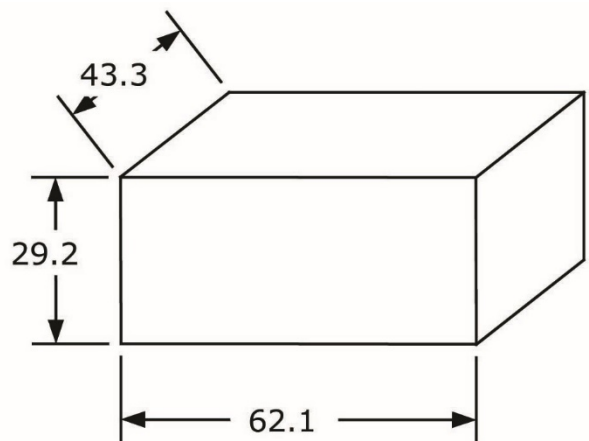


Volume = 1.45×10^7

19F-29 = _____

19F-30.

RECTANGULAR SOLID



Total Surface Area = ?

19F-30 = _____

19F-31. $\frac{(6410 + 7470)^2}{\sqrt{52.5 - 22.7}} + \frac{2.07 \times 10^9}{\sqrt{1450 + 2810}}$ ----- 31=_____

19F-32. $\sqrt{\frac{9.92}{\sqrt{35.2 + 15}}} \times \left[\frac{1}{(7.18 - 6.57)^2} + \frac{1}{(1.43 + 0.166)^2} \right]$ ----- 32=_____

19F-33. $\frac{[1.79 \times 10^{-5}/(0.78 + 0.77) + 1/(9260)]^{1/2}}{(3510 + 4680)^2 \times \sqrt{21600 - (-8250)}}$ ----- 33=_____

19F-34. $\frac{[(54.2 - 15.2)(0.476/0.608)]^{1/2}}{(0.25)^2 + (0.177 + 0.271)^2 + 0.121}$ ----- 34=_____

19F-35. $\frac{\left[\frac{(-0.00932 + 9.96 \times 10^{-4})}{(994 + 1200)} \right]^2 + \sqrt{\frac{2.48 \times 10^{-23} + 2.48 \times 10^{-23}}{\sqrt{0.931}}}}{\{(-0.00878)/(0.00614)\}^2}$ --- 35=_____

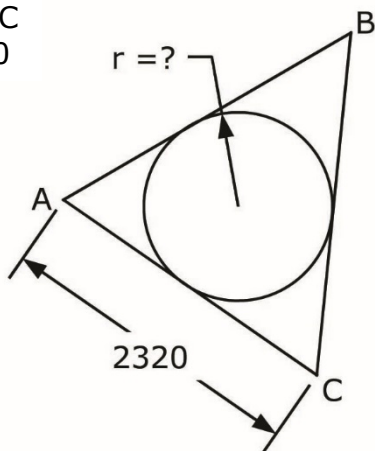
19F-36. What is the percent decrease in volume of earth and Venus?
Venus' diameter is 12,103.6 km. Earth's may be taken to be 12,742 km. ----- 36=_____%(SD)

19F-37. How many hours before bedtime can a person drink a cup of coffee without it keeping them awake? A cup of coffee has 180 mg caffeine which has a half life 5.7 hr. Assume caffeine less than 120 mg has no perceivable stimulus effect. ----- 37=_____hr

19F-38. A flashlight is placed a distance h above the surface of a bowling ball 8.5 in in diameter. The fraction of the bowling ball surface area illuminated by the flashlight is 35%. This fraction is given by $[1 - \sin \theta]/2$, where θ is the semicone angle of a cone whose apex is the flashlight with lines extending from the flashlight tangent to the bowling ball. What is h? ---- 38=_____in

19F-39.
ISOSCELES TRIANGLE AND CIRCLE

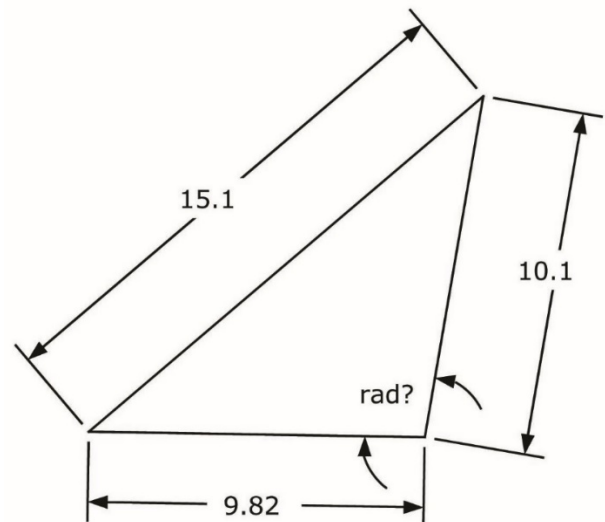
AB = BC
= 2600



19F-39 = _____

19F-40.

SCALENE TRIANGLE



19F-40 = _____

19F-41. $10^{-\{(0.0364 - 0.353)/(0.117 + 0.112)\}}$ ----- 41=_____

19F-42. $\frac{(-3.14 \times 10^{-6})}{(-1.90 \times 10^{-6})} [1 - e^{-(0.264)(0.485)}]$ ----- 42=_____

19F-43. $(5560) \log \{(5970)(0.963 + 1/0.617)\}$ ----- 43=_____

19F-44. $(1.06 \times 10^{-5} + 1.22 \times 10^{-5})^{-(0.526 + 0.351)}$ ----- 44=_____

19F-45. $(\text{deg}) \{(2.57 \times 10^{-6}) \sin(-74.9^\circ)\} \times \{(-6.31 \times 10^{-6}) \cos(-46.2^\circ)\}$ ---- 45=_____

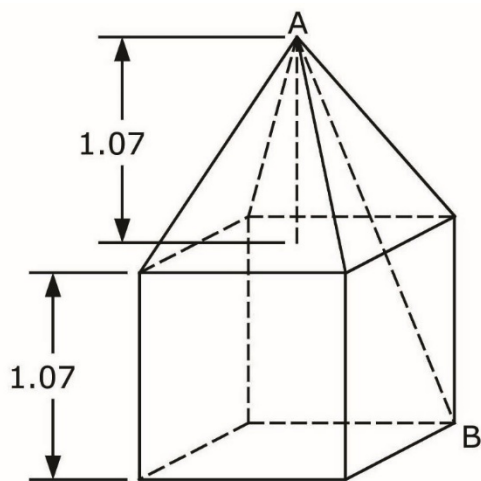
19F-46. If a 2-quart cook pot costs \$25.95, how much does a 1-gallon cook pot cost? Assume constant wall thickness and shape. ----- 46=\$_____

19F-47. A spurious correlation is the per capita consumption of mozzarella cheese and the number of civil engineering doctoral degrees awarded. Data are (lbs, degrees): (9.7, 570), (9.9, 560), (10.2, 620), (10.5, 660). What is the correlation coefficient? ----- 47=_____

19F-48. What is t if $e^t = 10t[2^t]$ and $t > 1$? ----- 48=_____

19F-49.

CUBE AND SQUARE PYRAMID

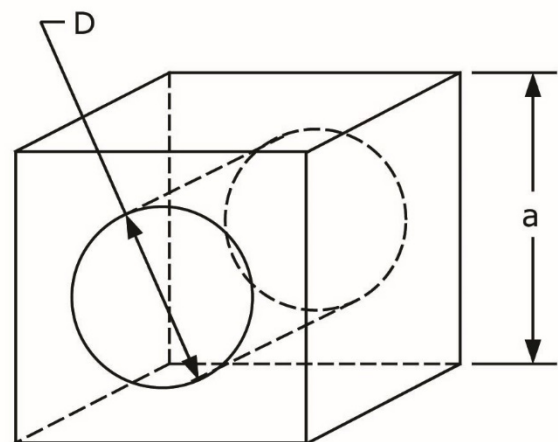


AB = ?

19F-49 = _____

19F-50.

CUBE WITH CYLINDRICAL CAVITY



Total Surface Area = $7a^2$

$D/a = ?$

19F-50 = _____

19F-51. $10^{+(0.479)} + 10^{-(0.421)} + \left[10^{(0.148/0.844)} - 10^{(0.0672)} \right]^{1/2}$ 51=_____

19F-52. $\frac{523 + e^{(4.62 + 1.71)}}{0.255 - e^{-(0.812 - 0.443)}}$ ----- 52=_____

19F-53. $\frac{\text{Ln}\{(51.3)(46.1)(30)\}}{228 + (77.6) \text{Ln}(25.1)}$ ----- 53=_____

19F-54. $\frac{(3.92)^{0.551} - (4.12)^{-0.883}}{-1.15 \times 10^{-5} + 1.92 \times 10^{-6}}$ ----- 54=_____

19F-55. (rad) $\frac{\arctan\{3.11 + (3.17)(0.753)\}}{\arcsin\{(84100 + 10100)/1.77 \times 10^5\}}$ ----- 55=_____

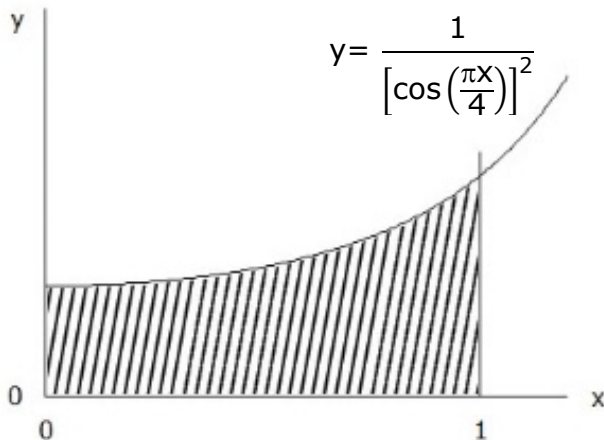
19F-56. (rad) Calculate the slope of the curve $y = 5\cos x$ at the point where the curve intersects the line $y = 2x$. ----- 56=_____

19F-57. A farmer has 100 ft of fence and wants to make an enclosure with five sides. The enclosure is a pentagon made up of an equilateral triangle and rectangle. Calculate the maximum enclosed area of the enclosure. ----- 57=_____ ft²

19F-58. Solve for u if $T_{11} = 25$ and $\mathbf{T} = 6\mathbf{S} + 2\mathbf{R}$, $\mathbf{S} = \begin{bmatrix} u & 20 \\ 20 & -4 \end{bmatrix}$ and $\mathbf{R} = \begin{bmatrix} 5 & 2u \\ 2u & 7 \end{bmatrix}$. ----- 58=_____

19F-59.

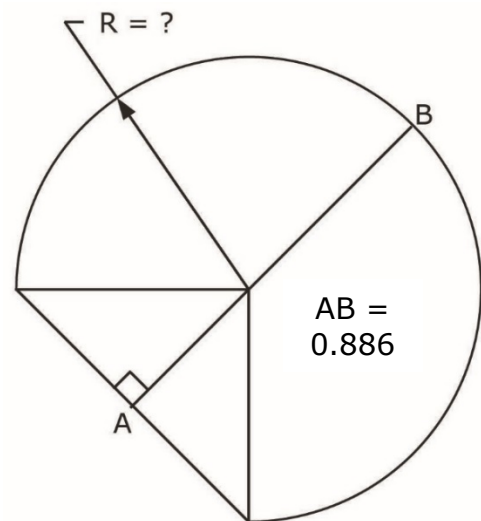
Radians
Hatched Area = ?



19F-59 = _____

19F-60.

THREE QUARTER CIRCLE AND
RIGHT ISOSCELES TRIANGLE



19F-60 = _____

19F-61. Donnie takes a test, and he is allowed to do a retake as many times (N) as he wants. After 4 retakes, he got a score (S) of 73%. How many total times must he retake the test to score just over 95%?

Assume his score improvement decays exponentially according to

$$S = 100(1 - Ae^{-N}) \text{ where } A \text{ is a constant.} \quad \text{----- } 61 = \underline{\hspace{2cm}} \text{ integer}$$

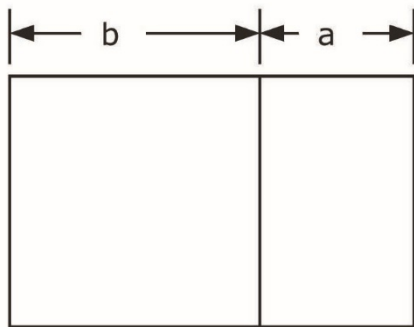
19F-62. The odds of being attacked by a shark in the US is 1/8,000,000.

What are the odds of being attacked by a shark 80 times? ----- 62 =

19F-63. An archer fires an arrow at a target 230 ft away with a release velocity of 270 ft/s. The time of flight may be calculated approximately assuming the arrow travels in a straight line at constant velocity, and it can be calculated using the more accurate time of flight trajectory equation with a small release angle. What is the percent error in the time of flight? ----- 63 = %

19F-64.

SQUARE AND SIMILAR RECTANGLES

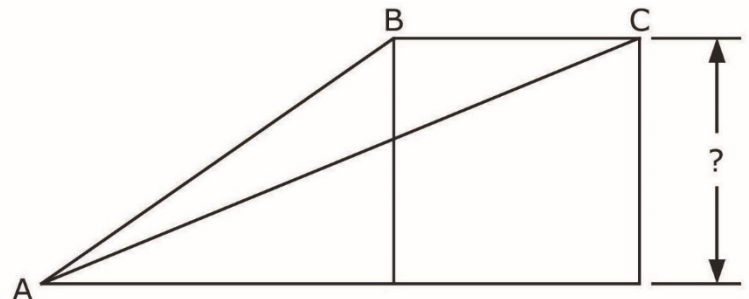


$$b/a = ?$$

19F-64 =

19F-65.

SQUARE AND RIGHT TRIANGLES



$$AB = 3.27 \quad AC = 4.93$$

19F-65 =

$$19F-66. \quad 2\text{Log} \sqrt{\frac{(3.77)(0.302)(3.54)}{(5.75)^3(1.42)^3}} \quad \text{----- } 66 = \underline{\hspace{2cm}}$$

$$19F-67. \quad (3.94)10^{\text{Log}[(9.14)(0.13)]} + \{(29.7)(0.926)\}^{1/2} \quad \text{----- } 67 = \underline{\hspace{2cm}}$$

$$19F-68. \quad (\text{deg}) \quad \left\{ \cos^2(31.3^\circ) - \sin^2(31.3^\circ) \right\} \times \frac{\tan(31.3^\circ)}{1 - \tan^2(31.3^\circ)} \quad \text{----- } 68 = \underline{\hspace{2cm}}$$

$$19F-69. \quad 1 + 0.47 + (0.47)^2 + \frac{(0.47)^4}{8} - \frac{(0.47)^5}{15} \quad \text{----- } 69 = \underline{\hspace{2cm}}$$

$$19F-70. \quad (\text{rad}) \quad \frac{(79.2)(-48.7) - \text{Ln}\{(0.905) + (-5.96)e^{(-2.66)}\}}{\arcsin\{(2.3)/(5.06 + 169)\}} \quad \text{----- } 70 = \underline{\hspace{2cm}}$$

19F-1	= 4.04 = 4.04×10^0	19F-11	= 46.7 = 4.67×10^1	19F-21	= 0.114 = 1.14×10^{-1}
19F-2	= -1.00 = -1.00×10^0	19F-12	= 2.13×10^6	19F-22	= 0.146 = 1.46×10^{-1}
19F-3	= 1.52 = 1.52×10^0	19F-13	= 0.769 = 7.69×10^{-1}	19F-23	= 0.0871 = 8.71×10^{-2}
19F-4	= 342 = 3.42×10^2	19F-14	= -205 = -2.05×10^2	19F-24	= -30.7 = -3.07×10^1
19F-5	= -14.2 = -1.42×10^1	19F-15	= 7400 = 7.40×10^3	19F-25	= 0.000115 = 1.15×10^{-4}
19F-6	= 139 = 1.39×10^2	19F-16	= 3.36 = 3.36×10^0	19F-26	= -50 integer
19F-7	= 12.9 = 1.29×10^1	19F-17	= 3.38×10^7	19F-27	= 13 integer
19F-8	= 4.56 = 4.56×10^0	19F-18	= 1.44 = 1.44×10^0	19F-28	= 2.18×10^{11}
19F-9	= 1.40 = 1.40×10^0	19F-19	= 1.32 = 1.32×10^0	19F-29	= 278 = 2.78×10^2
19F-10	= 0.936 = 9.36×10^{-1}	19F-20	= 198,000 = 1.98×10^5	19F-30	= 11,500 = 1.15×10^4

19F-31	= 6.70x10 ⁷	19F-41	= 24.1 = 2.41x10 ¹	19F-51	= 3.97 = 3.97x10 ⁰	19F-61	= 6 integer
19F-32	= 3.64 = 3.64x10 ⁰	19F-42	= 0.199 = 1.99x10 ⁻¹	19F-52	= -2480 = -2.48x10 ³	19F-62	= 5.66x10 ⁻⁵⁵³
19F-33	= 9.43x10 ⁻¹³	19F-43	= 23300 = 2.33x10 ⁴	19F-53	= 0.0234 = 2.34x10 ⁻²	19F-63	= -0.129 = -1.29x10 ⁻¹
19F-34	= 14.4 = 1.44x10 ¹	19F-44	= 11800 = 1.18x10 ⁴	19F-54	= -192000 = -1.92x10 ⁵	19F-64	= 1.62 = 1.62x10 ⁰
19F-35	= 1.05x10 ⁻¹¹	19F-45	= 1.08x10 ⁻¹¹	19F-55	= 2.48 = 2.48x10 ⁰	19F-65	= 1.88 = 1.88x10 ⁰
19F-36	= 5.010 = 5.010x10 ⁰ (4SD)	19F-46	= \$41.19	19F-56	= -4.48 = -4.48x10 ⁰	19F-66	= -2.13 = -2.13x10 ⁰
19F-37	= 3.33 = 3.33x10 ⁰	19F-47	= 0.948 = 9.48x10 ⁻¹	19F-57	= 586 = 5.86x10 ²	19F-67	= 9.93 = 9.93x10 ⁰
19F-38	= 9.92 = 9.92x10 ⁰	19F-48	= 16.7 = 1.67x10 ¹	19F-58	= 2.50 = 2.50x10 ⁰	19F-68	= 0.444 = 4.44x10 ⁻¹
19F-39	= 718 = 7.18x10 ²	19F-49	= 2.27 = 2.27x10 ⁰	19F-59	= 1.27 = 1.27x10 ⁰	19F-69	= 1.70 = 1.70x10 ⁰
19F-40	= 1.72 = 1.72x10 ⁰	19F-50	= 0.397 = 3.97x10 ⁻¹	19F-60	= 0.519 = 5.19x10 ⁻¹	19F-70	= -292000 = -2.92x10 ⁵