

Name _____

Tie Breaker: Points scored on Stated and Geometry Problems
 + _____ + _____ + _____

5x(Last Problem Attempted) + _____ + _____ + _____
 7x(Number Incorrect) - _____ - _____ - _____
 2x(Number Incorrect SDs) - _____ - _____ - _____
 TOTAL SCORE _____

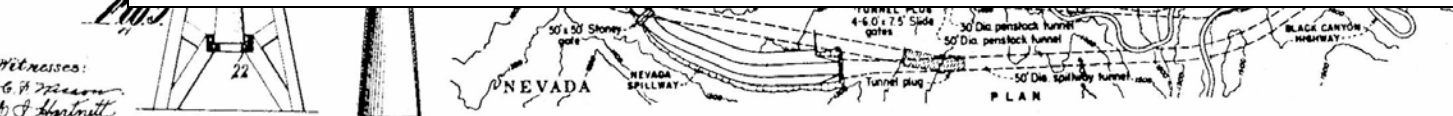
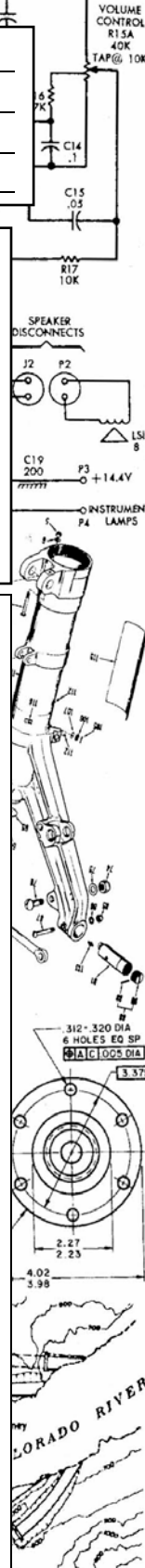
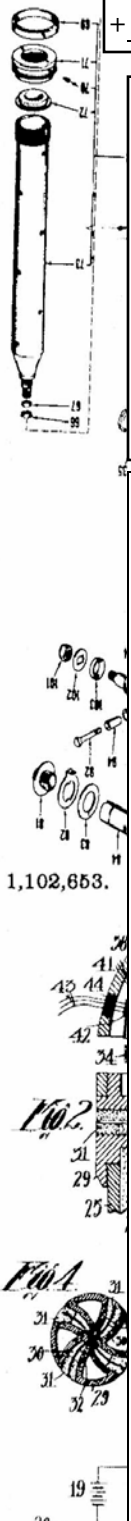
UIL Calculator Applications

Test 21B

(Invitational B)

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*, 1.23x10^{0*}
 1.23x10¹, 1.23x10⁰¹, .0190, 0.0190, 1.90x10⁻²
 - Incorrect: 12.30, 123.0, 1.23(10)², 1.23•10², 1.230x10²,
 1.23*10², 0.19, 1.9x10⁻², 19.0x10⁻³, 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.



21B-1. $(0.334 - 0.154)/(0.424)$ ----- 1= _____

21B-2. $(-7.6 \times \pi) - (14.1 - 18.3)$ ----- 2= _____

21B-3. $\frac{(1.21)(4.58)(3.92)}{-3.61} + 5.6$ ----- 3= _____

21B-4. $\frac{(1920 - 539)}{\{(0.879)/(-1.72)\}} + (847 - 439)$ ----- 4= _____

21B-5. $\frac{(-0.00858 - 0.00819)(15.3)}{\{(2.32)/(-55.1)\}} - (8.33 - 1.75)$ ----- 5= _____

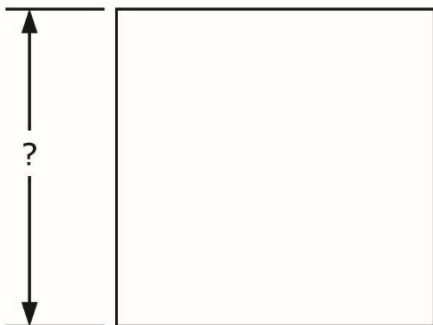
21B-6. What is the positive square root of 5.96? ----- 6= _____

21B-7. What is w if 2530 plus w equals 9240? ----- 7= _____

21B-8. Solve for t if t cubed divided by 5.04 equals -0.0823. ----- 8= _____

21B-9.

SQUARE

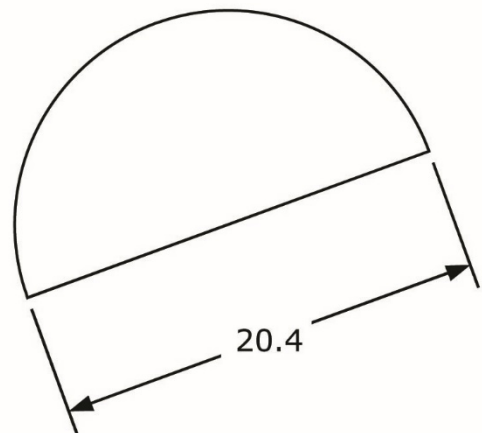


Area = 47.2

21B-9 = _____

21B-10.

SEMICIRCLE



Area = ?

21B-10 = _____

21B-11. $\frac{(-60.4 + 36.9)(-43.8 - 25.4 + 59.7)}{(-23.5)(68.3) - 1450}$ ----- 11 = _____

21B-12. $\frac{\{-0.108 + (0.647)(0.401)(-0.637)\}}{(0.799 + 3.62)(-0.444)(2.31 + 1.88)}$ ----- 12 = _____

21B-13. $\frac{-47800 + 17600 - 19900 + 10900 + 29700}{(\pi)(70.9 + 8.73)(9.36 + 7.33)}$ ----- 13 = _____

21B-14. $\frac{\{(0.636 + 0.654)(2.7 + 0.416) + 6.4 - 1.79\}}{(-531 - 185)(-0.76 + 0.822 - 0.128)}$ ----- 14 = _____

21B-15. $\frac{2740 + 6490 - (24000 + 1.15 \times 10^5)(\pi - 1.05)}{(-840)(-5.62)(2.13)(455 - 210 + 750)}$ ----- 15 = _____

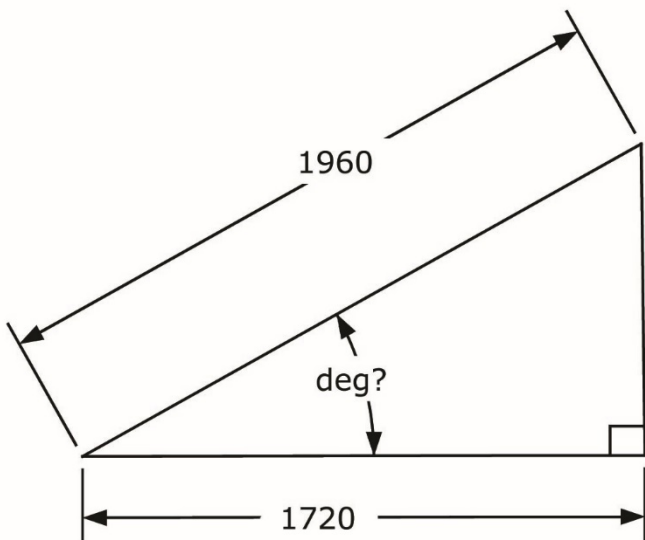
21B-16. Wendy bought four items at the store, costing \$21.95, \$4.82, \$11.70 and \$8.53. With 8.125% sales tax added, how much did she pay? ---- 16 = \$ _____

21B-17. Hana drove from Three Rivers TX to Four Corners TX, a distance of 202 mi. How fast did she drive if the trip took 3 hr 11 min? ----- 17 = _____ mph

21B-18. How many tablespoons are in a half gallon? ----- 18 = _____ integer

21B-19.

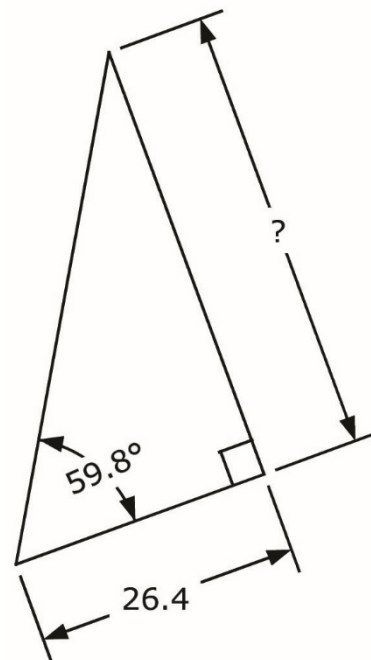
RIGHT TRIANGLE



21B-19 = _____

21B-20.

RIGHT TRIANGLE



21B-20 = _____

21B-21. $\frac{1}{-1.63 + \pi} + \frac{1}{1.62 - 9.68} + \frac{1}{(2.9)}$ ----- 21=_____

21B-22. $\left[\frac{(0.764)(0.538)}{-2.33} + 0.145\right]^2 + \sqrt{5.58 \times 10^{-7}}$ ----- 22=_____

21B-23. $\left[\frac{2.69 + 1.57 + \sqrt{0.416/0.746}}{23.7 + 22.6}\right]^2$ ----- 23=_____

21B-24. $[-97.3 + \sqrt{2130}]^2 \times [527 + 2750]^2 \times \sqrt{0.244/0.828}$ ----- 24=_____

21B-25. $(-11.8)(\pi) + \sqrt{(7160)/(9.81)} + [(0.647)(8.24)]^2$ ----- 25=_____

21B-26. The Taj Mahal sits on a 17 hectare complex. If a hectare is the area of a 100-m square, how many acres is this? ----- 26=_____ acres

21B-27. It is estimated that a pound of oreo cookies sold for \$0.22 in 1912, its first year of sales. In 2020, a 14.3 oz bag costs \$3.07. Based on this, what is the average annual inflation rate? ----- 27=_____ %

21B-28. The Great Salt Lake has an estimated surface area of 1710 mi² and an average depth of 16.3 ft. What is the percent error in the calculated lake's volume if the exact value is 15,338,000 acre-ft? ----- 28=_____ % (SD)

21B-29.

CUBE
AB = ?

A = midpoint

21B-29 = _____

21B-30.

SPHERE
D = ?

Total Surface Area = 0.268

21B-30 = _____

21B-31. $\left[\frac{-0.482}{-0.311 + 0.183} + 4.28 \right] \times \left\{ 2420 + (-65.7)^2 - \sqrt{1.89 \times 10^7} \right\}$ --- 31 = _____

21B-32. $\sqrt{\frac{9.45}{\sqrt{79.4 + 19.1}}} \times \left[\frac{1}{(2.13 - 0.43)^2} + \frac{1}{(13.2 + 8.1)^2} \right]$ ----- 32 = _____

21B-33. $\frac{[(5.18 - 2.86)(0.392/0.215)]^{1/2}}{(0.913)^2 + (0.257 + 0.907)^2 + 1.16}$ ----- 33 = _____

21B-34. $\frac{\sqrt{(300)/\{(335)/\sqrt{759}\}}}{2.18 + (0.483)(5.83)} + \{0.203 + 1.11\}^{1/2}$ ----- 34 = _____

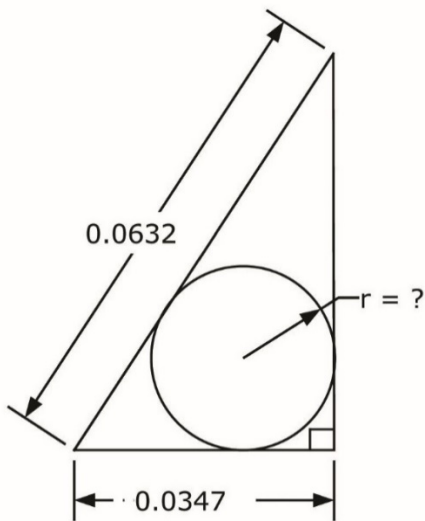
21B-35. $\frac{\left[\frac{(-5.05 \times 10^{-4} + 9.70 \times 10^{-5})}{(444 + 1050)} \right]^2 + \sqrt{\frac{5.55 \times 10^{-27} + 6.48 \times 10^{-27}}{\sqrt{0.262}}}}{\{(-4.30 \times 10^{-4})/(8.17 \times 10^{-4})\}^2}$ 35 = _____

21B-36. Nancy's quiz grade is linearly related to how long she studies. Studying 2 hr, she received a 75. Studying 3 hr, she got an 83. What would her grade be if she didn't study at all? ----- 36 = _____ integer

21B-37. Water pressure is the product of water density, the gravitational constant and depth. What is the water pressure at the Titanic, which sits at a depth of 12,000 ft, a positive number? ----- 37 = _____ psi

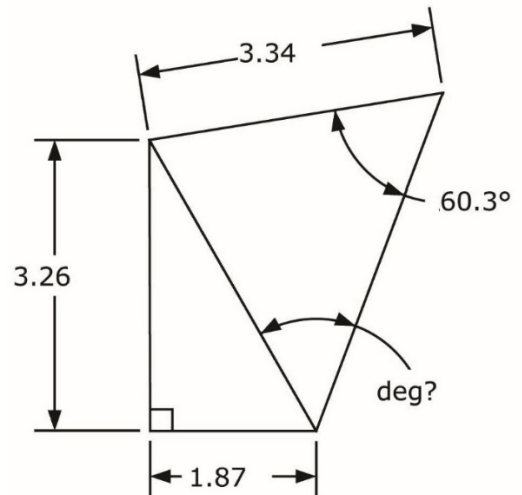
21B-38. At Galveston Pier 21, the tide height varies sinusoidally. High tide was 2.6 ft at 10 AM and low tide was 1.6 ft at 10 PM. What was the water level at 3:30 PM? ----- 38 = _____ ft

21B-39. RIGHT TRIANGLE AND CIRCLE



21B-39 = _____

21B-40. RIGHT AND SCALENE TRIANGLES



21B-40 = _____

21B-41. $(579)(735)10^{\{976/972\}}$ ----- 41 = _____

21B-42. $\frac{e^{+0.621} + e^{-0.18}}{(-6.10 \times 10^{-6} + 9.20 \times 10^{-7})}$ ----- 42 = _____

21B-43. $\frac{\text{Ln}(0.699 + 1.31 - 0.31)}{(-0.978)}$ ----- 43 = _____

21B-44. $(975 + 2550)^{1/3} + 1/\{(295)^{-0.299}\}$ ----- 44 = _____

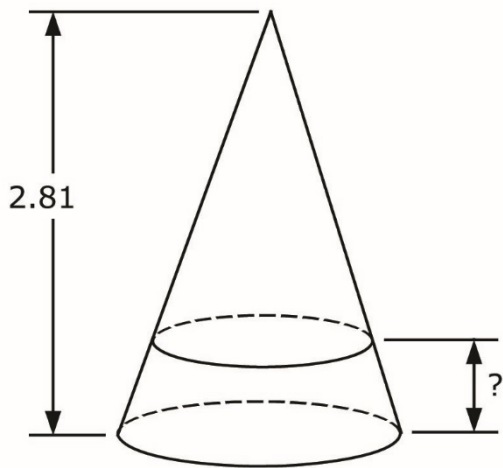
21B-45. (deg) $\sin \left[90^\circ \times \frac{(0.48)}{(0.576)} \right] + \cos \{ 179^\circ - 110^\circ \}$ ----- 45 = _____

21B-46. A person harvests potatoes at the same rate regardless of the size of the potato. If 3 workers harvest 1500 lbs of 5-in long potatoes in 8 hr, how many pounds of 3-in potatoes can 5 workers harvest in 3 hr? ----- 46 = _____ lbs

21B-47. Frank drives a golf ball down a fairway, attempting for the ball to travel 50 yd. It actually travels 46 yd. Repeating for 100 yd, it travels 105 yd. Other data include (150 yd, 135 yd) and (200 yd, 218 yd). If Frank wants the ball to travel 250 yd, what distance should he attempt? ----- 47 = _____ yd

21B-48. (rad) For what positive value of d does $d^2 = 20\cos(d)$? ----- 48 = _____

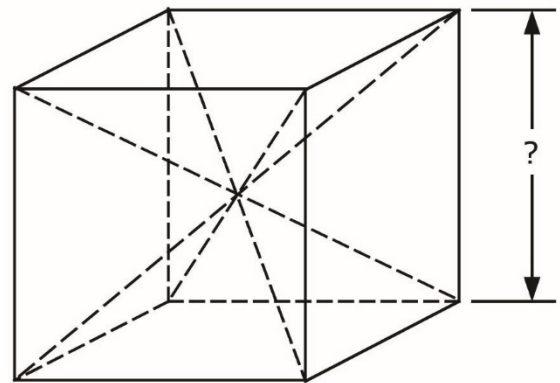
21B-49. LARGE CONE AND FRUSTUM



$$\text{Frustum Volume} = \frac{1}{2} \left(\begin{matrix} \text{Large} \\ \text{Cone} \\ \text{Volume} \end{matrix} \right)$$

21B-49 = _____

21B-50. CUBE AND TWO IDENTICAL PYRAMIDS



$$\text{Cube Volume} - \text{Both Pyramid Volumes} = 77.3$$

21B-50 = _____

21B-51. $\frac{(-0.0036) 10^{-(1.26 - 0.684)}}{0.00316 + 0.00129}$ ----- 51 = _____

21B-52. $\frac{\pi + e^{(1.51 + 0.702)}}{0.15 - e^{-(0.917 - 0.209)}}$ ----- 52 = _____

21B-53. $(6.94) \ln \left[\frac{4.63 + (0.487)(8.16)}{5.39 + 37.5} \right]$ ----- 53 = _____

21B-54. $\frac{(5.51)^{0.365} - (\pi)^{-0.814}}{43700 + 7290}$ ----- 54 = _____

21B-55. (rad) $\frac{\arctan\{7.17 + (9.85)(0.46)\}}{\arcsin\{(20.3 + 3.92)/39.3\}}$ ----- 55 = _____

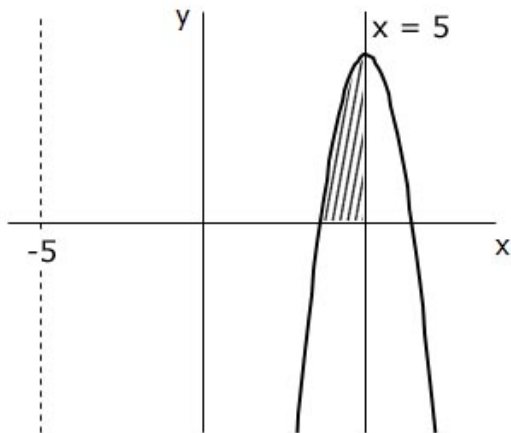
21B-56. For what value of y does the slope of the function $y = 3x^2 - 4x - 17$ equal 1.5? ----- 56 = _____

21B-57. A bug population is 250,000 bugs and doubles every 3 days. A bird eats 4 bugs hourly round the clock. How many birds are needed to maintain a constant bug population? ----- 57 = _____

21B-58. What is k_{12} if $\mathbf{k} = \begin{bmatrix} 51 & 61 \\ 61 & -45 \end{bmatrix} \begin{bmatrix} 0.5 & 1.2 \\ 1.2 & -8 \end{bmatrix}$? ----- 58 = _____

21B-59. SOLID OF REVOLUTION ($x = -5$)

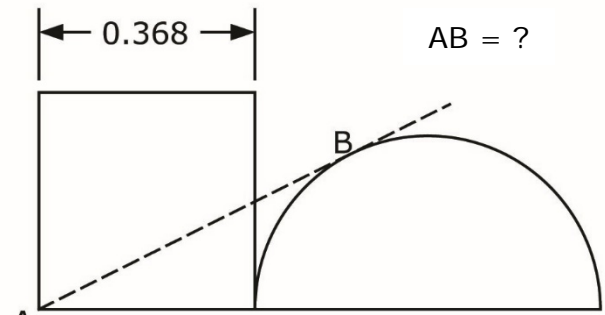
$y = -20x^2 + 200x - 460$



Volume = ?

21B-59 = _____

21B-60. SQUARE AND SEMICIRCLE



Square Area = Semicircle Area

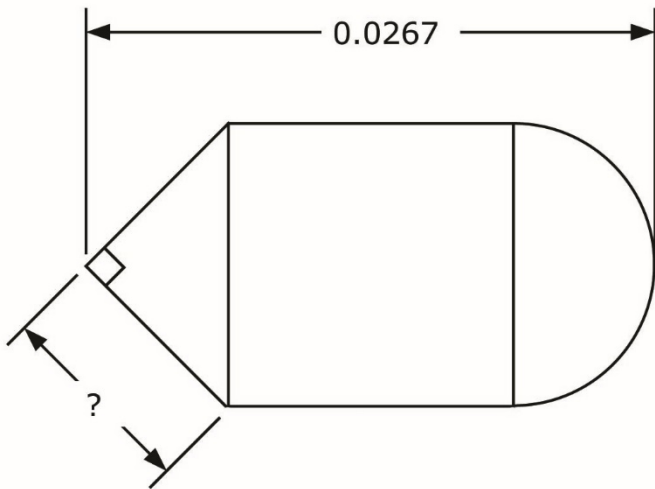
21B-60 = _____

21B-61. Two people are lost in the desert. One takes off heading south at 2 mph, and 25 min later, the other starts walking east at 2.5 mph. How long after the first person left does it take them to separate by 10 mi? ----- 61=_____ hr

21B-62. There are 3.72×10^{13} cells in the human body. What is this number raised to the 2530 power? ----- 62=_____

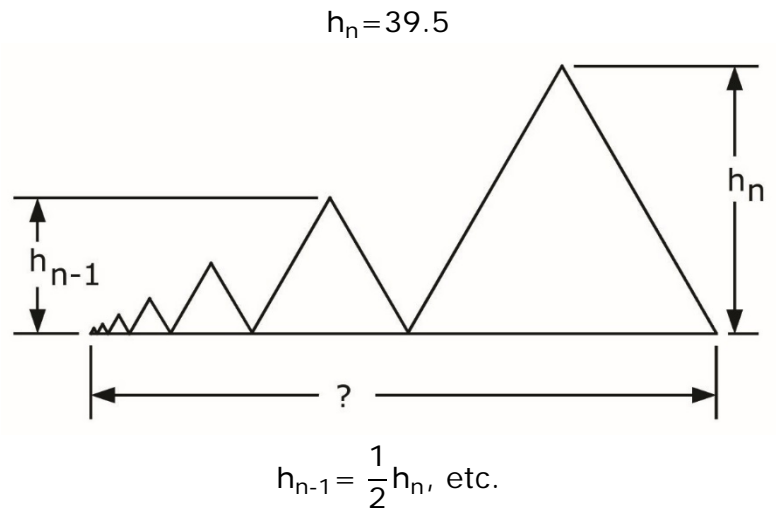
21B-63. A jet flying at 800 mph at an elevation above ground of 1200 ft fires an unpowered missile at a target. The release angle is 0° relative to the ground. How far from the ground target (horizontal distance) should the missile be fired? Neglect air resistance. ----- 63=_____ mi

21B-64.
RIGHT TRIANGLE, SQUARE, SEMICIRCLE



21B-64 = _____

21B-65.
INFINITE NUMBER OF EQUILATERAL TRIANGLES



21B-65 = _____

21B-66. $\ln \left[\frac{(6.86)^2 - 2(6.86)(8.93) + (8.93)^2}{(56.7)^2} \right]^2$ ----- 66=_____

21B-67. (rad) $\sin(5.16)\cos(2.84) - \cos(5.16)\sin(2.84)$ ----- 67=_____

21B-68. (rad) $\frac{98.2}{6(1.66)} \{ (6.14) + (2.87)\sin(-7.86) \}^5$ ----- 68=_____

21B-69. $1 + \frac{(0.629)^4}{2} - \frac{(0.629)^6}{6} + \frac{(0.629)^8}{24} - \frac{(0.629)^{10}}{120}$ ----- 69=_____

21B-70. (rad) $\frac{\arctan \left\{ e^{-(0.675)(0.411)} \sqrt{(-2.73)/(-7.68)} \right\}}{(-5.99)\sqrt{(8.7)(4.12)(6.74)}}$ ----- 70=_____

21B-1	= 0.425 = 4.25×10^{-1}	21B-11	= -0.0731 = -7.31×10^{-2}	21B-21	= 0.882 = 8.82×10^{-1}
21B-2	= -19.7 = -1.97×10^1	21B-12	= 0.0332 = 3.32×10^{-2}	21B-22	= 0.00173 = 1.73×10^{-3}
21B-3	= -0.418 = -4.18×10^{-1}	21B-13	= -2.28 = -2.28×10^0	21B-23	= 0.0117 = 1.17×10^{-2}
21B-4	= -2290 = -2.29×10^3	21B-14	= 0.183 = 1.83×10^{-1}	21B-24	= 1.53×10^{10}
21B-5	= -0.486 = -4.86×10^{-1}	21B-15	= -0.0281 = -2.81×10^{-2}	21B-25	= 18.4 = 1.84×10^1
21B-6	= 2.44 = 2.44×10^0	21B-16	= \$50.82	21B-26	= 42.0 = 4.20×10^1
21B-7	= 6710 = 6.71×10^3	21B-17	= 63.5 = 6.35×10^1	21B-27	= 2.58 = 2.58×10^0
21B-8	= -0.746 = -7.46×10^{-1}	21B-18	= 128 integer	21B-28	= 16 = 1.6×10^1 (2SD)
21B-9	= 6.87 = 6.87×10^0	21B-19	= 28.7 = 2.87×10^1	21B-29	= 1.78 = 1.78×10^0
21B-10	= 163 = 1.63×10^2	21B-20	= 45.4 = 4.54×10^1	21B-30	= 0.292 = 2.92×10^{-1}

21B-31	= 19200 = 1.92×10^4	21B-41	= 4.30×10^6	21B-51	= -0.215 = -2.15×10^{-1}	21B-61	= 3.37 = 3.37×10^0
21B-32	= 0.340 = 3.40×10^{-1}	21B-42	= -520000 = -5.20×10^5	21B-52	= -35.8 = -3.58×10^1	21B-62	= 2.98×10^{34} , 333
21B-33	= 0.614 = 6.14×10^{-1}	21B-43	= -0.542 = -5.42×10^{-1}	21B-53	= -11.1 = -1.11×10^1	21B-63	= 1.92 = 1.92×10^0
21B-34	= 2.14 = 2.14×10^0	21B-44	= 20.7 = 2.07×10^1	21B-54	= 2.88×10^{-5}	21B-64	= 0.00944 = 9.44×10^{-3}
21B-35	= 8.23×10^{-13}	21B-45	= 1.32 = 1.32×10^0	21B-55	= 2.24 = 2.24×10^0	21B-65	= 91.2 = 9.12×10^1
21B-36	= 59 integer	21B-46	= 203 = 2.03×10^2	21B-56	= -18.1 = -1.81×10^1	21B-66	= -13.2 = -1.32×10^1
21B-37	= 5200 = 5.20×10^3	21B-47	= 239 = 2.39×10^2	21B-57	= 602 = 6.02×10^2	21B-67	= 0.732 = 7.32×10^{-1}
21B-38	= 2.17 = 2.17×10^0	21B-48	= 1.46 = 1.46×10^0	21B-58	= -427 = -4.27×10^2	21B-68	= 3690 = 3.69×10^3
21B-39	= 0.0122 = 1.22×10^{-2}	21B-49	= 0.580 = 5.80×10^{-1}	21B-59	= 2240 = 2.24×10^3	21B-69	= 1.07 = 1.07×10^0
21B-40	= 50.5 = 5.05×10^1	21B-50	= 4.88 = 4.88×10^0	21B-60	= 0.593 = 5.93×10^{-1}	21B-70	= -0.00456 = -4.56×10^{-3}