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 22B

(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*, $1.23\text{x}10^{0}$*, $1.23\text{x}10^{1}$, $1.23\text{x}10^{01}$, .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}.

22B-1. (0.568 + 0.712) x 0.99 ---------- 1=_____

22B-2. (−6.22 + 6.82) x (−1.92) − 2.89 ---------- 2=_____

22B-3. (π − 1.88 + 2.5) x (6.09) − 86.5 ---------- 3=_____

22B-4. {(45.4 − 14.8 + 19.1)(−7.25)(−1.37)} − 353 ---------- 4=_____

22B-5. $\frac{(0.279 + 0.0622 - 0.288)(0.265)}{(0.448)(0.456)(0.261)}$ ---------- 5=_____

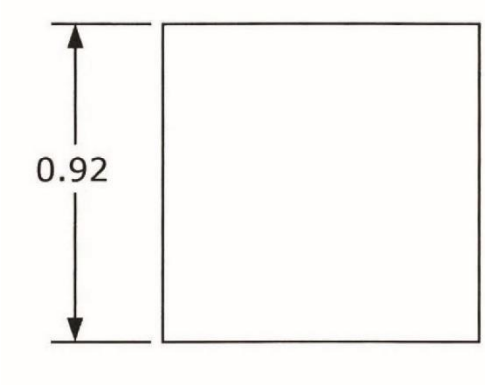
22B-6. What is the product of 0.0842 and 6.16? ---------- 6=_____

22B-7. Calculate the cube root of the sum, −65.4 and 50.7? ---------- 7=_____

22B-8. What is the sum, 0.847 and 0.845, when raised to the 0.0227 power? ---------- 8=_____

22B-9.

SQUARE

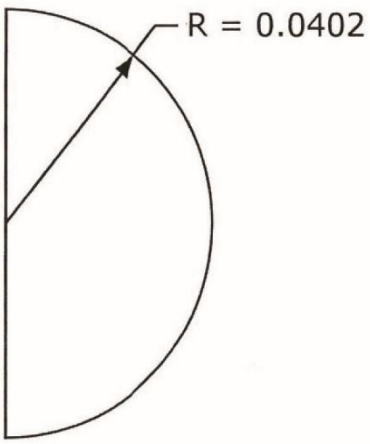


Area = ?

22B-9 =_____

22B-10.

SEMICIRCLE



Perimeter = ?

22B-10 =_____

22B-11. $\dfrac{(5880 + 1130)}{(0.61 - 1.89)} + \dfrac{(-1670 + 3180)}{(1.22 - 0.779)}$ ---------- 11=_____

22B-12. $\dfrac{3.96 + 3.55}{(0.309)(1.92)(3.38\text{x}10^{-5})} + (871 + 2960)(408 - 327)$ ---------- 12=_____

22B-13. $\dfrac{(-1.07\text{x}10^{-5} - 2.26\text{x}10^{-5})\{-1070 + (-7.79)(42.2)\}}{(74.3)(-0.904 + 0.175)(-76.4)(68.4)}$ ---------- 13=_____

22B-14. $\dfrac{4.46\text{x}10^{5}}{-0.828} + \dfrac{339 + 326 - 355}{0.146 - 0.161} + \dfrac{(-2.39\text{x}10^{-4} + 2.63\text{x}10^{-4})}{\{(-3.04\text{x}10^{-11})/(0.969)\}}$ ----- 14=_____

22B-15. $\dfrac{(85900 + 55300 - 76800)(0.568 - 0.421 - 0.548)}{(0.0642)(0.0937)(0.0645)(9.65 + 5.2 + 5.2)}$ ---------- 15=_____

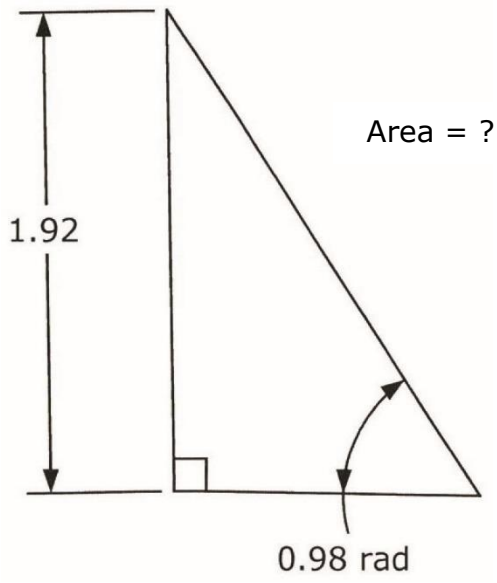
22B-16. Holt, Missouri holds the world record for the most rain in one hour, 305 mm. How much rain on average fell in one second? ---------- 16=_____ in

22B-17. A sparrow flies at 28 mph. Assuming 9 hr of flight daily, how long does it take to migrate from California to Alaska, a distance of 2000 mi? ---------- 17=_____ dy

22B-18. What is the average number of days in a month? ---------- 18=_____ dy

22B-19.

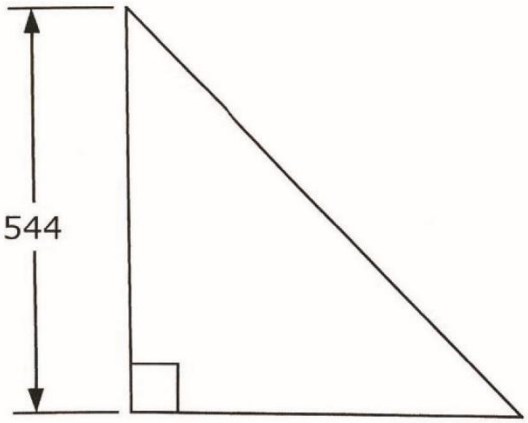
RIGHT TRIANGLE



22B-19 =_____

22B-20.

ISOSCELES RIGHT TRIANGLE



Perimeter = ?

22B-20 =_____

22B-21. $\left[\frac{\sqrt{0.645 - 0.223}}{5.85} + \frac{(0.144)}{7.29}\right]^2$ ---------- 21=_____

22B-22. $\left[\frac{(0.254)(0.362)}{-0.121} + 0.275\right]^2 + \sqrt{0.0419}$ ---------- 22=_____

22B-23. $[-87.2 + \sqrt{2110}]^2 \times [164 + 228]^2 \times \sqrt{0.0118/0.0266}$ ---------- 23=_____

22B-24. $\left[\frac{3.14 + 1.76 + \sqrt{0.568/0.684}}{\pi + 4.23}\right]^2$ ---------- 24=_____

22B-25. $(-8.26)(-0.0439)\sqrt{(-0.401)^2/0.869} + 1/\sqrt{11.6 + 25.7}$ ---------- 25=_____

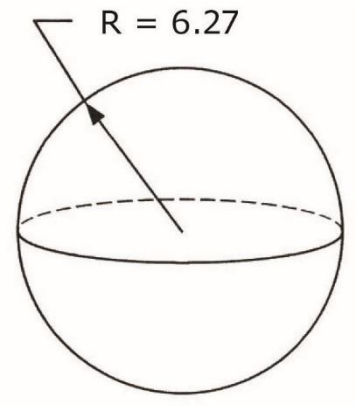
22B-26. How much money must Gary invest at 4.2% annual interest to have $5000 in 4 years? ---------- 26=$_____

22B-27. On a weekday, the Contest Director received 106 emails. If he gets 50% fewer emails on Saturday and Sunday, what average number of emails are received in a year? ---------- 27=_____

22B-28. Sound travels at 1125 ft/s. A rule of thumb is counting the number of seconds between a lightning strike and thunder clap gives how far away the event is, with 1 mi representing each 5 seconds. What is the percent error in this rule of thumb, assessed as the distance sound travels in 5 seconds? ---------- 28=_____%

22B-29.

SPHERE

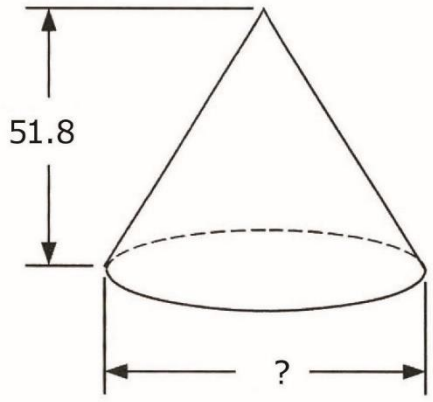


Volume = ?

22B-29 =_____

22B-30.

CONE



Volume = 60,300

22B-30 =_____

22B-31. $\left[\dfrac{-4.50\text{x}10^{-5}}{6.78\text{x}10^{-5} + 1.50\text{x}10^{-5}} + 0.649\right] \text{x} \left\{4500 + (-78.4)^2 - \sqrt{4.48\text{x}10^{7}}\right\}$ 31=_____

22B-32. $\sqrt{\dfrac{1/(926 - 527)}{(179)(2.32 + 0.634)^2}} + (0.872)^2(0.00127)$ ---------- 32=_____

22B-33. $\dfrac{\sqrt{(2.53)/\left\{(2.31)/\sqrt{8.21}\right\}}}{1.56 + (0.993)(\pi)} + \{0.0972 + 0.175\}^{1/2}$ ---------- 33=_____

22B-34. $\dfrac{(7.91\text{x}10^{5})^2(7.95\text{x}10^{-13} + 2.72\text{x}10^{-13})}{4.11\text{x}10^{-4} + (-0.334)(0.00263)} + \dfrac{1}{\dfrac{1}{-549} + \dfrac{1}{(959)}}$ ------ 34=_____

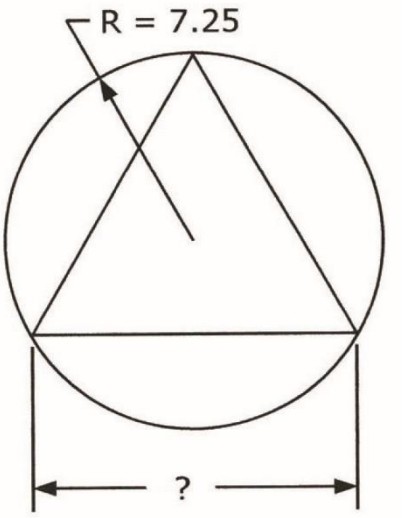
22B-35. $\dfrac{\left[\dfrac{(-24.8 + 17)}{(434 + 1400)}\right]^2 + \sqrt{\dfrac{1.86\text{x}10^{-10} + 3.20\text{x}10^{-10}}{\sqrt{0.402}}}}{\left\{(\pi)/(66.6)\right\}^2}$ ---------- 35=_____

22B-36. Heather is a blonde. On her head, she has 115,000 hairs with a density of 1290 hairs/in^2. Her hat size (head diameter) is 7 3/8 in. What fraction of her head has hairs? ---------- 36=_____%

22B-37. A car's mileage is inversely proportional to the car's weight. Lenny drives his 2400-lb car home, but it takes 1.5 tanks of gas, or 21 gallons. He wants to buy a new car that can get there on one tank of gas (14 gallons). What is the maximum new car weight? ---------- 37=_____lb

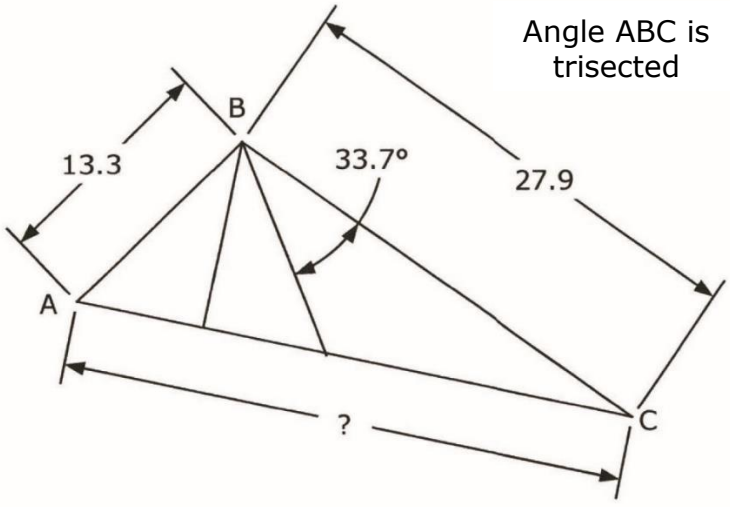
22B-38. A 1 in cube of ice melts in 13 min. If the time to melt is directly proportional to the square of the ice volume and inversely proportional to the square of its total surface area, how long would it take a 10-lb cube of ice to melt? ---------- 38=_____hr

22B-39.
CIRCLE AND EQUILATERAL TRIANGLE



22B-39 =_____

22B-40.
SCALENE TRIANGLES



22B-40 =_____

22B-41. $\dfrac{10^{-(0.932 - 2.79)}}{-9.18\text{x}10^{-5} + 3.88\text{x}10^{-5}}$ ---------- 41=_____

22B-42. $0.00176\, e^{0.561} + (6.28\text{x}10^{-4})\, e^{-0.52}$ ---------- 42=_____

22B-43. $-0.332 + (0.844)\text{Ln}(0.913 - 0.752)$ ---------- 43=_____

22B-44. $(6.47\text{x}10^{-6} + 4.08\text{x}10^{-5})^{-(0.954 + 0.187)}$ ---------- 44=_____

22B-45.(deg) $\sin\left[90° \text{ x } \dfrac{(8.93)}{(25)}\right] + \cos\{162° - 96°\}$ ---------- 45=_____

22B-46. The mass of 2 reams of "20-lb" letter-sized paper is 10 lb. What is the mass of 3 reams of "47-lb" ledger-sized (11 in x 17 in) card stock? The poundage in quotes refers to the weight of 500 standard sized sheets, which is proportional to the sheet thickness. ---------- 46=_____ lb

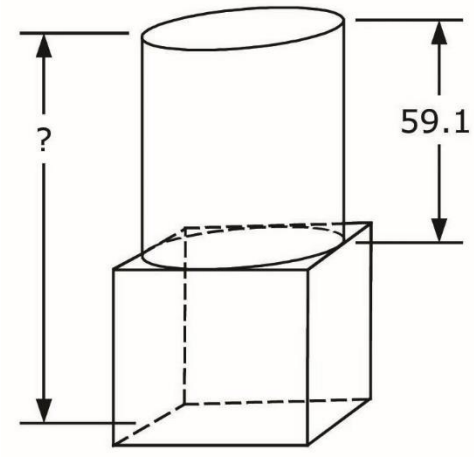
22B-47. Travis County daily COVID total first vaccinations on June 12-15 as a percentage of the total population were 67.26%, 67.33%, 67.40% and 67.56%, respectively. Assuming continuous vaccination around the clock, how many days after June 15 would the total first vaccination percentage just exceed 70%? Percentages are reported daily at noon. ------- 47=_____ dy(integer)

22B-48. (rad) What is z if $0<z<\pi$ and $[\sin(z)]^z = 0.5$? ---------- 48=_____

22B-49.

CUBE AND CYLINDER

Volume(Cube) = Volume(Cylinder)

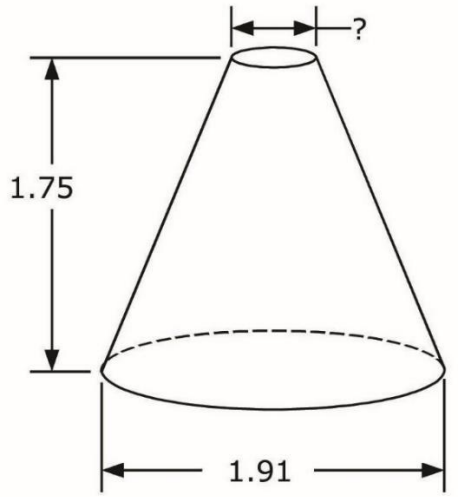


22B-49 =_____

22B-50.

FRUSTUM

Volume = 2.16



22B-50 =_____

22B-51. $10^{+(0.394)} + 10^{-(0.911)} + \left[10^{(0.306/0.188)} - 10^{(0.773)}\right]^{1/2}$ 51=_____

22B-52. $\dfrac{91.4 + e^{(3.39 + 1.9)}}{0.539 - e^{-(0.416 - 0.118)}}$ ---------- 52=_____

22B-53. $\dfrac{(6.30\text{x}10^{-4} + 0.00154)\ \text{Log}\{1/0.781\}}{\text{Log}\{(7.53)/(1.11 + 6.4)\}}$ ---------- 53=_____

22B-54. $\dfrac{(6.23)^{0.153} - (4.17)^{-0.879}}{-6.90\text{x}10^{-4} + 1.15\text{x}10^{-4}}$ ---------- 54=_____

22B-55.(rad) $\dfrac{\arctan\{1.36 + (2.78)(0.276)\}}{\arcsin\left\{(38100 + 22700)/2.75\text{x}10^{5}\right\}}$ ---------- 55=_____

22B-56. What is the slope of the function $y = 5\sin(x)\cos(x)$ at $x = \pi/3$? ------ 56=_____

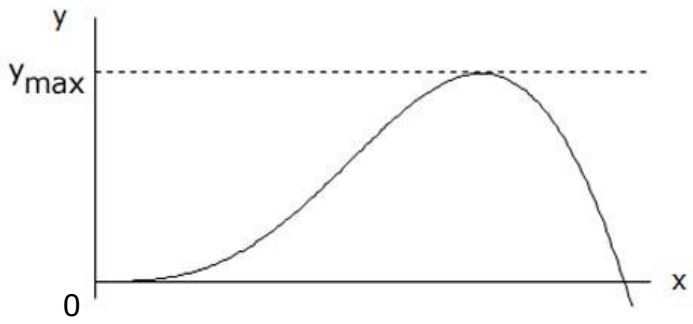
22B-57. Valerie leaves Muleshoe driving north to Friona at 63 mph. Ben leaves Bovina 2 min later driving east to Dimmitt driving at 52 mph. If Bovina is 18 mi north and 9 mi west of Muleshoe, what is the closest Valerie comes to Ben while driving? ---------- 57=_____ mi

22B-58. What is D_{11} if $D = \begin{bmatrix} 9 & 12 \\ 12 & -6 \end{bmatrix} + \begin{bmatrix} 2 & 3 \\ 3 & 7 \end{bmatrix}$? ---------- 58=_____

22B-59.

Radians

$y = x^2\sin(x)$

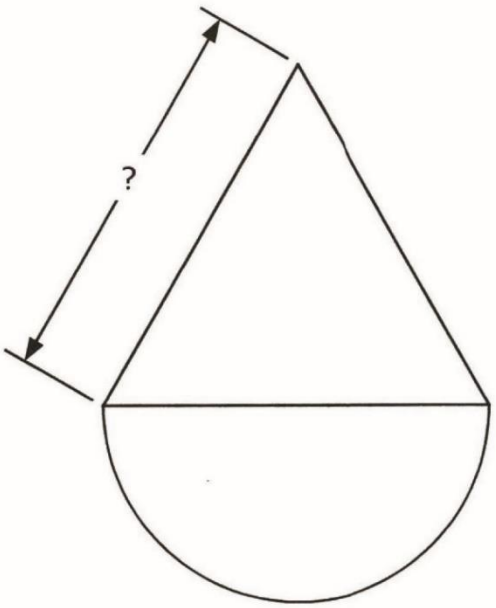


y_{max} = ?

22B-59 =_____

22B-60.

SEMICIRCLE AND EQUILATERAL TRIANGLE



Total Area = 7530

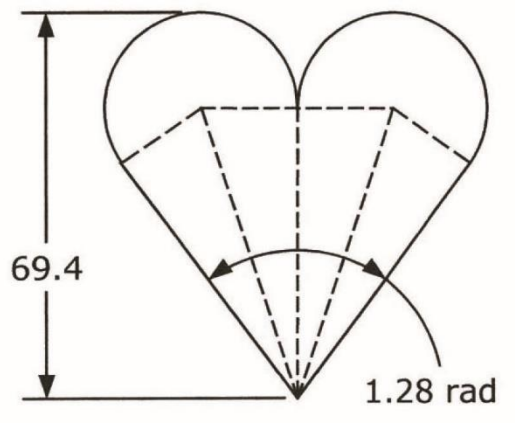
22B-60 =_____

22B-61. Sonia measures the distance from a wall to the back of a couch to be 13 ft 7 in. She measures to distance from the same wall to the front of the couch, obtaining 11 ft 1 in. What is the length taken up by the couch depth? ---------- 61=_____in(SD)

22B-62. Calculate $88{,}325^{-4330}$. ---------- 62=_____

22B-63. Abbie drops a ball from a 140-ft tall building. What is its (positive) velocity when it hits the ground? ---------- 63=_____mph

22B-64.
CONGRUENT SECTORS AND RIGHT TRIANGLES

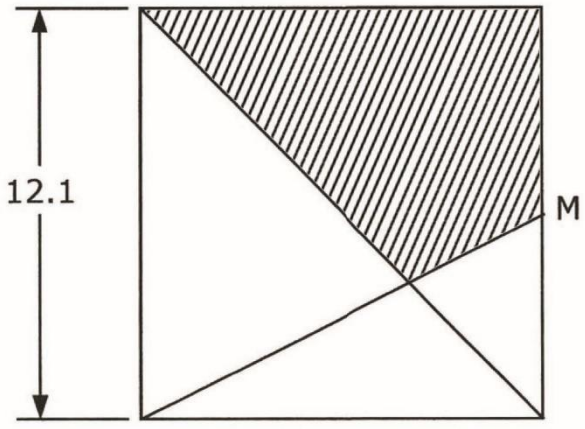


Total "Heart" Area = ?

22B-64 =_____

22B-65.
SQUARE

M = midpoint



Hatched Area = ?

22B-65 =_____

22B-66. $\left[\dfrac{(10^{7.24}) \times 10^{\{(\pi)(0.774)\}}}{(6.66)10^{0.575}}\right]^3$ ---------- 66=_____

22B-67. (rad) $\dfrac{\sin(7.73)}{\cos(7.73)}\sqrt{1 - \{\sin(0.942 \times 3.85)\}^2}$ ---------- 67=_____

22B-68. (rad) $\dfrac{1}{(969)(0.111)}\,\mathrm{Ln}\{(0.0639) + (-0.0211)\sin(0.671)\}$ -------- 68=_____

22B-69. $-\dfrac{1}{(1.4)} + \dfrac{1}{3(1.4)^3} - \dfrac{1}{5(1.4)^5} + \dfrac{1}{7(1.4)^7}$ ---------- 69=_____

22B-70. (rad) $\dfrac{(0.257)(0.0309) - \mathrm{Ln}\{(3.21) + (-7.07)e^{(-2.27)}\}}{\arcsin\{(1.46)/(2.62 + 1.06)\}}$ -------- 70=_____

22B-1 = 1.27
= 1.27×10^{0}

22B-2 = -4.04
= -4.04×10^{0}

22B-3 = -63.6
= -6.36×10^{1}

22B-4 = 141
= 1.41×10^{2}

22B-5 = 0.264
= 2.64×10^{-1}

22B-6 = 0.519
= 5.19×10^{-1}

22B-7 = -2.45
= -2.45×10^{0}

22B-8 = 1.01
= 1.01×10^{0}

22B-9 = 0.846
= 8.46×10^{-1}

22B-10 = 0.207
= 2.07×10^{-1}

22B-11 = -2050
= -2.05×10^{3}

22B-12 = 685000
= 6.85×10^{5}

22B-13 = 1.65×10^{-7}

22B-14 = -1.32×10^{6}

22B-15 = -3.32×10^{6}

22B-16 = 0.00334
= 3.34×10^{-3}

22B-17 = 7.94
= 7.94×10^{0}

22B-18 = 30.4
= 3.04×10^{1}

22B-19 = 1.24
= 1.24×10^{0}

22B-20 = 1860
= 1.86×10^{3}

22B-21 = 0.0171
= 1.71×10^{-2}

22B-22 = 0.440
= 4.40×10^{-1}

22B-23 = 1.74×10^{8}

22B-24 = 0.621
= 6.21×10^{-1}

22B-25 = 0.320
= 3.20×10^{-1}

22B-26 = $4241.30

22B-27 = 33200
= 3.32×10^{4}

22B-28 = -6.13
= -6.13×10^{0}

22B-29 = 1030
= 1.03×10^{3}

22B-30 = 66.7
= 6.67×10^{1}

22B-31 = 417
= 4.17×10^{2}

22B-32 = 0.00223
= 2.23×10^{-3}

22B-33 = 0.900
= 9.00×10^{-1}

22B-34 = -2710
= -2.71×10^{3}

22B-35 = 0.0208
= 2.08×10^{-2}

22B-36 = 52.2
= 5.22×10^{1}

22B-37 = 1600
= 1.60×10^{3}

22B-38 = 9.20
= 9.20×10^{0}

22B-39 = 12.6
= 1.26×10^{1}

22B-40 = 33.1
= 3.31×10^{1}

22B-41 = -1.36×10^{6}

22B-42 = 0.00346
= 3.46×10^{-3}

22B-43 = -1.87
= -1.87×10^{0}

22B-44 = 86200
= 8.62×10^{4}

22B-45 = 0.939
= 9.39×10^{-1}

22B-46 = 70.5
= 7.05×10^{1}

22B-47 = 25 integer

22B-48 = 2.31
= 2.31×10^{0}

22B-49 = 106
= 1.06×10^{2}

22B-50 = 0.452
= 4.52×10^{-1}

22B-51 = 8.64
= 8.64×10^{0}

22B-52 = -1430
= -1.43×10^{3}

22B-53 = 0.202
= 2.02×10^{-1}

22B-54 = -1810
= -1.81×10^{3}

22B-55 = 5.07
= 5.07×10^{0}

22B-56 = -2.50
= -2.50×10^{0}

22B-57 = 3.18
= 3.18×10^{0}

22B-58 = 11.0
= 1.10×10^{1}

22B-59 = 3.95
= 3.95×10^{0}

22B-60 = 95.5
= 9.55×10^{1}

22B-61 = 30. or 30
= 3.0×10^{1} (2SD)

22B-62 = $2.87 \times 10^{-21,417}$

22B-63 = 64.7
= 6.47×10^{1}

22B-64 = 2930
= 2.93×10^{3}

22B-65 = 61.0
= 6.10×10^{1}

22B-66 = 6.60×10^{24}

22B-67 = 7.10
= 7.10×10^{0}

22B-68 = -0.0277
= -2.77×10^{-2}

22B-69 = -0.616
= -6.16×10^{-1}

22B-70 = -2.21
= -2.21×10^{0}