Name _____

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

UIL Calculator Applications

Test 18B

(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.*, 1.23×10*, 1.23×10^0*
                1.23×10^1, 1.23×10^{01}, .0190, 0.0190, 1.90×10^{-2}

       Incorrect: 12.30, 123.0, $1.23(10)^2$, $1.23 \cdot 10^2$, 1.230×10^2,
                $1.23 * 10^2$, 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.
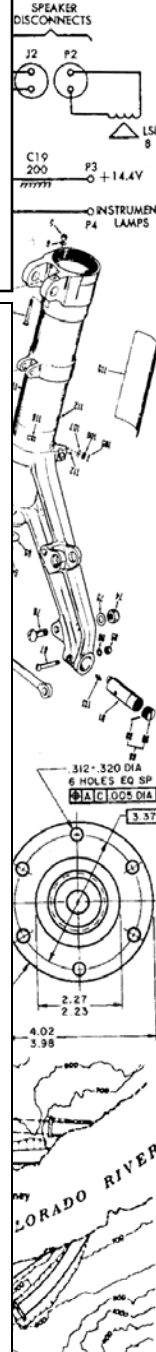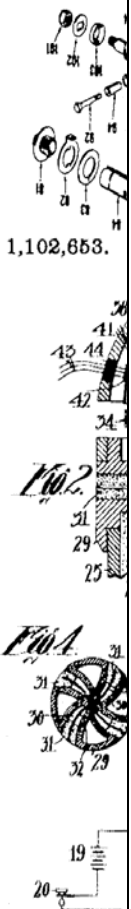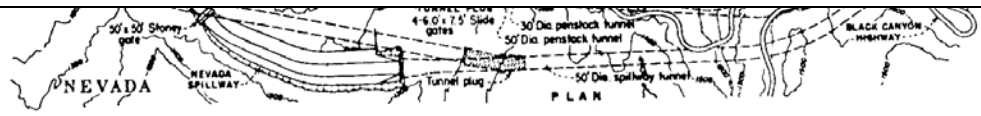
18B-1. (−3.65 + 10.4) x 6.64 --- 1=_____

18B-2. 8.29/1.94 + 1.37 − 4.27 -- 2=_____

18B-3. $\dfrac{(-7.28)(-8.51)(-0.821)}{-7.79}$ + 3.43 ------------------------------------ 3=_____

18B-4. {(−66.3)(0.305 + π − 1.51)(763)} + 35400 ----------------------- 4=_____

18B-5. 1.85x10^5 + 1.76x10^5 − 9.07x10^5 + $\dfrac{(-96400 + 45200)}{(0.726)(-0.987)}$ ----------- 5=_____

18B-6. What is the average of 65, 50 and 10π? ------------------------------ 6=_____

18B-7. Calculate the cube root of the product of 0.404, -0.959 and -1.06. --- 7=_____

18B-8. Calculate the base 10 logarithm of the sum of 960 and 2220. --------- 8=_____

18B-9.	18B-10.
CIRCLE	ISOSCELES TRAPEZOID

18B-9.
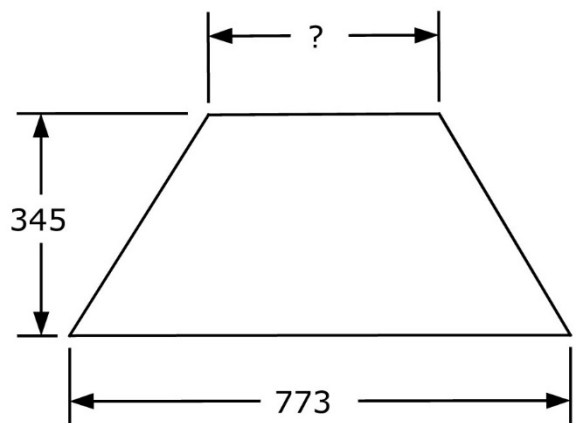
CIRCLE

R = 0.746
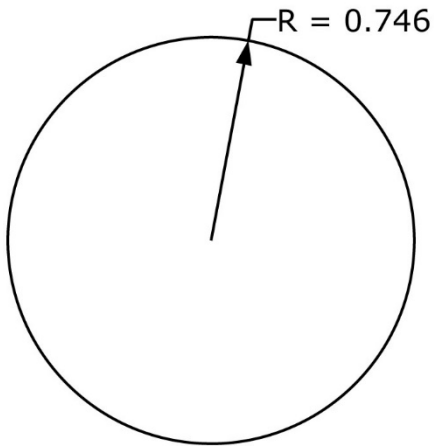
Circumference = ?

18B-9 =_____

18B-10.

ISOSCELES TRAPEZOID

?

345

773

Area = 195,000

18B-10 =_____

18B-11. $\dfrac{(6800 + 5710)}{(0.77 - 1.21)} + \dfrac{(-33600 + 41700)}{(7.18 - 3.73)}$ ---------------------------- 11=_____

18B-12. $\dfrac{-0.869 + 0.608}{(0.912)(5.93)(-1.70\text{x}10^{-7})} + (781 + 998)(170 - 48.1)$ ---------- 12=_____

18B-13. $\dfrac{6.90\text{x}10^5 + 7.24\text{x}10^5}{(-6.32)(-0.122) + 0.953} + \dfrac{8190 - 3260 + 12900}{(0.0027)(2.99)}$ --------------- 13=_____

18B-14. $\dfrac{(13.4 + 2.37)(3.92 + 6.5)(27.9 - 143)}{(-0.16 + 0.152)(-6.75)\{(9.68)/(9.76)\}}$ ------------------------- 14=_____

18B-15. $\dfrac{(6.54 + 6.68)}{8.63 - 15.2} + \dfrac{-0.76}{62.4 + 86.1} + \dfrac{(0.93)(616 - 435)}{(-406)(0.329)}$ --------------- 15=_____

18B-16. The movie, *Guardians of the Galaxy II*, runs 2 hr 16 min, and a
ticket costs $11.35. Assuming that ticket cost is linearly correlated to
movie run time, what would be the ticket price for the movie, *Logistics*
(2012), the longest movie ever made, at 51,420 minutes? ------------------- 16=$_____

18B-17. A badminton shuttlecock weighs between 4.75 and 5.51 grams.
What is the percent difference in these weights? ----------------------------- 17=_____ %(SD)

18B-18. The Harbin China Ice Festival is a small village built from ice
taken from the Songhua River. In 16 days, 15,000 ice cutters cut
4.2 million ft^3 of ice blocks for the construction. How much ice does one
worker cut in a day? -- 18=_____ ft^3

18B-19.

RIGHT TRIANGLE

0.42 rad

0.494

Area = ?

18B-19 =_____

18B-20.

RIGHT TRIANGLE

1800

deg?

974

18B-20 =_____

18B-21. $\left[\dfrac{\sqrt{1.74 - 0.882}}{-2.74} + \dfrac{(-0.93)}{7.12}\right]^2$ ------------------------------------- 21=_____

18B-22. $\dfrac{1}{-5.15 + 29.7} + \dfrac{1}{20.7 - 40.7} + \dfrac{1}{(6.56)}$ ---------------------------- 22=_____

18B-23. $(-814)(-4.95\times10^{-4})\sqrt{(-0.619)^2/0.189} + 1/\sqrt{2.37 + \pi}$ ----------- 23=_____

18B-24. $\left[-19 + \sqrt{259}\right]^2 \times \left[416 + 419\right]^2 \times \sqrt{14.7/379}$ -------------------- 24=_____

18B-25. $\left[\dfrac{3.2 + 1.62 + \sqrt{0.878/0.77}}{0.192 + 0.0728}\right]^2$ ------------------------------------- 25=_____

18B-26. A student comfortably reads text 0.2 in tall text on a computer screen 16 in away from his eyes. How tall should comparable text on a building be to be read from 1 mi away? --- 26=_____ ft

18B-27. The distance carbon diffuses in iron is proportional to the square root of the product of time and exp[-B/(T+273)], where B equals 22,500, and T is temperature in Centigrade. If carbon diffuses a distance in 5 hr at 600°C, at what temperature would carbon diffuse the same distance in 1 hr? -- 27=_____ °C

18B-28. What is the smaller of two, consecutive even integers if their product is 15,624? -- 28=_____ integer
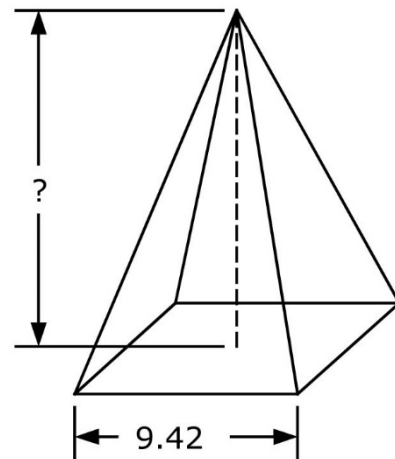
18B-29.

HALF CYLINDER

53

?
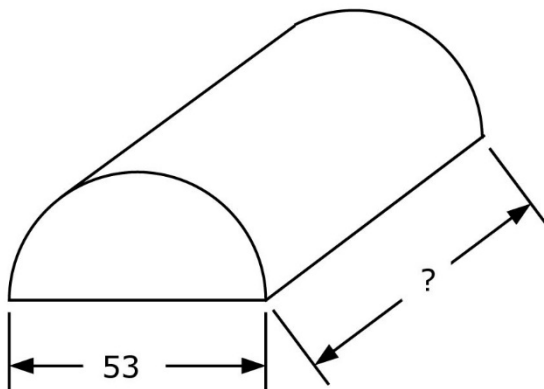
Total Surface Area = 12,800

18B-29 =_____

18B-30.

SQUARE PYRAMID

?

9.42

Volume = 337

18B-30 =_____

18B-31. $\left[\dfrac{-7210}{7240 + 5780} + 4.54\right] \times \left\{715 + (-27.6)^2 - \sqrt{1.15\times10^6}\right\}$ ------- 31=_____

18B-32. $\dfrac{(-4.44\times10^{-7} + 4.74\times10^{-7})^2}{\sqrt{11.8 - 8.57}} + \dfrac{3.81\times10^{-19}}{\sqrt{8.30\times10^{-7} + 8.76\times10^{-7}}}$ ----- 32=_____

18B-33. $\dfrac{[1.30\times10^{-4}/(0.503 + 0.373) + 1/(4460)]^{1/2}}{(1610 + 2710)^2 \times \sqrt{16300 - (2280)}}$ -------------------- 33=_____

18B-34. $\dfrac{(9.06\times10^5)^2(8.78\times10^{-13} + 4.84\times10^{-13})}{7.71\times10^{-4} + (-0.949)(0.0036)} + \dfrac{1}{\dfrac{1}{-261} + \dfrac{1}{(371)}}$ ------ 34=_____

18B-35. $\dfrac{\left[\dfrac{\sqrt{1.32 + 1.73}}{(3080)(5120)+(3970)^2}\right]}{\sqrt{5.22 + \pi} + (0.962 - 0.205)^2}$ ------------------------------------- 35=_____

18B-36. The number of 3D printers in the world has grown exponentially for the last 10 years. If there were 40,200 printers in 2008 and 100,000 printers in 2013, how many printers are there in 2018? --------------------- 36=_____

18B-37. A gossamer-thin string is 150 ft long. It is folded in half repeatedly until the length of the folded string is just less than 5 in. How many times was it folded? --- 37=_____ integer

18B-38. How long is the line segment between the intersections of the line y = 2x+3 with the circle $(x+1)^2 + y^2 = 55$? ----------------------------- 38=_____
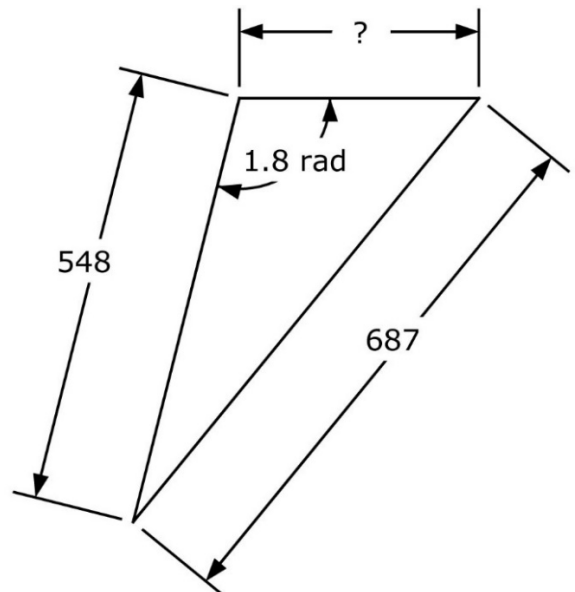
18B-39.

SCALENE TRIANGLE AND CIRCLE

9.33

0.38 rad

7.33

r = ?
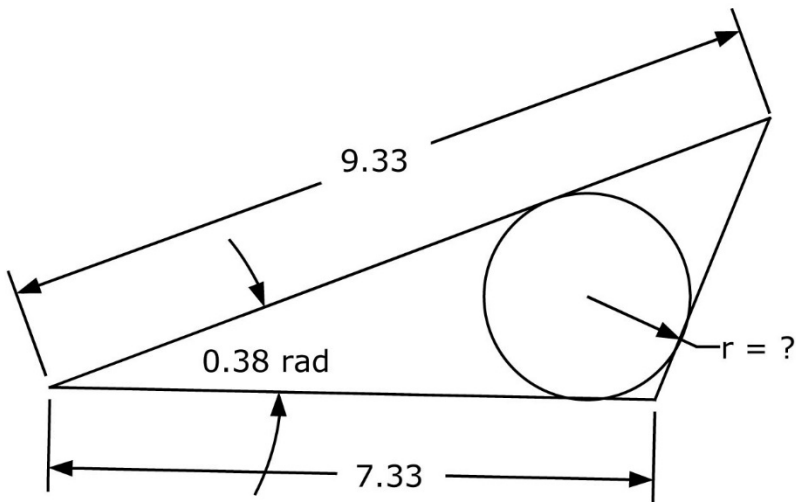
18B-39 =_____

18B-40.

SCALENE TRIANGLE

?

1.8 rad

548

687

18B-40 =_____

18B-41. $\dfrac{10^{-(4.2 - 4.46)}}{1800 + 1780}$ -- 41=_____

18B-42. $\dfrac{(7.65)}{(-5.23)}\left[1 - e^{-(0.513)(0.836)}\right]$ -------------------------------- 42=_____

18B-43. $(-82.2 - 106)\,\text{Ln}\{(-13.2)(-29.6)\}$ ---------------------------------- 43=_____

18B-44. $(10.1)^3 + (29 - 13.5)^{0.526}$ ------------------------------------- 44=_____

18B-45. (deg) $\dfrac{\cos\{(41.9°)/(3.64)\}}{\sin\{126° - 132°\}}$ -- 45=_____

18B-46. If a 5/8 in end wrench weighs 1 lb 5 oz, how much does a
1 3/16 in end wrench weigh? --- 46=_____ lbs

18B-47. A spurious correlation is that the number of pirates in the world
increases global warming. Data for the number of pirates and global
average temperature (°C) are (1880, 14.6°C), (1920, 14.85°C),
(1940, 15.2°C), (1980, 15.6°C), (2000, 15.9°C). What will the global
temperature be when there are 2500 pirates? -------------------------------- 47=_____ °C

18B-48. (rad) For what positive, nonzero value of h does
$h^2 = 6h\sin(h)\cos(h)$? -- 48=_____

18B-49. CYLINDER WITH HEMISPHERICAL CAVITY	18B-50. CUBE AND CYLINDER
R = ? Volume = 86.6	3.64 ? Cube Total Surface Area = Cylinder Total Surface Area
18B-49 =_____	18B-50 =_____
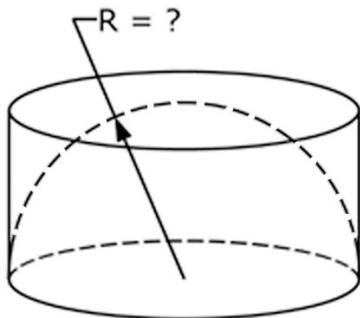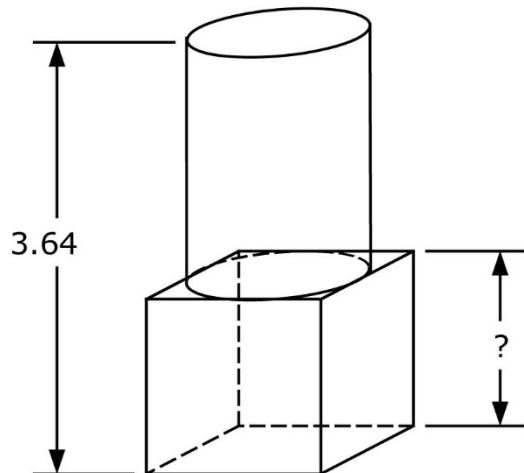
18B-51. $10^{+(0.225)} + 10^{-(0.331)} + \left[10^{(0.722/0.464)} - 10^{(0.953)}\right]^{1/2}$ 51=_____

18B-52. $\dfrac{(-77600 - 75400)\, e^{(0.184)(3.11)}}{e^{-(4.82 - \pi)}}$ -------------------------------- 52=_____

18B-53. $\dfrac{Ln\{(1380)(5710)(4290)\}}{-25500 + (-4870)\, Ln(3590)}$ -------------------------------- 53=_____

18B-54. $\dfrac{1}{(0.941)^{(-0.742)}} + (0.337 + 0.102)^{(0.954 - 0.619)}$ -------------- 54=_____

18B-55. (rad) $\dfrac{arcsin\{(-1100)(-1850)/(4.97\times10^6)\}}{6.29\times10^6 + (-8150)(-6800)}$ --------------------- 55=_____

18B-56. The curves $y = Ax^2$ and $y = 1/x$ intersect at a point. For what value of A do the curves intersect orthogonally? This occurs when one slope equals the negative reciprocal of the other slope. --------------------- 56=_____

18B-57. A typist wants to maximize his typing speed which is the number of words typed correctly in a certain time. The number of incorrectly typed words increases exponentially with the number of typed words w_t and equals (5 words)$\{exp[w_t/(50\ words)] - 1\}$. What is w_t to maximize his typing speed? --- 57=_____ words

18B-58. Solve for x if the determinant of $\begin{vmatrix} 8 & 9 & 12 \\ -5 & -10 & 5 \\ 3x & 4 & 7 \end{vmatrix} = 47.$ ---------------- 58=_____

18B-59.

SOLID OF REVOLUTION (y = -1)
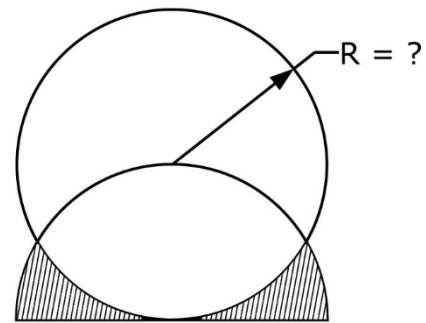
$y = 2 + \dfrac{x^2}{2}$
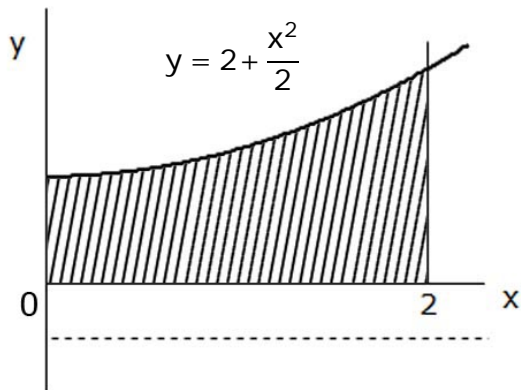
Volume = ?

18B-59 =_____

18B-60.

CIRCLE AND SEMICIRCLE

R = ?

Hatched Area = 4360

18B-60 =_____

18B-61. Joanie and Jane start running around a 440-yd running track, Joanie at a 7 min per mi pace and Jane at an 8 min 35 s per mi pace. How many laps does Jane run when Joanie "laps" her? ----------------------- 61=_____ laps
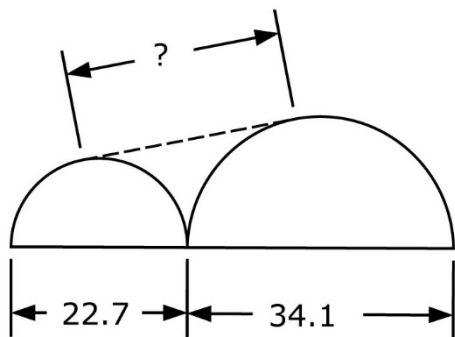
18B-62. What is $6^{(6^6)}$? -- 62=_____

18B-63. Astronaut Lyle throws a ball 120 ft on earth. How far could he throw the ball on Jupiter which has a gravitational acceleration of -81.3 ft/s^2? -- 63=_____ ft
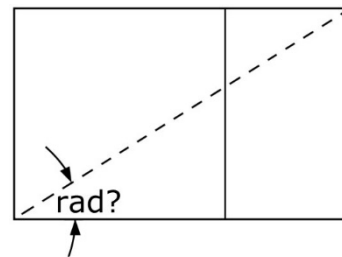

18B-64.

SEMICIRCLES

$\leftarrow$ 22.7 $\rightarrow$|$\leftarrow$ 34.1 $\rightarrow$|

18B-64 =_____

18B-65.

SQUARE AND RECTANGLES

rad?

$$\frac{\text{Large Rectangle}}{\text{Ratio of Sides}} = \frac{\text{Small Rectangle}}{\text{Ratio of Sides}}$$

18B-65 =_____

18B-66. $10^{5.74} \times \sqrt{\dfrac{(10^{7.38})(10^{0.753})}{(10^{-4.66})(10^{0.216})}}$ ----------------------------------- 66=_____

18B-67. $(92.8 - 22)^2 + (8.7 + 39)e^{Ln(6.18)}$ ------------------------------- 67=_____

18B-68. (rad) $\dfrac{1}{(4320)(0.111)} Ln\{(6.5) + (-5.72)\sin(3.36)\}$ -------------- 68=_____

18B-69. $1 + (0.55) + \dfrac{(0.55)^2}{2} + \dfrac{(0.55)^3}{6} + \dfrac{(0.55)^4}{24}$ ------------------------ 69=_____

18B-70. $\dfrac{-17.7}{\sqrt{41.1}} Ln\left[\dfrac{\sqrt{(-18)^2 + (240)} + \sqrt{350}}{\sqrt{0.511} + (60.3)(0.00683)}\right]$ --------------------------- 70=_____

18B-1   = 44.8
      = 4.48×10^1

18B-2   = 1.37
      = 1.37×10^0

18B-3   = 9.96
      = 9.96×10^0

18B-4   = -62600
      = -6.26×10^4

18B-5   = -475000
      = -4.75×10^5

18B-6   = 48.8
      = 4.88×10^1

18B-7   = 0.743
      = 7.43×10^{-1}

18B-8   = 3.50
      = 3.50×10^0

18B-9   = 4.69
      = 4.69×10^0

18B-10   = 357
      = 3.57×10^2

18B-11   = -26100
      = -2.61×10^4

18B-12   = 501000
      = 5.01×10^5

18B-13   = 3.03×10^6

18B-14   = -353000
      = -3.53×10^5

18B-15   = -3.28
      = -3.28×10^0

18B-16   = $4291.30

18B-17   = 16   (2SD)
      = 1.6×10^1

18B-18   = 17.5
      = 1.75×10^1

18B-19   = 0.0545
      = 5.45×10^{-2}

18B-20   = 32.8
      = 3.28×10^1

18B-21   = 0.220
      = 2.20×10^{-1}

18B-22   = 0.143
      = 1.43×10^{-1}

18B-23   = 1.00
      = 1.00×10^0

18B-24   = 1.16×10^6

18B-25   = 494
      = 4.94×10^2

18B-26   = 66.0
      = 6.60×10^1

18B-27   = 658
      = 6.58×10^2

18B-28   = 124   integer

18B-29   = 77.8
      = 7.78×10^1

18B-30   = 11.4
      = 1.14×10^1

18B-31 = 1610
= 1.61×10^3

18B-32 = 7.92×10^{-16}

18B-33 = 8.74×10^{-12}

18B-34 = -1300
= -1.30×10^3

18B-35 = 1.60×10^{-8}

18B-36 = 249000
= 2.49×10^5

18B-37 = 9 integer

18B-38 = 14.8
= 1.48×10^1

18B-39 = 1.25
= 1.25×10^0

18B-40 = 308
= 3.08×10^2

18B-41 = 0.000508
= 5.08×10^{-4}

18B-42 = -0.510
= -5.10×10^{-1}

18B-43 = -1120
= -1.12×10^3

18B-44 = 1030
= 1.03×10^3

18B-45 = -9.37
= -9.37×10^0

18B-46 = 9.00
= 9.00×10^0

18B-47 = 21.4
= 2.14×10^1

18B-48 = 1.34
= 1.34×10^0

18B-49 = 4.36
= 4.36×10^0

18B-50 = 1.51
= 1.51×10^0

18B-51 = 7.34
= 7.34×10^0

18B-52 = -1.45×10^6

18B-53 = -0.000371
= -3.71×10^{-4}

18B-54 = 1.71
= 1.71×10^0

18B-55 = 6.84×10^{-9}

18B-56 = 0.595
= 5.95×10^{-1}

18B-57 = 115
= 1.15×10^2

18B-58 = 1.40
= 1.40×10^0

18B-59 = 80.4
= 8.04×10^1

18B-60 = 113
= 1.13×10^2

18B-61 = 4.42
= 4.42×10^0

18B-62 = 2.66×10^{36305}

18B-63 = 47.5
= 4.75×10^1

18B-64 = 27.8
= 2.78×10^1

18B-65 = 0.554
= 5.54×10^{-1}

18B-66 = 1.07×10^{12}

18B-67 = 5310
= 5.31×10^3

18B-68 = 0.00427
= 4.27×10^{-3}

18B-69 = 1.73
= 1.73×10^0

18B-70 = -10.0
= -1.00×10^1