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 18H

(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*, $1.23x10^{0*}$ $1.23x10^{1}$, $1.23x10^{01}$, .0190, 0.0190, $1.90x10^{-2}$

Incorrect: 12.30, 123.0, $1.23(10)^{2}$, $1.23\cdot10^{2}$, $1.230x10^{2}$, $1.23*10^{2}$, 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}.

18H-1. (1.17 x 9.51) + 11 ---------- 1=_____

18H-2. (π x 2.39) – (0.765 – 1.43) ---------- 2=_____

18H-3. $\frac{(3.23)(-2.92)(\pi)}{-1.94}$ + 5.3 ---------- 3=_____

18H-4. {(6.79)(0.605 + π – 2.57)(–3.17)} + 60.1 ---------- 4=_____

18H-5. $\frac{(0.0875 + 0.0224 - 0.0504)(0.0437)}{(-0.089)(0.0764)(0.0959)}$ ---------- 5=_____

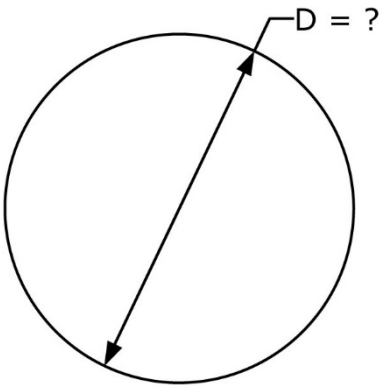
18H-6. What is 428 divided by the sum of 8.45 and -2.88? ---------- 6=_____

18H-7. What is the cube root of the product of 95 and -897? ---------- 7=_____

18H-8. What is the square of 583, divided by -42.3? ---------- 8=_____

18H-9.

CIRCLE

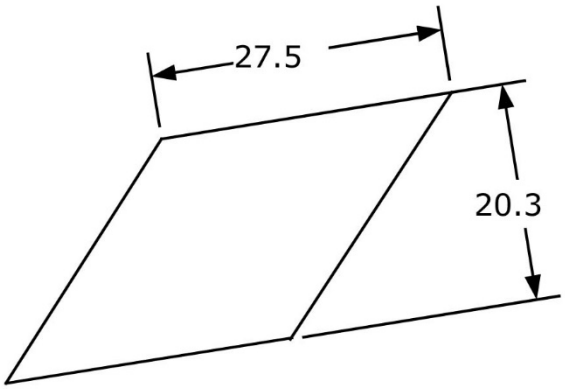


Circumference = 7000

18H-9 =_____

18H-10.

PARALLELOGRAM



Area = ?

18H-10 =_____

18H-11. $\dfrac{(479 + 217)(469 + 661)}{(-1.33)(0.171)(8150 - 8210)}$ ---------- 11=_____

18H-12. $\dfrac{(-0.316)(-8.9) - (1.49 + 0.586)(4.48)}{(-8.99 + 28.9 + \pi)(-8.38)}$ ---------- 12=_____

18H-13. $\dfrac{\{(-0.783 + 0.0909)(21.8 + 31.4) + (-88.5)\}(-2.8)}{(-7.89)(-0.8 + 5.53)(-4.12)}$ ---------- 13=_____

18H-14. $\dfrac{-307}{-0.589} + \dfrac{425 + 404 - 1250}{0.514 - 1.11} + \dfrac{(-2.78\text{x}10^{-4} + 9.39\text{x}10^{-4})}{\{(6.95\text{x}10^{-7})/(0.811)\}}$ ------- 14=_____

18H-15. $\dfrac{(0.711 + 2.18)}{9.72 - 10.7} + \dfrac{-0.658}{85.1 + 93} + \dfrac{(0.477)(932 - 380)}{(-438)(0.481)}$ ---------- 15=_____

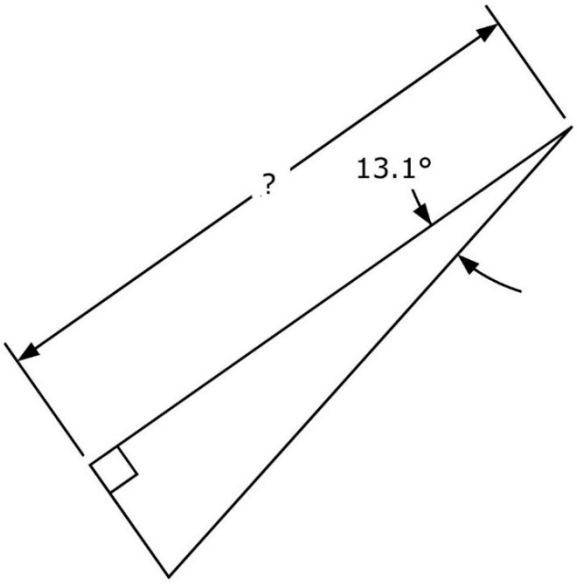
18H-16. Henry owes Rachel $23.85. If he pays her in nickels, how many are needed? ---------- 16=_____integer

18H-17. *Aladdin* is playing at the New Amsterdam Theater on Broadway. It seats 1747 people. If the average ticket price is $110, what is the income for a sell-out show? ---------- 17=$_____

18H-18. The most popular tourist attraction in the world is the Grand Bazaar in Istanbul, Turkey, visited annually by 91,250,000 people, almost double the number visiting Times Square in New York and five times the number visiting Disney World. If each person entered the Bazaar one-by-one, what would the time interval between people entering be? ---------- 18=_____s

18H-19.

RIGHT TRIANGLE

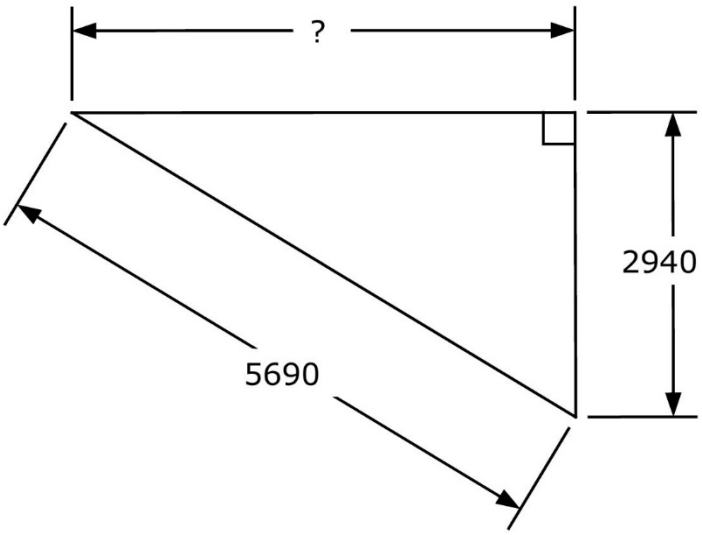


Area = 0.164

18H-19 =_____

18H-20.

RIGHT TRIANGLE



18H-20 =_____

18H-21. $\sqrt{\frac{(8.41)(\pi)}{624 + 377}} + 0.16$ ---------- 21=_____

18H-22. $\left[\frac{(0.919)(0.772)}{-3.55} + 0.0622\right]^2 + \sqrt{3.53x10^{-4}}$ ---------- 22=_____

18H-23. $\frac{\sqrt{7.86 + 6.19 + (16)/(1.24)}}{-5.32 + 4.61}$ ---------- 23=_____

18H-24. $(0.00182)(687) + \sqrt{(0.673)/(1.86)} + [(0.116)(8.43)]^2$ ---------- 24=_____

18H-25. $(4.74)(0.153)\sqrt{(-0.902)^2/0.206} + 1/\sqrt{0.268 + 2.2}$ ---------- 25=_____

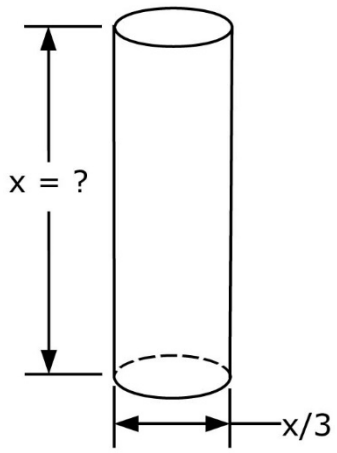
18H-26. The swimmer Michael Phelps won more Olympic medals than anyone, 28. He is 6 ft 4 in tall with an arm span of 6 ft 7 in. According to Da Vinci's Vitruvian Man, the arm span equal's a man's height. What is the percent difference in Phelp's arm span/height ratio and that of the Vitruvian Man? ---------- 26=_____%

18H-27. A 3 ft 5.2 in tall stick casts a shadow of 1.823 ft. If a tree casts a shadow of 16 ft 8.92 in, how tall is the tree? ---------- 27=_____ft(SD)

18H-28. When typing a repetitive manuscript, Ernie types on average 47 words per minute. It takes 22 seconds for him to locate, copy and paste a sentence. For what minimum number of words in a sentence is it faster to copy/paste rather than simply retype? ---------- 28=_____integer

18H-29.

CYLINDER

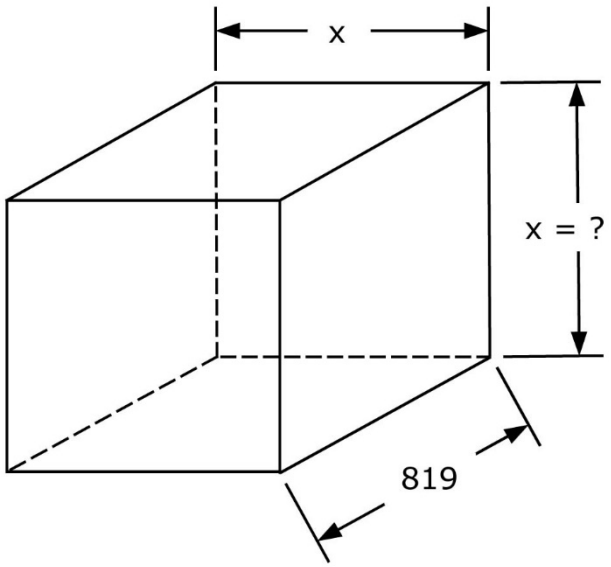


Total Surface Area = 8.23

18H-29 =_____

18H-30.

RECTANGULAR SOLID



Total Surface Area = $3.17x10^6$

18H-30 =_____

18H-31. $\sqrt{\dfrac{1/(993 - 790)}{(311)(2.02 + 0.821)^2}} + (-0.00773)^2(29.5)$ ---------- 31=_____

18H-32. $\dfrac{(3.07\text{x}10^{-6} + 2.67\text{x}10^{-5})^2}{\sqrt{97.1 - 36}} + \dfrac{1.38\text{x}10^{-13}}{\sqrt{5.30\text{x}10^{-6} + 9.10\text{x}10^{-6}}}$ ------ 32=_____

18H-33. $\dfrac{(8.73)^2 + \sqrt{5660}}{\sqrt{(0.00674)(-59.8)^2}} + \dfrac{\sqrt{\sqrt{(71.9)(0.431)}}}{-0.0868 + 0.181}$ ---------- 33=_____

18H-34. $\dfrac{[0.00862/(0.628 + 0.221) + 1/(75.5)]^{1/2}}{(47 + 63)^2 \text{ x } \sqrt{31.1 - (27.6)}}$ ---------- 34=_____

18H-35. $\dfrac{\left[\dfrac{(-0.0146 + 0.014)}{(818 + 1410)}\right]^2 + \sqrt{\dfrac{3.85\text{x}10^{-28} + 6.21\text{x}10^{-28}}{\sqrt{0.815}}}}{\{(-0.0102)/(0.0512)\}^2}$ -------- 35=_____

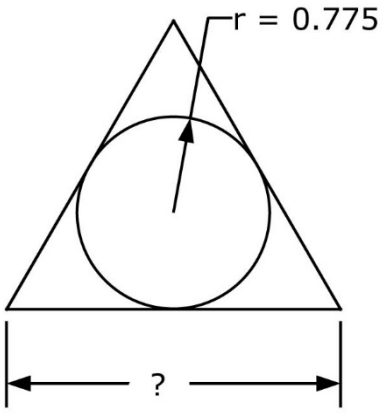
18H-36. Amy invests $8300 at 3.9% interest compounded annually. How much money does she have in 10 years? ---------- 36=$_____

18H-37. A circle is centered at the origin and is given by $x^2 + y^2 = 47$. A line extends with positive slope from the point (-12,3) and is tangent to the circle. What is the line slope? ---------- 37=_____

18H-38. Wood decays exponentially. If 20% has rotted in 45 days, how much longer will it take for a total of 40% to have rotted? ---------- 38=_____dy

18H-39.

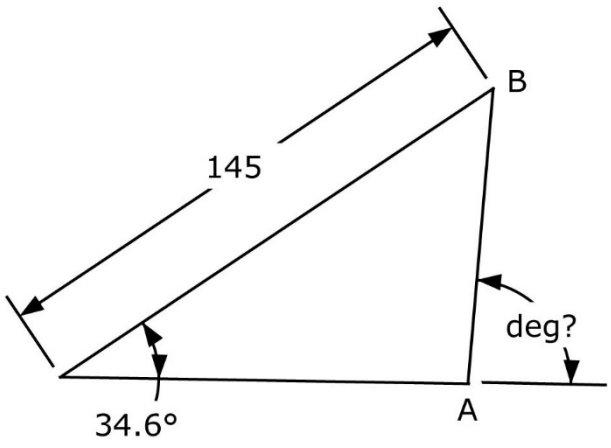
CIRCLE AND EQUILATERAL TRIANGLE



18H-39 =_____

18H-40.

SCALENE TRIANGLE



AB = 82.7

18H-40 =_____

18H-41. $(-4.35)(7.6)10^{\{\pi/2.91\}}$ ---------- 41=_____

18H-42. $8.67\ e^{0.187} + (8.55)\ e^{-0.351}$ ---------- 42=_____

18H-43. $(-5.15)\text{Log}\ \{(0.388)(3.2 + 1/0.209)\}$ ---------- 43=_____

18H-44. $(815 + 5510)^{1/3} + 1/\{(672)^{-0.13}\}$ ---------- 44=_____

18H-45.(deg) $\sin\left[90° \times \frac{(145)}{(220)}\right] + \cos\{61° - 48.3°\}$ ---------- 45=_____

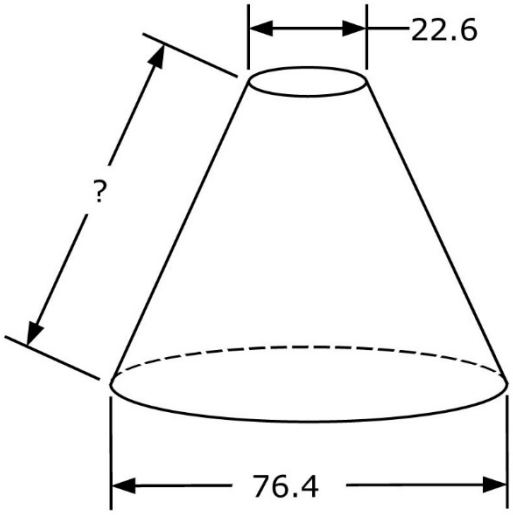
18H-46. Five pounds of pebbles (0.1 in long) has a certain total surface area. What mass of 0.01 in sand is needed to provide the same total surface area? ---------- 46=_____lbs

18H-47. Air pressure varies with altitude. In 2000 meter altitude increments starting at sea level, the air pressure in psi was 14.6, 11.6, 8.7, 6.96 and 5.07. At what elevation is the air pressure equal to 10 psi? ---- 47=_____m

18H-48. Besides w = 1, what is w if $3^{(w-1)} = w$? ---------- 48=_____

18H-49.

FRUSTUM

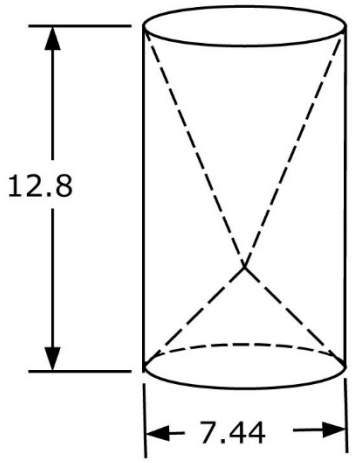


Total Surface Area = 15,000

18H-49 =_____

18H-50.

CYLINDER WITH CONICAL CAVITIES



Volume = ?

18H-50 =_____

18H-51. $10^{+(0.656)} + 10^{-(0.81)} + \left[10^{(0.917/0.237)} - 10^{(2.55)}\right]^{1/2}$ ----- 51=_____

18H-52. $\dfrac{1 + e^{+\{0.335 + (0.322)(1.32)\}}}{(5.29)(1.1 - e^{(-0.338)})}$ ---------- 52=_____

18H-53. $\dfrac{\text{Ln}(8830 + 9410)}{2440} + \dfrac{\text{Ln}(4750)}{4330 - 955}$ ---------- 53=_____

18H-54. $\dfrac{(3.13)^{0.195} - (1.17)^{-0.918}}{-2.36\text{x}10^{-5} + 3.93\text{x}10^{-6}}$ ---------- 54=_____

18H-55.(rad) $\arctan\left[\dfrac{(3850)(0.533)}{(4.32)(45)}\right] + (0.942)(1.14)$ ---------- 55=_____

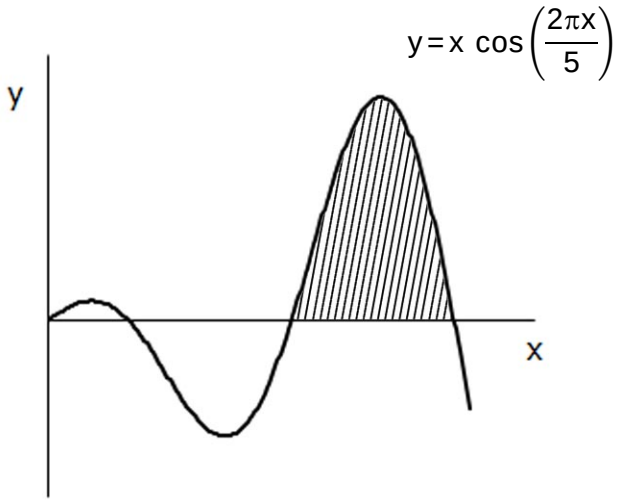
18H-56. (rad) Calculate A for which the slopes of the curves $y = Ax^2+B$ and $y = \sin(x)$ are equal when $x = \pi/4$. ---------- 56=_____

18H-57. Frank is 100 ft away from a 20-ft tall wall. He boards a hot air balloon that ascends vertically at 5 ft/s. Once above 20 ft elevation, Frank sees a spot on the ground on the other side of the wall that is closest to the wall. This spot moves towards the wall as he continues to ascend. How high is he when the spot moves towards the wall at 5 ft/s? ---- 57=_____ft

18H-58. Solve for positive g if the determinant of $\begin{vmatrix} 5 & g & 4 \\ g & -5 & 6 \\ 3 & 6 & 1 \end{vmatrix}$ = -175. --------- 58=_____

18H-59.

RADIANS

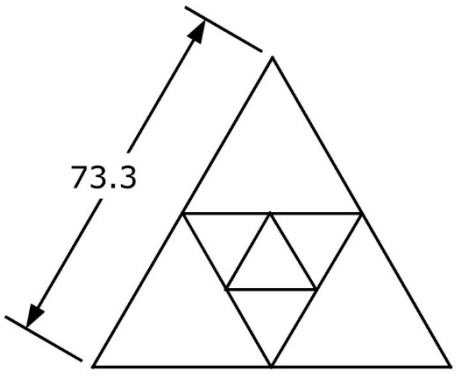


Hatched Area = ?

18H-59 =_____

18H-60.

EQUILATERAL TRIANGLES



Smallest Triangle Area = ?

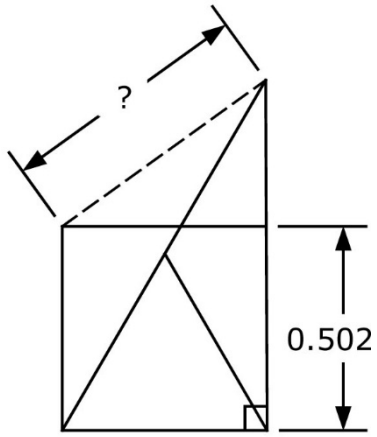
18H-60 =_____

18H-61. How many minutes after 7:50 does the hour and minute hand of a clock meet? ---------- 61=_____min

18H-62. A googol is 10^{100}. What is a googol raised to the power 12.666? 62=_____

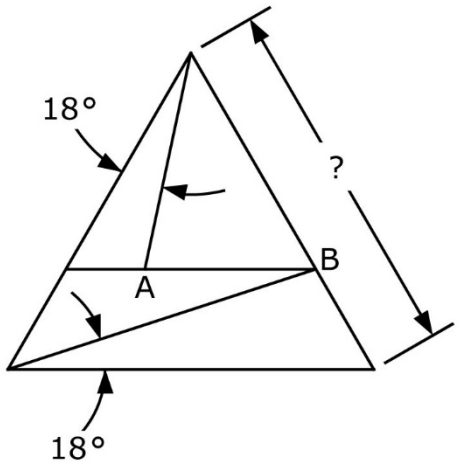
18H-63. In an egg toss, Kirin stands 15 ft away from Kyren. If Kirin's objective is to toss the egg with the lowest possible velocity and still cover the distance, what should the release velocity be? ---------- 63=_____mph

18H-64.
SQUARE, RIGHT AND EQUILATERAL TRIANGLES



18H-64 =_____

18H-65.
EQUILATERAL TRIANGLES



AB = 4800

18H-65 =_____

18H-66. $\dfrac{(10^{0.916})(10^{\pi})(10^{0.947})}{10^{\{(5.79)(0.262)\}}}$ ---------- 66=_____

18H-67. (rad) $\cos(2.67 - 0.623) - \cos(2.67 + 0.623)$ ---------- 67=_____

18H-68. (deg) $\sqrt{1 + \left[\dfrac{\cos(73.3°)}{\sin(73.3°)}\right]^2} \times \dfrac{\cos(-44.2°)}{\sin(-44.2°)}$ ---------- 68=_____

18H-69. $\dfrac{1}{(0.921)} + \dfrac{1}{3(0.921)^3} + \dfrac{1}{5(0.921)^5} + \dfrac{1}{7(0.921)^7}$ ---------- 69=_____

18H-70. $\dfrac{-0.502}{\sqrt{6.17}} \text{Ln}\left[\dfrac{\sqrt{(-8.91)^2 + (41)} + \sqrt{41.2}}{\sqrt{1.63} + (23.5)(0.00897)}\right]$ ---------- 70=_____

DO NOT DISTRIBUTE TO STUDENTS BEFORE OR DURING THE CONTEST!

18H-1 = 22.1
= 2.21×10^{1}

18H-2 = 8.17
= 8.17×10^{0}

18H-3 = 20.6
= 2.06×10^{1}

18H-4 = 34.8
= 3.48×10^{1}

18H-5 = -3.99
= -3.99×10^{0}

18H-6 = 76.8
= 7.68×10^{1}

18H-7 = -44.0
= -4.40×10^{1}

18H-8 = -8040
= -8.04×10^{3}

18H-9 = 2230
= 2.23×10^{3}

18H-10 = 558
= 5.58×10^{2}

18H-11 = 57600
= 5.76×10^{4}

18H-12 = 0.0336
= 3.36×10^{-2}

18H-13 = 2.28
= 2.28×10^{0}

18H-14 = 2000
= 2.00×10^{3}

18H-15 = -4.20
= -4.20×10^{0}

18H-16 = 477 integer

18H-17 = $192,170.00

18H-18 = 0.346
= 3.46×10^{-1}

18H-19 = 1.19
= 1.19×10^{0}

18H-20 = 4870
= 4.87×10^{3}

18H-21 = 0.322
= 3.22×10^{-1}

18H-22 = 0.0377
= 3.77×10^{-2}

18H-23 = -7.31
= -7.31×10^{0}

18H-24 = 2.81
= 2.81×10^{0}

18H-25 = 2.08
= 2.08×10^{0}

18H-26 = -3.80
= -3.80×10^{0}

18H-27 = 31.5 (3SD)
= 3.15×10^{1}

18H-28 = 18 integer

18H-29 = 2.60
= 2.60×10^{0}

18H-30 = 683
= 6.83×10^{2}

18H-31 = 0.00316
= 3.16×10^{-3}

18H-32 = 1.50×10^{-10}

18H-33 = 55.9
= 5.59×10^{1}

18H-34 = 6.76×10^{-6}

18H-35 = 2.67×10^{-12}

18H-36 = $12,168.40

18H-37 = 0.357
= 3.57×10^{-1}

18H-38 = 58.0
= 5.80×10^{1}

18H-39 = 2.68
= 2.68×10^{0}

18H-40 = 84.6
= 8.46×10^{1}

18H-41 = -397
= -3.97×10^{2}

18H-42 = 16.5
= 1.65×10^{1}

18H-43 = -2.53
= -2.53×10^{0}

18H-44 = 20.8
= 2.08×10^{1}

18H-45 = 1.84
= 1.84×10^{0}

18H-46 = 0.500
= 5×10^{-1}

18H-47 = 3480
= 3.48×10^{3}

18H-48 = 0.826
= 8.26×10^{-1}

18H-49 = 64.4
= 6.44×10^{1}

18H-50 = 371
= 3.71×10^{2}

18H-51 = 88.6
= 8.86×10^{1}

18H-52 = 1.53
= 1.53×10^{0}

18H-53 = 0.00653
= 6.53×10^{-3}

18H-54 = -19500
= -1.95×10^{4}

18H-55 = 2.55
= 2.55×10^{0}

18H-56 = 0.450
= 4.50×10^{-1}

18H-57 = 64.7
= 6.47×10^{1}

18H-58 = 42.7
= 4.27×10^{1}

18H-59 = 7.96
= 7.96×10^{0}

18H-60 = 145
= 1.45×10^{2}

18H-61 = 53.6
= 5.36×10^{1}

18H-62 = 3.98×10^{1266}

18H-63 = 15.0
= 1.50×10^{1}

18H-64 = 0.622
= 6.22×10^{-1}

18H-65 = 10300
= 1.03×10^{4}

18H-66 = 3070
= 3.07×10^{3}

18H-67 = 0.530
= 5.30×10^{-1}

18H-68 = -1.07
= -1.07×10^{0}

18H-69 = 2.07
= 2.07×10^{0}

18H-70 = -0.497
= -4.97×10^{-1}