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 23H

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

23H-1. (–71.7 + 82.5) x 2.19 ---------- 1=_____

23H-2. (0.579 x 0.713) – (0.316 – 0.697) ---------- 2=_____

23H-3. (–26.3 – 13.9 + 15.9) x (–77.7) – 17100 ---------- 3=_____

23H-4. {(–8.33)(0.115 + 0.337 – 0.0372)(5.57)} + 1.93 ---------- 4=_____

23H-5. $\frac{67900 + 24000}{(0.0715)(0.0926)(-0.098)} + 3.13\text{x}10^{8} - 1.19\text{x}10^{8}$ ---------- 5=_____

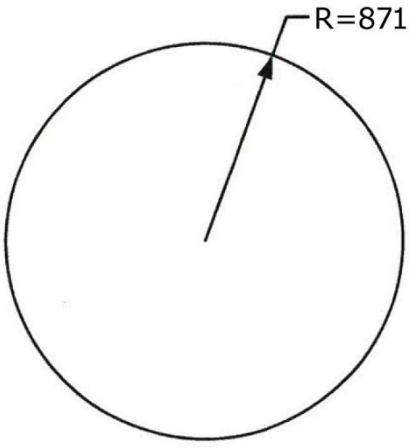
23H-6. What is the sum of 93 and the negative square root of 5790? --------- 6=_____

23H-7. What is the result of squaring the value, 38.5/6.26? ---------- 7=_____

23H-8. Calculate the remainder of 7020 divided by 0.767. ---------- 8=_____

23H-9.

CIRCLE

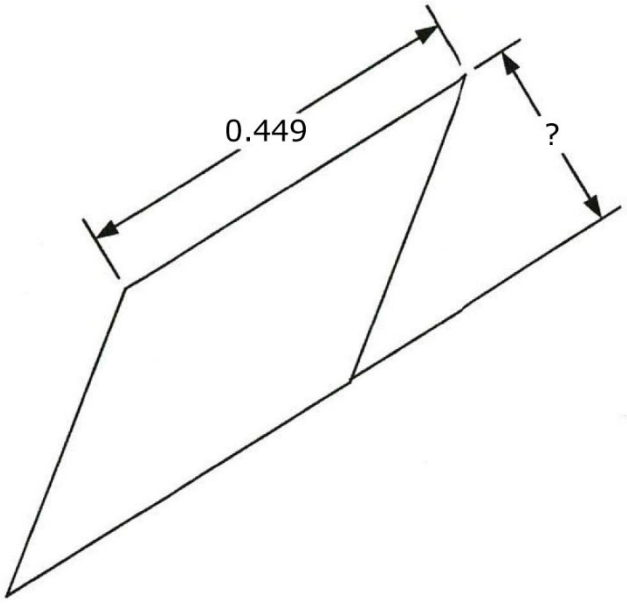


Circumference = ?

23H-9 =_____

23H-10.

PARALLELOGRAM



Area = 0.0971

23H-10 =_____

23H-11. $\dfrac{(8.1 + 2.74)(3.33 - 2.5 + 3.23)}{(1.68)(2.88) - \pi}$ ---------- 11=_____

23H-12. $\dfrac{(-1.17)(0.754) - (0.878 + 0.6)(-0.743)}{(0.764 + 3.29 + 1.91)(-0.861)}$ ---------- 12=_____

23H-13. $\dfrac{-72900 + 46800 - 50500 + 21500 + 68600}{(0.0931)(38.8 + 11.9)(-0.0337 + 0.0207)}$ ---------- 13=_____

23H-14. $\dfrac{680 + 580 - 1850}{(0.876)(-2.52)} - \dfrac{(8510)(2.19\text{x}10^{-4} + 1.62\text{x}10^{-4})}{0.888 + 0.556 - 1.43}$ ---------- 14=_____

23H-15. $\dfrac{40400 + 4.57\text{x}10^{5} - (22600 + 47600)(1.16 - 0.303)}{(-673)(7.72)(3.55)(765 - 984 + 1190)}$ ---------- 15=_____

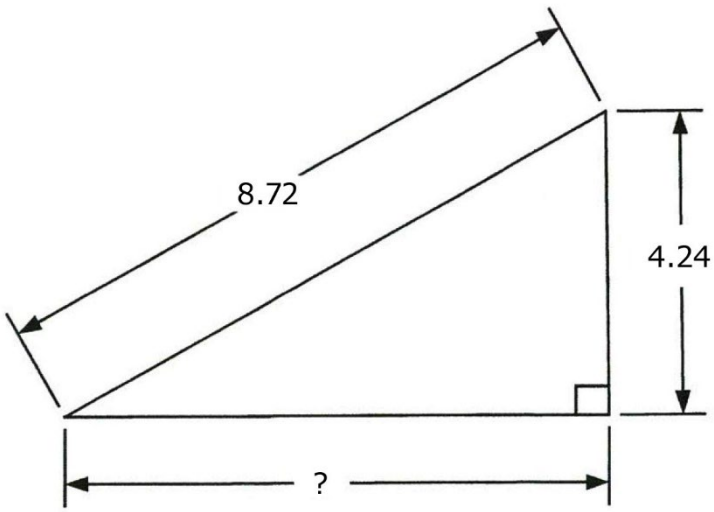
23H-16. If Donnie's trip to school takes 4.6 min, and the school is 2.5 mi from home, what is his average velocity? ---------- 16=_____ mph

23H-17. How many seconds has a person lived on their 16th birthday? ------- 17=_____ s

23H-18. A promoter has 1000 flyers to hand out. It takes him 1 hr 52 min to do this. How many flyers were distributed each minute? ---------- 18=_____

23H-19.

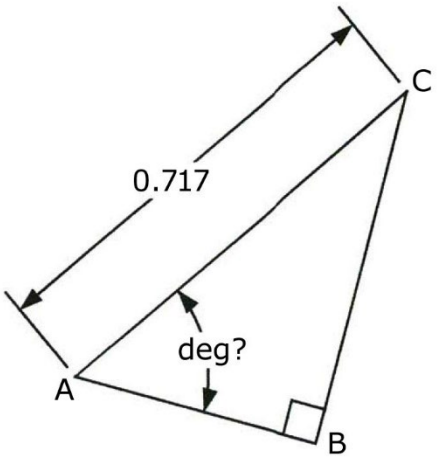
RIGHT TRIANGLE



23H-19 =_____

23H-20.

RIGHT TRIANGLE



Area = 0.121
BC>AB

23H-20 =_____

23H-21. $\left[\frac{(0.329)(0.11)}{-7.83} + 0.00149\right]^2 + \sqrt{8.94\text{x}10^{-11}}$ ---------- 21=_____

23H-22. $\left[\frac{\sqrt{2.44 - 2.43}}{-1.13} + \frac{(-0.00114)}{0.0674}\right]^2$ ---------- 22=_____

23H-23. $(0.0133)(26.3)\sqrt{(-0.823)^2/0.249} + 1/\sqrt{0.648 + 0.656}$ ---------- 23=_____

23H-24. $\left[\frac{0.906 + 0.108 + \sqrt{0.105/0.906}}{144 + 133}\right]^2$ ---------- 24=_____

23H-25. $(-0.789)(-0.637) + \sqrt{(0.47)/(3.83)} + [(0.224)(2.95)]^2$ ---------- 25=_____

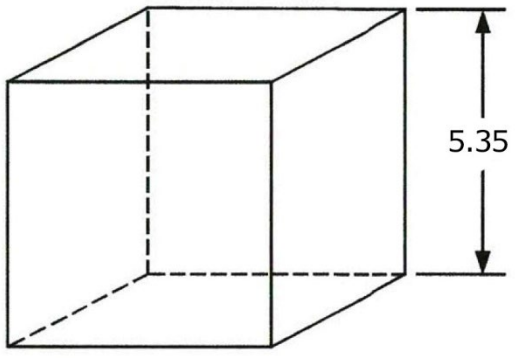
23H-26. A goat is tied to a straight fence with a 20-ft leash, 8 ft away from a gate. What is the goat's grazing area if the gate is open? ---------- 26=_____ ft^2

23H-27. Eliud Kipchoge set the world's record for the marathon, running 26 mi 385 yd in 2 hr 1 min 39 s. What was his average velocity? ---------- 27=_____ mph(SD)

23H-28. Dan types 50 words per minute, and Sheila types 65 words per minute. Dan starts typing the novel *Moby Dick*, which has 209,117 words. After time t, Sheila joins him. The book is finished 40 hr after Dan started. What is t? ---------- 28=_____ hr

23H-29.

CUBE

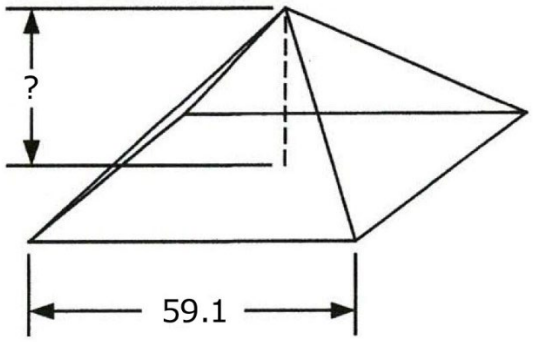


Total Surface Area = ?

23H-29 =_____

23H-30.

SQUARE PYRAMID



Volume = 33,000

23H-30 =_____

23H-31. $\sqrt{\dfrac{1/(946 - 535)}{(105)(2.18 + 1.32)^2}} + (955)^2(2.26\text{x}10^{-9})$ ---------- 31=_____

23H-32. $\left[\dfrac{-3780}{17100 + 15700} + 0.121\right] \text{x} \left\{363 + (-34.9)^2 - \sqrt{3.44\text{x}10^6}\right\}$ ----- 32=_____

23H-33. $\dfrac{[(2.59 - 1.86)(0.263/0.889)]^{1/2}}{(0.172)^2 + (0.17 + 0.193)^2 + 0.0932}$ ---------- 33=_____

23H-34. $\dfrac{(4.54\text{x}10^5)^2(2.02\text{x}10^{-12} + 9.81\text{x}10^{-13})}{0.0867 + (-0.873)(-0.251)} + \dfrac{1}{\dfrac{1}{0.308} + \dfrac{1}{(-0.765)}}$ ---- 34=_____

23H-35. $\dfrac{(-5970 + 7750)^2 - (8510 - 4960)^2}{\sqrt{(210)(0.943)(152 + 93.8 - 574)^2}}$ ---------- 35=_____

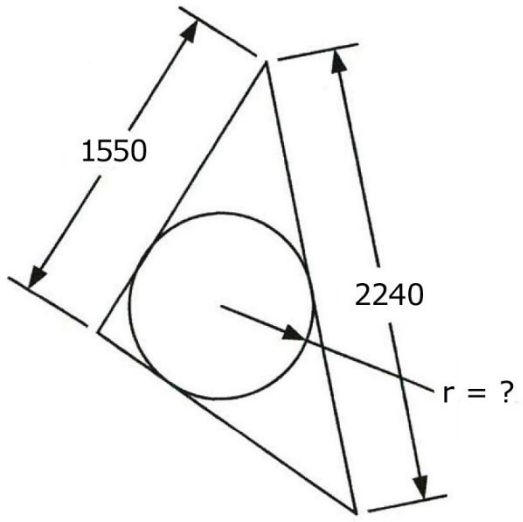
23H-36. The population of Mineral Wells TX was 16,767 in 2010. In 2020, it was 15,612. What is the percent decrease in population? ---------- 36=_____ %(SD)

23H-37. Algae in a fish tank doubles every 28 hr. How long would it take the algae to grow to ten times its original population? ---------- 37=_____ dy

23H-38. A circle circumference may be approximated by the sum of N equal-length straight line segments. What is N if the error in the perimeter calculation falls just within –1% of the circumscribed circle circumference? --- 38=_____ integer

23H-39.

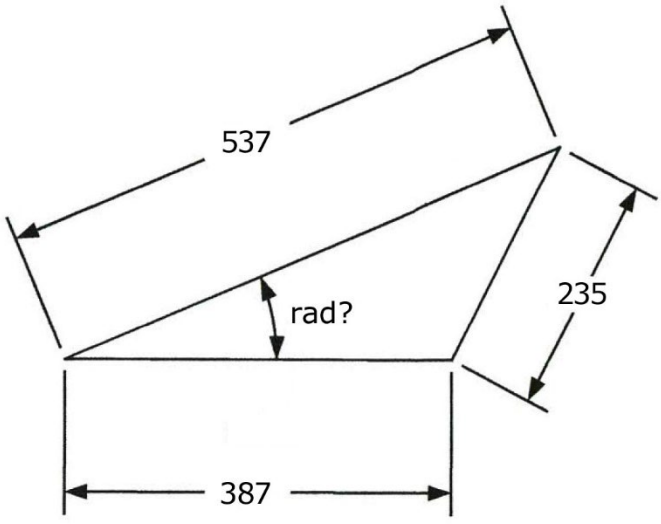
ISOSCELES TRIANGLE AND CIRCLE



23H-39 =_____

23H-40.

SCALENE TRIANGLE



23H-40 =_____

23H-41. $\dfrac{10^{-(4.17 - 4.98)}}{-7.34\text{x}10^{-4} + 2.28\text{x}10^{-4}}$ ---------- 41=_____

23H-42. $\dfrac{(-0.869)}{(0.575)}\left[1 - e^{-(0.567)(0.294)}\right]$ ---------- 42=_____

23H-43. $-0.155 + (0.24)\text{Ln}(0.531 - 0.406)$ ---------- 43=_____

23H-44. $(-0.0895 + 0.27)^{-(0.309 + 0.247)}$ ---------- 44=_____

23H-45.(deg) $\dfrac{\cos\{(87.5°)/(7.86)\}}{\sin\{118° - 222°\}}$ ---------- 45=_____

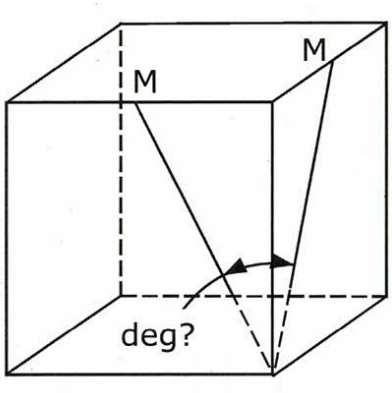
23H-46. Television sets are sized by the diagonal length of the viewing screen. The TV depth varies linearly with the size. If a 32-in TV costs $130, estimate the cost of an 85-in TV. Cost is proportional to TV volume. ---- 46=$_____

23H-47. The cost of pork belly varies monthly. In January 2021, it was 64.04 ¢/lb. In February, March and April, it was 72.82, 88.88 and 102.15 ¢/lb, respectively. Calculate the percent error in the extrapolated value for May if the actual value was 109.58 ¢/lb. ---------- 47=_____%

23H-48. Solve for positive m if $2^m = 10(m+3)$. ---------- 48=_____

23H-49.

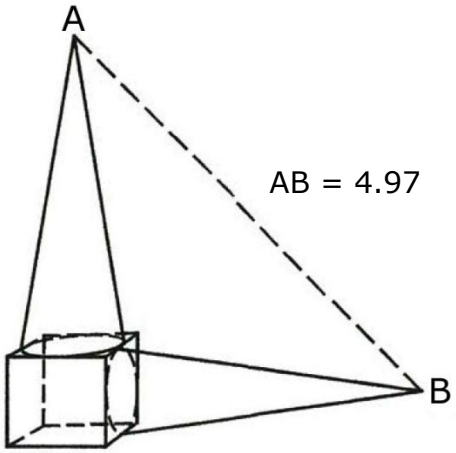
CUBE
M = midpoint



23H-49 =_____

23H-50.

CUBE AND IDENTICAL CONES



0.6[Volume(Both Cones)] = Volume(Cube)

Total Volume = ?

23H-50 =_____

23H-51. $\dfrac{(9.19\text{x}10^{6})\ 10^{-(1.92\ -\ 1.65)}}{-7.12\text{x}10^{6} + 2.83\text{x}10^{6}}$ ---------- 51=_____

23H-52. $\dfrac{1 + e^{+\{0.419\ +\ (0.79)(\pi)\}}}{(-9.37\text{x}10^{-7})(5.55 - e^{(-0.991)})}$ ---------- 52=_____

23H-53. $\dfrac{\text{Ln}\{(0.0019)(0.00483)(0.00891)\}}{0.0111 + (-0.0032)\ \text{Ln}(0.00708)}$ ---------- 53=_____

23H-54. $\dfrac{1}{(0.532)^{(-0.805)}} + (0.669 + 0.933)^{(0.796\ -\ 0.344)}$ ---------- 54=_____

23H-55.(rad) $\dfrac{\arcsin\{(0.824)(0.255)/(0.425)\}}{6.31\text{x}10^{-5} + (1.53\text{x}10^{-4})(0.966)}$ ---------- 55=_____

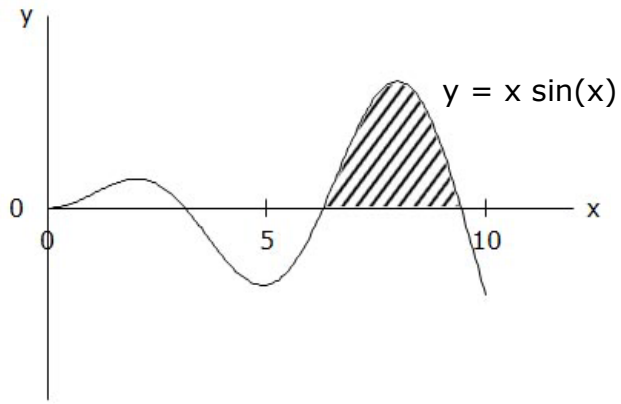
23H-56. (rad) For what value of x between 0 and $\pi/6$ does the slope of the curve y = tan(3x) equal 20? ---------- 56=_____

23H-57. A piece of string is 60 in long. It is cut into two pieces. One is formed into a circle, and the other is used to create an isosceles right triangle. What is the circle diameter, if the sum of the two areas is minimized? ---------- 57=_____ in

23H-58. What is the determinant of the product of $\begin{bmatrix} p & -12 \\ -12 & 3 \end{bmatrix}\begin{bmatrix} 25 & 32 \\ -40 & 5 \end{bmatrix}$ if p = 17? ----------58=_____

23H-59.

RADIANS

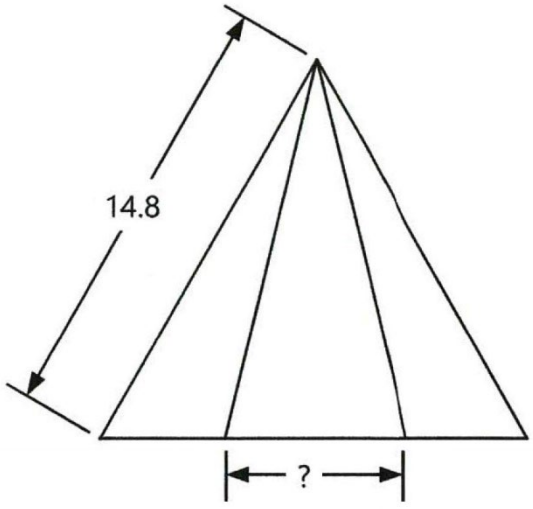


Hatched Area = ?

23H-59 =_____

23H-60.

EQUILATERAL AND ISOSCELES TRIANGLES



Area(Isosceles Triangle) = 40.8

23H-60 =_____

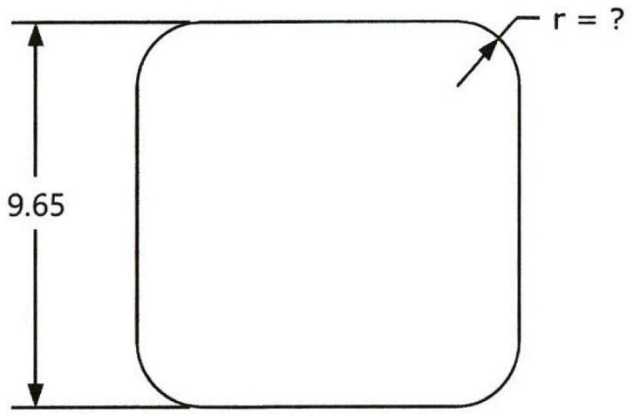
23H-61. A flight from Chicago to Rome, Italy leaves at 4:45 PM local time and arrives at 9:00 AM local time the next day. If the average plane velocity is 593 mph, and the distance is 5490 mi, how many 1-hr time zones are crossed? ---------- 61=_____integer

23H-62. A virus population of 100 viruses doubles every 10 s. What is the virus population after 300 days? ---------- 62=_____

23H-63. Randy pitches a rock from the top of a 112-ft rise into a lake. The release velocity and angle relative to the horizontal are 35 mph and 10°, respectively. If sound travels at 1100 ft/s, what is the elapsed time from the rock release to Randy hearing the splash? ---------- 63=_____s

23H-64.

SQUARE WITH ROUNDED CORNERS

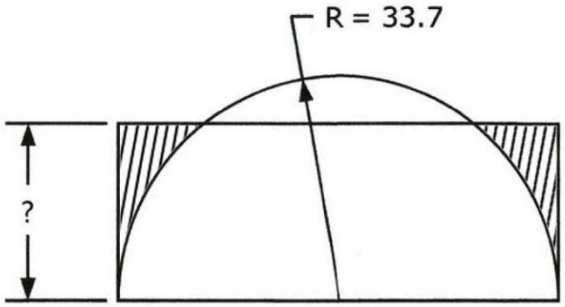


Area = 90.8

23H-64 =_____

23H-65.

SEMICIRCLE AND RECTANGLE



Hatched Area = Area(Segment)

23H-65 =_____

23H-66. $\dfrac{\sqrt{(2.8)^3}\ x\ \left\{e^{(-6.73)(-0.145)}\right\}^3}{\sqrt[3]{e^{(3.29)}\ x\ e^{(-1.6)}}}$ ---------- 66=_____

23H-67. (rad) $\dfrac{\sin(3.13)}{\cos(3.13)}\sqrt{1 - \{\sin(0.773\ x\ 3.38)\}^2}$ ---------- 67=_____

23H-68. (rad) $\dfrac{98.2}{6(92.8)}\left\{(-71.4) + (-50.2)\sin(-4.33)\right\}^5$ ---------- 68=_____

23H-69. $1 + (0.189) + \dfrac{(0.189)^2}{2} + \dfrac{(0.189)^3}{6} + \dfrac{(0.189)^4}{24}$ ---------- 69=_____

23H-70. (rad) $\dfrac{(-2.97)(0.353) - \text{Ln}\left\{(0.00799) + (-1.2)e^{(-5.27)}\right\}}{\arcsin\{(3.99)/(4.79 + 28.3)\}}$ --------- 70=_____

23H-1 = 23.7
= 2.37×10^{1}

23H-2 = 0.794
= 7.94×10^{-1}

23H-3 = −15200
= -1.52×10^{4}

23H-4 = −17.3
= -1.73×10^{1}

23H-5 = 5.24×10^{7}

23H-6 = 16.9
= 1.69×10^{1}

23H-7 = 37.8
= 3.78×10^{1}

23H-8 = 0.416
= 4.16×10^{-1}

23H-9 = 5470
= 5.47×10^{3}

23H-10 = 0.216
= 2.16×10^{-1}

23H-11 = 25.9
= 2.59×10^{1}

23H-12 = −0.0421
= -4.21×10^{-2}

23H-13 = −220000
= -2.20×10^{5}

23H-14 = 35.7
= 3.57×10^{1}

23H-15 = −0.0244
= -2.44×10^{-2}

23H-16 = 32.6
= 3.26×10^{1}

23H-17 = 5.05×10^{8}

23H-18 = 8.93
= 8.93×10^{0}

23H-19 = 7.62
= 7.62×10^{0}

23H-20 = 54.8
= 5.48×10^{1}

23H-21 = 1.93×10^{-5}

23H-22 = 0.0111
= 1.11×10^{-2}

23H-23 = 1.45
= 1.45×10^{0}

23H-24 = 2.39×10^{-5}

23H-25 = 1.29
= 1.29×10^{0}

23H-26 = 855
= 8.55×10^{2}

23H-27 = 12.93
= 1.293×10^{1} (4SD)

23H-28 = 17.1
= 1.71×10^{1}

23H-29 = 172
= 1.72×10^{2}

23H-30 = 28.3
= 2.83×10^{1}

23H-31 = 0.00344
= 3.44×10^{-3}

23H-32 = −1.58
= -1.58×10^{0}

23H-33 = 1.83
= 1.83×10^{0}

23H-34 = 2.54
= 2.54×10^{0}

23H-35 = −2040
= -2.04×10^{3}

23H-36 = 6.889
= 6.889×10^{0} (4SD)

23H-37 = 3.88
= 3.88×10^{0}

23H-38 = 13 integer

23H-39 = 449
= 4.49×10^{2}

23H-40 = 0.399
= 3.99×10^{-1}

23H-41 = −12800
= -1.28×10^{4}

23H-42 = −0.232
= -2.32×10^{-1}

23H-43 = −0.654
= -6.54×10^{-1}

23H-44 = 2.59
= 2.59×10^{0}

23H-45 = −1.01
= -1.01×10^{0}

23H-46 = $2436.41

23H-47 = 4.55
= 4.55×10^{0}

23H-48 = 6.58
= 6.58×10^{0}

23H-49 = 36.9
= 3.69×10^{1}

23H-50 = 2.32
= 2.32×10^{0}

23H-51 = −1.15
= -1.15×10^{0}

23H-52 = -3.95×10^{6}

23H-53 = −606
= -6.06×10^{2}

23H-54 = 1.84
= 1.84×10^{0}

23H-55 = 2450
= 2.45×10^{3}

23H-56 = 0.391
= 3.91×10^{-1}

23H-57 = 6.69
= 6.69×10^{0}

23H-58 = −131,000
= -1.31×10^{5}

23H-59 = 15.7
= 1.57×10^{1}

23H-60 = 6.37
= 6.37×10^{0}

23H-61 = 7 integer

23H-62 = $5.61 \times 10^{780,271}$

23H-63 = 3.10
= 3.10×10^{0}

23H-64 = 1.64
= 1.64×10^{0}

23H-65 = 26.5
= 2.65×10^{1}

23H-66 = 49.8
= 4.98×10^{1}

23H-67 = −0.0100
= -1.00×10^{-2}

23H-68 = -4.03×10^{9}

23H-69 = 1.21
= 1.21×10^{0}

23H-70 = 43.5
= 4.35×10^{1}