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 08I

(State)

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}.

08I-1. $(-0.25 + 1.45) \times 0.488$ ---------- 1=_____

08I-2. $(0.539 + 0.183 - 0.0802) \times 0.222$ ---------- 2=_____

08I-3. $(2.74 - 1.4 + 1.63 + 0.83)/(-6.11)$ ---------- 3=_____

08I-4. $\dfrac{(0.072)(-0.0166 - 0.0103 + 0.031)}{(-0.0894)(-0.0411)}$ ---------- 4=_____

08I-5. $\dfrac{(-0.00133 - 3.66\times10^{-4})(30.6)}{\{(-91.3)/(58.3)\}} - (0.0339 - 0.0259)$ ---------- 5=_____

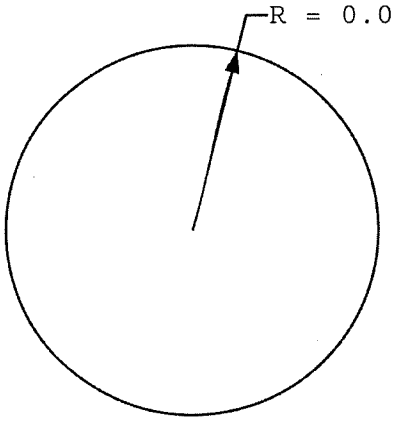
08I-6. Uma buys a $15.75 book. After paying 8.125% tax, how much change does she receive from a $20 bill? ---------- 6=$_____

08I-7. A circular field occupies 6 acres. What is the radius? ---------- 7=_____ ft

08I-8. In 2006, the US birth rate was 14.16 people per 1000 population; the death rate for the period was 8.26 per 1000. If the population at the start of 2006 was 300 million people, what was the annual increase in population for 2006? ---------- 8=_____ people

08I-9.

CIRCLE

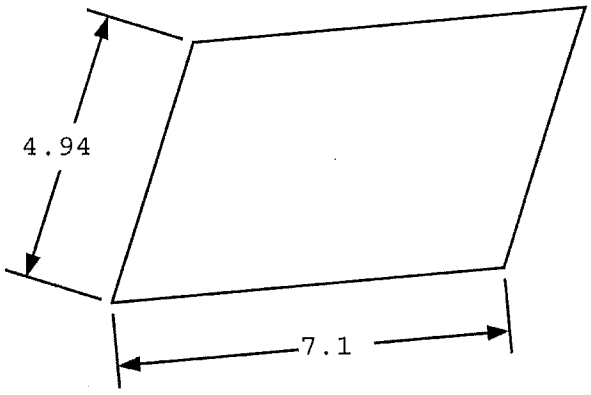


AREA = ?

08I-9 = _____

08I-10.

PARALLELOGRAM



PERIMETER = ?

08I-10 = _____

08I-11. $\dfrac{(-678)(-50.3) + (-596)(-270)}{-18.3 + 1.45 - (-7.65)(0.847)}$ ---------- 11=_____

08I-12. $\dfrac{0.656(9.27\text{x}10^{-5} + 6.27\text{x}10^{-5})}{(279 - 370)(0.35)} - \dfrac{-6.67\text{x}10^{-8}}{0.196 - 0.135}$ ---------- 12=_____

08I-13. $\dfrac{-91100 + 52200 - 75500 + 22500 + 3.25\text{x}10^{5}}{(-21.8)(71.3 + 18.6)(-88.2 + 8.86)}$ ---------- 13=_____

08I-14. $\dfrac{326 + 213 - 1270}{(0.31)(-0.894)} - \dfrac{(1.64\text{x}10^{6})(1.22\text{x}10^{-4} + 7.87\text{x}10^{-5})}{0.617 + 0.152 - 0.607}$ ---------- 14=_____

08I-15. $\dfrac{24100 + 1.65\text{x}10^{5} - (27800 + 34400)(1.27 - 0.55)}{(-537)(-1.56)(\pi)(783 - 398 + 1530)}$ ---------- 15=_____

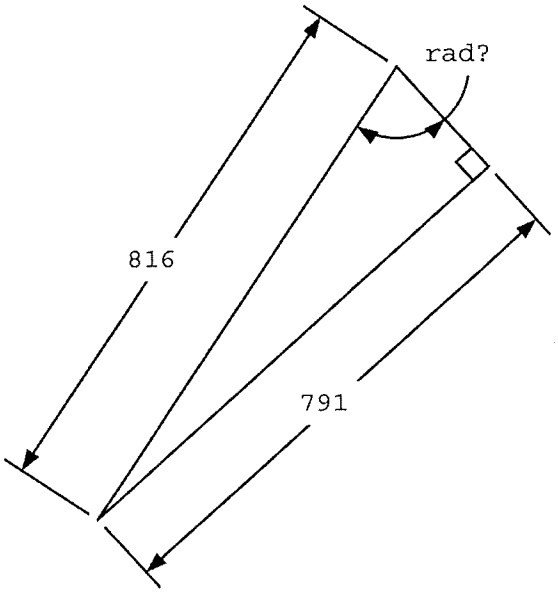
08I-16. The product of two consecutive positive integers is 118,680. What is their sum? ---------- 16=_____ integer

08I-17. If the average heart rate is 80 beats/min, how many times has the heart beat for a teenager on her 16th birthday? Assume that the heart starts beating 33 weeks prior to birth. ---------- 17=_____ beats

08I-18. The Old Testament has 592,439 words and 23,214 verses, while the New Testament has 181,253 words and 7956 verses. What is the percent difference in the average number of words per verse in the Old and New Testaments? ----- 18=_____ %

08I-19.

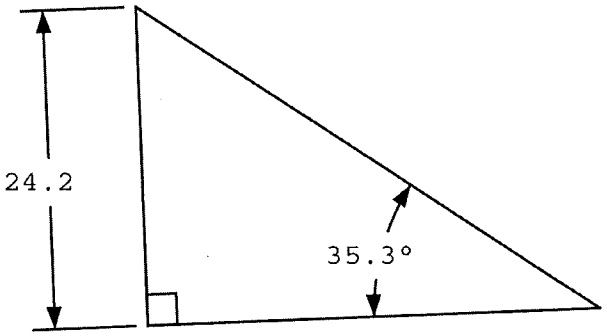
RIGHT TRIANGLE



08I-19 = _____

08I-20.

RIGHT TRIANGLE



AREA = ?

08I-20 = _____

08I-21. $\left[\frac{\sqrt{2.39 - 0.743}}{-5.34} + \frac{(-0.0954)}{0.683}\right]^2$ ---------- 21=_____

08I-22. $\left[\frac{(0.347)(0.415)}{-1.45} + 0.0532\right]^2 + \sqrt{8.48\text{x}10^{-7}}$ ---------- 22=_____

08I-23. $(-34.6)(-0.00912)\sqrt{(-0.959)^2/0.83} + 1/\sqrt{\pi + 8.98}$ ---------- 23=_____

08I-24. $[-33.1 + \sqrt{921}]^2 \text{ x } [381 + 875]^2 \text{ x } \sqrt{1.42/2.21}$ ---------- 24=_____

08I-25. $\frac{\sqrt{964 + 770 + (1.57\text{x}10^5)/(160)}}{-198 + 103}$ ---------- 25=_____

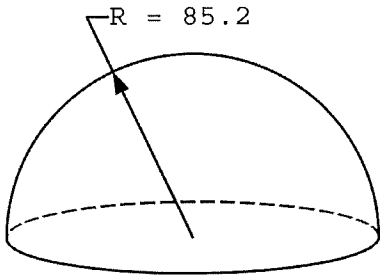
08I-26. The world 1-hr record for human powered vehicles was broken on July 6, 2006 by "Fast Freddy" Markham who pedaled 53.43 mi. The old record was 52.33 mi. What is the percent difference in these distances? ---------- 26=_____ %(SD)

08I-27. A tire manufacturer wants to offer a warranty on their tires of 50,000 mi or x years. The desire is for the life in years to associate with 50,000 mi travel. If the average car drives 1.5 hr daily at 30 mph, what is x? ---- 27=_____ yr

08I-28. What is $45{,}678^{98{,}765}$? ---------- 28=_____

08I-29.

HEMISPHERE

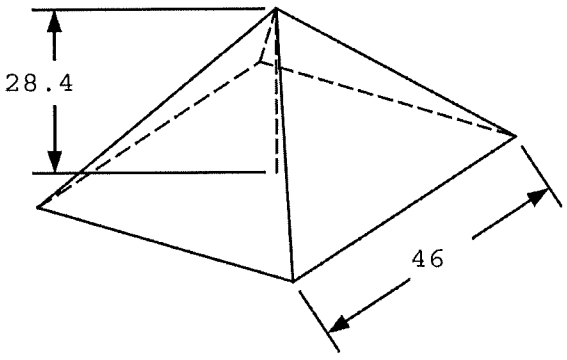


VOLUME = ?

08I-29 = _____

08I-30.

SQUARE PYRAMID



TOTAL SURFACE AREA = ?

08I-30 = _____

08I-31. $\sqrt{\dfrac{9.53}{\sqrt{38.2 + 26.5}}} \times \left[\dfrac{1}{(4.52 - 2.88)^2} + \dfrac{1}{(\pi + 0.669)^2}\right]$ ---------- 31=_____

08I-32. $\dfrac{(-0.571 + 0.888)^2}{\sqrt{14.4 - 4.93}} + \dfrac{0.0177}{\sqrt{0.144 + 0.185}}$ ---------- 32=_____

08I-33. $\dfrac{(4.82)^2 + \sqrt{354}}{\sqrt{(9.39)(-14)^2}} + \dfrac{\sqrt{\sqrt{(1.12\text{x}10^5)(0.246)}}}{4.57 + 14.1}$ ---------- 33=_____

08I-34. $\dfrac{(4.28\text{x}10^5)^2 (1.01\text{x}10^{-12} + 4.25\text{x}10^{-13})}{0.00269 + (-0.272)(0.0329)} + \dfrac{1}{\dfrac{1}{-28.3} + \dfrac{1}{(26)}}$ ---------- 34=_____

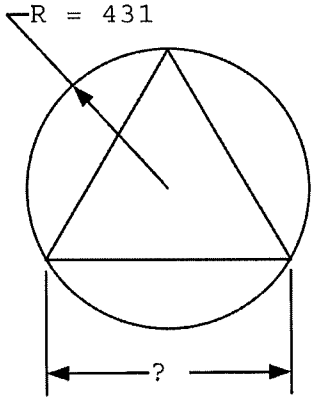
08I-35. $\dfrac{\left[\dfrac{-1.53\text{x}10^{-4}}{506}\right]^2 + \sqrt{\dfrac{(0.744)(0.461)}{(8.82\text{x}10^{25})}} + (1.18\text{x}10^{-13})}{0.902 + \sqrt{(-0.971)(-0.148)}}$ ---------- 35=_____

08I-36. A projectile's maximum vertical elevation is 57 ft and it lands 250 ft away. What is the angle of release relative to the ground? ---------- 36=_____ rad

08I-37. Two ships are 2 mi apart and traveling at 25 knots. The lead ship executes a turn 25° to port (left) at the same time that the trailing ship executes a 25° turn to starboard (right). How long does it take them to be 100 mi apart? One knot equals 1.15 mph. ---------- 37=_____ hr

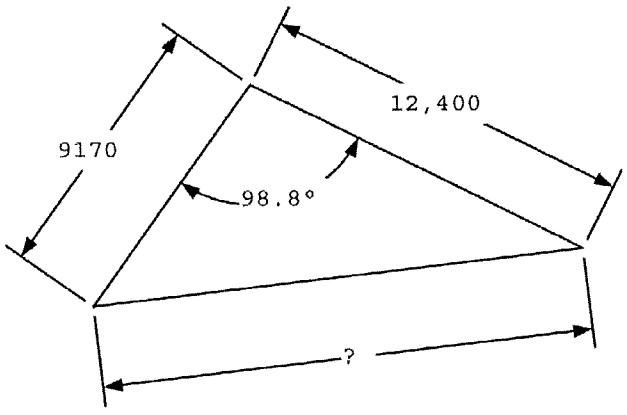
08I-38. The end of a 15-ft long dog leash slides along a taut 75-ft long clothesline. What is the height of the clothesline if the roaming area is 1800 ft^2? ---------- 38=_____ ft

08I-39.
EQUILATERAL TRIANGLE AND CIRCLE



08I-39 = _____

08I-40.
SCALENE TRIANGLE



08I-40 = _____

08I-41. $\dfrac{10^{-(\pi - 6.5)}}{-0.0918 + 0.0669}$ ---------- 41=_____

08I-42. $\dfrac{e^{+0.466} + e^{-0.931}}{(-2.89\text{x}10^{-6} + 9.66\text{x}10^{-7})}$ ---------- 42=_____

08I-43. $\dfrac{(3380)\text{Log}(10200 - 7770)}{(-64300)}$ ---------- 43=_____

08I-44. $(8.88)^{3} + (32.4 - 8.8)^{0.511}$ ---------- 44=_____

08I-45.(deg) $\{(74.6)\sin(-31.9°)\} \times \{(-90.9)\cos(-69.8°)\}$ ---------- 45=_____

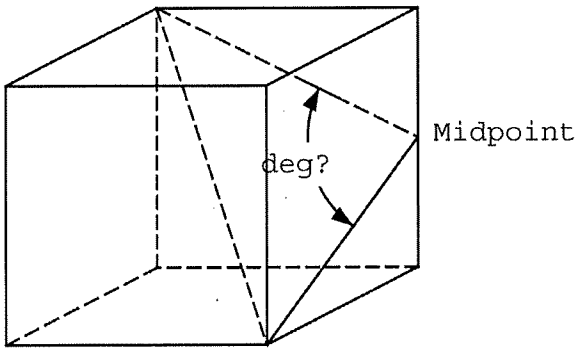
08I-46. On a Texas map scaled at 1:1,100,000, the straight-line distance from San Antonio to Victoria is 5.77 in. In exactly the opposite direction, the distance from San Antonio to Pecos measures 18.9 in. What is the actual distance between Pecos and Victoria? ---------- 46=_____ mi(SD)

08I-47. A toy dinosaur is 1.25 in long and grows enormously when placed in water. Its length was measured after placing in water at 10 minute intervals: 1.6 in, 2.2 in, 2.9 in, 3.4 in, 4.5 in and 6.25 in. What is the best-fit average linear growth rate? ---------- 47=_____ in/min

08I-48. Solve for (real) q if $7.5q^{5.8}-3 = 5q^{2}-2q$. ---------- 48=_____

08I-49.

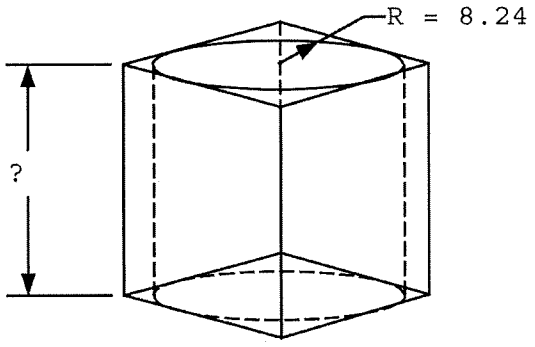
CUBE



08I-49 = _____

08I-50.

RECTANGULAR SOLID WITH CYLINDRICAL CAVITY



TOTAL SURFACE AREA = 1920

08I-50 = _____

08I-51. $\dfrac{(-0.0039)\ 10^{-(7.34\ -\ 3.58)}}{0.00673\ +\ 0.00537}$ ---------- 51=_____

08I-52. $\dfrac{1\ +\ e^{+\{0.455\ +\ (0.19)\ (\pi)\}}}{(0.537)\ (1.4\ -\ e^{(-0.112)})}$ ---------- 52=_____

08I-53. $\dfrac{\mathrm{Log}\{4.69\times10^{-10}\ +\ (3.81\times10^{-5})\ (1.62\times10^{-5})\}}{21.6\ -\ \mathrm{Log}\{(54.8)/(0.0358)\}}$ ---------- 53=_____

08I-54. $\dfrac{(8.66)^{0.625}\ -\ (\pi)^{-0.567}}{7.71\times10^{-4}\ +\ 1.29\times10^{-4}}$ ---------- 54=_____

08I-55. (rad) $\dfrac{\arcsin\{(7.68)\ (9.6)/(316)\}}{3.32\ +\ (-3.42)\ (-8.06)}$ ---------- 55=_____

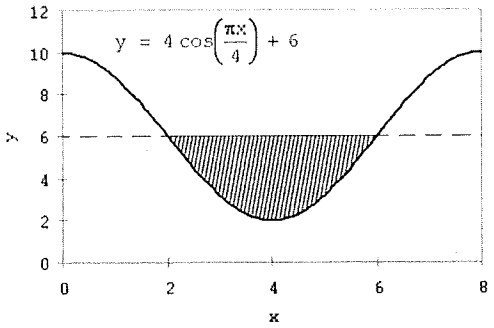
08I-56. (rad) What is the maximum value of y for $y = 30\sin x - x^2$? ---------- 56=_____

08I-57. A 5-in long string is cut into two pieces. One is used to form a circle and one a square. What is the length of the latter piece if the sum of the areas is minimized? ---------- 57=_____ in

08I-58. What is r if $\mathrm{Det}[\mathbf{C}] = 0$ and $[\mathbf{C}] = \begin{bmatrix} 4 & -6 & 9 \\ -6 & 7 & r \\ 9 & 3 & 3 \end{bmatrix}$? ------- 58=_____

08I-59.

SOLID OF REVOLUTION (RAD)
(Axis of Revolution: x = 1)

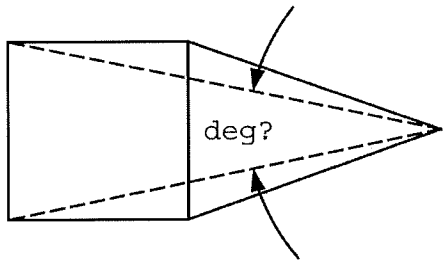


VOLUME = ?

08I-59 = _____

08I-60.

SQUARE AND ISOSCELES TRIANGLE



PERIMETER(SQUARE) = PERIMETER(TRIANGLE)

08I-60 = _____

08I-61. $\dfrac{(10^{8.19})(10^{2.77})(10^{0.27})}{10^{\{(\pi)(0.823)\}}}$ ---------- 61=_____

08I-62. $e^{\text{Ln}[(5.83)(49.1)]} + 10^{\text{Log}[(0.715)(190)]}$ ---------- 62=_____

08I-63. (rad) $\dfrac{98.2}{6(-8.24)}\{(3.2) + (0.859)\sin(-4.27)\}^5$ ---------- 63=_____

08I-64. $1 + 0.26 + (0.26)^2 + \dfrac{(0.26)^4}{8} - \dfrac{(0.26)^5}{15}$ ---------- 64=_____

08I-65. $\dfrac{6.33}{\sqrt{0.0803}}\ \text{Ln}\left[\dfrac{\sqrt{(-6.38)^2 + (38.1)} + \sqrt{202}}{\sqrt{\pi} + (66.5)(0.00651)}\right]$ ---------- 65=_____

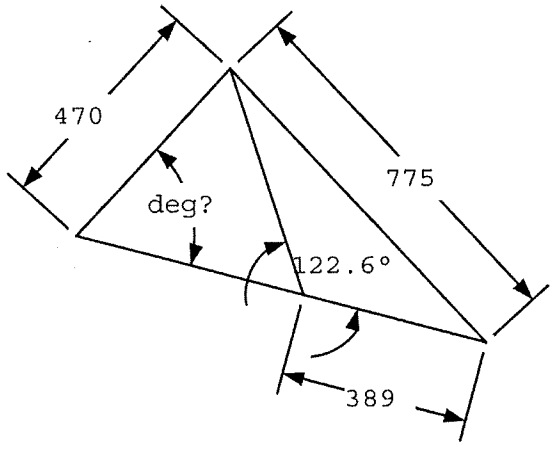
08I-66. A gun fires a bullet at 200 mph. What is the bullet's maximum range, the farthest horizontal distance it can travel? ---------- 66=_____ mi

08I-67. An insect population, if unchecked, would triple every 23 days. What fraction of the original population must be annihilated every 12 days to keep the population in check (i.e., to keep it from growing)? ---------- 67=_____ %

08I-68. A slow runner runs a 1/4 mi lap in 3.1 min, and a fast runner covers that distance in 1 min 55 sec. They started running from Point O on an oval track in opposite directions. When the fast runner met the slow runner, he immediately reversed direction and raced back to Point O. There, he again reversed direction, running until he met the slow runner again. This continued until the slow runner completed one lap, returning to Point O. How far did the fast runner run? - 68=_____ ft

08I-69.

SCALENE TRIANGLES

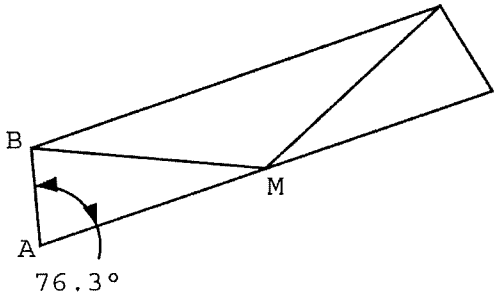


08I-69 = _____

08I-70.

REGULAR TRAPEZOID

TRAPEZOIDAL AREA = 2200



M = MIDPOINT
AM = BM = ?

08I-70 = _____

08I-1 = 0.586
= 5.86×10^{-1}

08I-2 = 0.142
= 1.42×10^{-1}

08I-3 = -0.622
= -6.22×10^{-1}

08I-4 = 0.0803
= 8.03×10^{-2}

08I-5 = 0.0251
= 2.51×10^{-2}

08I-6 = $2.97

08I-7 = 288
= 2.88×10^{2}

08I-8 = 1.77×10^{6}

08I-9 = 0.0157
= 1.57×10^{-2}

08I-10 = 24.1
= 2.41×10^{1}

08I-11 = -18800
= -1.88×10^{4}

08I-12 = -2.11×10^{-6}

08I-13 = 1.50
= 1.50×10^{0}

08I-14 = 606
= 6.06×10^{2}

08I-15 = 0.0286
= 2.86×10^{-2}

08I-16 = 689 integer

08I-17 = 7.00×10^{8}

08I-18 = -10.7
= -1.07×10^{1}

08I-19 = 1.32
= 1.32×10^{0}

08I-20 = 414
= 4.14×10^{2}

08I-21 = 0.144
= 1.44×10^{-1}

08I-22 = 0.00305
= 3.05×10^{-3}

08I-23 = 0.619
= 6.19×10^{-1}

08I-24 = 9.58×10^{6}

08I-25 = -0.549
= -5.49×10^{-1}

08I-26 = -2.06
= -2.06×10^{0} (3SD)

08I-27 = 3.04
= 3.04×10^{0}

08I-28 =
$9.33 \times 10^{460,215}$

08I-29 = 1.30×10^{6}

08I-30 = 5480
= 5.48×10^{3}

08I-31 = 0.480
= 4.80×10^{-1}

08I-32 = 0.0635
= 6.35×10^{-2}

08I-33 = 1.67
= 1.67×10^{0}

08I-34 = 278
= 2.78×10^{2}

08I-35 = 2.12×10^{-13}

08I-36 = 0.739
= 7.39×10^{-1}

08I-37 = 4.11
= 4.11×10^{0}

08I-38 = 11.2
= 1.12×10^{1}

08I-39 = 747
= 7.47×10^{2}

08I-40 = 16,500
= 1.65×10^{4}

08I-41 = -91700
= -9.17×10^{4}

08I-42 = -1.03×10^{6}

08I-43 = -0.178
= -1.78×10^{-1}

08I-44 = 705
= 7.05×10^{2}

08I-45 = 1240
= 1.24×10^{3}

08I-46 = 428
= 4.28×10^{2} (3SD)

08I-47 = 0.0786
= 7.86×10^{-2}

08I-48 = 0.952
= 9.52×10^{-1}

08I-49 = 102
= 1.02×10^{2}

08I-50 = 15.3
= 1.53×10^{1}

08I-51 = -5.60×10^{-5}

08I-52 = 14.2
= 1.42×10^{1}

08I-53 = -0.487
= -4.87×10^{-1}

08I-54 = 3700
= 3.70×10^{3}

08I-55 = 0.00762
= 7.62×10^{-3}

08I-56 = 27.7
= 2.77×10^{1}

08I-57 = 2.80
= 2.80×10^{0}

08I-58 = -11.4
= -1.14×10^{1}

08I-59 = 192
= 1.92×10^{2}

08I-60 = 23.4
= 2.34×10^{1}

08I-61 = 4.41×10^{8}

08I-62 = 422
= 4.22×10^{2}

08I-63 = -1970
= -1.97×10^{3}

08I-64 = 1.33
= 1.33×10^{0}

08I-65 = 52.5
= 5.25×10^{1}

08I-66 = 0.507
= 5.07×10^{-1}

08I-67 = 77.4
= 7.74×10^{1}

08I-68 = 2130
= 2.13×10^{3}

08I-69 = 62.0
= 6.20×10^{1}

08I-70 = 50.3
= 5.03×10^{1}