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 23A

(Invitational A)

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, (0.190)

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}.

23A-1. $(-9.46 \times 4.86) + 33.4$ ---------- 1=_____

23A-2. $(67 + 12.6 - \pi) \times 89.8$ ---------- 2=_____

23A-3. $(-0.822 - 0.544 - 2.12 + 0.297) \times (0.821)$ ---------- 3=_____

23A-4. $\{(-37)(0.366 + 0.543 - 0.364)(48.4)\} + 874$ ---------- 4=_____

23A-5. $\dfrac{\{(0.083 - 0.0502 + 0.131)/(-0.0203)\}}{\{(0.0312)(-0.0785)/(-0.0251)\}}$ ---------- 5=_____

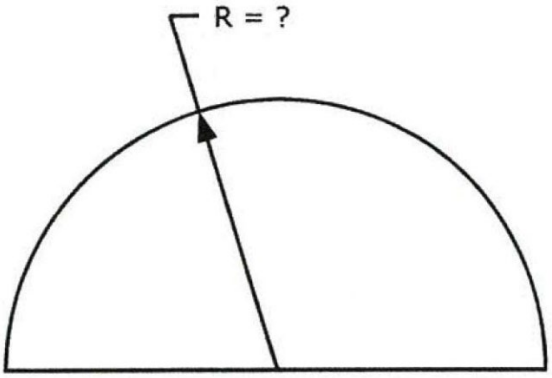
23A-6. Calculate the product of 99.7 and the positive square root of 770. ----- 6=_____

23A-7. Calculate negative x if $5x = 35/x$. ---------- 7=_____

23A-8. Calculate the cube root of the product of 4780 and −18.4. ---------- 8=_____

23A-9.

SEMICIRCLE

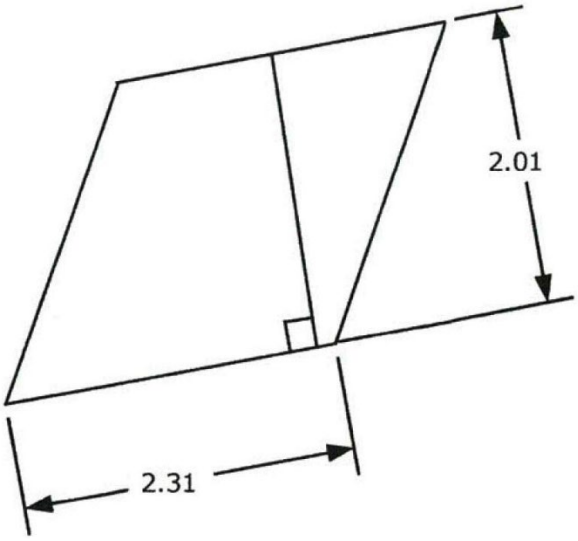


Area = 54.9

23A-9 =_____

23A-10.

RHOMBUS



Area = ?

23A-10 =_____

23A-11. $\dfrac{(0.0581)(-0.0356) - (0.479)(-0.00108) + 4.11\text{x}10^{-4}}{-9.76\text{x}10^{-4} + (-0.0137)(0.0494)}$ ---------- 11=_____

23A-12. $\dfrac{\{-53.6 + (-2.7)(5.29)(4.51)\}}{(0.321 + 2.8)(\pi)(1.09 + 0.317)}$ ---------- 12=_____

23A-13. $\dfrac{\{(-0.921 + 0.109)(57.8 + 66.8) + (-128)\}(0.527)}{(-0.176)(0.771 + \pi)(-0.102)}$ ---------- 13=_____

23A-14. $\dfrac{2570}{-4.36} + \dfrac{713 + 615 - 827}{0.167 - 0.906} + \dfrac{(0.005 + 0.0107)}{\{(-6.20\text{x}10^{-5})/(4.95)\}}$ ---------- 14=_____

23A-15. $\dfrac{56300 + 6.41\text{x}10^{5} - (61200 + 5.93\text{x}10^{5})(1.55 - 1.41)}{(-612)(-0.286)(0.53)(244 - 372 + 395)}$ ---------- 15=_____

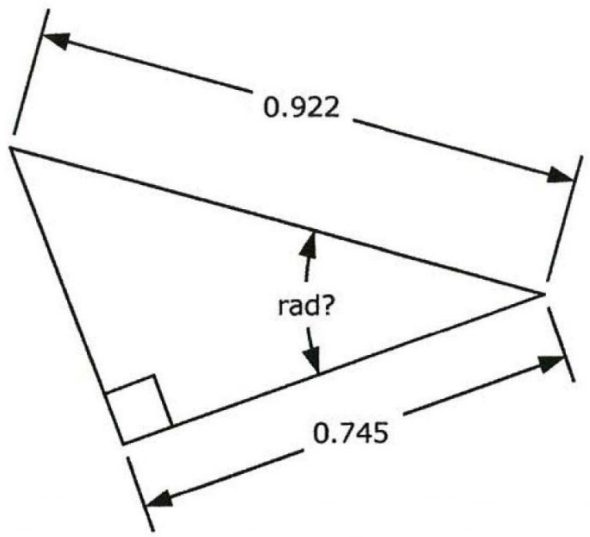
23A-16. What is the viewing area of a rectangular picture frame that has dimensions of 9.5 in and 13 in? ---------- 16=_____ in^2

23A-17. The pitcher's mound is 60 ft 6 in from home plate, and home plate is 127 ft 3 in from second base. What is the distance from the pitcher's mound to second base? ---------- 17=_____ ft

23A-18. A supersonic transport flies at 1.7 times the speed of sound. The speed of sound is 660 mph. How long does it take to fly from Los Angeles to Toyko, if the distance is 5451 mi? ---------- 18=_____ hr

23A-19.

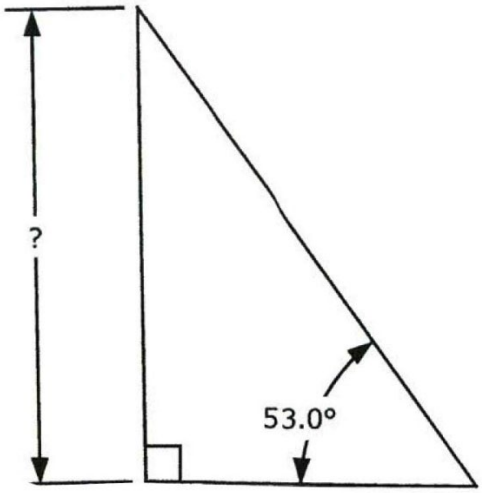
RIGHT TRIANGLE



23A-19 =_____

23A-20.

RIGHT TRIANGLE



Area = 5930

23A-20 =_____

23A-21. $\dfrac{-0.056 + 1/(-2.26)}{1/(2.79) + \pi} + \dfrac{1}{(-4.78)}$ ---------- 21=_____

23A-22. $\left[\dfrac{\sqrt{0.652 - 0.428}}{-5.77} + \dfrac{(-0.212)}{6.72}\right]^2$ ---------- 22=_____

23A-23. $\left[-59 + \sqrt{1150}\right]^2 \times \left[601 + 2350\right]^2 \times \sqrt{0.0205/0.0684}$ ---------- 23=_____

23A-24. $(-0.0816)(-3.7)\sqrt{(-0.149)^2/0.297} + 1/\sqrt{56.3 + 272}$ ---------- 24=_____

23A-25. $\left[\dfrac{0.732 + 0.0751 + \sqrt{0.16/0.525}}{-0.083 + 0.0667}\right]^2$ ---------- 25=_____

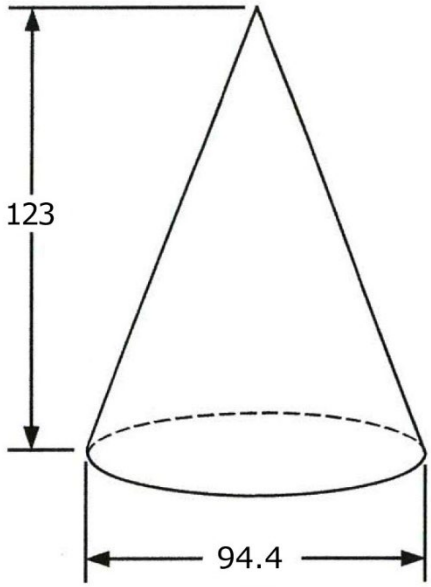
23A-26. Sam runs a mile in 6 min 48 s. What is his velocity? ---------- 26=_____ mph

23A-27. The *Mona Lisa* painting is valued at $900 million. It is rectangular, 2 ft 6 in by 1 ft 9 in. What is the value per unit area? ---------- 27=_____ $/mm^2

23A-28. Lenny invests $3530 for two years at 5% annual interest. What is the positive difference in total earnings, if the money was compounded annually or monthly? ---------- 28=$_____

23A-29.

CONE

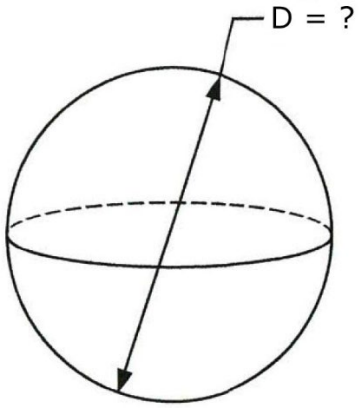


Total Surface Area = ?

23A-29 =_____

23A-30.

SPHERE



Volume = 77.3

23A-30 =_____

23A-31. $\sqrt{\dfrac{4.19}{\sqrt{22.1 + 15.4}}} \times \left[\dfrac{1}{(6.8 - \pi)^2} + \dfrac{1}{(4.48 + 2.54)^2}\right]$ ---------- 31=_____

23A-32. $\dfrac{(0.0605 + 0.355)^2}{\sqrt{55.7 - 28.3}} + \dfrac{0.00526}{\sqrt{0.0556 + 0.123}}$ ---------- 32=_____

23A-33. $\dfrac{\sqrt{(0.00516)/\{(0.373)/\sqrt{0.118}\}}}{0.0677 + (0.917)(8.42)} + \left\{1.68\text{x}10^{-5} + 2.66\text{x}10^{-5}\right\}^{1/2}$ 33=_____

23A-34. $\dfrac{(1.33)^2 + \sqrt{1.46}}{\sqrt{(0.766)(-75.9)^2}} + \dfrac{\sqrt{\sqrt{(0.319)(0.348)}}}{-8.26 + 25}$ ---------- 34=_____

23A-35. $\dfrac{\dfrac{1}{-5590} + \dfrac{\pi}{(103 + 85.4)^2} - \dfrac{\sqrt{3.21\text{x}10^{-6}}}{(-3.97)^2}}{(-2.94 + 3.5)^2 + (-0.323)}$ ---------- 35=_____

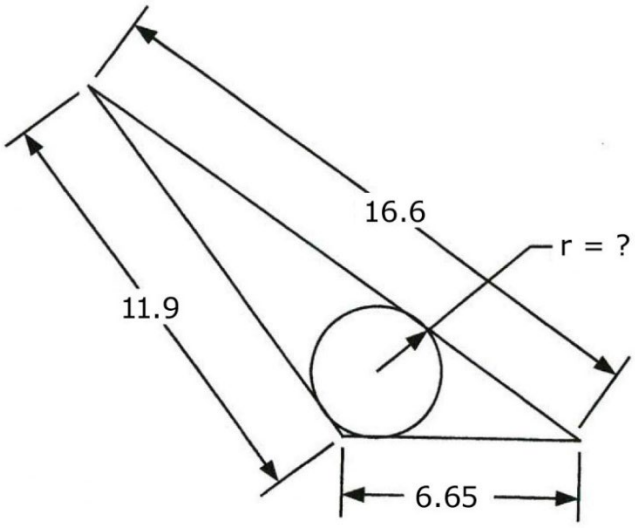
23A-36. Texas has a land area of 268,596 mi^2. A map of the US is scaled such that 1 in on the map represents 112.5 mi. What is the map area of Texas? ---------- 36=_____ in^2(SD)

23A-37. What is the positive x value of the intersection of the line $y = 3x + 2$ and the curve $y = 8x^2 - 20x - 25$? ---------- 37=_____

23A-38. Marie bikes 5 mi to school in 20 min, and she can walk in 1 hr 20 min. On the way to school, her bike broke down, and she walked the rest of the way. If the total commute was 47 min, how far from home was she when the bike broke down? ---------- 38=_____ mi

23A-39.

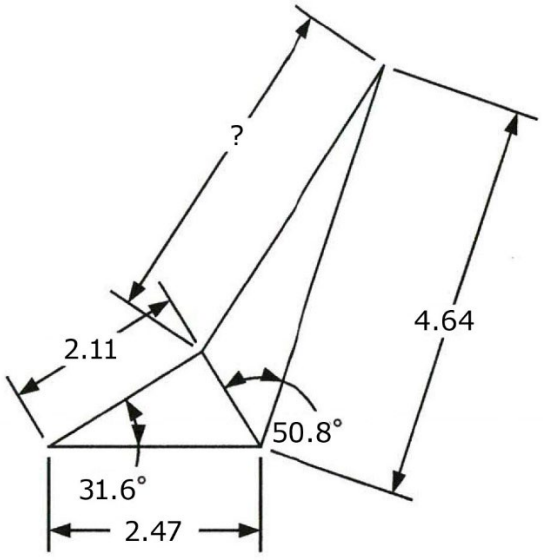
CIRCLE AND SCALENE TRIANGLE



23A-39 =_____

23A-40.

SCALENE TRIANGLES



23A-40 =_____

23A-41. $(-0.0837)(0.00337)10^{\{-0.0897/-0.0275\}}$ ---------- 41=_____

23A-42. $\dfrac{(1.13\text{x}10^{-6})}{(-7.08\text{x}10^{-5})}\left[1 - e^{-(0.315)(0.451)}\right]$ ---------- 42=_____

23A-43. $\dfrac{0.054 - 0.0878}{\text{Log}(\pi + 4.91)}$ ---------- 43=_____

23A-44. $(227 + 429)^{1/3} + 1/\{(77.7)^{-0.132}\}$ ---------- 44=_____

23A-45.(deg) $\sin\left[90° \text{ x } \dfrac{(-8.44\text{x}10^{-4})}{(9.40\text{x}10^{-4})}\right] + \cos\{147° - 125°\}$ ---------- 45=_____

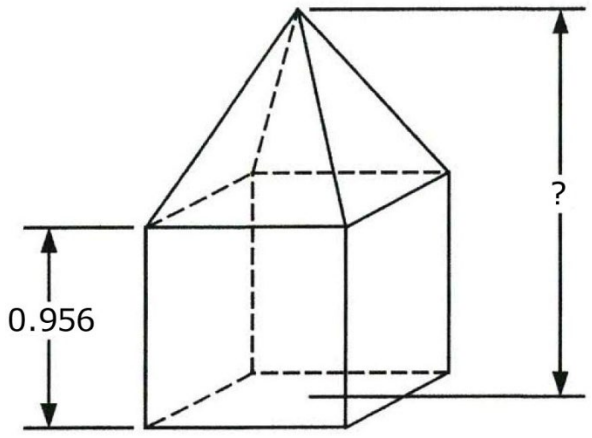
23A-46. Columbus' ship *Santa Maria* weighed 50 tons and was 76 ft long. A US battleship is 860 ft long and weighs 48,600 tons. The battleship density is actually two thirds the *Santa Maria* density. What is the percent error in estimating the battleship weight using the *Santa Maria* data? --------- 46=_____%

23A-47. Shirt size is measured by the neck perimeter in inches. The amount of cloth needed to make a shirt is measured by the length of cloth in yards from a bolt of constant width. A Size 12 shirt is made from 1.5 yd of cloth. Other values (Size, Cloth) are (15, 2.2 yd), (16, 2.5 yd) and (17, 2.8 yd). How much cloth is needed to produce a Size 18 shirt? ---------- 47=_____yd

23A-48. What is z if $5\sqrt{z} = \sqrt[3]{z} + 24$? ---------- 48=_____

23A-49.

CUBE AND SQUARE PYRAMID

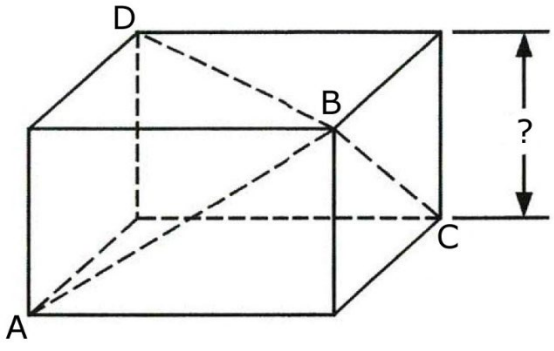


$$\text{Volume(Pyramid)} = \frac{\text{Volume(Cube)}}{\pi}$$

23A-49 =_____

23A-50.

RECTANGULAR SOLID



AB = 0.232 BC = 0.090 BD = 0.143

23A-50 =_____

23A-51. $\dfrac{10^{(0.889)} \times 10^{-(0.901)} + 0.769}{10^{(\pi + 0.657)}}$ ---------- 51=_____

23A-52. $\dfrac{(5.87 - 1.54)\, e^{(0.179)(3.21)}}{e^{-(6.89 - 2.58)}}$ ---------- 52=_____

23A-53. $\dfrac{\mathrm{Ln}(2.73\times10^{-5} + 2.87\times10^{-5})}{5.09\times10^{-7}} + \dfrac{\mathrm{Ln}(9.46\times10^{-5})}{3.93\times10^{-5} - 3.85\times10^{-5}}$ ---------- 53=_____

23A-54. $\dfrac{(776 + 1110)^{-0.225}}{(260)^{-(0.272 + 0.895)}}$ ---------- 54=_____

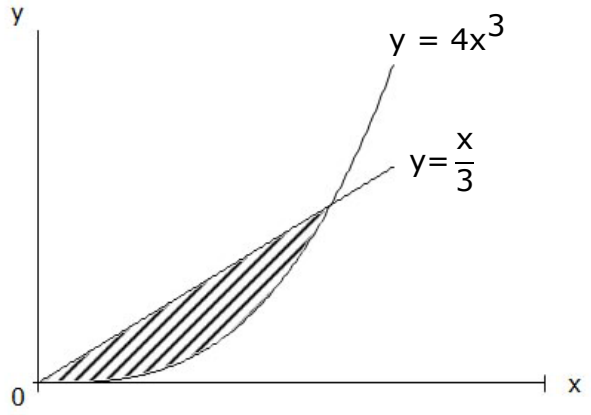
23A-55.(rad) $\dfrac{\arcsin\{(6.69)(-5.22)/(-45.6)\}}{6.99 + (2.47)(3.61)}$ ---------- 55=_____

23A-56. Calculate the area under the curve $y = 4x^2 - 14x + 15$ for $1<x<6$. ----- 56=_____

23A-57. A bug population of 100 bugs doubles in number every 3 days. Birds eat the bugs, each bird consuming 26 bugs/day. How many birds are needed to control the total bug population to just under 9,000 bugs? --------- 57=_____integer

23A-58. What is the determinant of $\begin{bmatrix} 1 & 5 & 15 \\ 5 & -6 & -10 \\ 15 & -10 & 22 \end{bmatrix}$? ---------- 58=_____

23A-59.

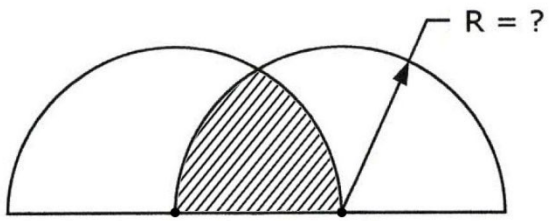


Hatched Area = ?

23A-59 =_____

23A-60.

CONGRUENT SEMICIRCLES



Hatched Area = 0.435

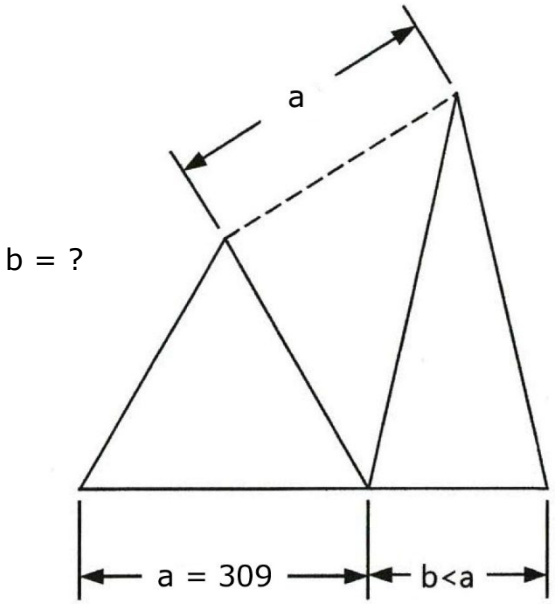
23A-60 =_____

23A-61. How long after 1:15 do the minute and hour hands of a clock align? ---------- 61=_____min

23A-62. The probability of winning the Powerball lottery is 1 in 192 million. What is the probability of winning it 100 times? ---------- 62=_____

23A-63. A tennis player hits a lob from the baseline. The ball's maximum height is 15 ft at the net, and it travels the full length of the court, 78 ft. What is the time of flight of the ball? ---------- 63=_____s

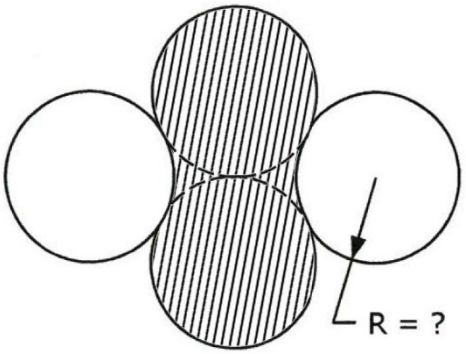
23A-64.
EQUILATERAL AND ISOSCELES TRIANGLES



Area(Isosceles Triangle) = Area(Equilateral Triangle)

23A-64 =_____

23A-65.
CONGRUENT CIRCLES



Hatched Area = 3.53

23A-65 =_____

23A-66. $10^{\pi} \times \sqrt{\frac{(10^{4.09})(10^{0.446})}{(10^{-8.64})(10^{0.882})}}$ ---------- 66=_____

23A-67. (rad) sin(5.19)cos(3.69) – cos(5.19)sin(3.69) ---------- 67=_____

23A-68. (deg) sin(−68.8°)cos(46.3°) + cos(−68.8°)sin(46.3°) ---------- 68=_____

23A-69. $\frac{1}{(0.649)} + \frac{1}{3(0.649)^3} + \frac{1}{5(0.649)^5} + \frac{1}{7(0.649)^7}$ ---------- 69=_____

23A-70. $\frac{1}{\sqrt{(51.1)^2 - (1670)}}\ \text{Ln}\left\{\frac{(59.7) - \sqrt{(51.1)^2 - (1670)}}{(59.7) + \sqrt{(51.1)^2 - (1670)}}\right\}$ ---------- 70=_____

23A-1 = −12.6
= -1.26×10^{1}

23A-2 = 6870
= 6.87×10^{3}

23A-3 = −2.62
= -2.62×10^{0}

23A-4 = −102
= -1.02×10^{2}

23A-5 = −82.7
= -8.27×10^{1}

23A-6 = 2770
= 2.77×10^{3}

23A-7 = −2.65
= -2.65×10^{0}

23A-8 = −44.5
= -4.45×10^{1}

23A-9 = 5.91
= 5.91×10^{0}

23A-10 = 4.64
= 4.64×10^{0}

23A-11 = 0.690
= 6.90×10^{-1}

23A-12 = −8.55
= -8.55×10^{0}

23A-13 = −1720
= -1.72×10^{3}

23A-14 = −2520
= -2.52×10^{3}

23A-15 = 24.5
= 2.45×10^{1}

23A-16 = 124
= 1.24×10^{2}

23A-17 = 66.8
= 6.68×10^{1}

23A-18 = 4.86
= 4.86×10^{0}

23A-19 = 0.630
= 6.30×10^{-1}

23A-20 = 125
= 1.25×10^{2}

23A-21 = −0.352
= -3.52×10^{-1}

23A-22 = 0.0129
= 1.29×10^{-2}

23A-23 = 3.00×10^{9}

23A-24 = 0.138
= 1.38×10^{-1}

23A-25 = 6950
= 6.95×10^{3}

23A-26 = 8.82
= 8.82×10^{0}

23A-27 = 2210
= 2.21×10^{3}

23A-28 = $8.62

23A-29 = 26,500
= 2.65×10^{4}

23A-30 = 5.29
= 5.29×10^{0}

23A-31 = 0.0786
= 7.86×10^{-2}

23A-32 = 0.0454
= 4.54×10^{-2}

23A-33 = 0.0154
= 1.54×10^{-2}

23A-34 = 0.0793
= 7.93×10^{-2}

23A-35 = 0.0217
= 2.17×10^{-2}

23A-36 = 21.22
= 2.122×10^{1} (4SD)

23A-37 = 3.77
= 3.77×10^{0}

23A-38 = 2.75
= 2.75×10^{0}

23A-39 = 1.85
= 1.85×10^{0}

23A-40 = 3.95
= 3.95×10^{0}

23A-41 = −0.515
= -5.15×10^{-1}

23A-42 = −0.00211
= -2.11×10^{-3}

23A-43 = −0.0373
= -3.73×10^{-2}

23A-44 = 10.5
= 1.05×10^{1}

23A-45 = −0.0600
= -6.00×10^{-2}

23A-46 = −0.620
= -6.20×10^{-1}

23A-47 = 3.11
= 3.11×10^{0}

23A-48 = 29.3
= 2.93×10^{1}

23A-49 = 1.87
= 1.87×10^{0}

23A-50 = 0.144
= 1.44×10^{-1}

23A-51 = 0.000277
= 2.77×10^{-4}

23A-52 = 573
= 5.73×10^{2}

23A-53 = -3.08×10^{7}

23A-54 = 121
= 1.21×10^{2}

23A-55 = 0.0548
= 5.48×10^{-2}

23A-56 = 117
= 1.17×10^{2}

23A-57 = 80 integer

23A-58 = −932
= -9.32×10^{2}

23A-59 = 0.00694
= 6.94×10^{-3}

23A-60 = 0.842
= 8.42×10^{-1}

23A-61 = 55.9
= 5.59×10^{1}

23A-62 = 4.68×10^{-829}

23A-63 = 1.93
= 1.93×10^{0}

23A-64 = 182
= 1.82×10^{2}

23A-65 = 0.731
= 7.31×10^{-1}

23A-66 = 1.94×10^{9}

23A-67 = 0.997
= 9.97×10^{-1}

23A-68 = −0.383
= -3.83×10^{-1}

23A-69 = 7.44
= 7.44×10^{0}

23A-70 = −0.0370
= -3.70×10^{-2}