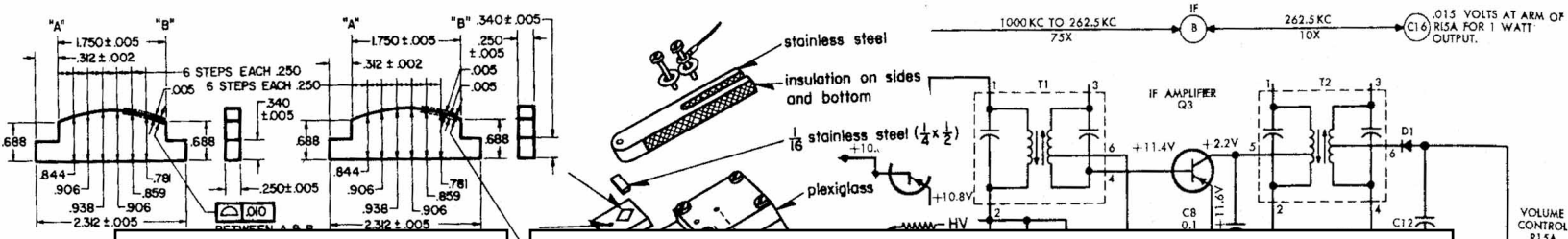


Tie Breaker: Points scored on Stated and Geometry Problems			
	+ _____	+ _____	+ _____

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

UIL Calculator Applications

Test 23I

(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}.

23I-1. $(-9.7/3.56) + \pi$ ---------- 1=_____

23I-2. $(-5.77 + 2.66 - 0.603) \times 7.61$ ---------- 2=_____

23I-3. $(-7.54 + 9.84 - 1.87)/(7.98) + 0.03$ ---------- 3=_____

23I-4. $\dfrac{(4650 - 4360)}{\{(-0.029)/(0.0549)\}} + (375 - 43.2)$ ---------- 4=_____

23I-5. $\dfrac{\{(0.173 - 0.097 + 0.278)/(\pi)\}}{\{(7.73)(5.99)/(3.44)\}}$ ---------- 5=_____

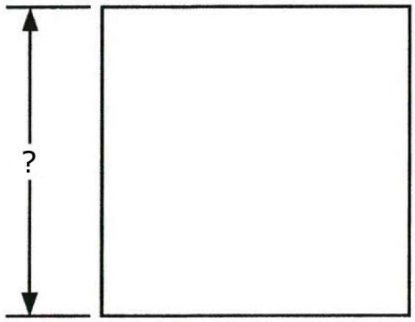
23I-6. What is the result from squaring the sum of 0.706 and 0.931? --------- 6=_____

23I-7. What is the product of the square of 0.861 and the positive square root of 0.905? ---------- 7=_____

23I-8. What is y if (y+5)/(y) = 4.85? ---------- 8=_____

23I-9.

SQUARE

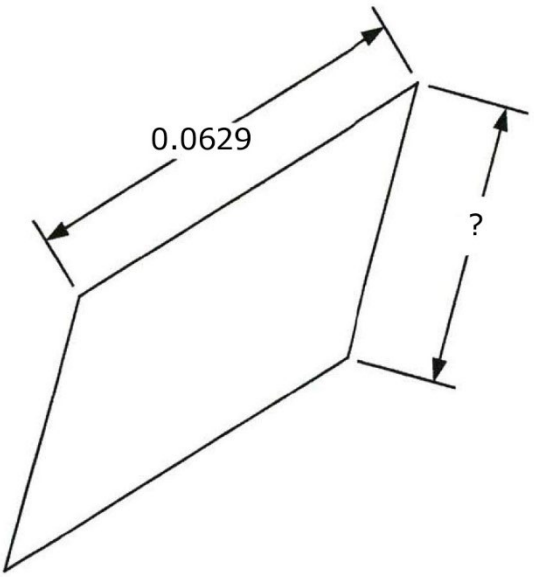


Area = 165

23I-9 =_____

23I-10.

PARALLELOGRAM



Perimeter = 0.214

23I-10 =_____

23I-11. $\dfrac{(557)(31.7) + (70.5)(806)}{-3.16 + \pi - (-6.11)(0.244)}$ ---------- 11=_____

23I-12. $\dfrac{-0.343(5.18\text{x}10^{-5} + 3.63\text{x}10^{-5})}{(598 - 1820)(4.53)} - \dfrac{7.18\text{x}10^{-10}}{-0.278 - 0.0812}$ ---------- 12=_____

23I-13. $\dfrac{-44400 + 9020 - 9240 + 5930 + 22000}{(0.0988)(27 + 16.5)(-0.0982 + 0.0801)}$ ---------- 13=_____

23I-14. $\dfrac{(7810 + 5820 - 620)(0.00969 + 0.0597 - 0.054)}{(0.8 - 0.143)(0.9)(-0.735 - 0.474)}$ ---------- 14=_____

23I-15. $\dfrac{(93900 + 72500 - 89100)(0.398 - 0.305 - 0.376)}{(265)(-506)(902)(1.97 + 1.35 + 2.59)}$ ---------- 15=_____

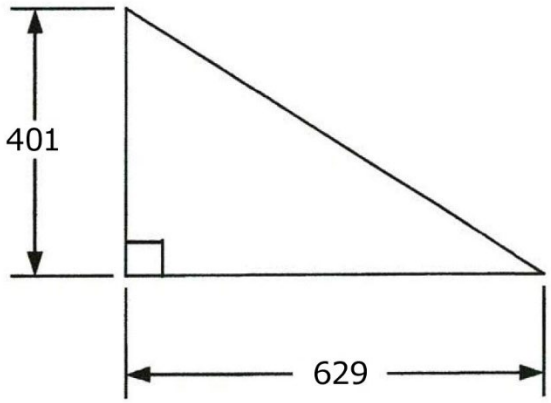
23I-16. How long does it take Terrie to drive 155 mi at 65 mph? ---------- 16=_____ hr

23I-17. It's 33.7 mi from Nixon TX to Kenedy TX. How many inches is this? -- 17=_____ in

23I-18. What is the diameter of a 55-gal drum, if its height is 34.7 in? -------- 18=_____ in

23I-19.

RIGHT TRIANGLE

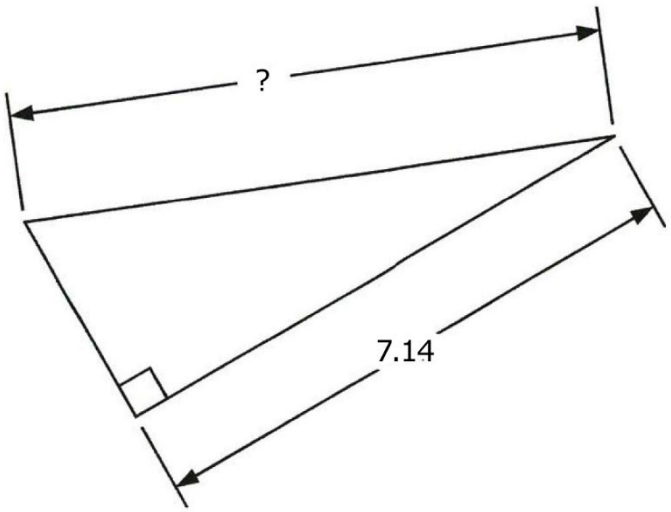


Area = ?

23I-19 =_____

23I-20.

RIGHT TRIANGLE



Area = 10.1

23I-20 =_____

23I-21. $\left[\frac{\sqrt{0.304 - 0.149}}{-7.35} + \frac{(-0.102)}{2.92}\right]^2$ ---------- 21=_____

23I-22. $\left[\frac{(0.487)(0.708)}{\pi} + 0.0324\right]^2 + \sqrt{1.28\text{x}10^{-7}}$ ---------- 22=_____

23I-23. $(5.61)(0.0971)\sqrt{(-0.7)^2/0.518} + 1/\sqrt{2.9 + 12.6}$ ---------- 23=_____

23I-24. $(0.42)(32.2) + \sqrt{(52.9)/(7.2)} + [(0.466)(\pi)]^2$ ---------- 24=_____

23I-25. $\left[\frac{3.85 + 0.718 + \sqrt{0.851/0.158}}{-1.56 + 0.471}\right]^2$ ---------- 25=_____

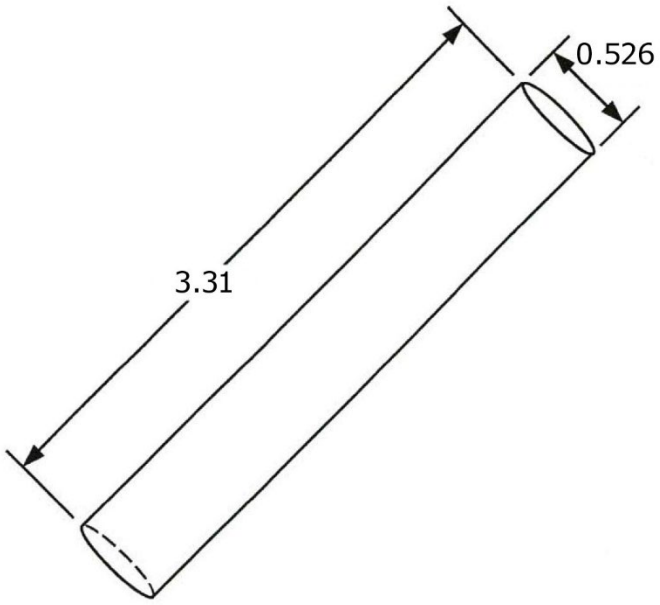
23I-26. The Circuit of the Americas F1 race track is 2.300 mi long. The single-lap record, set by Charles Leclerc in a Ferrari, is 1 min 36.169 s. What was his average speed? ---------- 26=_____mph(SD)

23I-27. A "1000-piece" jigsaw puzzle was rectangular when completed, measuring 38 pieces by 27 pieces. What is the percent error in calling it a 1000-piece puzzle? ---------- 27=_____%

23I-28. The Cadillac Ranch is ten half-buried Cadillac cars, an art project outside Amarillo. If a Cadillac costs $35,000 in 2023, how much did all ten Cadillacs cost when the Ranch was constructed in 1974? Assume an average annual inflation rate of 2.6%. ---------- 28=$_____

23I-29.

CYLINDER

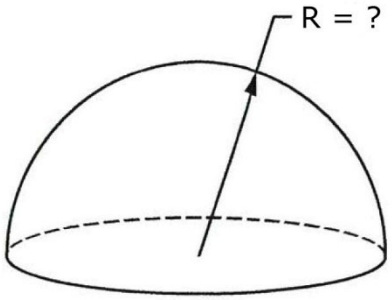


Total Surface Area = ?

23I-29 =_____

23I-30.

HEMISPHERE



Total Surface Area = 91.8

23I-30 =_____

23I-31. $\dfrac{(-3.88\text{x}10^{-6} + 1.03\text{x}10^{-5})^2}{\sqrt{67.7 - 34.8}} + \dfrac{1.47\text{x}10^{-14}}{\sqrt{2.77\text{x}10^{-6} + 5.18\text{x}10^{-6}}}$ -------- 31=_____

23I-32. $\dfrac{1}{0.0103} + \dfrac{1}{\sqrt{6.21\text{x}10^{-5}}} + \dfrac{(4.72 + 5.88 - 4.14)^2}{\sqrt{1.58 - 1.28}}$ ---------- 32=_____

23I-33. $\dfrac{(7.84\text{x}10^{5})^2(4.70\text{x}10^{-13} + 3.49\text{x}10^{-13})}{0.00573 + (-0.284)(-0.0984)} + \dfrac{1}{\dfrac{1}{1.58} + \dfrac{1}{(-13.4)}}$ -------- 33=_____

23I-34. $\dfrac{\sqrt{(0.4)/\{(0.7)/\sqrt{0.322}\}}}{0.292 + (0.151)(4.12)} + \{0.0735 + 0.411\}^{1/2}$ ---------- 34=_____

23I-35. $\dfrac{\dfrac{1}{-3100} + \dfrac{-3.37}{(193 + 44.1)^2} - \dfrac{\sqrt{2.08\text{x}10^{-6}}}{(4.91)^2}}{(-0.793 + 2.83)^2 + (-5.74)}$ ---------- 35=_____

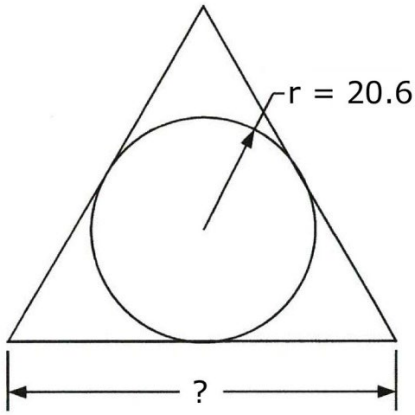
23I-36. A stick in the ground 3 ft 6.25 in tall casts a shadow that is 1 ft 3.4 in long. How tall is a building casting a shadow 40 ft 9.2 in long? ---------- 36=_____ ft(SD)

23I-37. A person inhales a single virus cell. The virus triples in number every 4 hr. If it takes 300,000 virus cells to cause symptoms, what is the virus incubation period? ---------- 37=_____ dy

23I-38. The Washington Monument is an obelisk composed of a tapered square-cross-section (frustum of a pyramid) surmounted by a square-based pyramid. The frustum bases are a = 16.8 m and b = 10.5 m. The frustum height is h = 152.4 m. The pyramid base is 10.5 m, and it is 16.76 m tall. Calculate the volume of the Washington Monument. The volume of a pyramidal frustum is $V = h(a^2+ab+b^2)/3$. ---------- 38=_____ m^3

23I-39.

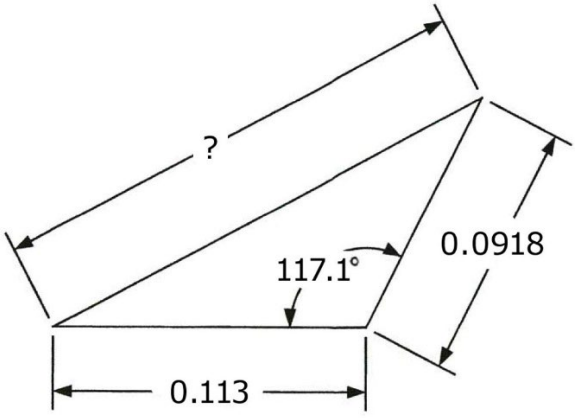
EQUILATERAL TRIANGLE AND CIRCLE



23I-39 =_____

23I-40.

SCALENE TRIANGLE



23I-40 =_____

23I-41. $10^{-\{(0.398 - 0.654)/(0.69 + 0.0717)\}}$ ---------- 41=_____

23I-42. $\frac{(1.48\text{x}10^{-6})}{(-9.86\text{x}10^{-7})}\left[1 - e^{-(0.346)(0.786)}\right]$ ---------- 42=_____

23I-43. $\frac{(0.00403)\text{Log}(0.00631 - 0.00481)}{(0.00209)}$ ---------- 43=_____

23I-44. $(7.21)^{3} + (13.8 - 5.62)^{2.93}$ ---------- 44=_____

23I-45.(deg) $\frac{\cos\{(76.9°)/(7.82)\}}{\sin\{67.1° - 67.5°\}}$ ---------- 45=_____

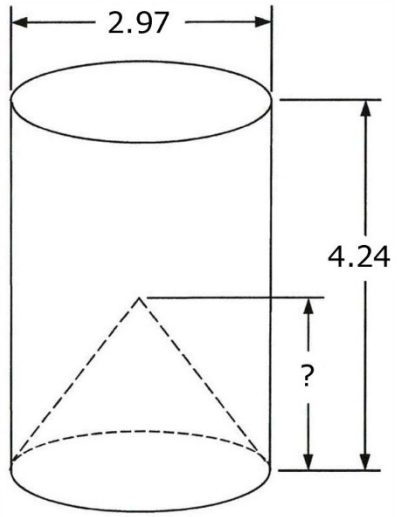
23I-46. Assume lobsters and crawfish are geometrically similar. A 1.5 lb, 17-in long lobster yields 6.5 oz of tail meat. A crawfish averages 6.9 in length. If Ronnie wants to eat a half pound of crawfish tail meat, how many crawfish should he buy? ---------- 46=_____(integer)

23I-47. Hakim measured an oven's temperature at set points from 50°F to 300°F in 50°F increments. The actual oven temperatures, measured with a thermometer, were 55°F, 112°F, 175°F, 220°F, 285°F and 330°F, respectively. If a cake is supposed to be baked at 350°F, what should the oven set point be? ---------- 47=_____°F

23I-48. Calculate h for $7h^{7} = 5h^{5}+50$. ---------- 48=_____

23I-49.

CYLINDER WITH CONICAL CAVITY

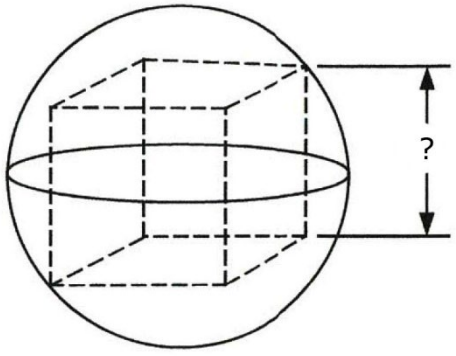


Volume = 24.8

23I-49 =_____

23I-50.

SPHERE WITH CUBIC CAVITY WHOSE CORNERS CONTACT THE SPHERE



Volume = 5460

23I-50 =_____

23I-51. $10^{+(0.864)} + 10^{-(0.34)} + \left[10^{(0.729/0.904)} - 10^{(0.58)}\right]^{1/2}$ ----- 51=_____

23I-52. $\dfrac{1 + e^{+\{0.313 + (0.363)(4.44)\}}}{(-2340)(7.93 - e^{(-0.308)})}$ ---------- 52=_____

23I-53. (601) Ln $\left[\dfrac{21.8 + (259)(0.0127)}{833 + 2440}\right]$ ---------- 53=_____

23I-54. $\dfrac{(6.65)^{0.649} - (3.57)^{-0.393}}{-0.0546 + 0.00911}$ ---------- 54=_____

23I-55.(rad) $\dfrac{\arctan\{1.74 + (1.97)(0.634)\}}{\arcsin\left\{(1.64\text{x}10^{-4} + 1.14\text{x}10^{-4})/3.59\text{x}10^{-4}\right\}}$ ---------- 55=_____

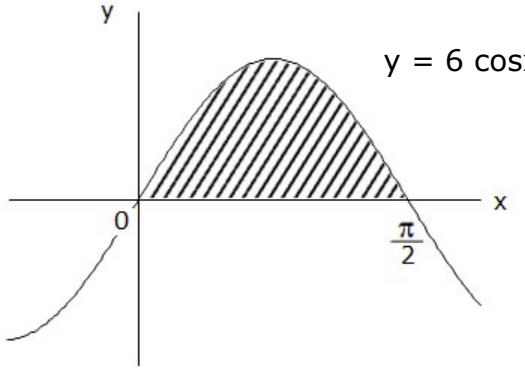
23I-56. At what value of x does the slope of the function $x^2-35x+231$ equal 4π? ---------- 56=_____

23I-57. Square stepping stones of side dimension a are butted next to each other in a line to create a path N times a long, N being the number of stepping stones. A 12-in stepping stone costs $1.58, and a 16-in stepping stone costs $2.50. What stepping stone dimension (a) minimizes the total cost of the path? The cost of a stepping stone equals ma^2+C, where m and C are constants. ---------- 57=_____ in

23I-58. What is F_{23} if **F** = 13**G** +22**H**, **G** = $\begin{bmatrix} 9 & 14 & -19 \\ 14 & 9 & 3 \\ -19 & 3 & 12 \end{bmatrix}$, and **H** = $\begin{bmatrix} 35 & 12 & 6 \\ 12 & 27 & -14 \\ 6 & -14 & 13 \end{bmatrix}$? ---------- 58=_____

23I-59.

RADIANS



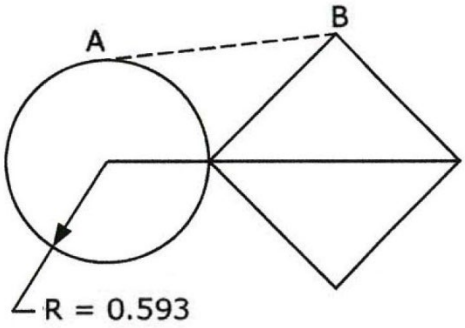
Hatched Area = ?

23I-59 =_____

23I-60.

CIRCLE AND SQUARE

AB = ?



Area(Circle) = Area(Square)

23I-60 =_____

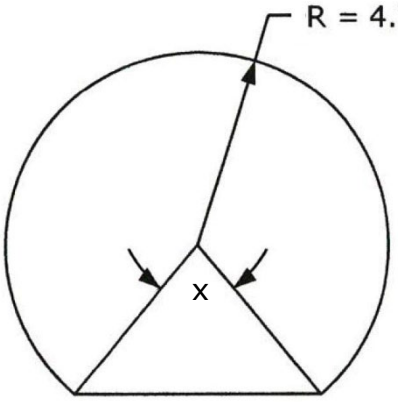
23I-61. Congruent isosceles triangles may be grouped to form a shape similar to a circle. More triangles make the assemblage look more like a circle. The sum of the triangle areas is given by Area$=\frac{N}{2}R^2\sin\left(\frac{2\pi}{N}\right)$, where N is the number of triangles and R is the radius of the associated circumscribed circle. What is the smallest N for which the sum of the triangle areas equals the circle area with just smaller than −1% error? -------- 61=_____integer

23I-62. What is 5^{5^5}? ---------- 62=_____

23I-63. A professional golfer consistently hits a golf ball 250 yd with a 4 iron. The angle of release for a 4 iron is 24°. How far would the golf ball travel if she used a 5 iron instead? The angle of release is 27°. ---------- 63=_____yd

23I-64.

SECTOR AND ISOSCELES TRIANGLE



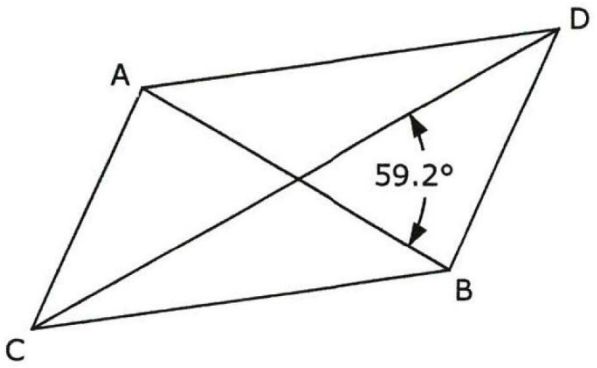
x<100°

$\text{Sector Area} = 5\left(\text{Triangle Area}\right) = ?$

23I-64 =_____

23I-65.

PARALLELOGRAM



AB = 6.44 CD = 10.9

Parallelogram Area = ?

23I-65 =_____

23I-66. $2\text{Log}\sqrt{\frac{(5.33)(4.33)(7.35)}{(3.19)^3(0.63)^3}}$ ---------- 66=_____

23I-67. (rad) $\frac{\sin(0.15)}{\cos(0.15)}\sqrt{1-\{\sin(0.667 \times 8.11)\}^2}$ ---------- 67=_____

23I-68. (deg) $\sqrt{1+\left[\frac{\cos(74.9°)}{\sin(74.9°)}\right]^2} \times \frac{\cos(-57.5°)}{\sin(-57.5°)}$ ---------- 68=_____

23I-69. $\frac{1}{(0.25)} + \frac{1}{3(0.25)^3} + \frac{1}{5(0.25)^5} + \frac{1}{7(0.25)^7}$ ---------- 69=_____

23I-70. $\frac{(-2590)}{(9.68)} - \frac{(0.717)}{(0.109)^2}\text{Ln}\left[\frac{(-0.0283)^2 + (2.57\text{x}10^{-4})}{(5.9)+\sqrt{62.1}}\right]$ ---------- 70=_____

23I-1 = 0.417
= 4.17×10^{-1}

23I-2 = −28.3
= -2.83×10^{1}

23I-3 = 0.0839
= 8.39×10^{-2}

23I-4 = −217
= -2.17×10^{2}

23I-5 = 0.00837
= 8.37×10^{-3}

23I-6 = 2.68
= 2.68×10^{0}

23I-7 = 0.705
= 7.05×10^{-1}

23I-8 = 1.30
= 1.30×10^{0}

23I-9 = 12.8
= 1.28×10^{1}

23I-10 = 0.0441
= 4.41×10^{-2}

23I-11 = 50600
= 5.06×10^{4}

23I-12 = 7.46×10^{-9}

23I-13 = 215000
= 2.15×10^{5}

23I-14 = −280
= -2.80×10^{2}

23I-15 = 3.06×10^{-5}

23I-16 = 2.38
= 2.38×10^{0}

23I-17 = 2.14×10^{6}

23I-18 = 21.6
= 2.16×10^{1}

23I-19 = 126,000
= 1.26×10^{5}

23I-20 = 7.68
= 7.68×10^{0}

23I-21 = 0.00783
= 7.83×10^{-3}

23I-22 = 0.0206
= 2.06×10^{-2}

23I-23 = 0.784
= 7.84×10^{-1}

23I-24 = 18.4
= 1.84×10^{1}

23I-25 = 40.0
= 4.00×10^{1}

23I-26 = 86.10
= 8.610×10^{1} (4SD)

23I-27 = −2.53
= -2.53×10^{0}

23I-28 = $99,505.56

23I-29 = 5.90
= 5.90×10^{0}

23I-30 = 3.12
= 3.12×10^{0}

23I-31 = 1.24×10^{-11}

23I-32 = 300
= 3.00×10^{2}

23I-33 = 16.7
= 1.67×10^{1}

23I-34 = 1.32
= 1.32×10^{0}

23I-35 = 0.000278
= 2.78×10^{-4}

23I-36 = 112
= 1.12×10^{2} (3SD)

23I-37 = 1.91
= 1.91×10^{0}

23I-38 = 29,500
= 2.95×10^{4}

23I-39 = 71.4
= 7.14×10^{1}

23I-40 = 0.175
= 1.75×10^{-1}

23I-41 = 2.17
= 2.17×10^{0}

23I-42 = −0.357
= -3.57×10^{-1}

23I-43 = −5.45
= -5.45×10^{0}

23I-44 = 847
= 8.47×10^{2}

23I-45 = −141
= -1.41×10^{2}

23I-46 = 19 integer

23I-47 = 314
= 3.14×10^{2}

23I-48 = 1.41
= 1.41×10^{0}

23I-49 = 1.98
= 1.98×10^{0}

23I-50 = 14.7
= 1.47×10^{1}

23I-51 = 9.38
= 9.38×10^{0}

23I-52 = −0.000466
= -4.66×10^{-4}

23I-53 = −2930
= -2.93×10^{3}

23I-54 = −61.8
= -6.18×10^{1}

23I-55 = 1.41
= 1.41×10^{0}

23I-56 = 23.8
= 2.38×10^{1}

23I-57 = 6.95
= 6.95×10^{0}

23I-58 = −269
= -2.69×10^{2}

23I-59 = 3.00
= 3.00×10^{0}

23I-60 = 1.41
= 1.41×10^{0}

23I-61 = 26 integer

23I-62 = 1.91×10^{2184}

23I-63 = 272
= 2.72×10^{2}

23I-64 = 55.3
= 5.53×10^{1}

23I-65 = 30.1
= 3.01×10^{1}

23I-66 = 1.32
= 1.32×10^{0}

23I-67 = 0.0970
= 9.70×10^{-2}

23I-68 = −0.660
= -6.60×10^{-1}

23I-69 = 2570
= 2.57×10^{3}

23I-70 = 304
= 3.04×10^{2}