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 21I

(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}.

21I-1. $(0.33 - 0.0883)/(3.36 \times 10^{-4})$ ---------- 1=_____

21I-2. $(-9.88 \times 4.33) - (7.89 - 17.3)$ ---------- 2=_____

21I-3. $(39.7 - 14.4 + 115 + \pi)/(51.6)$ ---------- 3=_____

21I-4. $\{(8.65)(0.579 + 0.719 - 0.14)(3.86)\} + 16.4$ ---------- 4=_____

21I-5. $\dfrac{(0.171 + 0.114 - 0.15)(-0.0473)}{(-0.991)(-0.698)(-0.0924)}$ ---------- 5=_____

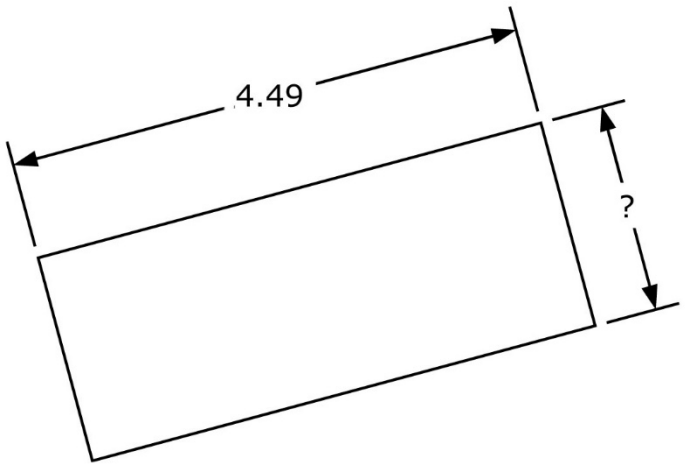
21I-6. What is 6 times the square root of 5697? ---------- 6=_____

21I-7. What is 10 raised to the power 1.69? ---------- 7=_____

21I-8. What is positive x if $54x = 12/x$? ---------- 8=_____

21I-9.

RECTANGLE

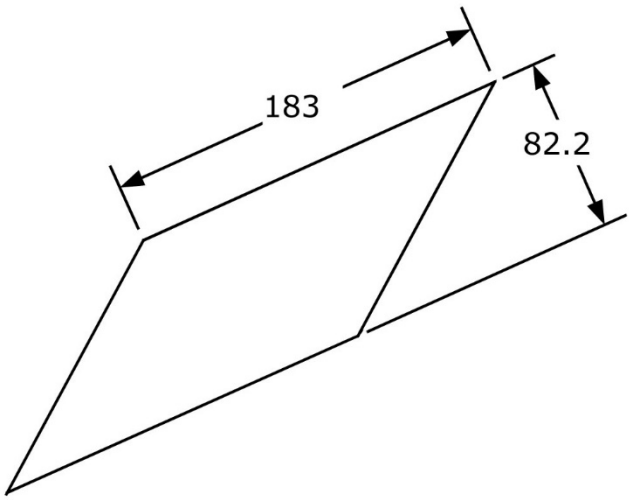


Perimeter = 12.6

21I-9 =_____

21I-10.

PARALLELOGRAM



Area = ?

21I-10 =_____

21I-11. $\dfrac{(-0.0842)(-0.0556) - (0.0182)(0.0377) + 0.00383}{0.00429 + (-0.0655)(-0.0156)}$ ---------- 11=_____

21I-12. $\dfrac{\{2.89\text{x}10^{-5} + (-0.0657)(-0.0195)(0.0651)\}}{(0.869 + 2.22)(0.0162)(1.1 + 0.259)}$ ---------- 12=_____

21I-13. $\dfrac{6.57\text{x}10^{5} + 8.34\text{x}10^{5}}{(-1.12)(-0.583) + 1.62} + \dfrac{9110 - 4000 + 4120}{(6.69\text{x}10^{-6})(662)}$ ---------- 13=_____

21I-14. $\dfrac{(2790 + 2370 - 304)(0.00734 + 0.0103 - 0.00842)}{(-0.909 - 0.714)(9.85)(8.79 - \pi)}$ ---------- 14=_____

21I-15. $\dfrac{1.38\text{x}10^{5} + 4.49\text{x}10^{5} - (27500 + 1.25\text{x}10^{5})(2.24 - 1.21)}{(-882)(0.0996)(-0.0394)(467 - 1560 + 1930)}$ --------- 15=_____

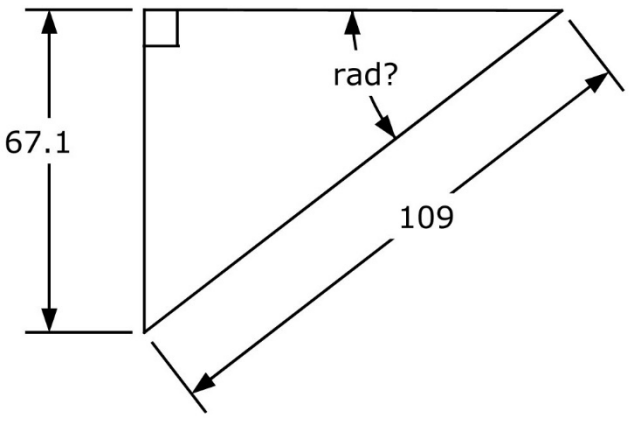
21I-16. Jim reads a page in 1 min 45 s. How long would it take him to read the 1225-page book, *War and Peace*? ---------- 16=_____hr

21I-17. A loaf of bread has 24 slices, including the heels. How many loaves much be purchased to provide one sandwich each for 350 people, if the heels are not used? ---------- 17=_____integer

21I-18. Quincy decreases her time to run 1 mi from 9 min 38 s to 8 min 7 s. What is the percent increase in distance traveled if she runs 30 min at each rate? ---------- 18=_____%

21I-19.

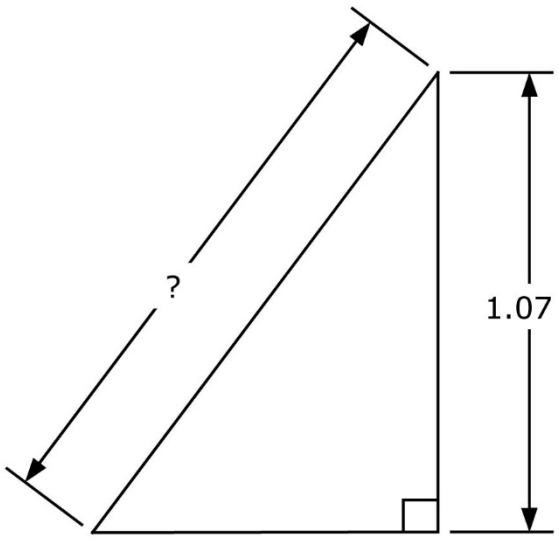
RIGHT TRIANGLE



21I-19 =_____

21I-20.

RIGHT TRIANGLE



Area = 0.431

21I-20 =_____

21I-21. $\left[\frac{(0.15)(0.835)}{-1.95} + 0.0521\right]^2 + \sqrt{1.50\text{x}10^{-8}}$ ---------- 21=_____

21I-22. $\frac{12.2 + 1/(0.0223)}{1/(0.181) + 8.51} + \frac{1}{(0.216)}$ ---------- 22=_____

21I-23. $(6.96\text{x}10^{-4})(910) + \sqrt{(0.0463)/(1.21)} + [(0.277)(2.61)]^2$ -------- 23=_____

21I-24. $\frac{\sqrt{0.0834 + 0.048 + (0.00279)/(0.0463)}}{-0.00852 + 0.00816}$ ---------- 24=_____

21I-25. $\left[\frac{1.34 + \pi + \sqrt{0.228/0.26}}{-1.39 + 1.25}\right]^2$ ---------- 25=_____

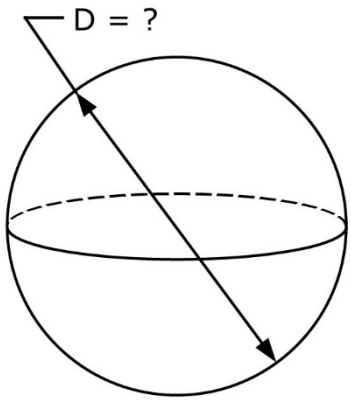
21I-26. The Great Pyramid of Giza was reported to have been built in 20 years, and there were an estimated 2.3 million massive stone blocks used in its construction. Assuming workers toiled continuously day and night, on average, how many stone blocks were placed hourly? ---------- 26=_____blocks

21I-27. An astronomer measures the distance to the front of the moon, 238,937 mi. She also measures the distance to the back side of the moon, 241,096 mi. What is the diameter of the moon? ---------- 27=_____mi(SD)

21I-28. Frank buys 5 packs of hot dog buns ($0.85 each), 5 packs of franks ($0.89 each), and one jar each of mustard ($0.58), ketchup ($2.25) and relish ($1.58). Assume all the condiments are used up. There are 8 buns and franks in a pack, what is the average cost of one hot dog? ---------- 28=$_____

21I-29.

SPHERE

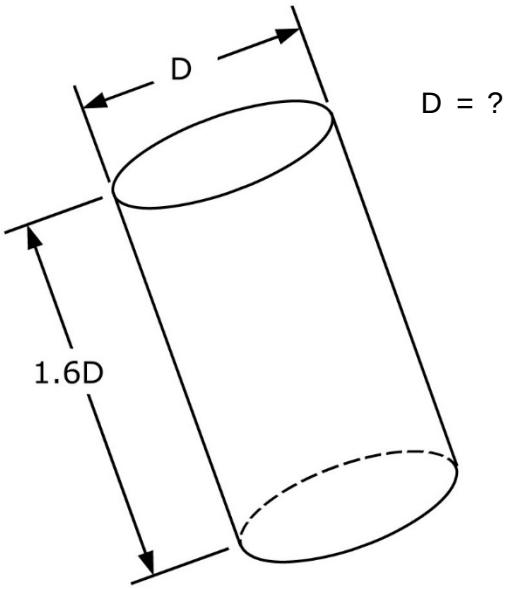


Volume = 0.702

21I-29 =_____

21I-30.

CYLINDER



Total Surface Area = 7.04

21I-30 =_____

21I-31. $\dfrac{(8150 + 13900)^2}{\sqrt{81.5 - 10.9}} + \dfrac{2.02\text{x}10^9}{\sqrt{8640 + 9430}}$ ---------- 31=_____

21I-32. $\sqrt{\dfrac{1/(529 - 337)}{(186)(1.94 + 1.79)^2}} + (7.50\text{x}10^{-4})^2(4590)$ ---------- 32=_____

21I-33. $\dfrac{\sqrt{(50600)/\left\{(74900)/\sqrt{39600}\right\}}}{\pi + (0.207)(1.4)} + \{0.763 + 1.12\}^{1/2}$ ---------- 33=_____

21I-34. $\dfrac{[0.0116/(0.167 + 0.574) + 1/(31.3)]^{1/2}}{(84.1 + 119)^2 \text{ x } \sqrt{21.1 - (11.6)}}$ ---------- 34=_____

21I-35. $\dfrac{\dfrac{1}{1.25\text{x}10^5} + \dfrac{0.0891}{(120 + 30.9)^2} - \dfrac{\sqrt{1.24\text{x}10^{-15}}}{(0.0949)^2}}{(0.00169 + 0.00273)^2 + (-3.03\text{x}10^{-5})}$ ---------- 35=_____

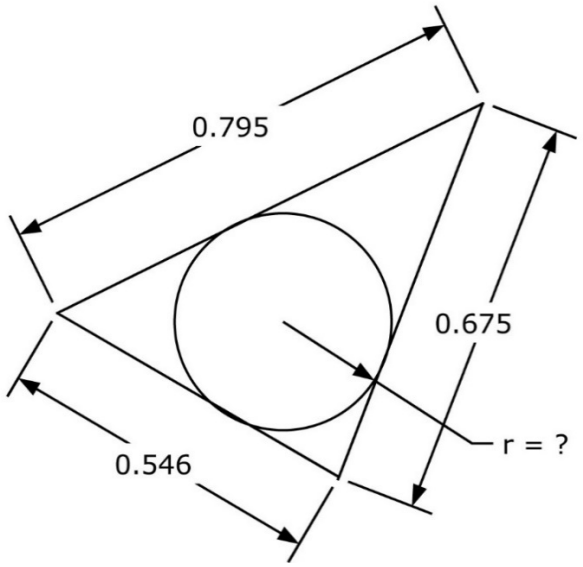
21I-36. At the State Meet for UIL Calculator Applications, contestants typically work all the numerical problems (number crunchers) in 12 min. Assuming a keystroke speed of 1.7 keystrokes/s, what is the average number of keystrokes for a number cruncher problem? ---------- 36=_____

21I-37. The dwarf planet Eris is 10.166×10^9 km from earth. If a spacecraft left earth for Eris traveling at the same speed as Voyager 2, 34,519 mph, how long would it take to reach Eris? ---------- 37=_____ yr(SD)

21I-38. An elevator has a traveling speed of 5 ft/s. It accelerates/decelerates at 4 ft/s^2. What is the percent error the time taken to travel 60 ft if one assumed the elevator accelerated/decelerated instantaneously? ---------- 38=_____ %

21I-39.

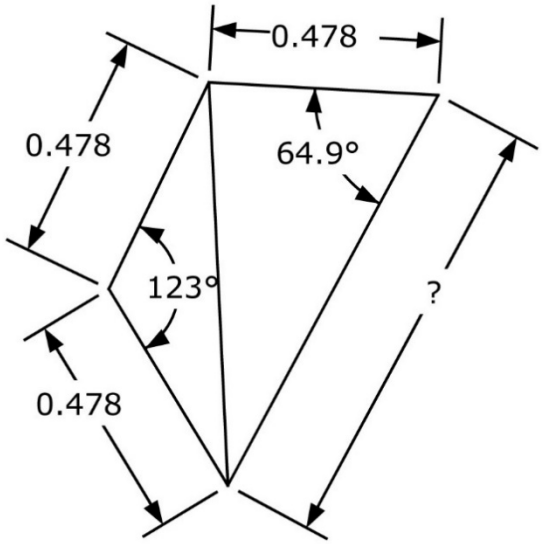
SCALENE TRIANGLE AND CIRCLE



21I-39 =_____

21I-40.

ISOSCELES AND SCALENE TRIANGLES



21I-40 =_____

21I-41. $(-357)(269)10^{\{207/21.5\}}$ ---------- 41=_____

21I-42. $-0.041\ e^{0.542} + (-0.00971)\ e^{-0.372}$ ---------- 42=_____

21I-43. $\dfrac{(8830)\text{Log}(8450 - 879)}{(-5170)}$ ---------- 43=_____

21I-44. $(0.0995 + 0.0999)^{-(0.489 + 0.323)}$ ---------- 44=_____

21I-45. (deg) $\{(-0.0879)\sin(-87.3°)\} \times \{(0.055)\cos(-27.6°)\}$ ---------- 45=_____

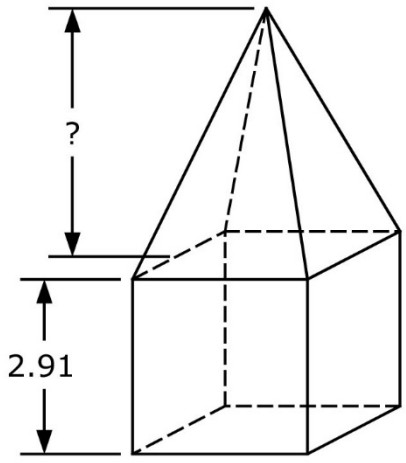
21I-46. A brand of containers are made from plastic and all have the same thickness. They are designed to hold a liquid priced at $10.75/gal. If an empty 2-gal container cost $5.95, what is the value of a full 10-gal container? ---------- 46=$_____

21I-47. The price of a bag of sugar is comprised of the constant bag cost and the sugar cost. An 4-lb bag costs $2, and a 12-lb bag costs $5. What is the size of a bag of sugar that costs $8? ---------- 47=_____lb

21I-48. What is w if $2^w = w^2 + 3$? ---------- 48=_____

21I-49.

CUBE AND SQUARE PYRAMID

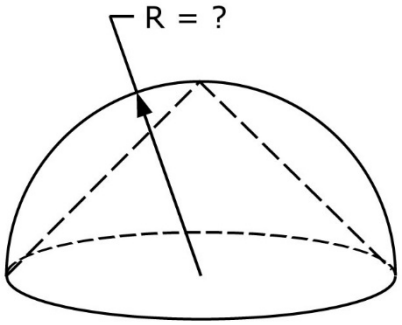


$$\begin{matrix}\text{Cube}\\ \text{Total}\\ \text{Surface Area}\end{matrix} = 1.5 \left[\begin{matrix}\text{Pyramid}\\ \text{Total}\\ \text{Surface Area}\end{matrix}\right]$$

21I-49 =_____

21I-50.

HEMISPHERE WITH CONICAL CAVITY



Total Surface Area = 77.8

21I-50 =_____

21I-51. $\dfrac{10^{(0.962)} \times 10^{-(0.13)} + 0.141}{10^{(32.2 + 0.597)}}$ ---------- 51=_____

21I-52. $\dfrac{13800 + e^{(4.91 + 4.82)}}{0.179 - e^{-(0.83 - 0.166)}}$ ---------- 52=_____

21I-53. $\dfrac{\text{Ln}(0.448 + 0.537)}{-0.158} + \dfrac{\text{Ln}(1.21)}{8.85 - 3.95}$ ---------- 53=_____

21I-54. $\dfrac{1}{(0.973)^{(-0.412)}} + (0.451 + 0.386)^{(0.31 - 0.198)}$ ---------- 54=_____

21I-55. (rad) $\dfrac{\arcsin\left\{(652)(-471)/(-5.89 \times 10^{5})\right\}}{-23200 + (-308)(262)}$ ---------- 55=_____

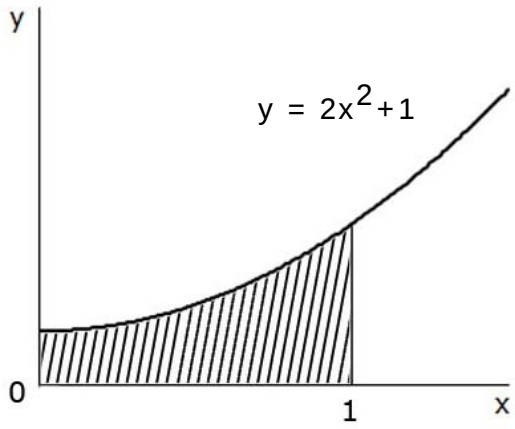
21I-56. What is the slope of the curve $y = 3x^3 - 25x^2 + 13x - 5$ when $y = 30$? ---- 56=_____

21I-57. A window is a rectangle surmounted by a semicircle. The total perimeter is 9 ft. The rectangular part is made of clear glass which passes all the light through it. The semicircle portion is colored and passes only half the light. What is the radius of the semicircle portion of the window for which the most light is transmitted through the window? ---------- 57=_____ ft

21I-58. Solve for F_{12} if **F** = **GH**. **G** = $\begin{bmatrix} 894 & 838 \\ 838 & 583 \end{bmatrix}$ and **H** = $\begin{bmatrix} 37 & 36 \\ 36 & -67 \end{bmatrix}$. ------- 58=_____

21I-59.

SOLID OF REVOLUTION (x = 0)

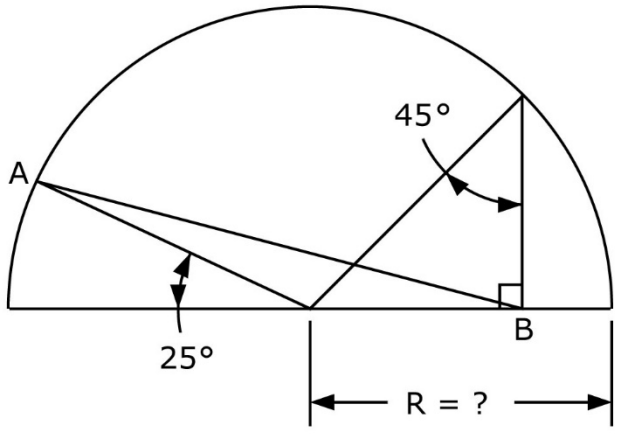


Volume = ?

21I-59 =_____

21I-60.

SEMICIRCLE AND RIGHT TRIANGLE



AB = 10.8

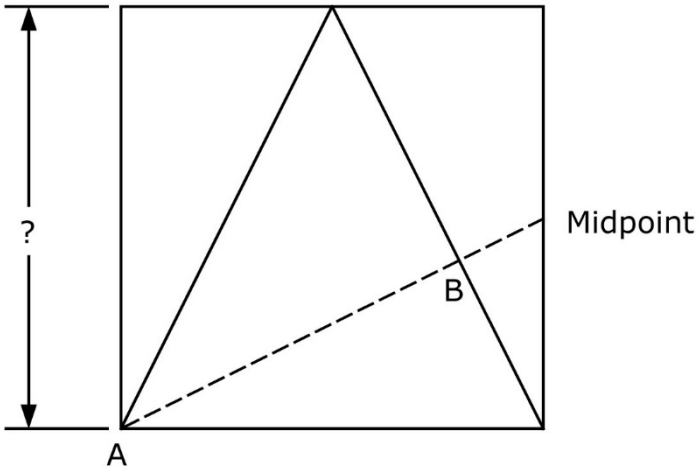
21I-60 =_____

21I-61. Falfurrias (98°8'42"W) lies on the same latitude as the Taj Mahal (78°2'31"E) in India. Both lie at 27°12' north. How long is the shorter line of constant latitude between these places? ---------- 61=_____mi

21I-62. The probability of being dealt a straight flush in poker is 1.39×10^{-5}. What is the probability of being dealt 200 straight flushes in a row? ---------- 62=_____

21I-63. Don throws a fast ball at a release angle of 15° to a friend some distance away. He could alternatively lob the ball high into the air to his friend. In that case, what should the release angle be? ---------- 63=_____degrees

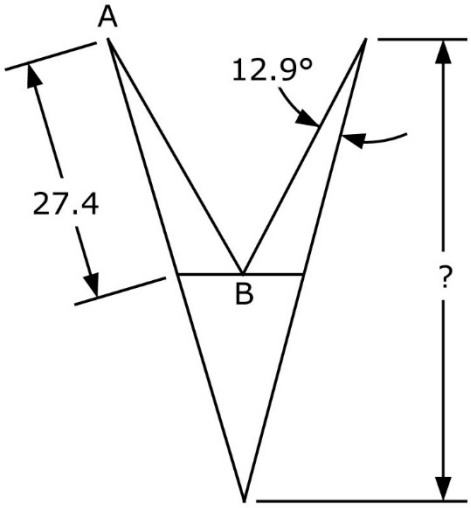
21I-64.
ISOSCELES TRIANGLE AND SQUARE



AB = 0.657

21I-64 =_____

21I-65.
ISOSCELES TRIANGLE AND CONGRUENT SCALENE TRIANGLES



AB = 30.4

21I-65 =_____

21I-66. $\text{Ln}\left[\frac{(4.2)(4.28)}{(13)}\right]^3 + \text{Ln}\left[\frac{(13)}{(5.09)}\right]^3$ ---------- 66=_____

21I-67. (rad) $\sin(3.08)\cos(0.979) - \cos(3.08)\sin(0.979)$ ---------- 67=_____

21I-68. (rad) $\frac{98.2}{6(0.835)}\left\{(0.326) + (0.0493)\sin(-1.83)\right\}^5$ ---------- 68=_____

21I-69. $1 + 0.33 + (0.33)^2 + \frac{(0.33)^4}{8} - \frac{(0.33)^5}{15}$ ---------- 69=_____

21I-70. (rad) $e^{(4.33)\left[\frac{(35.9)\sin(4.02) - (28.1)\cos(-1.07)}{(4.65)\sqrt{(35.9)^2 + (28.1)^2}}\right]}$ ---------- 70=_____

21I-1 = 719
= 7.19×10^{2}

21I-2 = -33.4
= -3.34×10^{1}

21I-3 = 2.78
= 2.78×10^{0}

21I-4 = 55.1
= 5.51×10^{1}

21I-5 = 0.0999
= 9.99×10^{-2}

21I-6 = 453
= 4.53×10^{2}

21I-7 = 49.0
= 4.90×10^{1}

21I-8 = 0.471
= 4.71×10^{-1}

21I-9 = 1.81
= 1.81×10^{0}

21I-10 = 15000
= 1.50×10^{4}

21I-11 = 1.47
= 1.47×10^{0}

21I-12 = 0.00165
= 1.65×10^{-3}

21I-13 = 2.74×10^{6}

21I-14 = -0.496
= -4.96×10^{-1}

21I-15 = 148
= 1.48×10^{2}

21I-16 = 35.7
= 3.57×10^{1}

21I-17 = 32 integer

21I-18 = 18.7
= 1.87×10^{1}

21I-19 = 0.663
= 6.63×10^{-1}

21I-20 = 1.34
= 1.34×10^{0}

21I-21 = 0.000270
= 2.70×10^{-4}

21I-22 = 8.69
= 8.69×10^{0}

21I-23 = 1.35
= 1.35×10^{0}

21I-24 = -1220
= -1.22×10^{3}

21I-25 = 1500
= 1.50×10^{3}

21I-26 = 13.1
= 1.31×10^{1}

21I-27 = 2159
= 2.159×10^{3} (4SD)

21I-28 = $0.33

21I-29 = 1.10
= 1.10×10^{0}

21I-30 = 1.03
= 1.03×10^{0}

21I-31 = 7.29×10^{7}

21I-32 = 0.00400
= 4.00×10^{-3}

21I-33 = 4.75
= 4.75×10^{0}

21I-34 = 1.72×10^{-6}

21I-35 = -0.744
= -7.44×10^{-1}

21I-36 = 35.0
= 3.50×10^{1}

21I-37 = 20.875 (5SD)
= 2.0875×10^{1}

21I-38 = -9.43
= -9.43×10^{0}

21I-39 = 0.180
= 1.80×10^{-1}

21I-40 = 0.923
= 9.23×10^{-1}

21I-41 = -4.08×10^{14}

21I-42 = -0.0772
= -7.72×10^{-2}

21I-43 = -6.63
= -6.63×10^{0}

21I-44 = 3.70
= 3.70×10^{0}

21I-45 = 0.00428
= 4.28×10^{-3}

21I-46 = $124.90

21I-47 = 20.0
= 2.00×10^{1}

21I-48 = 4.59
= 4.59×10^{0}

21I-49 = 4.12
= 4.12×10^{0}

21I-50 = 6.50
= 6.50×10^{0}

21I-51 = 1.11×10^{-32}

21I-52 = -91200
= -9.12×10^{4}

21I-53 = 0.135
= 1.35×10^{-1}

21I-54 = 1.97
= 1.97×10^{0}

21I-55 = -5.28×10^{-6}

21I-56 = 187
= 1.87×10^{2}

21I-57 = 1.03
= 1.03×10^{0}

21I-58 = -24000
= -2.40×10^{4}

21I-59 = 6.28
= 6.28×10^{0}

21I-60 = 6.48
= 6.48×10^{0}

21I-61 = 10800
= 1.08×10^{4}

21I-62 = 4.01×10^{-972}

21I-63 = 75.0
= 7.50×10^{1}

21I-64 = 0.735
= 7.35×10^{-1}

21I-65 = 47.7
= 4.77×10^{1}

21I-66 = 3.79
= 3.79×10^{0}

21I-67 = 0.863
= 8.63×10^{-1}

21I-68 = 0.0327
= 3.27×10^{-2}

21I-69 = 1.44
= 1.44×10^{0}

21I-70 = -14.7
= -1.47×10^{1}