4A-56

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 10H

(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*, $1.23x10^{0}$*
$1.23x10^{1}$, $1.23x10^{01}$, .0190, 0.0190, $1.90x10^{-2}$

Incorrect: 12.30, 123.0, $1.23(10)^{2}$, $1.23\cdot10^{2}$, $1.230x10^{2}$, $1.23*10^{2}$, 0.19, $1.9x10^{-2}$, $19.0x10^{-3}$, 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}.

10H-1. $13.1 + 3.65 - 118$ ---------- 1=_____

10H-2. $-70/63 + 0.737 - 1.11$ ---------- 2=_____

10H-3. $(3.99 - 1.49 + 1.64) \times (-3.7) - 99.3$ ---------- 3=_____

10H-4. $\{(-1.95)(0.179 + 0.302 - 0.0831)(-4.48)\} + \pi$ ---------- 4=_____

10H-5. $\dfrac{(-0.00308 - 0.00205)(0.0138)}{\{(-0.0517)/(0.0456)\}} - (1.43\times10^{-4} - 3.49\times10^{-5})$ ------- 5=_____

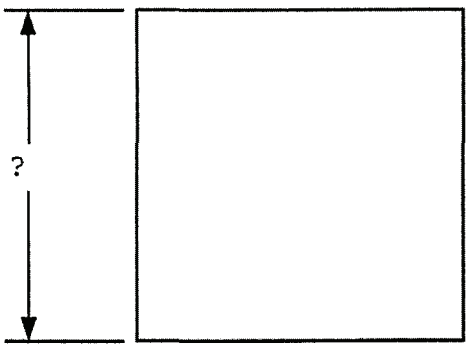
10H-6. What is the square of the product of 75 times pi and one one-hundreth of 65? ---------- 6=_____

10H-7. How many times must one take the square root of 3 for the result to be just under 1.05? ---------- 7=_____ integer

10H-8. Hattie makes hatbands from ribbon. How many hatbands can she get from a 100-yd spool if each hatband requires 27 in of ribbon? ---------- 8=_____ integer

10H-9.

SQUARE

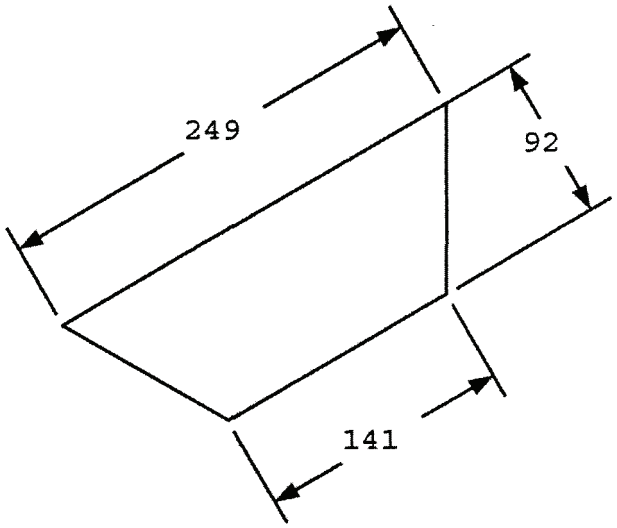


Area = 9.12

10H-9 = _____

10H-10.

ISOSCELES TRAPEZOID



Area = ?

10H-10 = _____

10H-11. $\dfrac{(4900 + 2060)}{(0.887 - 2.62)} + \dfrac{(-1820 + 2450)}{(1.39 - 0.926)}$ ---------- 11=_____

10H-12. $\dfrac{(0.742 + 0.562 - 0.838)(0.238)(0.437)}{(8.12 - 7.78)(-0.984 - 2.54)}$ ---------- 12=_____

10H-13. $\dfrac{(-3.86\times10^{-5} - 8.67\times10^{-5})\{13500 + (98.4)(45.4)\}}{(-36.2)(-0.974 + 0.967)(5.6)(-2.93)}$ ---------- 13=_____

10H-14. $\dfrac{(66.9 + 13)(\pi + 7.92)(54.6 - 88.6)}{(3.52 + 0.407)(-7.16)\{(-0.0552)/(-5.75)\}}$ ---------- 14=_____

10H-15. $\dfrac{8000 + 65500 - (38000 + 68900)(2.48 - 2.14)}{(-215)(2.66)(-0.777)(823 - 900 + 1140)}$ ---------- 15=_____

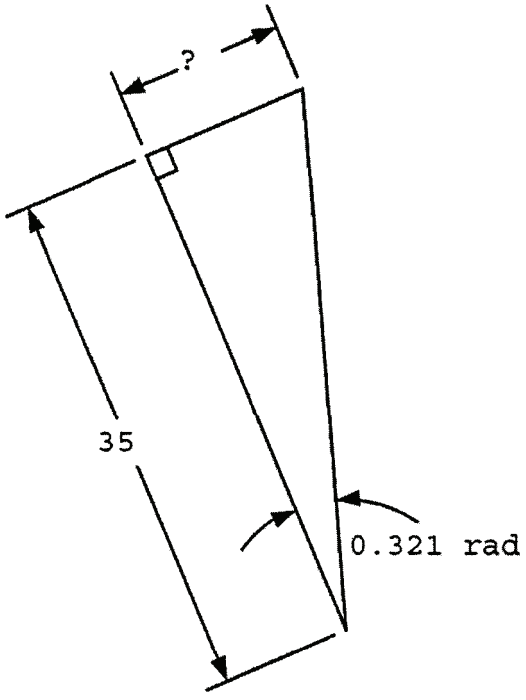
10H-16. How many microinches are in a parsec if a parsec is 3.08568025×10^{16} meters? ---------- 16=_____ μin

10H-17. Bamboo is the fasting growing plant in the world, growing as much as 60 cm in 24 hr. What is the ratio of growth rates of a human being, 2.75 in/yr, and bamboo? The ratio is greater than one. ---------- 17=_____

10H-18. A standard that is 1.000 meter long casts a shadow that is 25.84 cm long. If a person casts a shadow 1 ft 4.37 in long, how tall is the person? ---------- 18=_____ ft(SD)

10H-19.

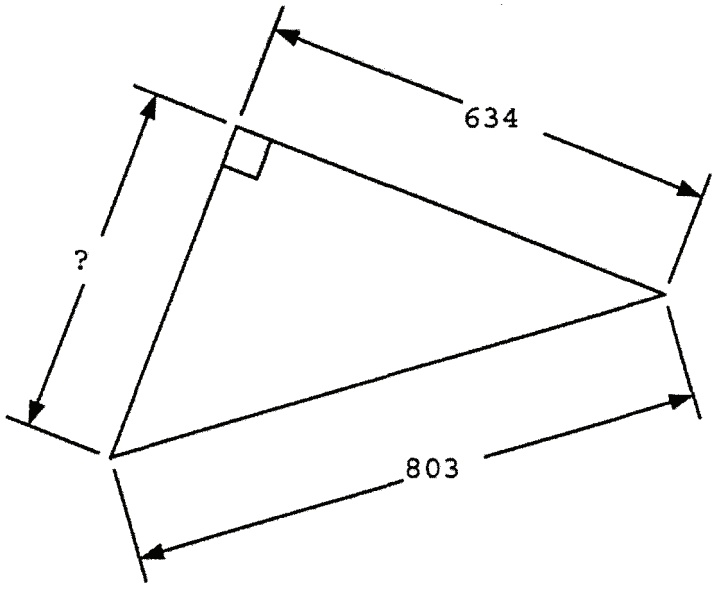
RIGHT TRIANGLE



10H-19 = _____

10H-20.

RIGHT TRIANGLE



10H-20 = _____

10H-21. $\left[\frac{(0.119)(0.206)}{8.9} + 0.00173\right]^2 + \sqrt{1.38\text{x}10^{-10}}$ ---------- 21=_____

10H-22. $\sqrt{\frac{(7.53)(7.35)}{900 + 668}} + 0.187$ ---------- 22=_____

10H-23. $\left[\frac{4.6 + 3.84 + \sqrt{0.285/0.501}}{0.0859 + 0.0266}\right]^2$ ---------- 23=_____

10H-24. $(-0.443)(-170) + \sqrt{(10500)/(6.46)} + [(0.845)(9.89)]^2$ -------- 24=_____

10H-25. $\frac{\sqrt{0.0101 + 0.00136 + (5.38\text{x}10^{-4})/(0.0717)}}{-0.0611 + 0.0185}$ ---------- 25=_____

10H-26. A heart pumps 70 ml per beat, and the human total blood volume is 11 pints. What fraction of total blood volume is pumped by a spectator whose pulse is 70 beats per min (bpm) in the time needed for one entire blood volume circulation by a soccer player whose pulse is 145 bpm? -------- 26=_____ %

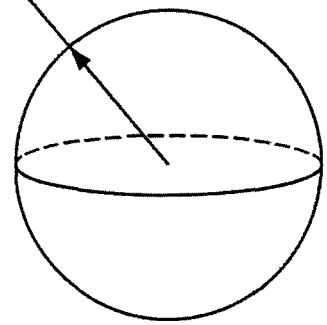
10H-27. The loop of a lasso is 3 ft in diameter. A calf's head is 13 inches in diameter. What is the maximum angle within which a rider 15 ft from the calf may throw the lasso to lasso the calf? Assume that the calf and rider are roughly the same elevation, that the calf and rider are not moving and that the angle is measured by the rope extended from the rider to the middle of the loop. ---------- 27=_____ rad

10H-28. Two investors split and invest $10,000. One invests his part at 5% annual interest compounded monthly, while the other invests her part at 6% compounded annually. What is the positive difference in the amount each started with if they have equal amounts at the end of two years? ---------- 28= $_____

10H-29.

SPHERE

Radius = 0.538

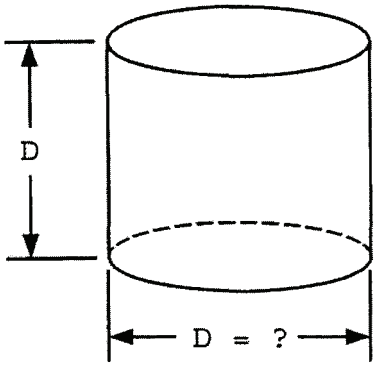


Volume = ?

10H-29 = _____

10H-30.

CYLINDER



Total Surface Area = 3.49

10H-30 = _____

10H-31. $\dfrac{1}{6.30\times10^{-5}} + \dfrac{1}{\sqrt{1.10\times10^{-8}}} + \dfrac{(9.76 + 50.3 - 19.8)^2}{\sqrt{0.969 - 0.914}}$ ---------- 31=_____

10H-32. $\sqrt{\dfrac{9.13}{\sqrt{21.6 + 8.93}}} \times \left[\dfrac{1}{(6.29 - \pi)^2} + \dfrac{1}{(4.68 + 4.37)^2}\right]$ -------- 32=_____

10H-33. $\dfrac{(3.24\times10^{5})^2 (2.29\times10^{-12} + 1.40\times10^{-12})}{0.00408 + (-0.8)(0.00794)} + \dfrac{1}{\dfrac{1}{-57.6} + \dfrac{1}{(96.8)}}$ ----- 33=_____

10H-34. $\dfrac{[(66000 - 32000)(0.863/0.585)]^{1/2}}{(4.37)^2 + (0.828 + 3.56)^2 + 15.8}$ ---------- 34=_____

10H-35. $\dfrac{\dfrac{1}{29100} + \dfrac{0.94}{(192 + 52.3)^2} - \dfrac{\sqrt{6.12\times10^{-19}}}{(-0.00705)^2}}{(0.395 + 0.555)^2 + (-1.2)}$ ---------- 35=_____

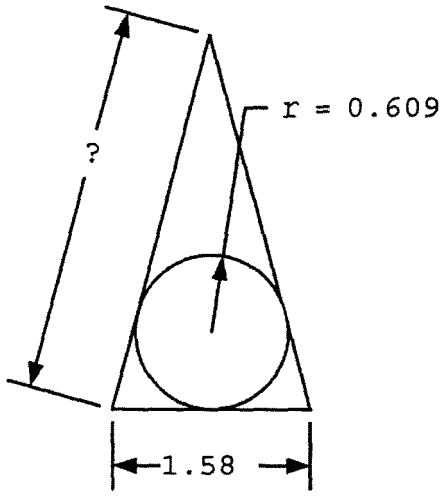
10H-36. Amy can bike to the store in 7 min, and walking takes 25 min. What percent of the distance to the store was traversed by bike if she had a flat along the way, and the total travel time was 12 min? ---------- 36=_____ %

10H-37. A standard 0.22 caliber bullet has a maximum ballistic range of 1 mi 2610 ft. What is the range if the bullet is fired at an angle of 25 degrees relative to the ground? ------ 37=_____ mi (SD)

10H-38. In Seguin, Texas one day the high was 101°F at 5 PM and the low was 76°F at 5 AM. Assuming the temperature varied sinusoidally, how many hours after 9 AM did the temperature first hit 93°F? ---------- 38=_____ hr

10H-39.

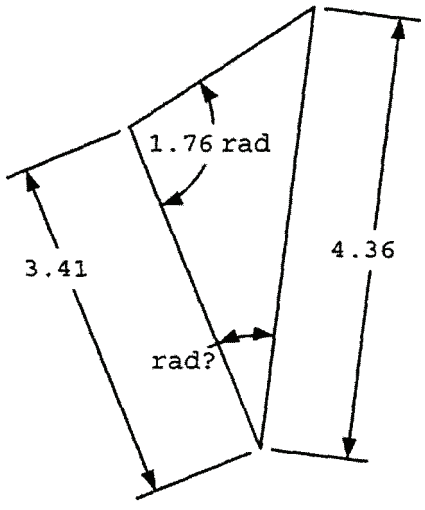
ISOSCELES TRIANGLE AND CIRCLE



10H-39 = _____

10H-40.

SCALENE TRIANGLE



10H-40 = _____

10H-41. $\dfrac{10^{-(8.6 - 9.62)}}{102 + 18}$ ---------- 41=_____

10H-42. $-3.77\text{x}10^{-5}\ e^{0.591} + (-1.81\text{x}10^{-5})\ e^{-0.538}$ ---------- 42=_____

10H-43. $(5600 - 28900)\ \text{Ln}\{(-524)(-451)\}$ ---------- 43=_____

10H-44. $(512 + 2300)^{1/3} + 1/\{(262)^{-0.127}\}$ ---------- 44=_____

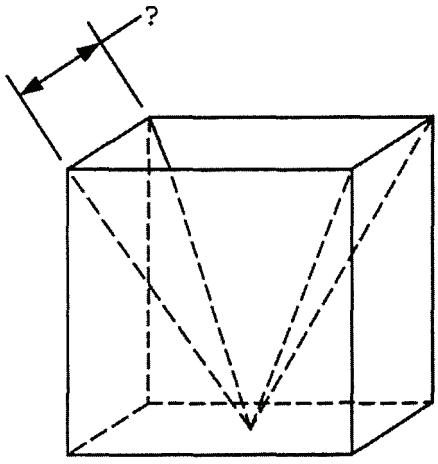
10H-45. (deg) $\sin\left[90° \text{ x } \dfrac{(-98200)}{(1.51\text{x}10^{5})}\right] + \cos\{42.2° - 9.59°\}$ ---------- 45=_____

10H-46. A 55-gallon drum is 23 inches in diameter and is 35 inches tall. If a glass manufacturer wanted to make a small 12-oz drinking glass that looked like a 55-gallon drum, how tall should the glass be? ---------- 46=_____ in

10H-47. The time needed to chainsaw a branch in two varies linearly with the cross sectional area of the branch. If times associated with various branch diameters are (6 s, 1.8 in), (17 s, 3.75 in), (43 s, 4.75 in), (74 s, 7.5 in) and (106 s, 8.4 in), what diameter branch would be cut in two in 3 minutes? ---------- 47=_____ in

10H-48. (rad) What is t if $\sin(t/5) = 3t + \cos(t/2)$? ---------- 48=_____

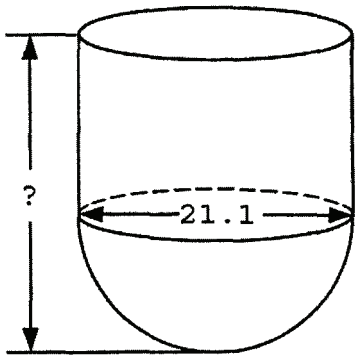
10H-49.
CUBE WITH PYRAMIDAL CAVITY



Total Surface Area = 24.7

10H-49 = _____

10H-50.
CYLINDER AND HEMISPHERE



Total Volume = 7300

10H-50 = _____

10H-51. $10^{+(0.381)} + 10^{-(0.612)} + \left[10^{(0.772/0.799)} - 10^{(0.355)}\right]^{1/2}$ 51=_____

10H-52. $\dfrac{(-0.0679 - 0.0216)\, e^{(0.55)(4.25)}}{e^{-(7.89 - 7.38)}}$ ---------- 52=_____

10H-53. $\dfrac{\mathrm{Ln}(5.59\times10^{5} + 1.18\times10^{6})}{5.85\times10^{5}} + \dfrac{\mathrm{Ln}(4.73\times10^{5})}{8.72\times10^{5} - 2.37\times10^{5}}$ ---------- 53=_____

10H-54. $\dfrac{1}{(0.329)^{(-0.14)}} + (0.801 + 0.175)^{(0.349 - 0.583)}$ ---------- 54=_____

10H-55. (rad) $\arctan\left[\dfrac{(3960)(0.38)}{(9.93)(29.1)}\right] + (0.885)(1.45)$ ---------- 55=_____

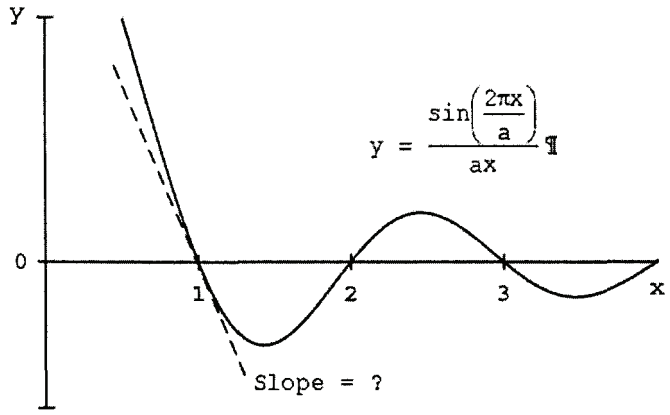
10H-56. What is the (positive) slope of the line passing through the origin and tangent to the curve $y = -(8+6x^2)$? ----- 56=_____

10H-57. The number of pens n that Gabe sells in a week depends on what he charges for them. The selling price P per pen comes to P = \$6 - \$0.025n. His weekly cost C to make n pens is C = \$55 +\$0.1n. What should Gabe charge for a pen to maximize his total weekly profit? ---------- 57= \$_____

10H-58. What is K_{22} if the determinant of $\mathbf{K} = 44K_{22}$, and $\mathbf{K} = \begin{bmatrix} -7 & 2 & 11 \\ 2 & K_{22} & -10 \\ 11 & -10 & 8 \end{bmatrix}$? ---------- 58=_____

10H-59.

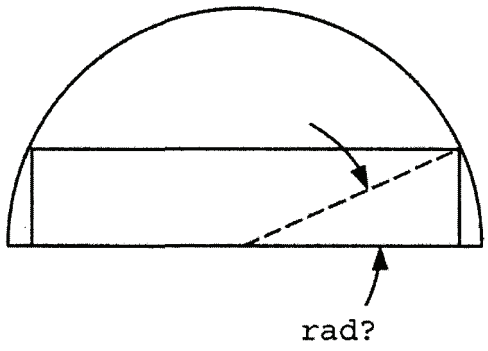
RADIANS



10H-59 = _____

10H-60.

SEMICIRCLE AND RECTANGLE



Segment Area = Rectangle Area

10H-60 = _____

10H-61. $\dfrac{\sqrt{(0.701)^3} \times \{e^{(3.62)(0.0605)}\}^3}{\sqrt[3]{e^{(-7.55)} \times e^{(2.67)}}}$ ---------- 61=_____

10H-62. (rad) $\dfrac{\sin(54.5)}{\cos(54.5)}\sqrt{1 - \{\sin(0.743 \times 2.99)\}^2}$ ---------- 62=_____

10H-63. (deg) $\sin(-43.2°)\cos(28.1°) + \cos(-43.2°)\sin(28.1°)$ ---------- 63=_____

10H-64. $(0.19) - \dfrac{(0.19)^2}{2} + \dfrac{(0.19)^3}{3} - \dfrac{(0.19)^4}{4}$ ---------- 64=_____

10H-65. $\dfrac{-76.6}{\sqrt{95.1}} \text{Ln}\left[\dfrac{\sqrt{(-44.1)^2 + (402)} + \sqrt{1920}}{\sqrt{2.46} + (88.8)(0.00221)}\right]$ ---------- 65=_____

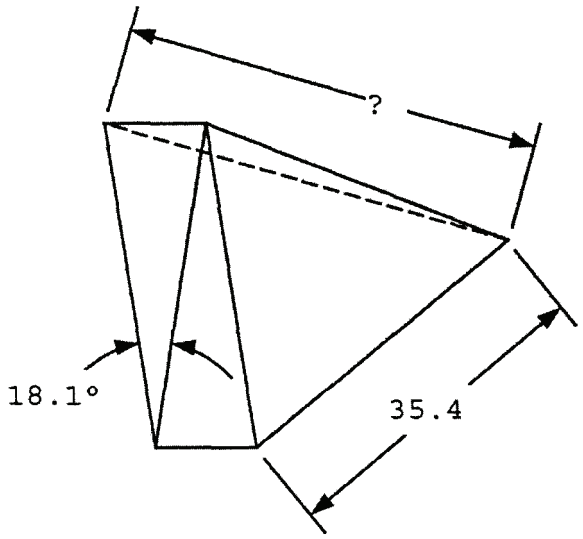
10H-66. If $x^2 + y^2 = 352$ and $x^2 - y^2 = -33$, what is the smallest value of $(x+y)^2$? ---------- 66=_____

10H-67. What is the roaming area of a goat on a 30 ft leash tied to the corner of a shed that is 16 ft by 24 ft? --------- 67=_____ ft^2

10H-68. The velocity of a car increases with time at $v(t) = 9t$ mph, where t is in seconds from the time the car began moving. How long before the car is 150 ft from where it began? ---------- 68=_____ sec

10H-69.

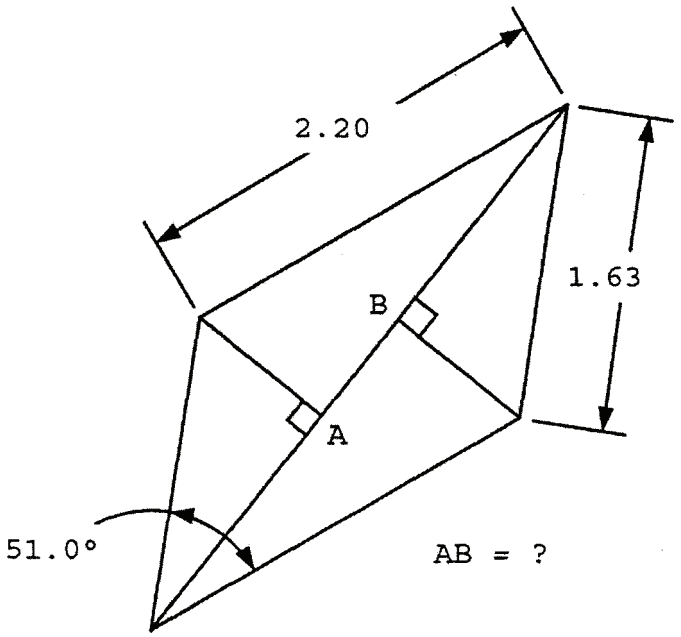
EQUILATERAL AND CONGRUENT ISOSCELES TRIANGLES



10H-69 = _____

10H-70.

PARALLELOGRAM



10H-70 = _____

10H-1 = -101
= -1.01×10^{2}

10H-2 = -1.48
= -1.48×10^{0}

10H-3 = -115
= -1.15×10^{2}

10H-4 = 6.62
= 6.62×10^{0}

10H-5 = -4.57×10^{-5}

10H-6 = 23,500
= 2.35×10^{4}

10H-7 = 5 integer

10H-8 = 133 integer

10H-9 = 3.02
= 3.02×10^{0}

10H-10 = 17,900
= 1.79×10^{4}

10H-11 = -2660
= -2.66×10^{3}

10H-12 = -0.0405
= -4.05×10^{-2}

10H-13 = 0.541
= 5.41×10^{-1}

10H-14 = 111000
= 1.11×10^{5}

10H-15 = 0.0787
= 7.87×10^{-2}

10H-16 = 1.21×10^{24}

10H-17 = 3140
= 3.14×10^{3}

10H-18 = 5.279 (4SD)
= 5.279×10^{0}

10H-19 = 11.6
= 1.16×10^{1}

10H-20 = 493
= 4.93×10^{2}

10H-21 = 3.19×10^{-5}

10H-22 = 0.375
= 3.75×10^{-1}

10H-23 = 6680
= 6.68×10^{3}

10H-24 = 185
= 1.85×10^{2}

10H-25 = -3.23
= -3.23×10^{0}

10H-26 = 48.3
= 4.83×10^{1}

10H-27 = 0.128
= 1.28×10^{-1}

10H-28 = $83.72

10H-29 = 0.652
= 6.52×10^{-1}

10H-30 = 0.861
= 8.61×10^{-1}

10H-31 = 32300
= 3.23×10^{4}

10H-32 = 0.145
= 1.45×10^{-1}

10H-33 = -313
= -3.13×10^{2}

10H-34 = 4.14
= 4.14×10^{0}

10H-35 = -0.000116
= -1.16×10^{-4}

10H-36 = 72.2
= 7.22×10^{1}

10H-37 = 1.14 (3SD)
= 1.14×10^{0}

10H-38 = 3.41
= 3.41×10^{0}

10H-39 = 3.10
= 3.10×10^{0}

10H-40 = 0.506
= 5.06×10^{-1}

10H-41 = 0.0873
= 8.73×10^{-2}

10H-42 = -7.86×10^{-5}

10H-43 = -288000
= -2.88×10^{5}

10H-44 = 16.1
= 1.61×10^{1}

10H-45 = -0.0106
= -1.06×10^{-2}

10H-46 = 4.18
= 4.18×10^{0}

10H-47 = 11.1
= 1.11×10^{1}

10H-48 = -0.352
= -3.52×10^{-1}

10H-49 = 1.85
= 1.85×10^{0}

10H-50 = 24.4
= 2.44×10^{1}

10H-51 = 5.29
= 5.29×10^{0}

10H-52 = -1.54
= -1.54×10^{0}

10H-53 = 4.51×10^{-5}

10H-54 = 1.86
= 1.86×10^{0}

10H-55 = 2.66
= 2.66×10^{0}

10H-56 = 13.9
= 1.39×10^{1}

10H-57 = $3.05

10H-58 = 1.03
= 1.03×10^{0}

10H-59 = -1.57
= -1.57×10^{0}

10H-60 = 0.431
= 4.31×10^{-1}

10H-61 = 5.76
= 5.76×10^{0}

10H-62 = 1.17
= 1.17×10^{0}

10H-63 = -0.261
= -2.61×10^{-1}

10H-64 = 0.174
= 1.74×10^{-1}

10H-65 = -31.1
= -3.11×10^{1}

10H-66 = 1.55
= 1.55×10^{0}

10H-67 = 2300
= 2.30×10^{3}

10H-68 = 4.77
= 4.77×10^{0}

10H-69 = 46.0
= 4.60×10^{1}

10H-70 = 0.630
= 6.30×10^{-1}