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

UIL Calculator Applications

Test 24I

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

  Incorrect: 12.30, 123.0, 1.23(10)^{2}, 1.23·10^{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}.
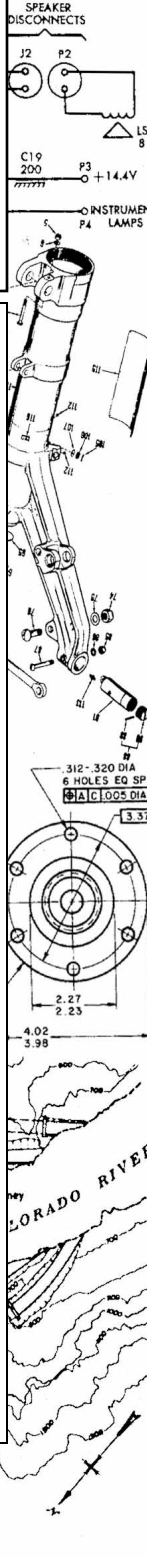
24I-1.   (−7.37 − 5.25)/(3.46) --- 1=_____

24I-2.   (−4.4 x 7.46) − (18.2 − 24.3) -- 2=_____

24I-3.   (−47.2 + 157 − 127)/(−3.8) + 1.56 ---------------------------------- 3=_____

24I-4.   {(72.7 − 71.3 + 307)(0.0434)(−0.0515)} − 0.214 ------------------ 4=_____

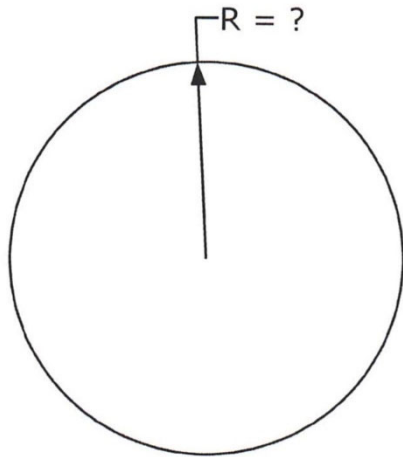24I-5. $\dfrac{82500 + 42200}{(6.94)(−9.69)(−8.44)} + 249 − 222$ ------------------------------------ 5=_____

24I-6. What number equals the sum of 68.6 and 88.4? ----------------------- 6=_____

24I-7. What is the product of 4.71 and 8.93, divided by 75.4? ---------------- 7=_____

24I-8. Valerie buys an item costing $27.40. How much change does she
get back if she pays with two $20 bills? --- 8=$_____

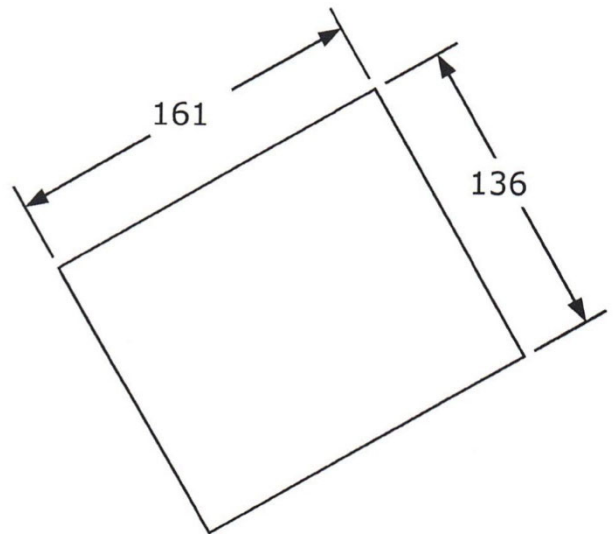| 24I-9.	24I-10.
CIRCLE	RECTANGLE

24I-9.
CIRCLE

R = ?

Circumference = 0.0995

24I-9 =_____

24I-10.
RECTANGLE

161

136

Area = ?

24I-10 =_____

24I-11. $\dfrac{(-97.7)(16.7) - (-28.3)(28.3) + 1070}{-3360 + (39.7)(-69.7)}$ ----------------------------- 11=_____

24I-12. $\dfrac{\{-143 + (6.58)(-4.12)(9.28)\}}{(0.208 + 0.229)(-7.84)(2.73 + 0.85)}$ ----------------------------- 12=_____

24I-13. $\dfrac{(-9.74\times10^{-5} - 3.16\times10^{-4})\{37.3 + (7.23)(\pi)\}}{(8.3)(-0.465 + 0.318)(-6.82)(-9.54)}$ -------------------- 13=_____

24I-14. $\dfrac{\{(0.948 + 8.61)(1.43 + 0.0996) + 25.3 - 16\}}{(-259 - 227)(0.872 + \pi - 0.931)}$ -------------------- 14=_____

24I-15. $\dfrac{60600 + 69300 - (39300 + 51900)(1.75 - \pi)}{(-958)(9.94)(-6.67)(707 - 730 + 774)}$ --------------------- 15=_____

24I-16. Taylor Swift played the US Bank Stadium in Minneapolis in 2023.
The stadium seats 73,000 people, and the average ticket price was
$1450. What was the gross revenue for the sell-out performance? ------------- 16=$_____

24I-17. A chicken on average lays 2 eggs every 3 days. If a commercial
farm wants to produce 800 dozen eggs daily, how many chickens must be
laying? -- 17=_____   integer

24I-18. There were 196.9 million iphone sales in 2020, and 242 million
sold in 2021. What is the percent increase in iphone sales? ------------------- 18=_____ %
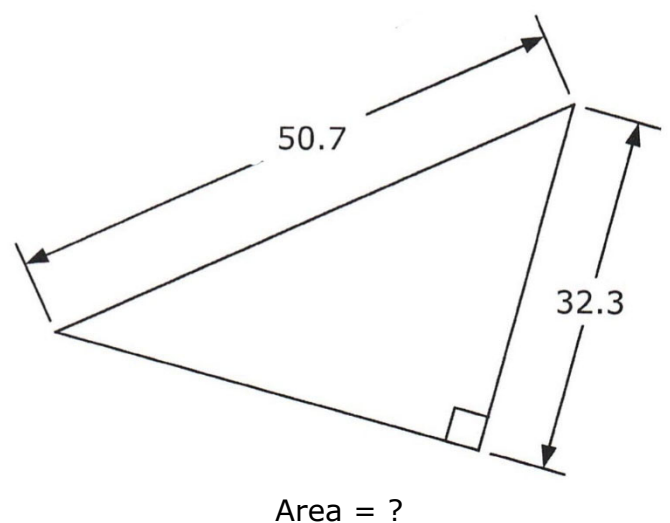
24I-19.
RIGHT TRIANGLE

3.61

rad?

2.34
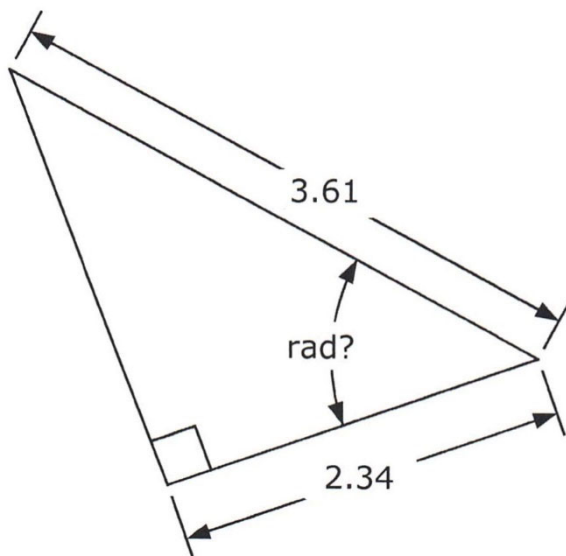
24I-19 =_____

24I-20.
RIGHT TRIANGLE

50.7

32.3

Area = ?

24I-20 =_____

24I-21. $\left[\dfrac{(0.685)(0.675)}{-2.12} + 0.131\right]^2 + \sqrt{3.00 \times 10^{-5}}$ ----------------------- 21=_____

24I-22. $\left[\dfrac{\sqrt{0.777 - 0.697}}{-7.03} + \dfrac{(-0.0163)}{2.44}\right]^2$ ------------------------------------ 22=_____

24I-23. $\left[-28.1 + \sqrt{761}\right]^2 \times \left[586 + 900\right]^2 \times \sqrt{6.3/64.4}$ ------------------- 23=_____

24I-24. $\left[\dfrac{2.92 + 0.442 + \sqrt{0.601/0.164}}{967 + 182}\right]^2$ ----------------------------------- 24=_____

24I-25. $(0.134)(\pi)\sqrt{(-0.283)^2/0.759} + 1/\sqrt{15.7 + 41.2}$ ------------------- 25=_____

24I-26. A loaf of bread bakes at 350°F for 35 min. The oven heats from room temperature (75°F) at 40°F/min, and it takes the oven 1 hr 45 min to cool. How long was the oven heated above room temperature? ------------- 26=_____ hr

24I-27. Jim's Apple Farm is the largest candy store in Minnesota. Didi can drive there from Sherman TX in 13 hr 25 min, averaging 64.7 mph, or she could walk there in 285 hr, not counting breaks. What is her average walking speed? -- 27=_____ mph

24I-28. Synchronous orbit is defined by $R_s = \sqrt[3]{\dfrac{GmT^2}{4\pi^2}}$ where R_s = 26,190 mi, m = 5.97237×10²⁴ kg, and T = 0.99726968 dy. What is G? ------------------ 28=____ $m^3/(kg\ s^2)$(SD)

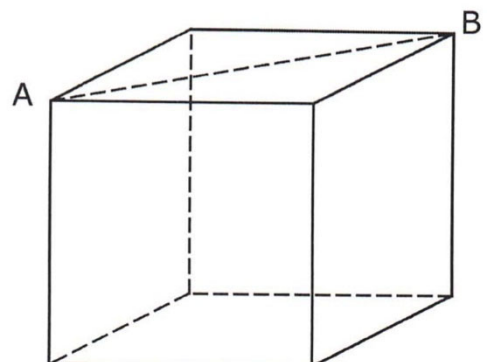| 24I-29.	24I-30.
SPHERE	CUBE

24I-29. SPHERE

R = 6.79
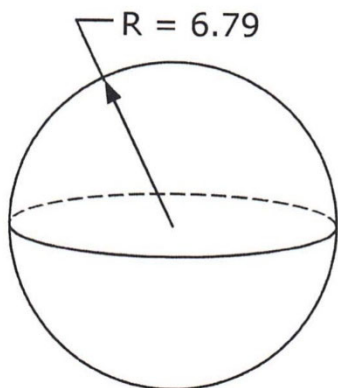
Volume = ?

24I-29 =_____

24I-30. CUBE

Total Surface Area = 103

AB = ?

24I-30 =_____

24I-31. $\dfrac{(0.0544 + 0.0598)^2}{\sqrt{63.1 - 40.5}} + \dfrac{6.63\text{x}10^{-4}}{\sqrt{0.0676 + 0.0956}}$ ------------------------- 31=_____

24I-32. $\sqrt{\dfrac{4.53}{\sqrt{43.7 + 37.5}}} \times \left[\dfrac{1}{(2.59 - 0.416)^2} + \dfrac{1}{(2.63 + 1.24)^2}\right]$ ---------- 32=_____

24I-33. $\dfrac{\sqrt{(43.4)/\{(95.7)/\sqrt{92.3}\}}}{0.443 + (0.62)(6.82)} + \{0.169 + 0.196\}^{1/2}$ ---------------- 33=_____

24I-34. $\dfrac{(8.64\text{x}10^5)^2(7.60\text{x}10^{-13} + 6.92\text{x}10^{-13})}{6.74 + (-0.318)(23.5)} + \dfrac{1}{\dfrac{1}{-0.894} + \dfrac{1}{(0.717)}}$ ----- 34=_____

24I-35. $\dfrac{\dfrac{1}{-9950} + \dfrac{-79.1}{(879 + 193)^2} - \dfrac{\sqrt{55.5}}{(-329)^2}}{(555 + 3350)^2 + (-3.36\text{x}10^7)}$ ------------------------------- 35=_____

24I-36. A ball is dropped from 40 in above the floor. It recovers 80% of its height. Calculate the total distance the ball travels before coming to rest. ----- 36=_____ ft

24I-37. A right isosceles triangle has a hypotenuse dimension of 14 in. It is placed on a 1 in by 1 in grid with both ends of the hypotenuse atop grid points and on the same grid line. What is the percent error in approximating the triangle area by counting 1 in x 1 in grid squares lying completely within the triangle and multiplying by a single grid square area, 1 in^2? --------------- 37=_____ %

24I-38. Jim runs laps around a 1/4 mi track at a 7 min mile. After 9 minutes, Daniel starts from the same starting point running in the same direction. How fast is Daniel running if he catches Jim in 1 min 9 s? ---------- 38=_____ mph
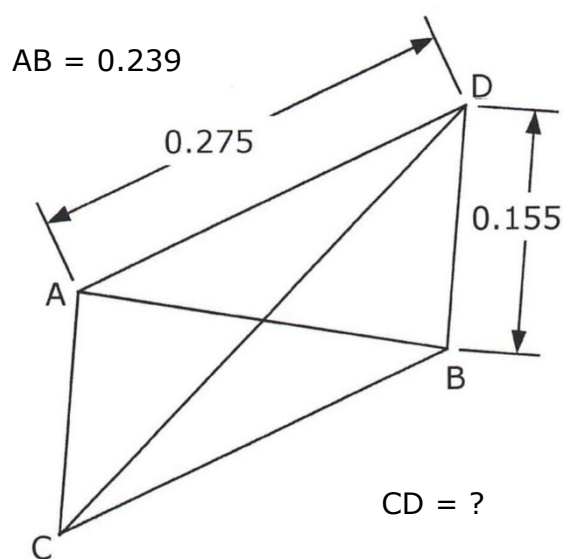
24I-39.	24I-40.
EQUILATERAL TRIANGLE AND INSCRIBED CIRCLE	PARALLELOGRAM

r = 865

?

AB = 0.239

0.275

D

0.155

A

B

CD = ?

C
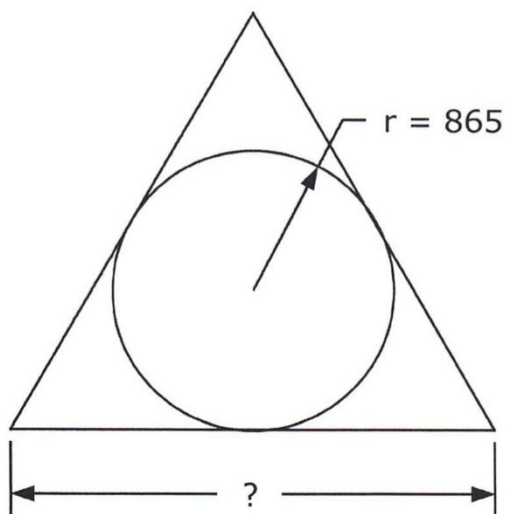
24I-39 =_____

24I-40 =_____

24I-41. $(3.04 \times 10^{-5})(-9.23 \times 10^{-5})10^{\{-6.45 \times 10^{-6}/-5.40 \times 10^{-6}\}}$ ---------- 41=_____

24I-42. $-9.99 \times 10^{-4}\, e^{0.267} + (-9.81 \times 10^{-4})\, e^{-0.895}$ -------------------- 42=_____

24I-43. $(-4240)\mathrm{Log}\{(7730)(0.481 + 1/0.982)\}$ ------------------------- 43=_____

24I-44. $(2.82 + 6.58)^{-(0.978 + 0.761)}$ ------------------------------------- 44=_____

24I-45.(deg) $\dfrac{\cos\{(34°)/(6.91)\}}{\sin\{62.2° - 175°\}}$ -- 45=_____

24I-46. Mr. Kimble wants to provide each student with a pad of paper with a certain amount of writing area. If a 3-in pad containing 50 sheets is acceptable, how many sheets should be in a 4-in pad? Sheets have equal thickness and identical shape. --- 46=_____ integer

24I-47. Keith flew as part of his job duties. His annual flying miles from 2018 to 2022 were 28310, 42900, 65000, 71250, and 89400. Estimate how far he flew in 2023. --- 47=_____ mi

24I-48. For what value of v does $5v^5 = 4v^4 + 3v^3 + 45$? ------------------------ 48=_____
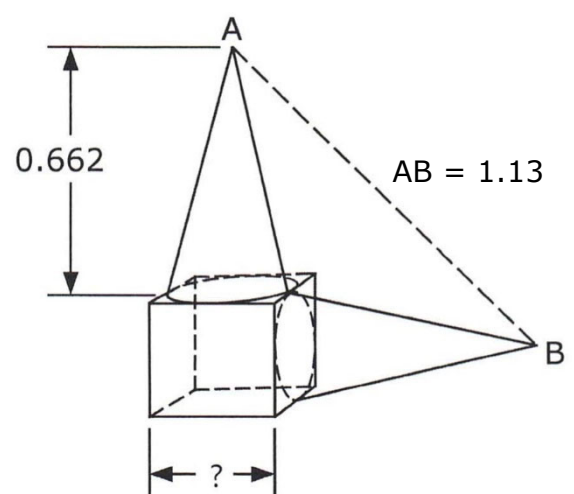
24I-49.

CUBE WITH SPHERICAL CAVITY

a = ?
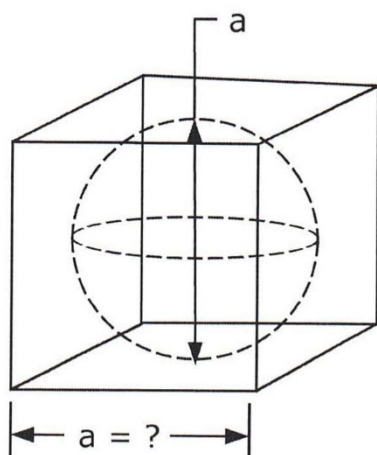
Volume = 460

24I-49 =_____

24I-50.

IDENTICAL CONES AND CUBE

A

0.662

AB = 1.13

B

?

24I-50 =_____

24I-51. $\dfrac{10^{(0.231)} \times 10^{-(0.71)} + 0.625}{10^{(0.398 + 0.459)}}$ ------------------------------------- 51=_____

24I-52. $\dfrac{66.7 + e^{(3.45 + 1.58)}}{0.253 - e^{-(0.623 - 0.702)}}$ ------------------------------------- 52=_____

24I-53. $\dfrac{(8.24 \times 10^{-4} + 0.00136)\,\mathrm{Log}\{1/0.00386\}}{\mathrm{Log}\{(3.95 \times 10^{-4})/(0.00518 + 0.00828)\}}$ ------------------------ 53=_____

24I-54. $\dfrac{(7.36)^{0.436} - (6.73)^{-0.459}}{3.27 + 0.545}$ ------------------------------------- 54=_____

24I-55.(rad) $\dfrac{\arctan\{2.69 + (3.9)(0.45)\}}{\arcsin\{(0.42 + 0.0819)/1.32\}}$ ------------------------------------- 55=_____

24I-56. Calculate the area enclosed by the curves $y = 5(x-3)^2 - 30$ and
$y = (-2)(x-3)^2 + 5x - 27$. --- 56=_____

24I-57. A car accelerates from rest to 60 mph in 18 s. The velocity
increases sinusoidally during the acceleration according to
$v = \left(1 - \cos\left(\frac{\pi t}{18s}\right)\right) 30$ mph. How far did the car travel during the acceleration
from rest to 60 mph? -- 57=_____ ft

24I-58. What is S_{23} if $\mathbf{S} = \mathbf{TU}$, $\mathbf{T} = \begin{bmatrix} 1 & -5 & 13 \\ -5 & 17 & 4 \\ 13 & 4 & 11 \end{bmatrix}$ and $\mathbf{U} = \begin{bmatrix} -6 & 15 & 18 \\ 15 & 2 & -7 \\ 18 & -7 & 3 \end{bmatrix}$? ----- 58=_____
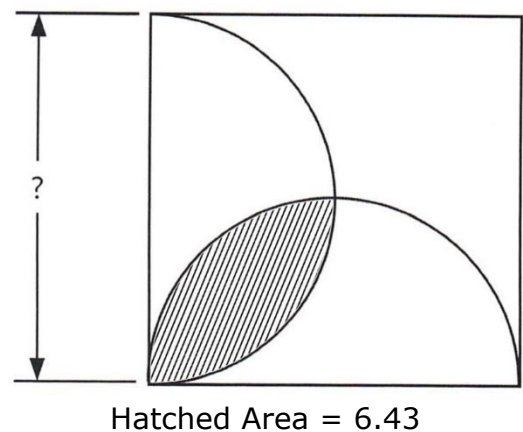
24I-59.

Radians

Slope = 0.1

y = Tan⁻¹(x)

x = ?
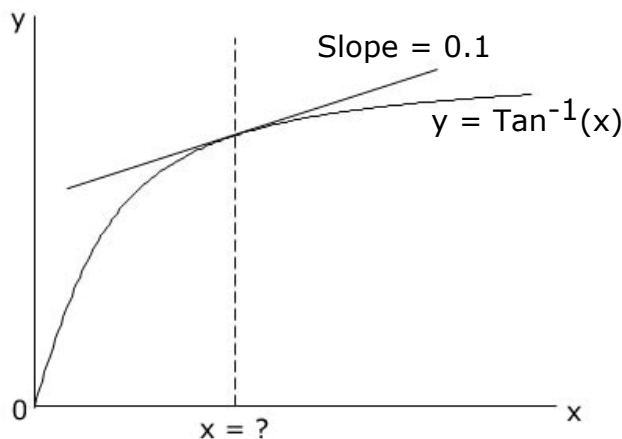
24I-59 =_____

24I-60.

SQUARE AND SEMICIRCLES


Hatched Area = 6.43

24I-60 =_____

24I-61. One strobe light flashes at 48 flashes per minute, and a second strobe flashes at 51 flashes per minute. What is the time interval between the strobes flashing at the same time in sync? ---------------------------------- 61=_____ sec

24I-62. The odds of being hit by a meteorite in a lifetime is $1/(8.4 \times 10^8)$. What is this fraction raised to the –64,826th power? -------------------------- 62=_____

24I-63. A professional firework explodes at its maximum elevation of 275 ft. If fired straight up into the air, what is the release velocity? ----------- 63=_____ mph

---

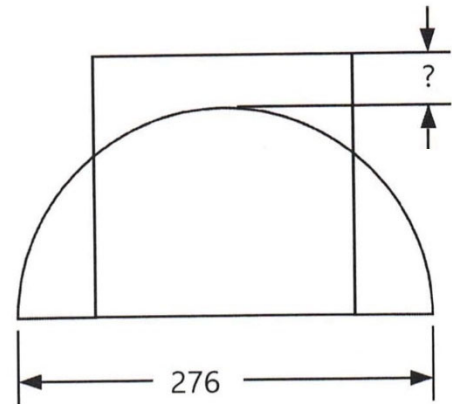24I-64.

IDENTICAL RIGHT TRIANGLES

B   34.0°

AB = 0.558
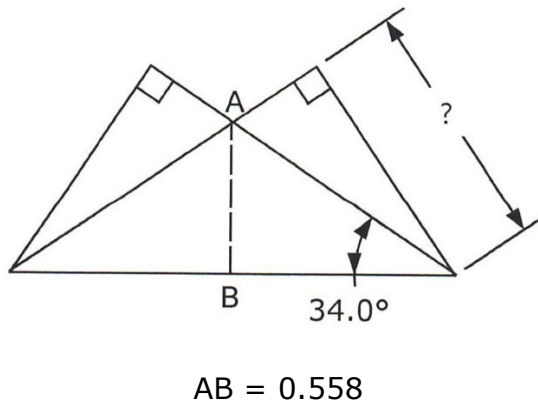
24I-64 =_____

24I-65.

SQUARE AND SEMICIRCLE

276

Square Area = Semicircle Area

24I-65 =_____

24I-66. $\text{Ln}\left[\dfrac{(5.7)^2 - 2(5.7)(13.9) + (13.9)^2}{(155)^2}\right]^2$ ---------------------------------- 66=_____

24I-67. $(92.8 - 13.2)^2 + (2.34 + 3.74)e^{\text{Ln}(219)}$ ---------------------------- 67=_____

24I-68. $(\text{rad}) \dfrac{98.2}{6(2.99)}\left\{(-3.88) + (-1.94)\sin(-4.12)\right\}^5$ ---------------------- 68=_____

24I-69. $\dfrac{1}{(0.829)} + \dfrac{1}{3(0.829)^3} + \dfrac{1}{5(0.829)^5} + \dfrac{1}{7(0.829)^7}$ ----------------- 69=_____

24I-70. $\dfrac{0.609}{\sqrt{0.0349}} \text{Ln}\left[\dfrac{\sqrt{(0.888)^2 + (0.122)} + \sqrt{0.373}}{\sqrt{0.286} + (66.4)(0.00186)}\right]$ --------------------- 70=_____

24I-1 = −3.65
= −3.65x10^0

24I-2 = −26.7
= −2.67x10^1

24I-3 = 6.09
= 6.09x10^0

24I-4 = −0.903
= −9.03x10^{-1}

24I-5 = 247
= 2.47x10^2

24I-6 = 157
= 1.57x10^2

24I-7 = 0.558
= 5.58x10^{-1}

24I-8 = $12.60

24I-9 = 0.0158
= 1.58x10^{-2}

24I-10 = 21900
= 2.19x10^4

24I-11 = −0.0391
= −3.91x10^{-2}

24I-12 = 32.2
= 3.22x10^1

24I-13 = 0.000313
= 3.13x10^{-4}

24I-14 = −0.0160
= −1.60x10^{-2}

24I-15 = 0.00538
= 5.38x10^{-3}

24I-16 = $105,850,000.00

24I-17 = 14400 integer

24I-18 = 22.9
= 2.29x10^1

24I-19 = 0.866
= 8.66x10^{-1}

24I-20 = 631
= 6.31x10^2

24I-21 = 0.0131
= 1.31x10^{-2}

24I-22 = 0.00220
= 2.20x10^{-3}

24I-23 = 182,000
= 1.82x10^5

24I-24 = 2.11x10^{-5}

24I-25 = 0.269
= 2.69x10^{-1}

24I-26 = 2.45
= 2.45x10^0

24I-27 = 3.05
= 3.05x10^0

24I-28 = 6.667x10^{-11}
(4SD)

24I-29 = 1310
= 1.31x10^3

24I-30 = 5.86
= 5.86x10^0

24I-31 = 0.00438
= 4.38×10^{-3}

24I-32 = 0.197
= 1.97×10^{-1}

24I-33 = 1.05
= 1.05×10^{0}

24I-34 = 2.14
= 2.14×10^{0}

24I-35 = 1.30×10^{-11}

24I-36 = 30.0
= 3.00×10^{1}

24I-37 = -14.3
= -1.43×10^{1}

24I-38 = 10.4
= 1.04×10^{1}

24I-39 = 3000
= 3.00×10^{3}

24I-40 = 0.377
= 3.77×10^{-1}

24I-41 = -4.39×10^{-8}

24I-42 = -0.00171
= -1.71×10^{-3}

24I-43 = -17200
= -1.72×10^{4}

24I-44 = 0.0203
= 2.03×10^{-2}

24I-45 = -1.08
= -1.08×10^{0}

24I-46 = 29 integer

24I-47 = 105,000
= 1.05×10^{5}

24I-48 = 1.87
= 1.87×10^{0}

24I-49 = 9.88
= 9.88×10^{0}

24I-50 = 0.274
= 2.74×10^{-1}

24I-51 = 0.133
= 1.33×10^{-1}

24I-52 = -265
= -2.65×10^{2}

24I-53 = -0.00344
= -3.44×10^{-3}

24I-54 = 0.517
= 5.17×10^{-1}

24I-55 = 3.46
= 3.46×10^{0}

24I-56 = 41.4
= 4.14×10^{1}

24I-57 = 792
= 7.92×10^{2}

24I-58 = -197
= -1.97×10^{2}

24I-59 = 3.00
= 3.00×10^{0}

24I-60 = 6.71
= 6.71×10^{0}

24I-61 = 20.0
= 2.00×10^{1}

24I-62 = 2.13x10578,525

24I-63 = 90.7
= 9.07×10^{1}

24I-64 = 0.925
= 9.25×10^{-1}

24I-65 = 35.0
= 3.50×10^{1}

24I-66 = -11.8
= -1.18×10^{1}

24I-67 = 7670
= 7.67×10^{3}

24I-68 = -27300
= -2.73×10^{4}

24I-69 = 2.83
= 2.83×10^{0}

24I-70 = 2.82
= 2.82×10^{0}