

Name _____

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

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

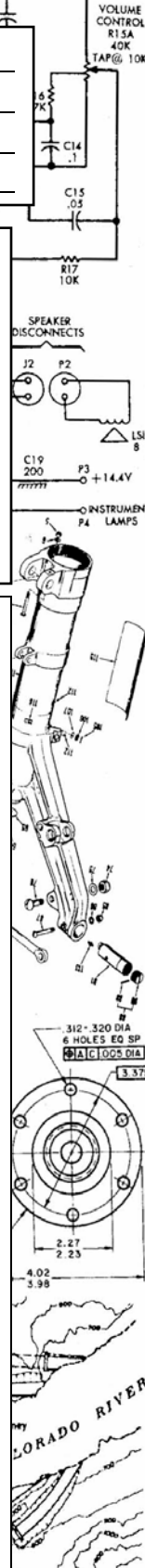
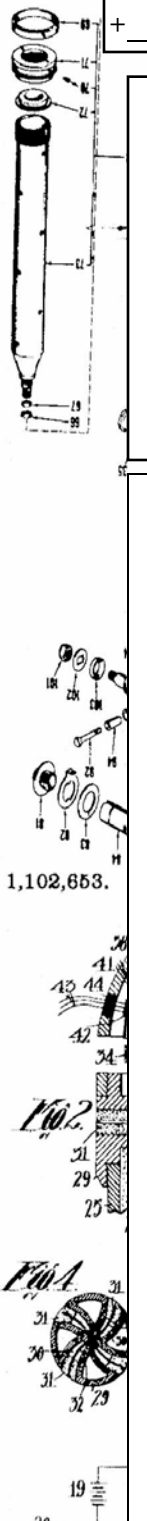
UIL Calculator Applications

Test 21A

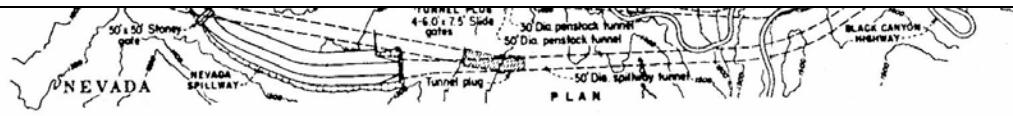
(Invitational A)

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*, 1.23x10^{0*}, 1.23x10¹, 1.23x10⁰¹, .0190, 0.0190, 1.90x10⁻²
 Incorrect: 12.30, 123.0, 1.23(10)², 1.23•10², 1.230x10², 1.23*10², 0.19, 1.9x10⁻², 19.0x10⁻³, 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.



Witnesses:
 G. P. Wilson
 J. J. Hartnett



21A-1. $(5.88/1.66) + 3.37$ ----- 1= _____

21A-2. $0.396/0.951 + 0.376 - 0.417$ ----- 2= _____

21A-3. $(6.12 - 4.24 - 5.21 + 0.446) \times (-1.25)$ ----- 3= _____

21A-4. $\frac{(7420 - 4350)}{\{(0.0935)/(-0.00276)\}} + (59.2 - 29.8)$ ----- 4= _____

21A-5. $\frac{(0.932 + 0.91 - 0.949)(0.431)}{(0.469)(0.35)(0.125)}$ ----- 5= _____

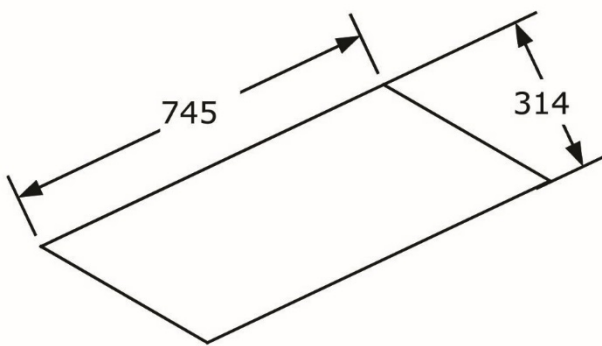
21A-6. What is 6.93 times 0.652? ----- 6= _____

21A-7. Calculate the positive square root of the product of 0.196 and 9.92. -- 7= _____

21A-8. Find y if 2.52 raised to the y power equals 687. ----- 8= _____

21A-9.

PARALLELOGRAM

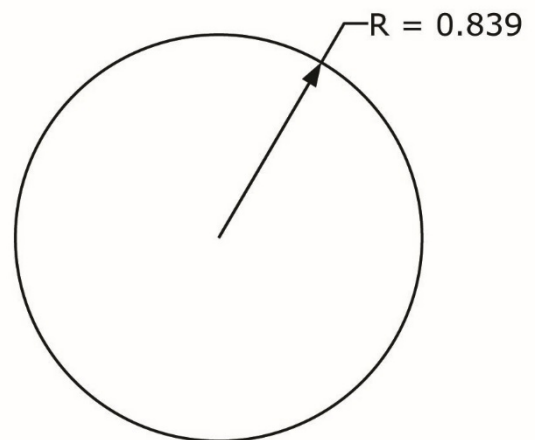


Area = ?

21A-9 = _____

21A-10.

CIRCLE



Circumference = ?

21A-10 = _____

21A-11. $\frac{(-3.51)(2.83) - (\pi)(-9.64) + 7.24}{64 + (3.37)(7.65)}$ ----- 11=_____

21A-12. $\frac{(-385 + 176 - 318)(312)(643)}{(7.57 - 2.53)(-701 - 2780)}$ ----- 12=_____

21A-13. $\frac{-76200 + 61600 - 73800 + 25800 + 71200}{(8.43)(82.7 + 59.2)(-4.18 + 2.43)}$ ----- 13=_____

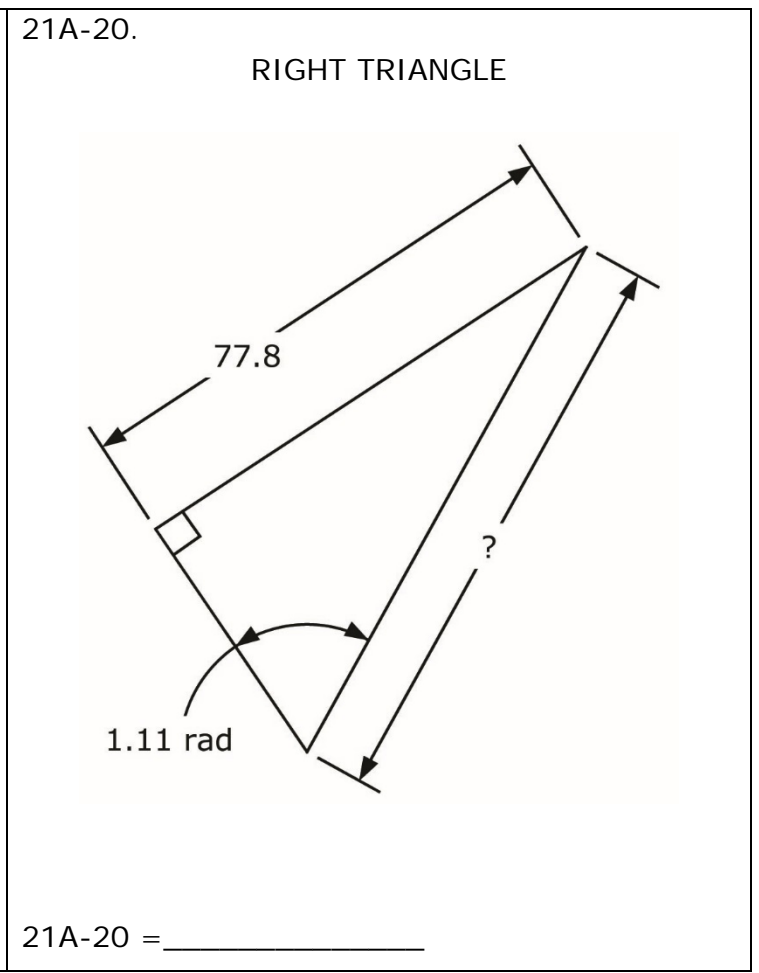
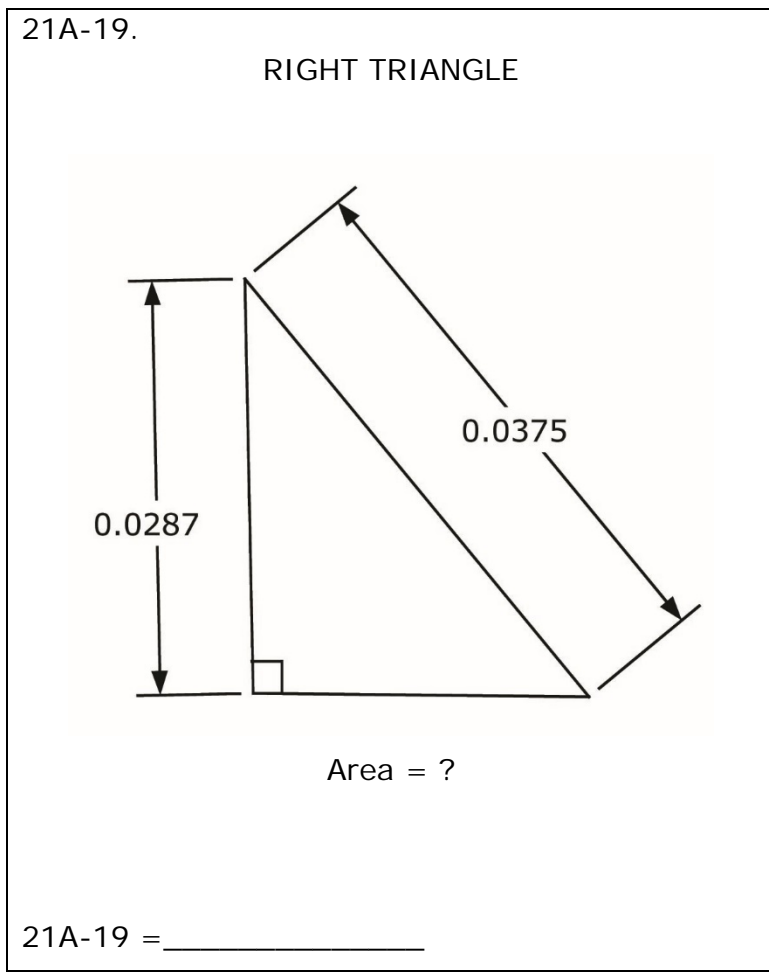
21A-14. $\frac{(5350 + 970 - 561)(0.00587 + 0.00858 - 9.67 \times 10^{-4})}{(9.71 - 5.55)(-7.2)(8.32 - 6.66)}$ ----- 14=_____

21A-15. $\frac{(0.418 + 0.549)}{5.72 - 16.2} + \frac{-0.0382}{80.5 + 651} + \frac{(0.284)(132 - 56.6)}{(-425)(0.732)}$ ----- 15=_____

21A-16. An old saying concerning greedy people is, "You give them an inch and they will take a mile." How many inches are in a mile? ----- 16=_____ in(integer)

21A-17. The smallest leaf in the world belongs to the plant, *Wolffia globosa*. It is 150 μm in diameter. How many would be needed to equal the area of the largest leaf in the world belonging to *Raphia regalis*? Its leaf is 80 feet long and 10 feet wide. ----- 17=_____

21A-18. On average, what fraction of a year is all the weekends? ----- 18=_____ %



21A-21. $\sqrt{\frac{(\pi)(7.32)}{186 + 113}} + 0.333$ ----- 21= _____

21A-22. $\frac{1}{0.098 + 0.337} + \frac{1}{0.159 - 0.272} + \frac{1}{(0.293)}$ ----- 22= _____

21A-23. $(-4.13)(-0.0953)\sqrt{(-0.828)^2/0.891} + 1/\sqrt{6.3 + 8.61}$ ----- 23= _____

21A-24. $\frac{\sqrt{\pi + 2.61 + (46.6)/(6.19)}}{-7.83 + 1.11}$ ----- 4= _____

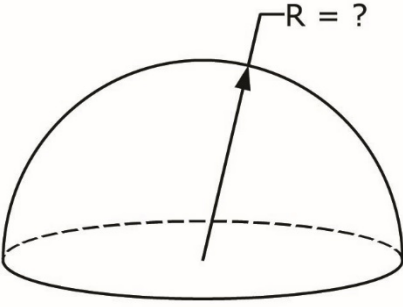
21A-25. $(0.0896)(5.9) + \sqrt{(0.0104)/(2.87)} + [(0.228)(1.24)]^2$ ----- 25= _____

21A-26. The product of two, consecutive, even numbers is 8,648. What is their sum? ----- 26= _____ integer

21A-27. A bag of chicken feed costs \$30 and feeds six chickens for a month. Chickens on average lay two eggs every three days. What is the average cost of a dozen eggs? ----- 27= \$ _____

21A-28. A person must burn 3500 calories to lose one pound of weight. If a 200-pound person wants to lose 40 pounds in six months, by how much must their daily caloric intake be reduced? ----- 28= _____ calories

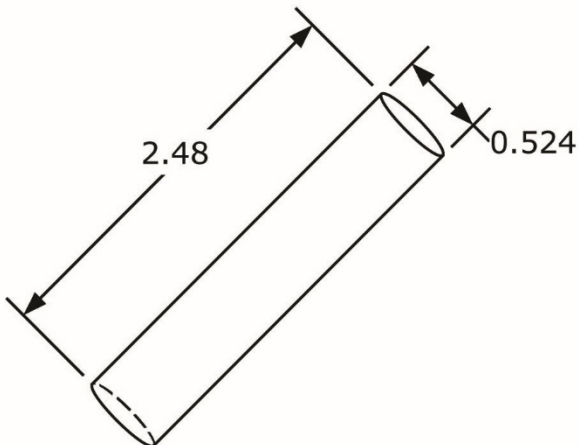
21A-29. HEMISPHERE



Volume = 187,000

21A-29 = _____

21A-30. CYLINDER



Volume = ?

21A-30 = _____

21A-31. $\sqrt{\frac{2.58}{\sqrt{38 + 4.28}}} \times \left[\frac{1}{(7.72 - 1.53)^2} + \frac{1}{(12.8 + 10.8)^2} \right]$ ----- 31 = _____

21A-32. $\frac{(-8.59 + 17.4)^2}{\sqrt{35.9 - 26.8}} + \frac{20.3}{\sqrt{5.23 + 6.52}}$ ----- 32 = _____

21A-33. $\frac{[(1.55 - 0.751)(0.366/0.362)]^{1/2}}{(0.339)^2 + (0.144 + 0.251)^2 + 0.0718}$ ----- 33 = _____

21A-34. $\frac{(5.30 \times 10^5)^2 (1.36 \times 10^{-12} + 1.02 \times 10^{-12})}{26.9 + (-0.502)(387)} + \frac{1}{\frac{1}{-6.44 \times 10^{-4}} + \frac{1}{(0.00132)}}$ 34 = _____

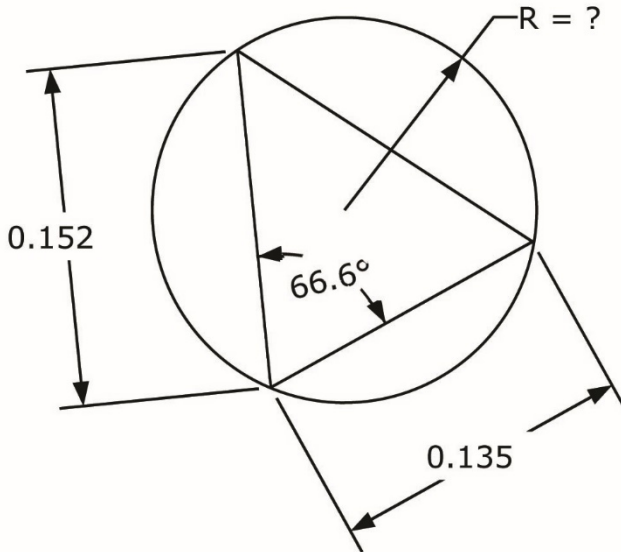
21A-35. $\frac{\left[\frac{(9.73 + \pi)}{(986 + 6420)} \right]^2 + \sqrt{\frac{8.87 \times 10^{-12} + 3.15 \times 10^{-11}}{\sqrt{0.699}}}}{\{(-9.93)/(9.43)\}^2}$ ----- 35 = _____

21A-36. Wendy gets 19.7 mi/gal driving in the city and 26.2 mi/gal on the highway. If she drives 245 mi and consumes 9.98 gal, what fraction of the trip was in the city? ----- 36 = _____ %

21A-37. A bathtub drains in 4 min 45 s. It fills in 3 min 12 s. How long would it take to fill the bathtub if the stopper was removed? ----- 37 = _____ min(SD)

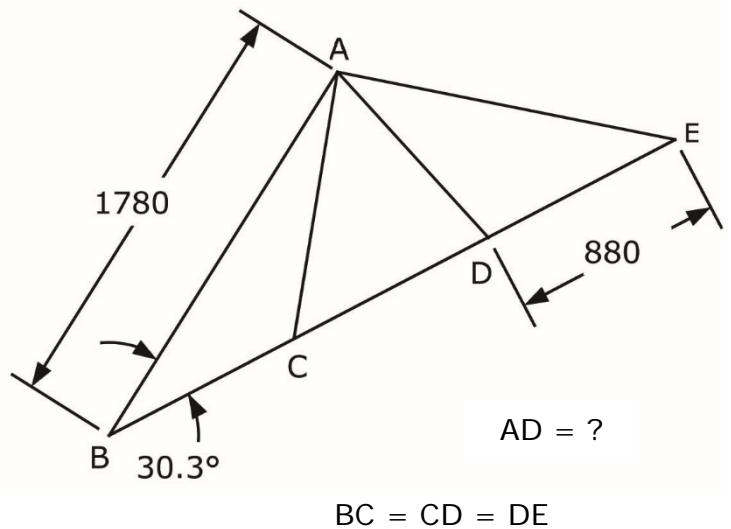
21A-38. Average human blood pressure is 100 mm Hg, the pressure imposed at the base by a column of mercury 100 mm tall. If pressure is the product of material density, the gravitational constant and column height, what is this value in psi? The density of mercury is 13.5 g/cm³. ----- 38 = _____ psi

21A-39. SCALENE TRIANGLE AND CIRCLE



21A-39 = _____

21A-40. SCALENE TRIANGLES



21A-40 = _____

21A-41. $10^{-\{(0.411 - 0.84)/(0.635 + 0.392)\}}$ ----- 41 = _____

21A-42. $\frac{e^{+0.843} + e^{-0.588}}{(-0.00908 + 0.00653)}$ ----- 42 = _____

21A-43. $\frac{\text{Ln}(3.52 + 20 - 0.762)}{(5.4)}$ ----- 43 = _____

21A-44. $(-5.30 \times 10^{-5} + 5.52 \times 10^{-5})^{-(0.285 + 0.573)}$ ----- 44 = _____

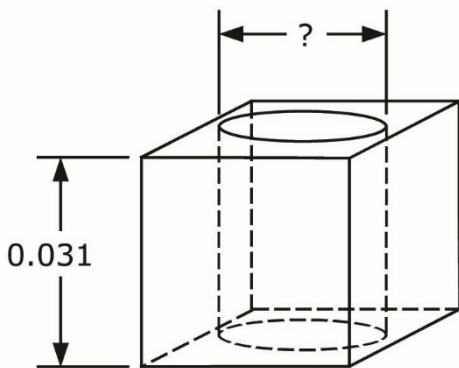
21A-45. (deg) $\sin \left[90^\circ \times \frac{(3.30 \times 10^6)}{(3.46 \times 10^6)} \right] + \cos \{ 179^\circ - 162^\circ \}$ ----- 45 = _____

21A-46. An empty 1-quart capacity saucepan weighs 2 lbs. How much does an empty half-gallon saucepan weigh? Assume that the sheet metal thickness is the same for both. ----- 46 = _____ lbs

21A-47. Calculate the correlation coefficient for these data: (1.2, 2.95), (2.3, 7.25), (3.5, 9.4), (5, 13.3), (5.85, 17). ----- 47 = _____

21A-48. Calculate positive x if $13x^x = 15x + 20$. ----- 48 = _____

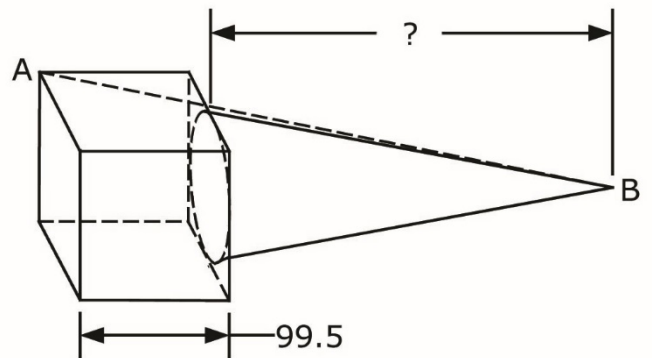
21A-49. CUBE WITH CYLINDRICAL CAVITY



Solid Cube Volume = 2 (Cylinder Volume)

21A-49 = _____

21A-50. CUBE AND CONE



21A-50 = _____

21A-51. $\frac{10^{(0.355)} \times 10^{-(0.161)} + 0.977}{10^{(10.8 + 0.276)}} \dots\dots\dots 51 = \underline{\hspace{2cm}}$

21A-52. $\frac{5.37 + e^{(\pi + 1.82)}}{0.853 - e^{-(0.744 - 0.871)}} \dots\dots\dots 52 = \underline{\hspace{2cm}}$

21A-53. $\frac{\text{Ln}\{(9.74 \times 10^{-4})(4.16 \times 10^{-4})(0.00801)\}}{-0.00786 + (0.00308) \text{Ln}(0.00656)} \dots\dots\dots 53 = \underline{\hspace{2cm}}$

21A-54. $\frac{1}{(0.5)^{(-0.234)} + (0.555 + 0.65)^{(0.541 - 0.764)}} \dots\dots\dots 54 = \underline{\hspace{2cm}}$

21A-55. (rad) $\frac{\arcsin\{(6270)(54000)/(8.87 \times 10^8)\}}{-3.08 \times 10^7 + (-50700)(2390)} \dots\dots\dots 55 = \underline{\hspace{2cm}}$

21A-56. For the function $y = -5x^2 + 30x - 40$, what is the x value associated with the maximum? $\dots\dots\dots 56 = \underline{\hspace{2cm}}$

21A-57. A cylindrical water tank is 6 ft in diameter and 4 ft tall. When drained from the bottom, the flow rate out is proportional to the water level in the tank. If a full tank drains 40% in 45 min, how long does it take to drain the tank another 40%? $\dots\dots\dots 57 = \underline{\hspace{2cm}}$ min

21A-58. What is the determinant of the matrix $\begin{bmatrix} 13 & -8 & 11 \\ -8 & 13 & 15 \\ 11 & 15 & 9 \end{bmatrix}$? $\dots\dots\dots 58 = \underline{\hspace{2cm}}$

21A-59.

$y = 2x^3 - 50x^2 - 130x - 800$

21A-59 = $\underline{\hspace{2cm}}$

21A-60.

IDENTICAL RHOMBUSES

Total Area = 824

21A-60 = $\underline{\hspace{2cm}}$

21A-61. Donnie can peel a sack of potatoes in 45 min, and Xavier can peel a sack in 34 minutes. If Donnie starts and is joined by Xavier after 13 min, how long did it take to peel the entire sack of potatoes? ----- 61 = _____ min

21A-62. The universe is estimated to be 4.33×10^{17} s old. What is this number raised to the 5,943 power? ----- 62 = _____

21A-63. A construction worker on the ground tosses a brick up to a worker on the second floor. What is the initial velocity of the brick if the vertical distance is 14 ft and the worker catches the brick at its maximum height? ----- 63 = _____ mph

21A-64.
IDENTICAL ISOSCELES TRIANGLES
 AB = ?

0.547

A B

Total Area = 0.274

21A-64 = _____

21A-65.
INFINITE NUMBER OF CIRCLES

R = 1.71

deg?

Area of All Circles = 16.1

21A-65 = _____

21A-66. $\text{Log}(4.33) + \text{Log}(9.83) + \text{Log}(8.96) + \text{Log} \left[\frac{(2.36)}{(9.83)} \right]$ ----- 66 = _____

21A-67. (rad) $\sin(0.904)\cos(3.48) - \cos(0.904)\sin(3.48)$ ----- 67 = _____

21A-68. (rad) $\frac{1}{(3400)(0.111)} \text{Ln} \{ (3.9) + (-2.08)\sin(0.754) \}$ ----- 68 = _____

21A-69. $\frac{1}{(0.409)} + \frac{1}{3(0.409)^3} + \frac{1}{5(0.409)^5} + \frac{1}{7(0.409)^7}$ ----- 69 = _____

21A-70. $\frac{-88}{\sqrt{3.37}} \text{Ln} \left[\frac{\sqrt{(-61.2)^2 + (3160)} + \sqrt{6320}}{\sqrt{0.927 + (68.5)(0.00724)}} \right]$ ----- 70 = _____

21A-1	= 6.91 = 6.91×10^0	21A-11	= 0.307 = 0.7×10^{-1}	21A-21	= 0.610 = 6.10×10^{-1}
21A-2	= 0.375 = 3.75×10^{-1}	21A-12	= 6030 = 6.03×10^3	21A-22	= -3.14 = -3.14×10^0
21A-3	= 3.60 = 3.60×10^0	21A-13	= -4.11 = -4.11×10^0	21A-23	= 0.604 = 6.04×10^{-1}
21A-4	= -61.2 = -6.12×10^1	21A-14	= -1.56 = -1.56×10^0	21A-24	= -0.542 = -5.42×10^{-1}
21A-5	= 18.8 = 1.88×10^1	21A-15	= -0.161 = -1.61×10^{-1}	21A-25	= 0.669 = 6.69×10^{-1}
21A-6	= 4.52 = 4.52×10^0	21A-16	= 63,360 integer	21A-26	= 186 integer
21A-7	= 1.39 = 1.39×10^0	21A-17	= 4.21×10^9	21A-27	= \$2.96
21A-8	= 7.07 = 7.07×10^0	21A-18	= 28.6 = 2.86×10^1	21A-28	= 767 = 7.67×10^2
21A-9	= 234,000 = 2.34×10^5	21A-19	= 0.000346 = 3.46×10^{-4}	21A-29	= 44.7 = 4.47×10^1
21A-10	= 5.27 = 5.27×10^0	21A-20	= 86.9 = 8.69×10^1	21A-30	= 0.535 = 5.35×10^{-1}

21A-31	= 0.0176 = 1.76×10^{-2}	21A-41	= 2.62 = 2.62×10^0	21A-51	= 2.13×10^{-11}	21A-61	= 26.8 = 2.68×10^1
21A-32	= 31.7 = 3.17×10^1	21A-42	= -1130 = -1.13×10^3	21A-52	= -525 = -5.25×10^2	21A-62	= 4.44×10^{104813}
21A-33	= 2.62 = 2.62×10^0	21A-43	= 0.579 = 5.79×10^{-1}	21A-53	= 837 = 8.37×10^2	21A-63	= 20.5 = 2.05×10^1
21A-34	= -0.00525 = -5.25×10^{-3}	21A-44	= 71500 = 7.15×10^4	21A-54	= 1.81 = 1.81×10^0	21A-64	= 0.742 = 7.42×10^{-1}
21A-35	= 8.99×10^{-6}	21A-45	= 1.95 = 1.95×10^0	21A-55	= -2.58×10^{-9}	21A-65	= 24.0 = 2.40×10^1
21A-36	= 20.4 = 2.04×10^1	21A-46	= 3.17 = 3.17×10^0	21A-56	= 3.00 = 3.00×10^0	21A-66	= 1.96 = 1.96×10^0
21A-37	= 9.81 (3SD) = 9.81×10^0	21A-47	= 0.992 = 9.92×10^{-1}	21A-57	= 96.8 = 9.68×10^1	21A-67	= -0.536 = -5.36×10^{-1}
21A-38	= 1.92 = 1.92×10^0	21A-48	= 1.97 = 1.97×10^0	21A-58	= -6190 = -6.19×10^3	21A-68	= 0.00240 = 2.40×10^{-3}
21A-39	= 0.0862 = 8.62×10^{-2}	21A-49	= 0.0247 = 2.47×10^{-2}	21A-59	= 6960 = 6.96×10^3	21A-69	= 99.4 = 9.94×10^1
21A-40	= 925 = 9.25×10^2	21A-50	= 266 = 2.66×10^2	21A-60	= 35.6 = 3.56×10^1	21A-70	= -226 = -2.26×10