

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 19B (Invitational B)

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.*, 1.23×10*, 1.23×10^{0*}
1.23×10¹, 1.23×10⁰¹, .0190, 0.0190, 1.90×10⁻²

Incorrect: 12.30, 123.0, 1.23(10)², 1.23·10², 1.230×10²,
1.23*10², 0.19, 1.9×10⁻², 19.0×10⁻³, 1.90E-02

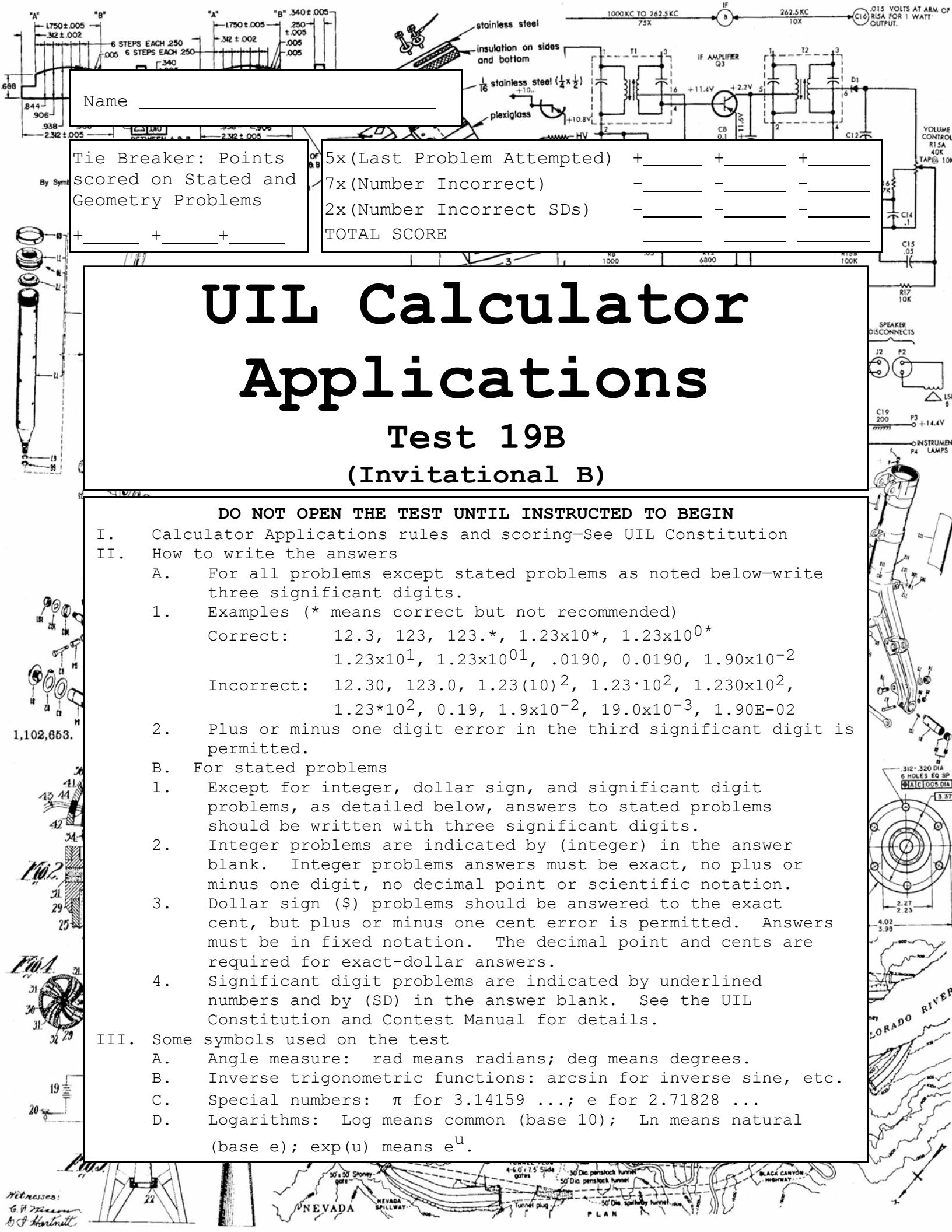
2. Plus or minus one digit error in the third significant digit is permitted.

B. For stated problems

- Except for integer, dollar sign, and significant digit problems, as detailed below, answers to stated problems should be written with three significant digits.
- 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.
- 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.
- 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

- Angle measure: rad means radians; deg means degrees.
- Inverse trigonometric functions: arcsin for inverse sine, etc.
- Special numbers: π for 3.14159 ...; e for 2.71828 ...
- Logarithms: Log means common (base 10); Ln means natural (base e); exp(u) means e^u.



19B-1. $-0.132 + 0.0907 - 0.414$ ----- 1= _____

19B-2. $(9.66 - \pi)/(8.84) + 0.399$ ----- 2= _____

19B-3. $\frac{(-44.5)(91.9)(7.61)}{69.4} + 431$ ----- 3= _____

19B-4. $\frac{5680 + 29400 - 8710}{(0.086)(0.0538)(0.00996)}$ ----- 4= _____

19B-5. $\frac{(-0.00329 - 0.00207)(23.8)}{\{(-84.1)/(-17.5)\}} - (-0.132 - 0.0138)$ ----- 5= _____

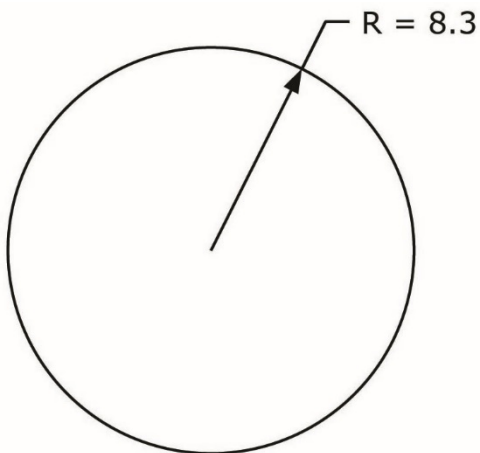
19B-6. Calculate the average of 73.8, 26.5 and 60. ----- 6= _____

19B-7. What is 0.0873 divided by the sum of 0.667 and 0.726? ----- 7= _____

19B-8. What is the product of 6.89 and the average of 54.5 and 72.8? ----- 8= _____

19B-9.

CIRCLE

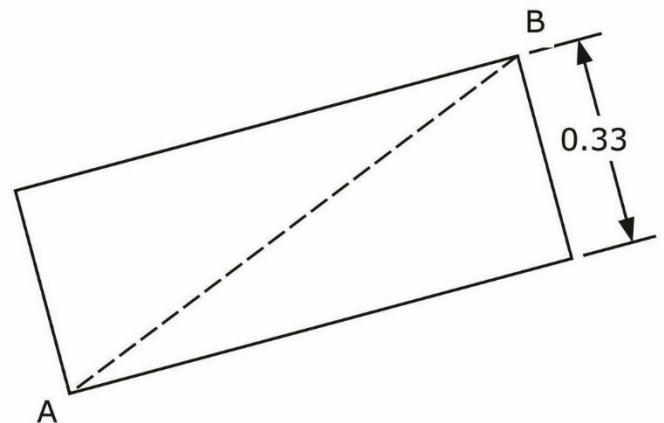


Area = ?

19B-9 = _____

19B-10.

RECTANGLE



Area = 0.271

AB = ?

19B-10 = _____

19B-11. $\frac{(0.0463 + 0.0305)(-0.0784 - 0.0354 + 0.0371)}{(0.0776)(-0.0843) - 0.00778}$ ----- 11=_____

19B-12. $\frac{(-553 + 289 - 500)(-776)(-897)}{(8.63 - 4.63)(346 - 445)}$ ----- 12=_____

19B-13. $\frac{(-40.1)(158 - 38)\{-14900 - (32.6)(-78.3)\}}{(3.82 + 3.37)(33.6 - 93.8)}$ ----- 13=_____

19B-14. $\frac{302 + 133 - 135}{(0.752)(1.57)} - \frac{(68000)(6.95 \times 10^{-4} + 5.72 \times 10^{-4})}{0.561 + 0.0779 - 0.14}$ ----- 14=_____

19B-15. $\frac{(\pi + 4.74)}{9.72 - 17.2} + \frac{-0.0314}{64.7 + 193} + \frac{(0.39)(422 - 210)}{(-664)(0.722)}$ ----- 15=_____

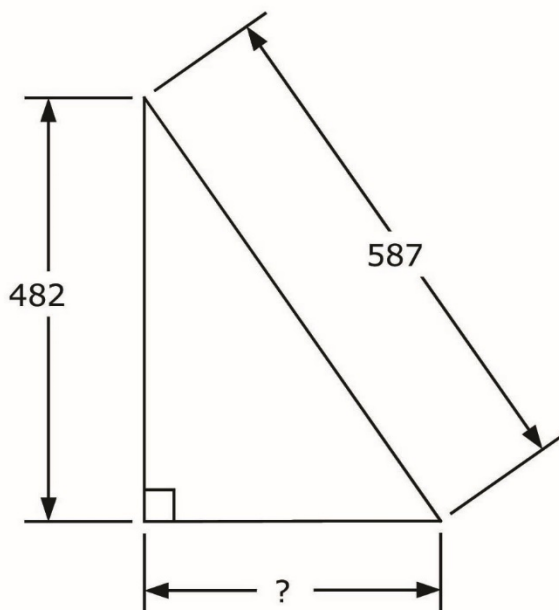
19B-16. A first class stamp cost \$0.15 in 1980 and \$0.49 in 2019. What is the average annual inflation rate over this period? ----- 16=_____ %

19B-17. Light travels at 186,000 mi/s. How far does it travel in 1 ns? ----- 17=_____ ft

19B-18. A recipe for stew calls for 1 cup chopped onion and feeds 8 people. If a large onion yields $1 \frac{2}{3}$ cups chopped, how many onions are needed for enough stew to feed 720 people? ----- 18=_____ integer

19B-19.

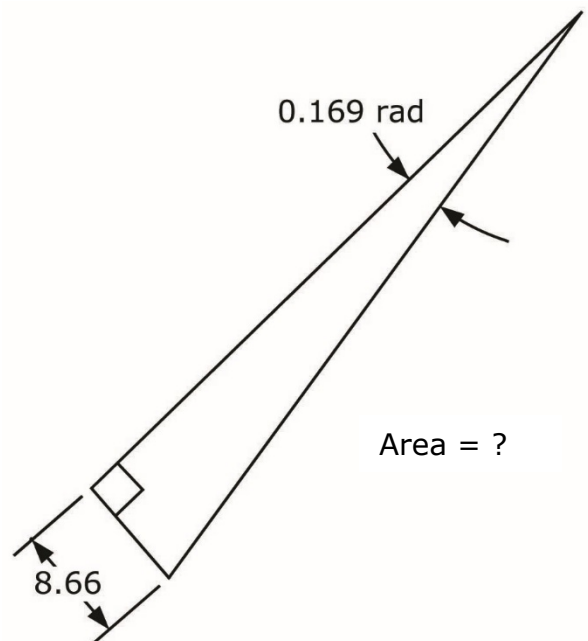
RIGHT TRIANGLE



19B-19 = _____

19B-20.

RIGHT TRIANGLE



19B-20 = _____

19B-21. $\left[\frac{(0.264)(0.691)}{7.84} + 0.00778 \right]^2 + \sqrt{3.41 \times 10^{-7}}$ ----- 21=_____

19B-22. $\frac{0.919 + 1/(\pi)}{1/(1.28) + 5.57} + \frac{1}{(2.24)}$ ----- 22=_____

19B-23. $(-0.346)(-2.38)\sqrt{(-0.505)^2/0.321} + 1/\sqrt{0.67 + 1.44}$ ----- 23=_____

19B-24. $(0.00837)(11.8) + \sqrt{(0.00332)/(2.11)} + [(0.126)(1.94)]^2$ ----- 24=_____

19B-25. $\left[\frac{1.33 + 0.899 + \sqrt{0.971/0.58}}{-761 + 656} \right]^2$ ----- 25=_____

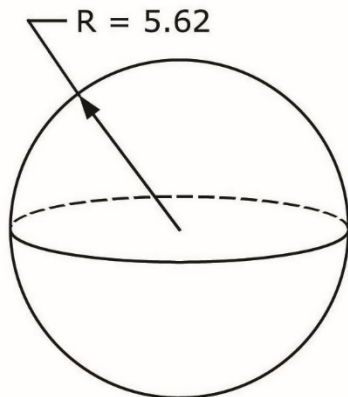
19B-26. The world population in 2016 was 7,346,235,000 people. The fraction of females was 49.6%. How many more males were there than females? ----- 26=_____

19B-27. What is the percent decrease in viewing time of a 30-min TV program if it can be recorded and watched in 22.9 min after zapping the commercials? ----- 27=_____ %

19B-28. A large box store does inventory on their 3 sizes of box. They have 2820 large boxes, 7320 medium boxes and 8950 small boxes. If they sale 18.52% of their inventory, how many total boxes are left? ----- 28=_____ (SD)

19B-29.

SPHERE

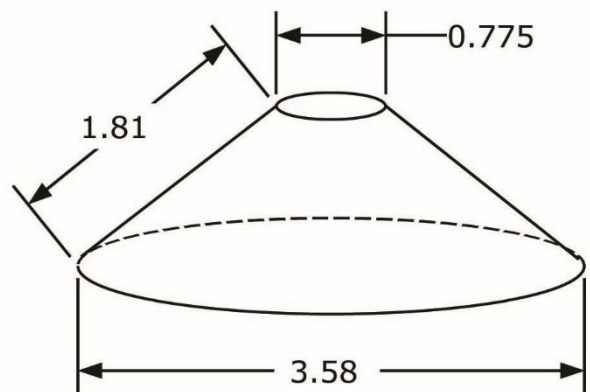


Total Surface Area = ?

19B-29 = _____

19B-30.

FRUSTUM



Volume = ?

19B-30 = _____

19B-31. $\left[\frac{-3.47 \times 10^7}{-2.88 \times 10^7 + 1.23 \times 10^7} + 2.16 \right] \times \left\{ 348 + (-40.3)^2 - \sqrt{7.24 \times 10^6} \right\}$ 31=_____

19B-32. $\frac{(0.00387 + 0.00393)^2}{\sqrt{40.1 - 15.7}} + \frac{4.49 \times 10^{-7}}{\sqrt{0.00263 + 0.00623}}$ ----- 32=_____

19B-33. $\frac{(7.95)^2 + \sqrt{2700}}{\sqrt{(0.647)(-45.9)^2}} + \frac{\sqrt{\sqrt{(19100)(0.643)}}}{-0.744 + 4.51}$ ----- 33=_____

19B-34. $\frac{[0.00888/(0.421 + 0.765) + 1/(72)]^{1/2}}{(57 + 67.1)^2 \times \sqrt{33.2 - (24.2)}}$ ----- 34=_____

19B-35. $\frac{\left[\frac{(9.8 + 0.99)}{(463 + 712)} \right]^2 + \sqrt{\frac{6.39 \times 10^{-9} + 1.27 \times 10^{-8}}{\sqrt{0.882}}}}{\{(8.72)/(-8.82)\}^2}$ ----- 35=_____

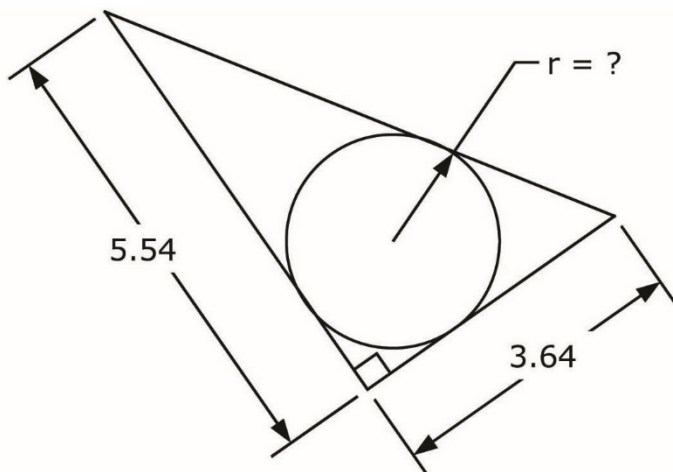
19B-36. What is the x value of the intersection of the lines $y = -4x + 13$ and $y = x/10 - 5$? ----- 36=_____

19B-37. A chain letter initially has a distribution that doubles every 25 days. At this rate, how long does it take for the distribution to quintuple? ----- 37=_____ dy

19B-38. A tile is 12 in by 12 in and there are 20 tiles in a box. What is the minimum theoretical number of boxes of floor tiles needed to tile a 14ft 7 in by 11 ft 9 in room? ----- 38=_____ integer boxes

19B-39.

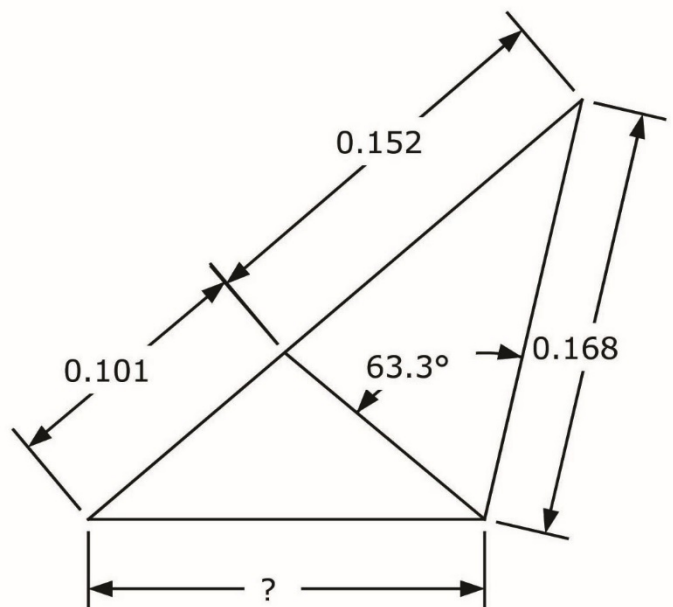
RIGHT TRIANGLE AND CIRCLE



19B-39 = _____

19B-40.

SCALENE TRIANGLES



19B-40 = _____

19B-41. $\frac{10^{-(0.73 - 6.29)}}{-88.8 + 35.3}$ ----- 41=_____

19B-42. $\frac{e^{+0.249} + e^{-0.317}}{(0.017 + 0.0178)}$ ----- 42=_____

19B-43. $\frac{(35.2)\text{Log}(94.1 - 93.4)}{(-79.6)}$ ----- 43=_____

19B-44. $(809 + 5860)^{1/3} + 1/\{(431)^{-0.308}\}$ ----- 44=_____

19B-45. (deg) $\frac{\cos\{(79.9^\circ)/(2.73)\}}{\sin\{121^\circ - 382^\circ\}}$ ----- 45=_____

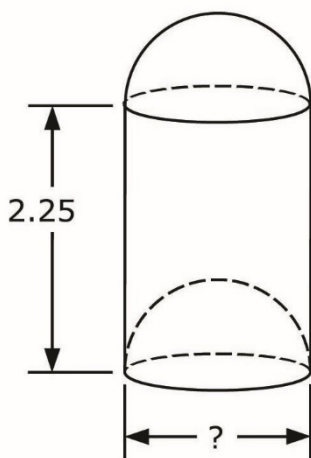
19B-46. Two field workers can load a truck with 12-in watermelons in 4 hr. How long will it take 7 workers to fill 3 trucks with 6-in cantaloupes? Assume workers carry one watermelon to the truck but can carry 3 cantaloupes. ----- 46=_____ hr

19B-47. Horse size is measured in hands and also in inches. Measurements of horse sizes in (hands, in) are (15,62), (11,46), (16,64), (18,72). How many inches are in a hand? ----- 47=_____ in

19B-48. (rad) For what value of k between 0 and 1 does $4\tan(k) = 3\cos(k)$? ----- 48=_____

19B-49.

HEMISPHERES AND CYLINDER

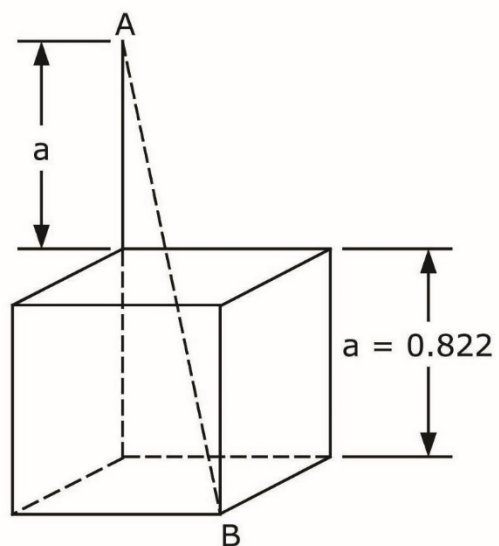


Volume = 4.27

19B-49 = _____

19B-50.

CUBE



AB = ?

19B-50 = _____

19B-51. $\frac{(8.44) 10^{-(4.92 - 3.45)}}{-5.43 + 3.36}$ ----- 51=_____

19B-52. $\frac{(7560 - 3390) e^{(0.277)(0.6)}}{e^{-(3.91 - 3.78)}}$ ----- 52=_____

19B-53. $\frac{\text{Log}\{5.49 \times 10^{-4} + (0.044)(0.0302)\}}{2.81 - \text{Log}\{(51.4)/(0.0904)\}}$ ----- 53=_____

19B-54. $\frac{1}{(0.26)^{(-0.182)}} + (0.409 + 0.79)^{(0.37 - 0.684)}$ ----- 54=_____

19B-55. (rad) $\frac{\arcsin\{(-80700)(28400)/(-3.81 \times 10^9)\}}{1.86 \times 10^9 + (-43800)(-51200)}$ ----- 55=_____

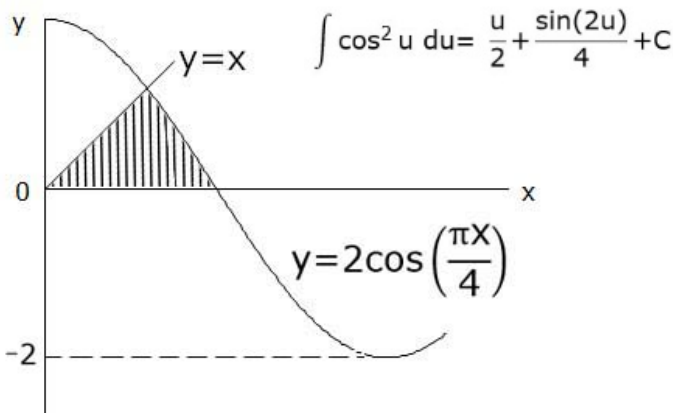
19B-56. At what value of y does the slope of the curve $y = 0.04[2^x]$ equal 2.5? ----- 56=_____

19B-57. A fountain pen costs \$20 to manufacture. The estimated daily number of pens sold N varies based on the retail price P according to $N = 500\exp(-P/\$25)$. What selling price maximizes profits? ----- 57=\$_____

19B-58. Find the determinant of the sum of $\begin{bmatrix} 25 & 36 \\ 36 & -14 \end{bmatrix}$ and $\begin{bmatrix} 0.5 & 0.3 \\ 0.3 & 1 \end{bmatrix}$. ----- 58=_____

19B-59.

SOLID OF REVOLUTION
(y = -2)

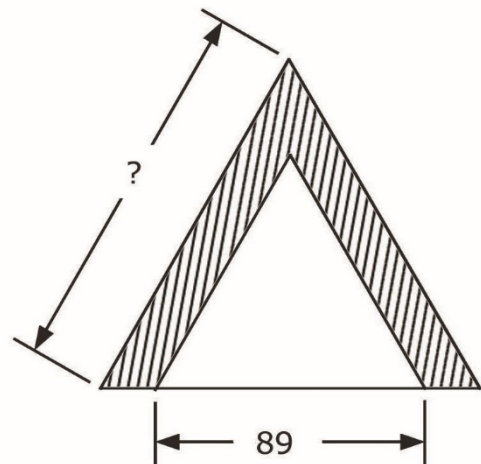


Volume = ?

19B-59 = _____

19B-60.

EQUILATERAL TRIANGLES



Hatched Area = 3360

19B-60 = _____

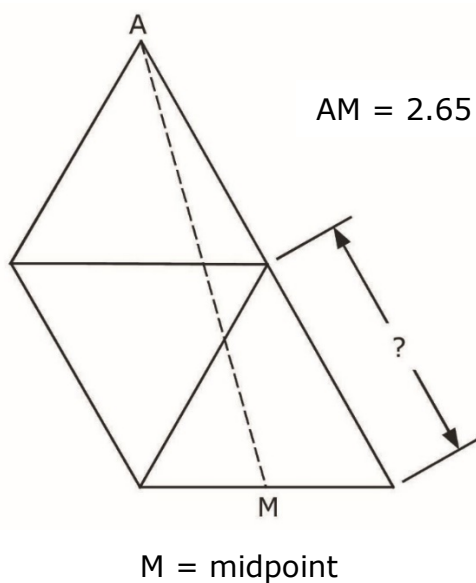
19B-61. Water on a beach advances and recedes sinusoidally daily with the tide. At maximum advance, it was 31 ft from a beach house. At maximum recession 12 hr later, it was 48 ft away. What is the shorter time interval between it being 35 ft away? ----- 61=_____hr

19B-62. The probability of winning a 49-ball, six-number lottery is $1/13,983,816$. What's the probability of winning 75 times in a row? ----- 62=_____

19B-63. A coin is tossed off a 150-ft tall building with an initial velocity of 29 ft/s and a release angle relative to the ground of 28° . How far from the building does it land? ----- 63=_____ft

19B-64.

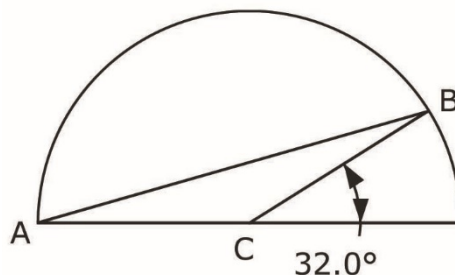
EQUILATERAL TRIANGLES



19B-64 = _____

19B-65.

SEMICIRCLE



19B-65 = _____

19B-66. $\frac{\sqrt{(6.11)^3} \times \{e^{(-4.51)(-0.168)}\}^3}{\sqrt[3]{e^{(0.161)} \times e^{(-0.158)}}}$ ----- 66=_____

19B-67. (rad) $\cos(0.433 - 0.19) - \cos(0.433 + 0.19)$ ----- 67=_____

19B-68. (deg) $\{\cos^2(87.4^\circ) - \sin^2(87.4^\circ)\} \times \frac{\tan(87.4^\circ)}{1 - \tan^2(87.4^\circ)}$ ----- 68=_____

19B-69. $1 + \frac{(0.449)^4}{2} - \frac{(0.449)^6}{6} + \frac{(0.449)^8}{24} - \frac{(0.449)^{10}}{120}$ ----- 69=_____

19B-70. $\frac{1}{\sqrt{(69.1)^2 - (2800)}} \ln \left\{ \frac{(46.7) - \sqrt{(69.1)^2 - (2800)}}{(46.7) + \sqrt{(69.1)^2 - (2800)}} \right\}$ ----- 70=_____

19B-1	= -0.455 = -4.55×10^{-1}	19B-11	= 0.411 = 4.11×10^{-1}	19B-21	= 0.00155 = 1.55×10^{-3}
19B-2	= 1.14 = 1.14×10^0	19B-12	= 1.34×10^6	19B-22	= 0.641 = 6.41×10^{-1}
19B-3	= -17.4 = -1.74×10^1	19B-13	= -137000 = -1.37×10^5	19B-23	= 1.42 = 1.42×10^0
19B-4	= 5.72×10^8	19B-14	= 81.4 = 8.14×10^1	19B-24	= 0.198 = 1.98×10^{-1}
19B-5	= 0.119 = 1.19×10^{-1}	19B-15	= -1.23 = -1.23×10^0	19B-25	= 0.00113 = 1.13×10^{-3}
19B-6	= 53.4 = 5.34×10^1	19B-16	= 3.08 = 3.08×10^0	19B-26	= 5.88×10^7
19B-7	= 0.0627 = 6.27×10^{-2}	19B-17	= 0.982 = 9.82×10^{-1}	19B-27	= 23.7 = 2.37×10^1
19B-8	= 439 = 4.39×10^2	19B-18	= 54 integer	19B-28	= 15,550 = 1.555×10^4 (4SD)
19B-9	= 216 = 2.16×10^2	19B-19	= 335 = 3.35×10^2	19B-29	= 397 = 3.97×10^2
19B-10	= 0.885 = 8.85×10^{-1}	19B-20	= 220 = 2.20×10^2	19B-30	= 4.85 = 4.85×10^0

19B-31	= -3060 = -3.06x10 ³	19B-41	= -6790 = -6.79x10 ³	19B-51	= -0.138 = -1.38x10 ⁻¹	19B-61	= 7.74 = 7.74x10 ⁰
19B-32	= 1.71x10 ⁻⁵	19B-42	= 57.8 = 5.78x10 ¹	19B-52	= 5610 = 5.61x10 ³	19B-62	= 1.20x10 ⁻⁵³⁶
19B-33	= 5.91 = 5.91x10 ⁰	19B-43	= 0.0685 = 6.85x10 ⁻²	19B-53	= -49.4 = -4.94x10 ¹	19B-63	= 89.8 = 8.98x10 ¹
19B-34	= 3.16x10 ⁻⁶	19B-44	= 25.3 = 2.53x10 ¹	19B-54	= 1.73 = 1.73x10 ⁰	19B-64	= 1.47 = 1.47x10 ⁰
19B-35	= 0.000232 = 2.32x10 ⁻⁴	19B-45	= 0.883 = 8.83x10 ⁻¹	19B-55	= 1.57x10 ⁻¹⁰	19B-65	= 248 = 2.48x10 ²
19B-36	= 4.39 = 4.39x10 ⁰	19B-46	= 9.14 = 9.14x10 ⁰	19B-56	= 3.61 = 3.61x10 ⁰	19B-66	= 146 = 1.46x10 ²
19B-37	= 58.0 = 5.80x10 ¹	19B-47	= 3.69 = 3.69x10 ⁰	19B-57	= \$45.00 = -1650	19B-67	= 0.158 = 1.58x10 ⁻¹
19B-38	= 9 integer	19B-48	= 0.565 = 5.65x10 ⁻¹	19B-58	= -1.65x10 ³	19B-68	= 0.0453 = 4.53x10 ⁻²
19B-39	= 1.28 = 1.28x10 ⁰	19B-49	= 1.55 = 1.55x10 ⁰	19B-59	= 18.2 = 1.82x10 ¹	19B-69	= 1.02 = 1.02x10 ⁰
19B-40	= 0.153 = 1.53x10 ⁻¹	19B-50	= 2.01 = 2.01x10 ⁰	19B-60	= 125 = 1.25x10 ²	19B-70	= -0.0832 = -8.32x10 ⁻²