Name _____

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

# UIL Calculator Applications

## Test 22A
### (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.*, $1.23 \times 10$*, $1.23 \times 10^{0}$* $1.23 \times 10^{1}$, $1.23 \times 10^{01}$, .0190, 0.0190, $1.90 \times 10^{-2}$

       Incorrect: 12.30, 123.0, $1.23(10)^{2}$, $1.23 \cdot 10^{2}$, $1.230 \times 10^{2}$, $1.23*10^{2}$, 0.19, $1.9 \times 10^{-2}$, $19.0 \times 10^{-3}$, 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:  $\pi$ for 3.14159 ...; e for 2.71828 ...
    D.   Logarithms:  Log means common (base 10);  Ln means natural (base e); exp(u) means $e^{u}$.
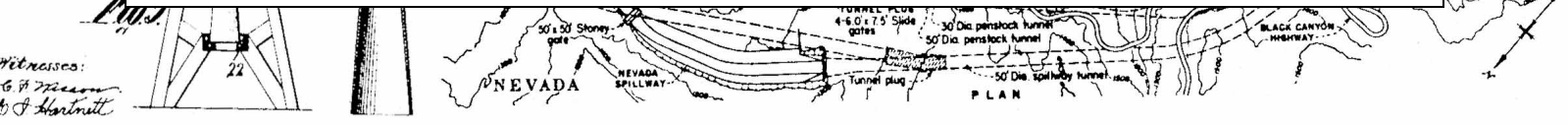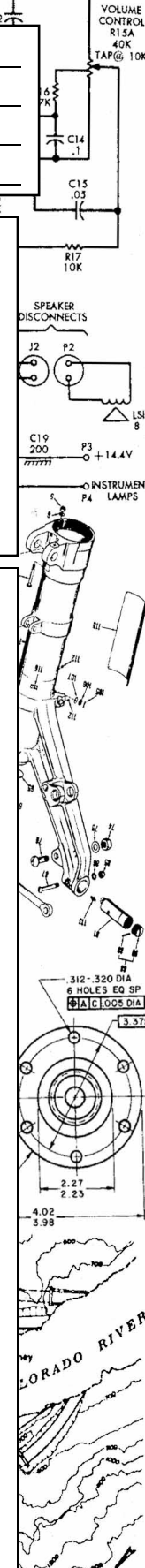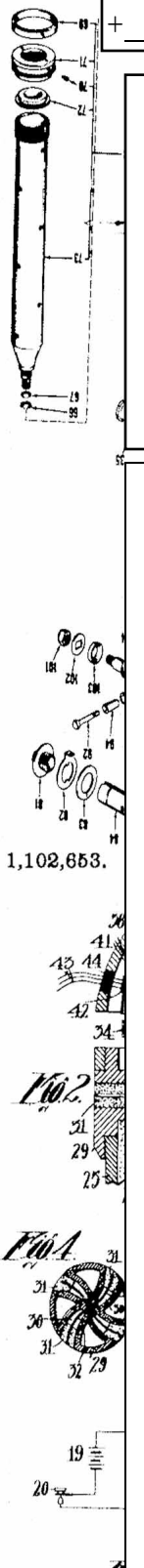
22A-1.  $(8.21 - 3.21)/(-7.28)$ ------------------------------------------------------ 1=_____

22A-2.  $(0.533 - 0.531)/(-0.442) + 0.00348$ --------------------------------- 2=_____

22A-3.  $(89.5 - 20.3 - 38 + 15.8) \times (-65.2)$ ------------------------------- 3=_____

22A-4.  $\{(10.4 - 6.55 + 30.9)(-0.00894)(0.071)\} - 0.0154$ --------------- 4=_____

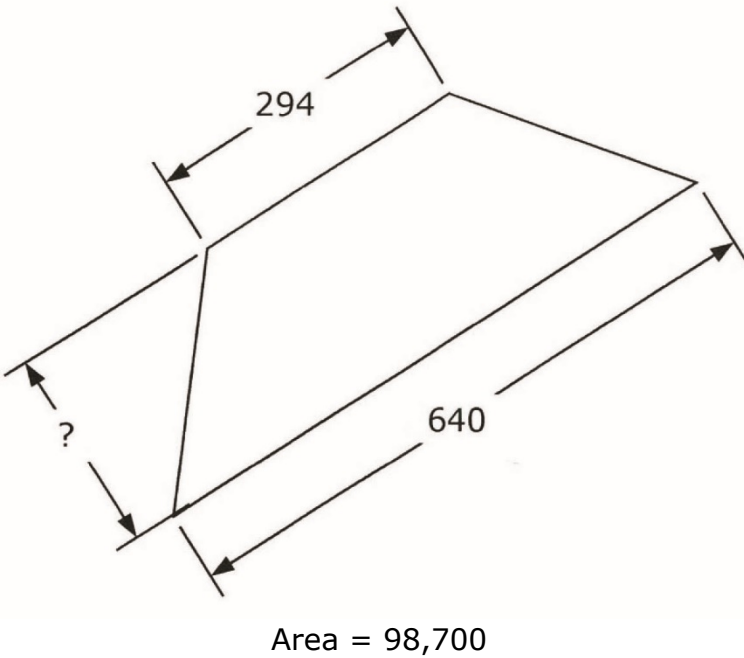22A-5.  $\dfrac{(881 + 300 - 1360)(114)}{(390)(783)(937)}$ --------------------------------------- 5=_____

22A-6 What is 0.0722 divided by 0.134? -------------------------------------- 6=_____

22A-7. What is the sum, 23.8 and 6.15, raised to the $\pi$ power? --------------- 7=_____

22A-8. Calculate the sum of the square of 0.778 when added to the
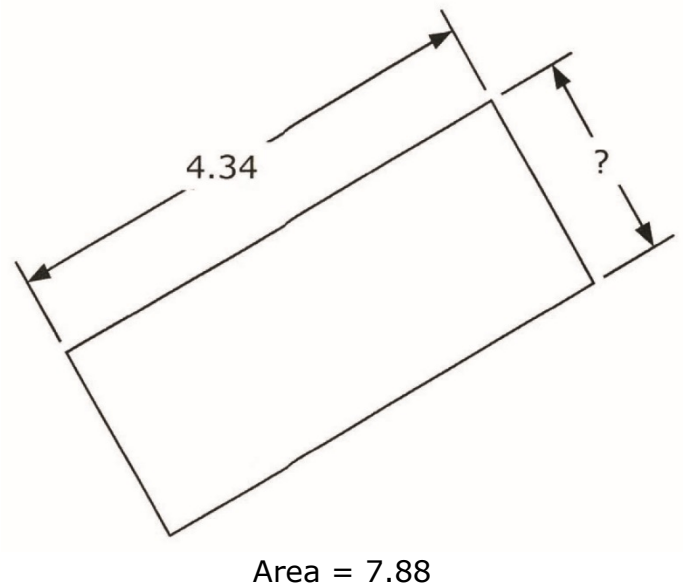product of 568 and 0.000795. ------------------------------------------------- 8=_____

| 22A-9. | 22A-10. |
|---|---|
| ISOSCELES TRAPEZOID | RECTANGLE |
|  294 640 ? Area = 98,700 |  4.34 ? Area = 7.88 |
| 22A-9 =_____ | 22A-10 =_____ |

22A-11. $\dfrac{(0.115)(2.83) + (0.997)(0.513)}{-6.64 + 3.33 - (\pi)(0.859)}$ ----------------------------------- 11=_____

22A-12. $\dfrac{-6.86(2.83\times10^{-5} + 9.94\times10^{-6})}{(711 - 1630)(-16.2)} - \dfrac{-5.27\times10^{-9}}{0.827 - 0.224}$ ---------------- 12=_____

22A-13. $\dfrac{(-3.92\times10^{-5} - 4.29\times10^{-5})\{-2300 + (-21.7)(27.1)\}}{(68.5)(-0.123 + 0.0965)(-11.8)(-19.8)}$ ------------ 13=_____

22A-14. $\dfrac{\{(0.702 + 1.57)(3.69 + \pi) + 64.9 - 48.1\}}{(-926 - 342)(-7.48 + 12.5 - 1.87)}$ ---------------------- 14=_____

22A-15. $\dfrac{(59300 + 53500 - 4.05\times10^{5})(0.644 - 0.54 - 2.47)}{(-6.47)(2.15)(0.981)(6.34 + 4.33 + 19.3)}$ ------------- 15=_____
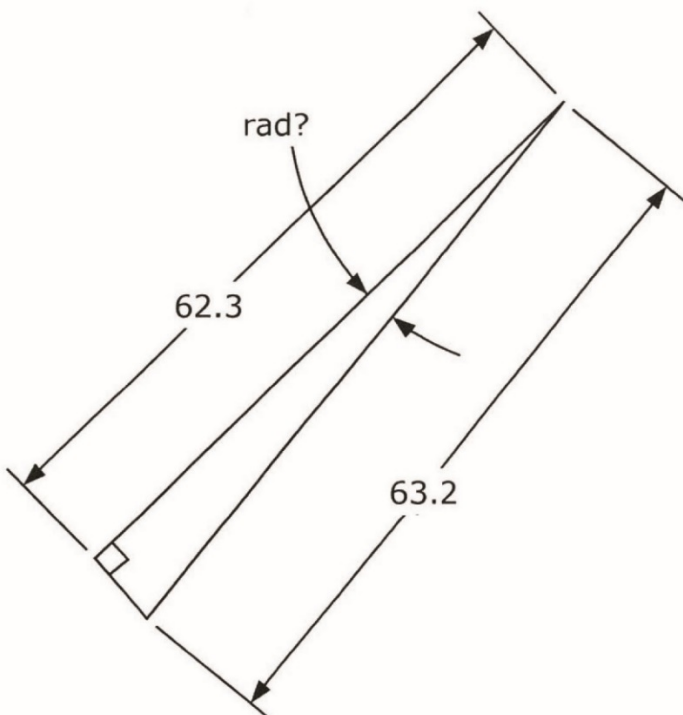
22A-16. How many ft are in a km? ------------------------------------------- 16=_____ ft

22A-17. The movie Frozen cost $150 million to make and has a run time of 1 hr 49 min.  What was the cost for one second of run time? -------------- 17=$_____

22A-18. The record for the 100-yd dash is 9.1 s.  What is this speed in mph? -------------------------------------------------------------------- 18=_____ mph

| 22A-19. | 22A-20. |
|---|---|
| RIGHT TRIANGLE | ISOSCELES RIGHT TRIANGLE |



22A-19. (RIGHT TRIANGLE) labels: rad?, 62.3, 63.2

22A-20. (ISOSCELES RIGHT TRIANGLE) labels: ?, Area = 54.3

22A-19 =_____
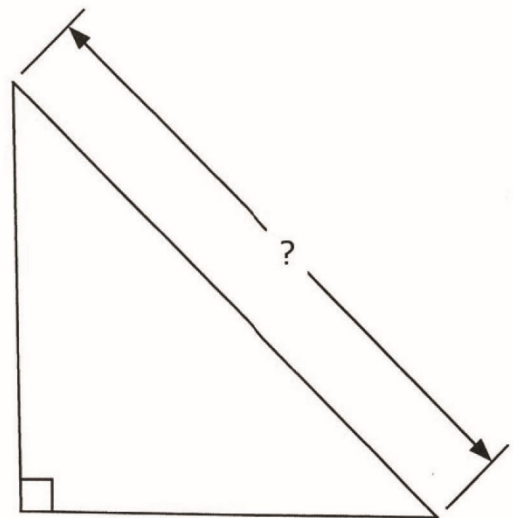
22A-20 =_____

22A-21. $\left[\dfrac{(0.443)(0.867)}{1.96} + 0.146\right]^2 + \sqrt{0.00814}$ ------------------------- 21=_____

22A-22. $\left[\dfrac{\sqrt{1.4 - 1.11}}{4.79} + \dfrac{(0.622)^2}{9.67}\right]$ ----------------------------------- 22=_____

22A-23. $\left[-81.3 + \sqrt{4720}\right]^2 \times [123 + 373]^2 \times \sqrt{0.902/0.409}$ ------------- 23=_____

22A-24. $(-248)(-0.0404) + \sqrt{(31.9)/(2.24)} + \left[(0.624)(3.24)\right]^2$ ----------- 24=_____

22A-25. $\dfrac{\sqrt{6.53 + 4.3 + (7.14)/(3.38)}}{\pi + 1.33}$ ------------------------------------- 25=_____

22A-26. Left handers comprise 12% of the population. 50.8% are women, and 2% of the population was red headed.  How many left-handed, red-headed men are there in Texas? The population of Texas is 29.15 million. ---- 26=_____

22A-27. An 8 ft 2X4 piece of lumber is not 2 in by 4 in in cross section.  It is actually 1 5/8 in by 3 5/8 in.  What is the percent decrease in volume?----- 27=_____ %

22A-28. A tube of toothpaste is a cylinder 5.5 in long and 0.78 in in diameter.  One brushing uses a cube 0.25 in on a side.  If a person brushes twice daily, how long does a tube last? -------------------------------- 28=_____ dy
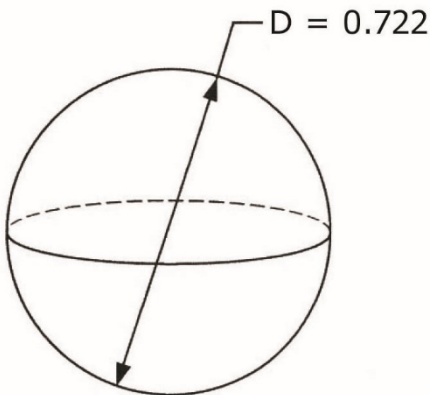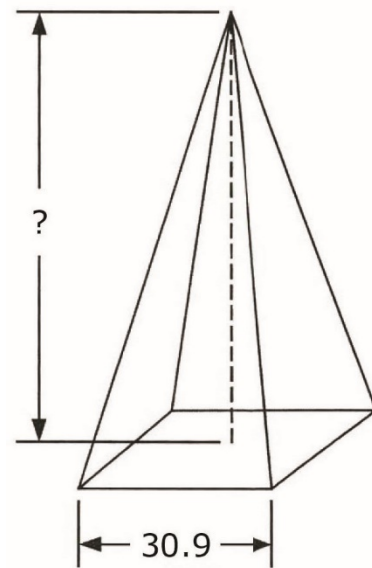
| 22A-29. | 22A-30. |
|---|---|
| SPHERE | SQUARE-BASE PYRAMID |
| D = 0.722 | ?     30.9    Volume = 21,200 |
| Surface Area = ? | |
| 22A-29 =_____ | 22A-30 =_____ |

22A-31. $\sqrt{\dfrac{7.88}{\sqrt{75 + 30.5}}} \times \left[\dfrac{1}{(7.26 - 2.36)^2} + \dfrac{1}{(7.44 + 5.27)^2}\right]$ ---------- 31=_____

22A-32. $\dfrac{1}{0.00258} + \dfrac{1}{\sqrt{2.72\text{x}10^{-6}}} + \dfrac{(4.74 + 6.64 - 1.34)^2}{\sqrt{0.614 - 0.486}}$ ---------------- 32=_____

22A-33. $\dfrac{(8.14\text{x}10^5)^2(3.38\text{x}10^{-13} + 8.13\text{x}10^{-14})}{0.136 + (-0.355)(-0.704)} + \dfrac{1}{\dfrac{1}{0.641} + \dfrac{1}{(-0.204)}}$ 33=_____

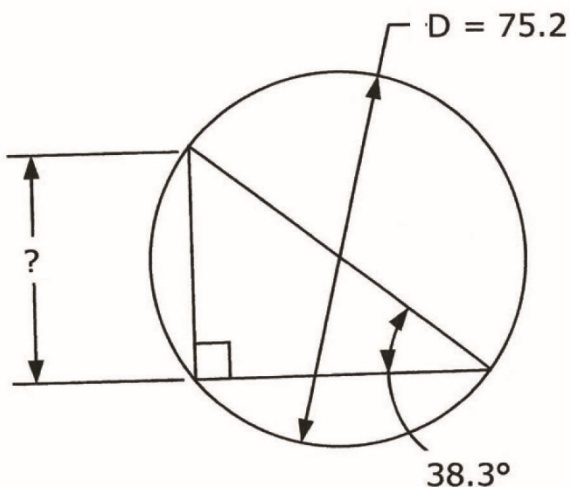22A-34. $\dfrac{[(2.56 - 2.25)(0.708/0.607)]^{1/2}}{(0.782)^2 + (0.159 + 1.04)^2 + 0.989}$ ----------------------------- 34=_____

22A-35. $\dfrac{\left[\dfrac{(-0.0769 + 0.0701)}{(977 + 1040)}\right]^2 + \sqrt{\dfrac{4.52\text{x}10^{-23} + 4.98\text{x}10^{-23}}{\sqrt{0.84}}}}{\{(-0.0643)/(0.0792)\}^2}$ ------- 35=_____

22A-36. Tammy leaves home and drives <u>85</u> mi in <u>1 hr 35 min 54</u> s. She increases her velocity by <u>8.1</u>% and returns home.  What was her driving time on the return? ------------------------------------------------------- 36=_____ hr(SD)

22A-37. Wanda cuts a piece of 25-in long string into two pieces.  She forms a square with one and a circle with the other.  The combined area is 25 in$^2$. If the circle area is larger than the square area, what is the circle diameter? ----------------------------------------------------------------- 37=_____ in

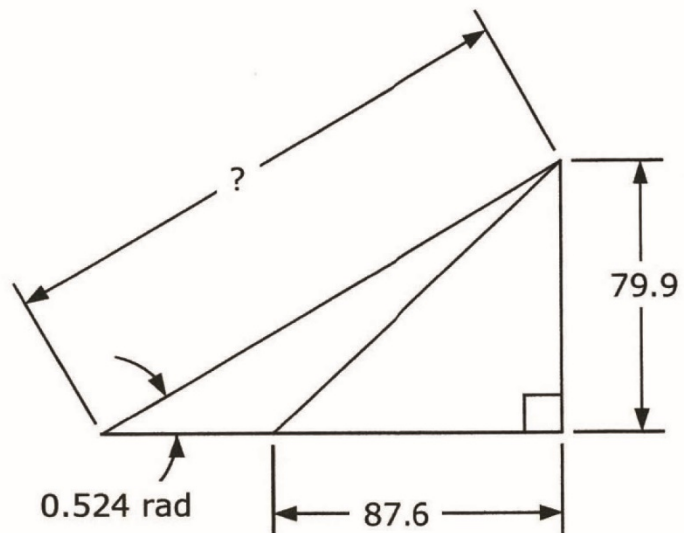22A-38. The mass of a raindrop is 0.034 g.  How any drops fall into a rain gauge with a cross sectional area of 1 in$^2$ during a 2 in downpour? ----------- 38=_____

| 22A-39. | 22A-40. |
|---|---|
| CIRCLE AND RIGHT TRIANGLE | RIGHT TRIANGLES |



22A-39. D = 75.2, 38.3°

22A-40. 79.9, 0.524 rad, 87.6, ?

22A-39 =_____

22A-40 =_____

22A-41.　$(-229)(-16800)10^{\{17100/2100\}}$ ---------------------------------- 41=_____

22A-42.　$-8.42 \times 10^{-6} \, e^{0.969} + (-4.87 \times 10^{-6}) \, e^{-0.311}$ -------------------- 42=_____

22A-43.　$-0.305 + (0.462)Ln(0.664 - 0.396)$ ----------------------------- 43=_____

22A-44.　$(0.375)^3 + (5.74 - 4.92)^{2.17}$ ------------------------------- 44=_____

22A-45.(deg)　$\sin\left[90° \times \dfrac{(7.43 \times 10^6)}{(1.56 \times 10^7)}\right] + \cos\{163° - 143°\}$ ---------------- 45=_____

22A-46. A cioppino recipe calls for 20 medium shrimp and feeds 6 people. How many large shrimp are needed to feed 500 people? There's 45 medium shrimp in a pound and 33 large shrimp in a pound. Each person gets a constant mass of shrimp. ------------------------------------------------- 46=_____  integer

22A-47. What is the regression coefficient for the data (1,43), (2,99), (3,150), (4,180), (5,122)? ----------------------------------------------- 47=_____

22A-48. What is x if x is greater than 1 and $2^X = 10x$? ---------------------- 48=_____

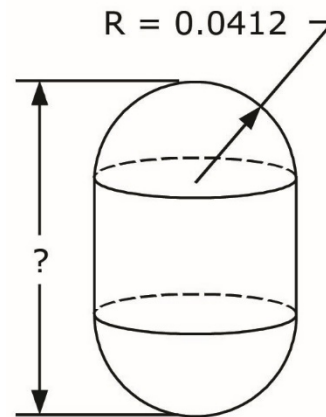| 22A-49. | 22A-50. |
|---|---|
| SPHERE AND CUBE | HEMISPHERES AND CYLINDER |



22A-49. SPHERE AND CUBE

0.931

?
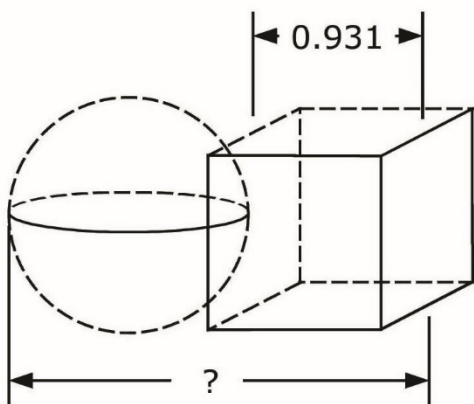
Surface Area (Sphere) = Surface Area(Cube)

22A-49 =_____



22A-50. HEMISPHERES AND CYLINDER

R = 0.0412

?

Volume(Cylinder) = Volume(Both Hemispheres)

22A-50 =_____

22A-51.    $10^{+(0.622)} + 10^{-(0.531)} + \left[ 10^{(0.873/0.976)} - 10^{(0.821)} \right]^{1/2}$    51=_____

22A-52.    $\dfrac{592 + e^{(3.93 + 3.87)}}{0.468 - e^{-(0.243 - 0.78)}}$    ------------------------------------------- 52=_____

22A-53.    $\dfrac{Log\left\{ 2.52 \times 10^9 + (97000)(92700) \right\}}{3.48 - Log\{(71.3)/(0.051)\}}$    ----------------------------- 53=_____

22A-54.    $\dfrac{1}{(0.719)^{(-0.574)}} + (0.627 + 0.437)^{(0.856 - 0.83)}$    --------------- 54=_____

22A-55.(rad)    $\dfrac{arcsin\left\{ (-6340)(-9910)/(1.10 \times 10^8) \right\}}{-2.42 \times 10^6 + (-1300)(1920)}$    ------------------------ 55=_____

22A-56. Solve for the y value of the minimum on the curve

$y = 6x^7 - 50x^5 + 25.$    --------------------------------------------------------- 56=_____

22A-57. Danny is 5 ft 8 in tall.  Outside, he casts a shadow that is 16 ft
6.6 in long.  At what highest speed is the end of his shadow moving away
from him?  -------------------------------------------------------------------- 57=_____ in/min

22A-58. Calculate the determinant of $\begin{bmatrix} 12 & 5 \\ 5 & -10 \end{bmatrix}$    ------------------------------ 58=_____ integer
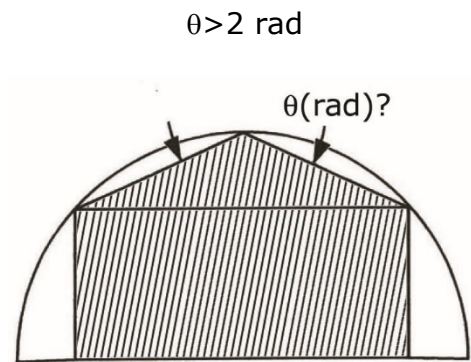
22A-59.
### SOLID OF REVOLUTION (y = -1)
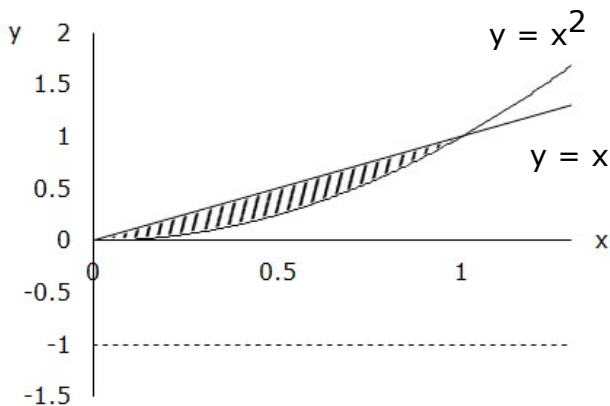


Volume = ?

22A-59 =_____

22A-60.
### SEMICIRCLE, RECTANGLE AND ISOSCELES TRIANGLE

θ>2 rad



θ(rad)?

$\dfrac{\text{Hatched Area}}{\text{Semicircle Area}} = 0.78$

22A-60 =_____

22A-61. How long after 10:10 does it take the hour and minute hands of
a clock to align?  ---------------------------------------------------------- 61=_____ min

22A-62. The odds of being attacked by a shark are 1 in 3,748,067. What
is this small fraction raised to the 81,245 power?  ----------------------------- 62=_____

22A-63. An archer fires an arrow with a release velocity of 120 mph.  What
is the release angle (relative to horizontal) if the time of flight is 4 s?  -------- 63=_____ deg

| 22A-64. | 22A-65. |
|---|---|
| SQUARES AND EQUILATERAL TRIANGLE | EQUILATERAL AND SCALENE  TRIANGLE |

22A-64.
SQUARES AND EQUILATERAL TRIANGLE
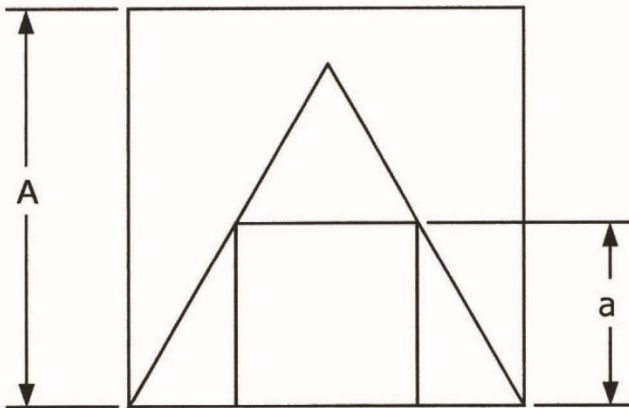


$$\frac{a}{A} = ?$$

22A-64 =_____

22A-65.
EQUILATERAL AND SCALENE  TRIANGLE



Line AB is
trisected

?

7.33

B
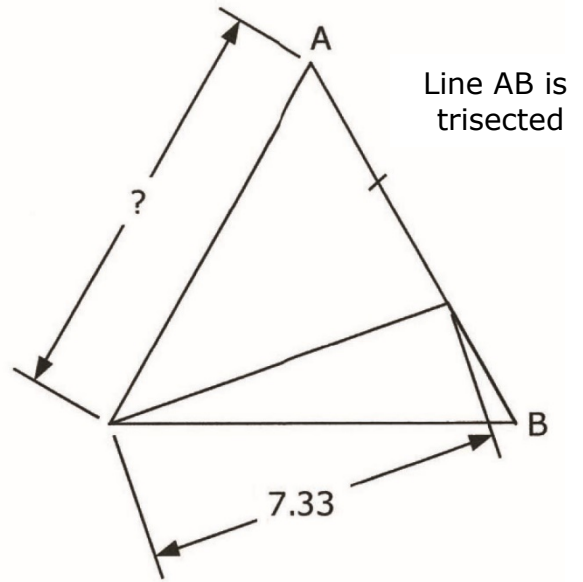
22A-65 =_____

22A-66.   $Ln\left[\frac{(4.71)(6.96)}{(4.42)}\right]^3 + Ln\left[\frac{(4.42)}{(1.95)}\right]^3$  ------------------------------------ 66=_____

22A-67.   $e^{Ln[(9.58)(14.8)]} + 10^{Log[(0.812)(97.9)]}$  ------------------------- 67=_____

22A-68.   $(deg)\left\{cos^2(61.8°) - sin^2(61.8°)\right\} \times \dfrac{tan(61.8°)}{1 - tan^2(61.8°)}$  ----------- 68=_____

22A-69.   $\dfrac{1}{(0.98)} + \dfrac{1}{3(0.98)^3} + \dfrac{1}{5(0.98)^5} + \dfrac{1}{7(0.98)^7}$  ------------------- 69=_____

22A-70.   $\dfrac{1}{\sqrt{(50.6)^2 - (1940)}} Ln\left\{\dfrac{(122) - \sqrt{(50.6)^2 - (1940)}}{(122) + \sqrt{(50.6)^2 - (1940)}}\right\}$  ---------- 70=_____

22A-1  = -0.687
       = $-6.87 \times 10^{-1}$

22A-2  = -0.00104
       = $-1.04 \times 10^{-3}$

22A-3  = -3060
       = $-3.06 \times 10^{3}$

22A-4  = -0.0375
       = $-3.75 \times 10^{-2}$

22A-5  = $-7.13 \times 10^{-5}$

22A-6  = 0.539
       = $5.39 \times 10^{-1}$

22A-7  = 43500
       = $4.35 \times 10^{4}$

22A-8  = 1.06
       = $1.06 \times 10^{0}$

22A-9  = 211
       = $2.11 \times 10^{2}$

22A-10 = 1.82
       = $1.82 \times 10^{0}$

22A-11 = -0.139
       = $-1.39 \times 10^{-1}$

22A-12 = $-8.88 \times 10^{-9}$

22A-13 = -0.000559
       = $-5.59 \times 10^{-4}$

22A-14 = -0.00809
       = $-8.09 \times 10^{-3}$

22A-15 = -1690
       = $-1.69 \times 10^{3}$

22A-16 = 3280
       = $3.28 \times 10^{3}$

22A-17 = $22,935.78

22A-18 = 22.5
       = $2.25 \times 10^{1}$

22A-19 = 0.169
       = $1.69 \times 10^{-1}$

22A-20 = 14.7
       = $1.47 \times 10^{1}$

22A-21 = 0.207
       = $2.07 \times 10^{-1}$

22A-22 = 0.0312
       = $3.12 \times 10^{-2}$

22A-23 = $5.80 \times 10^{7}$

22A-24 = 17.9
       = $1.79 \times 10^{1}$

22A-25 = 0.805
       = $8.05 \times 10^{-1}$

22A-26 = 34,400
       = $3.44 \times 10^{4}$

22A-27 = 26.4
       = $2.64 \times 10^{1}$

22A-28 = 84.1
       = $8.41 \times 10^{1}$

22A-29 = 1.64
       = $1.64 \times 10^{0}$

22A-30 = 66.6
       = $6.66 \times 10^{1}$

22A-31 = 0.0419
= $4.19 \times 10^{-2}$

22A-32 = 1280
= $1.28 \times 10^{3}$

22A-33 = 0.421
= $4.21 \times 10^{-1}$

22A-34 = 0.198
= $1.98 \times 10^{-1}$

22A-35 = $3.27 \times 10^{-11}$

22A-36 = 1.479
= $1.479 \times 10^{0}$ (4SD)

22A-37 = 4.99
= $4.99 \times 10^{0}$

22A-38 = 964
= $9.64 \times 10^{2}$

22A-39 = 46.6
= $4.66 \times 10^{1}$

22A-40 = 160
= $1.60 \times 10^{2}$

22A-41 = $5.35 \times 10^{14}$

22A-42 = $-2.58 \times 10^{-5}$

22A-43 = -0.913
= $-9.13 \times 10^{-1}$

22A-44 = 0.703
= $7.03 \times 10^{-1}$

22A-45 = 1.62
= $1.62 \times 10^{0}$

22A-46 = 1220
= $1.22 \times 10^{3}$

22A-47 = 0.725
= $7.25 \times 10^{-1}$

22A-48 = 5.88
= $5.88 \times 10^{0}$

22A-49 = 2.22
= $2.22 \times 10^{0}$

22A-50 = 0.137
= $1.37 \times 10^{-1}$

22A-51 = 5.59
= $5.59 \times 10^{0}$

22A-52 = -2440
= $-2.44 \times 10^{3}$

22A-53 = 30.1
= $3.01 \times 10^{1}$

22A-54 = 1.83
= $1.83 \times 10^{0}$

22A-55 = $-1.24 \times 10^{-7}$

22A-56 = -1210
= $-1.21 \times 10^{3}$

22A-57 = 2.83
= $2.83 \times 10^{0}$

22A-58 = -145
= $-1.45 \times 10^{2}$

22A-59 = 1.47
= $1.47 \times 10^{0}$

22A-60 = 2.33
= $2.33 \times 10^{0}$

22A-61 = 44.5
= $4.45 \times 10^{1}$

22A-62 = $1.05 \times 10^{-534,089}$

22A-63 = 21.4
= $2.14 \times 10^{1}$

22A-64 = 0.464
= $4.64 \times 10^{-1}$

22A-65 = 8.31
= $8.31 \times 10^{0}$

22A-66 = 8.47
= $8.47 \times 10^{0}$

22A-67 = 221
= $2.21 \times 10^{2}$

22A-68 = 0.416
= $4.16 \times 10^{-1}$

22A-69 = 1.76
= $1.76 \times 10^{0}$

22A-70 = -0.0166
= $-1.66 \times 10^{-2}$