# UIL Calculator Applications

Test 25F

(District)

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*, $1.23\text{x}10^{0}$*

                        $1.23\text{x}10^{1}$, $1.23\text{x}10^{01}$, .0190, 0.0190, $1.90\text{x}10^{-2}$

        Incorrect: 12.30, 123.0, $1.23(10)^{2}$, $1.23\cdot10^{2}$, $1.230\text{x}10^{2}$,

                      $1.23\text{*}10^{2}$, 0.19, $1.9\text{x}10^{-2}$, $19.0\text{x}10^{-3}$, 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}.
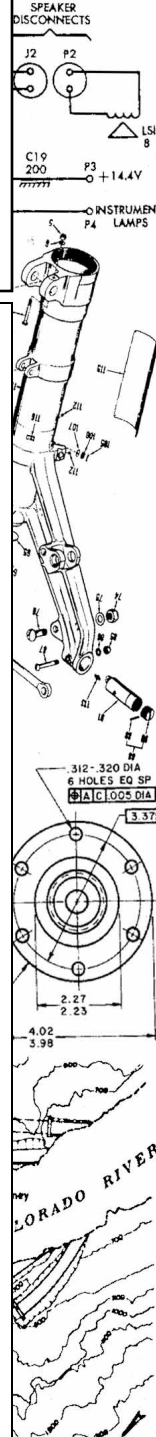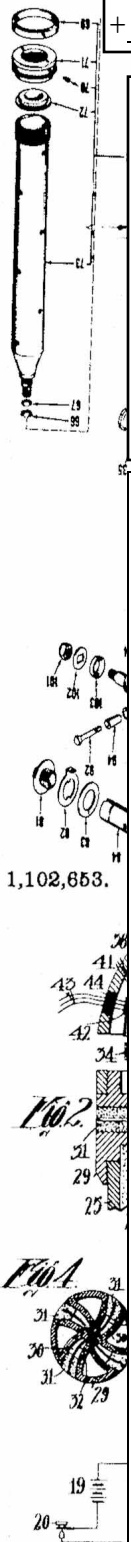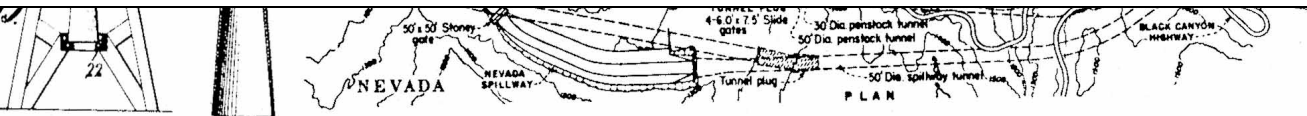
25F-1.   (0.255 + 0.349) x 0.28 -- 1=_____

25F-2.   (−83.5 x 17.5) − (962 − 6210) -- 2=_____

25F-3.   (−7.14 + 7.75 − π)/(4.02) + 0.745 ----------------------------------- 3=_____

25F-4.   {(84 − 11.7 + 14.5)(−8.54)(−1.99)} − 686 ------------------------ 4=_____

25F-5. $\dfrac{(-0.00544 - 0.00373)(537)}{\{(444)/(-4.61)\}}$ − (0.0785 − 0.0363)   ------------------ 5=_____

25F-6. What is the sum of 0.944 and 0.775, divided by 8.2? ----------------- 6=_____
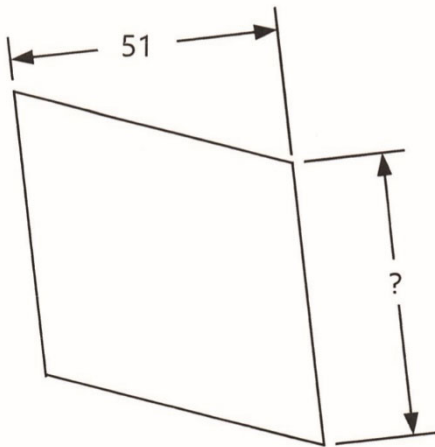
25F-7. Multiply the sum of 0.254 and 0.485 by 461. -------------------------- 7=_____

25F-8. How many times can 7.63 be divided into 4050 with a positive
remainder? -- 8=_____ integer
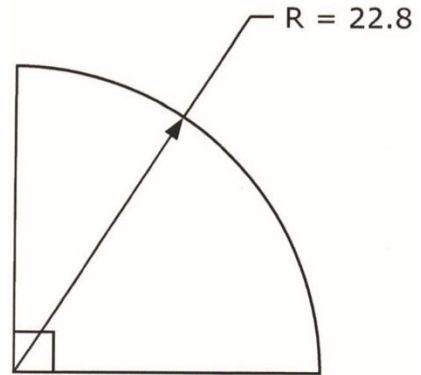
25F-9.	25F-10.
RHOMBUS	QUARTER CIRCLE
Area = 2760	
	Perimeter = ?
25F-9 =_____	25F-10 =_____

25F-11. $\dfrac{(2.48 + 2.4)(-7.97 + 9.37)}{(-1.17)(0.753)(7150 - 13800)}$ ------------------------------------ 11=_____

25F-12. $\dfrac{-796(1.25\text{x}10^{-5} + 6.75\text{x}10^{-6})}{(726 - 1840)(535)} - \dfrac{3.16\text{x}10^{-9}}{0.468 - 0.207}$ ----------------- 12=_____

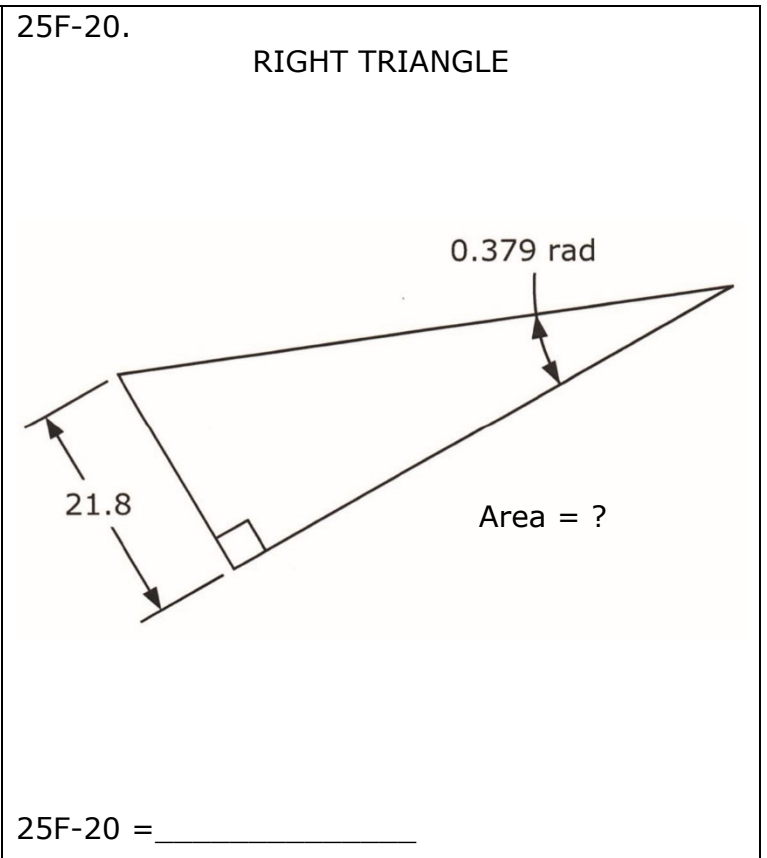25F-13. $\dfrac{\{(-0.556 + 0.463)(57 + 112) + (-62.3)\}(499)}{(-81.9)(642 + 2350)(497)}$ ------------------ 13=_____

25F-14. $\dfrac{811 + 569 - 5010}{(0.765)(4.66)} - \dfrac{(57600)(2.65\text{x}10^{-4} + 2.01\text{x}10^{-4})}{0.163 + 0.143 - 0.378}$ ---------- 14=_____

25F-15. $\dfrac{36200 + 2.17\text{x}10^5 - (90900 + 2.05\text{x}10^5)(1.49 - 0.81)}{(-179)(0.326)(0.125)(222 - 209 + 285)}$ ---------- 15=_____

25F-16. The Taj Mahal was built in 1632. How old was it in 2025? ----------- 16=_____ yr, integer

25F-17. Sam spent $75.45 on merchandise. If this included the 8.125%
sales tax, what was the cost of the items? ------------------------------------ 17=$_____

25F-18. A hummingbird's heart rate is 1,100 beats per minute. Its life
span is 4.8 years. How many times does its heart beat over its entire life?---- 18=_____ beats

25F-19.

RIGHT TRIANGLE

0.202

?

0.231

25F-19 =_____

25F-20.

RIGHT TRIANGLE

0.379 rad

21.8

Area = ?

25F-20 =_____
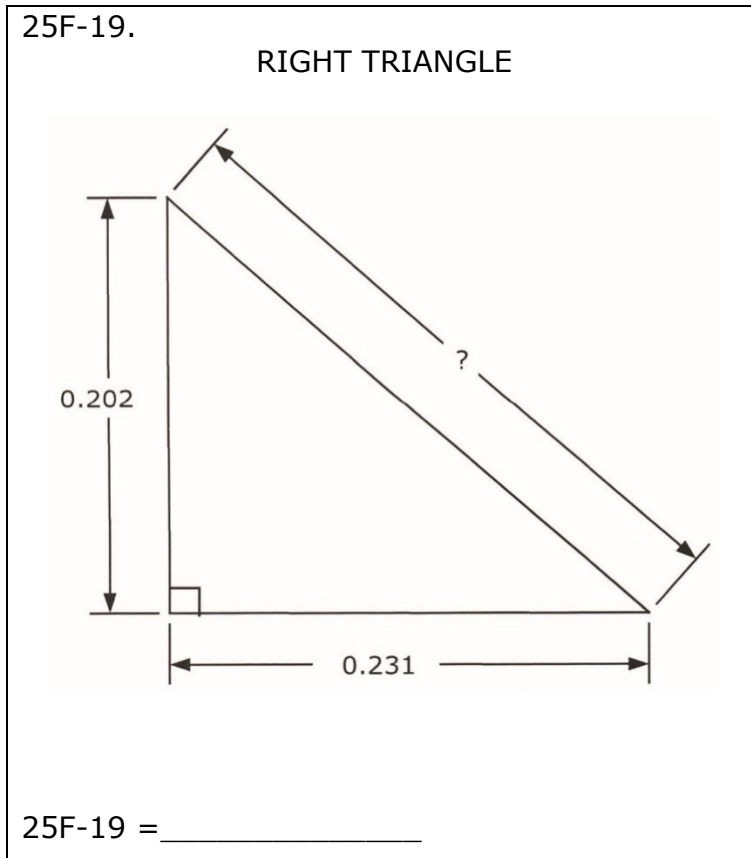
25F-21. $\dfrac{0.0447 + 1/(3.43)}{1/(2.81) + 0.585} + \dfrac{1}{(1.26)}$ --------------------------------------- 21=_____

25F-22. $\dfrac{1}{-8.92 + 62.4} + \dfrac{1}{12.2 - 17.6} + \dfrac{1}{(32.4)}$ ------------------------------- 22=_____

25F-23. $\dfrac{\sqrt{48.4 + 14 + (817)/(40.6)}}{32.5 + 15.2}$ ------------------------------------- 23=_____

25F-24. $(-0.132)(\pi)\sqrt{(-0.199)^2/0.462} + 1/\sqrt{21.9} + 42.1$ ------------------ 24=_____

25F-25. $(-1820)(-0.0234) + \sqrt{(7090)/(7.66)} + [(0.711)(7.86)]^2$ ---------- 25=_____

25F-26. A spherical balloon is blown up to a diameter of 8 in. If it is inflated more to double its volume, what is its new diameter? ---------------- 26=_____ in

25F-27. For handbells higher pitched than F3, the mass of a Malmark handbell is approximately $(420\text{ lbs})/N^2$, where N is the number of half-steps above C2. What is the percent error in the formula if the G#4 handbell, 16 half-steps above C2, weighs 2 lbs 0.9 oz? ----------------------- 27=_____ %

25F-28. A dime is 0.705 in in diameter, 0.0531 in thick, and weighs 0.08 oz. A nickel is 0.835 in in diameter, 0.0768 in thick, and weighs 0.176 oz. What is the ratio of the value of a ton of dimes to a ton of nickels? ----------- 28=_____

25F-29.

CONE

Total Surface Area = 76.1

5.39
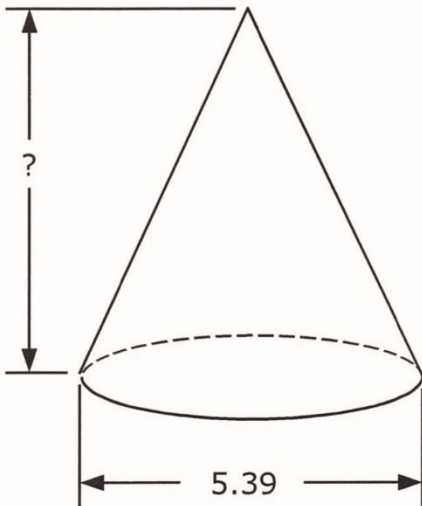
25F-29 =_____

25F-30.

PRISM

Volume = 846

13.6

7.87

25F-30 =_____

25F-31. $\dfrac{(235 + 532)^2}{\sqrt{24.8 - 7.34}} + \dfrac{4.43 \times 10^6}{\sqrt{428 + 654}}$ ----------------------------------- 31=_____

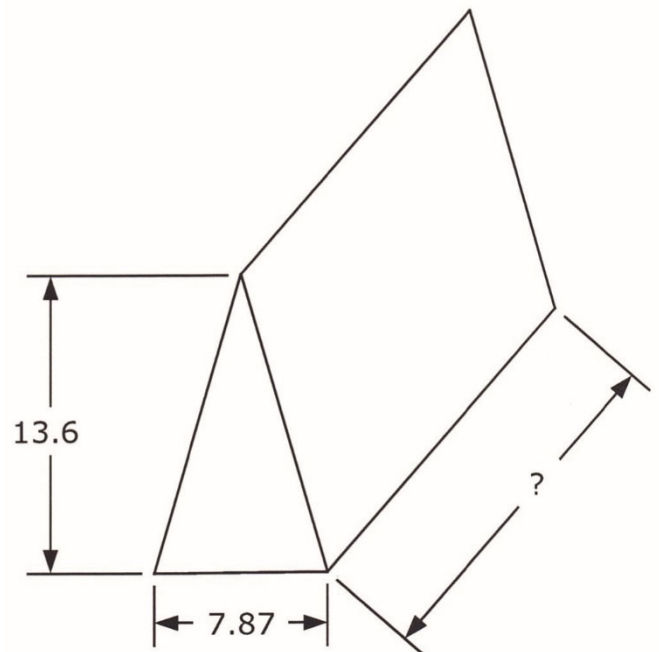25F-32. $\sqrt{\dfrac{8.78}{\sqrt{94.5 + 65.7}}} \times \left[\dfrac{1}{(1.53 - 0.532)^2} + \dfrac{1}{(2.21 + 1.74)^2}\right]$ ---------- 32=_____

25F-33. $\dfrac{\sqrt{(1.5)/\{(8.12)/\sqrt{9.2}\}}}{0.253 + (0.939)(1.21)} + \{0.151 + 0.746\}^{1/2}$ ------------------ 33=_____

25F-34. $\dfrac{[(26500 - 15500)(0.627/0.662)]^{1/2}}{(0.174)^2 + (0.23 + 0.282)^2 + 0.0868}$ ------------------------------ 34=_____

25F-35. $\dfrac{\dfrac{1}{1770} + \dfrac{61.3}{(263 + 247)^2} - \dfrac{\sqrt{0.181}}{(-42.5)^2}}{(57.1 + 394)^2 + (-7.89 \times 10^5)}$ ---------------------------- 35=_____

25F-36. The passing period between classes at a high school is 5 min. If Asher's classes are 120 yd apart, how much "free time" between classes does he have to visit with friends in the hall? His walking pace is 20 min/mi. --- 36=_____ min

25F-37. The Washington Monument is 555 ft 5.1 in tall. What is the percent error in assuming the height is 1/10 mi? ------------------------------ 37=_____ %(SD)

25F-38. The color percentages of peanut M&Ms in a large bag are 23% blue, 23% orange, 15% green, 15% yellow, 12% red, 12% brown. What is the smallest bag size, the number of M&Ms, that could exactly match these percentages? --- 38=_____ integer

25F-39.
CIRCLE AND ISOSCELES TRIANGLE

2.37

R = ?

1.17 rad
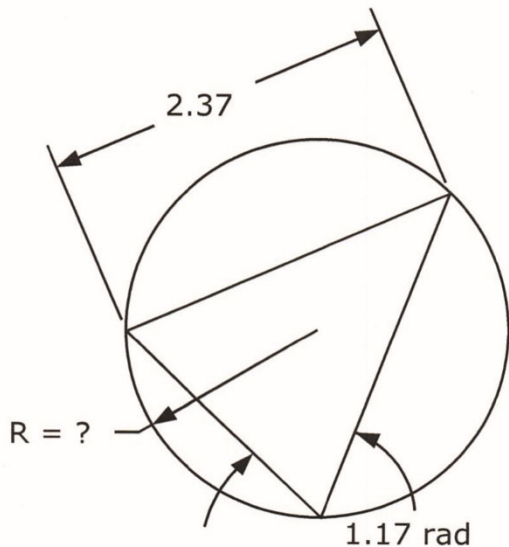
25F-39 =_____

25F-40.
SCALENE TRIANGLES

9.21

16.3

0.626 rad

1.09 rad

15.1

rad?
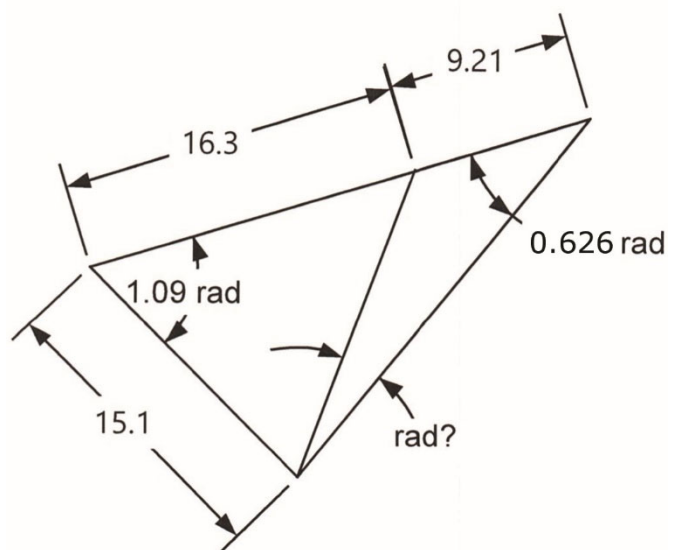
25F-40 =_____

25F-41. $\dfrac{10^{-(2.98\ -\ 5.52)}}{-0.0345\ +\ 0.00577}$ --- 41=_____

25F-42. $802\ e^{0.973} + (386)\ e^{-0.624}$ ------------------------------------- 42=_____

25F-43. $(-4030)\text{Log}\ \{(9750)(1.27 + 1/0.134)\}$ --------------------------- 43=_____

25F-44. $(468 + 1300)^{1/3} + 1/\{(261)^{-0.458}\}$ --------------------------- 44=_____

25F-45.(deg) $\sin\left[90° \times \dfrac{(734)}{(2880)}\right] + \cos\ \{110° - 30.1°\}$ ------------------- 45=_____

25F-46. A 3D printed widget weighs 4.78 lbs. What is the percent
decrease in linear dimension, if the desired weight is 4 lbs? ------------------ 46=_____ %

25F-47. Length and weights of various snakes are (4 in, 0.06 oz), (2 ft,
1.3 lbs), (3 ft, 4.4 lbs). What is the weight of a 4-ft long Gaboon Viper? ----- 47=_____ lbs

25F-48. (rad) Compute the value of θ if $0<\theta<\pi$ and $\theta\cos(2\theta) = 1$. ----------- 48=_____

25F-49.	25F-50.
HEMISPHERE AND CONE	RECTANGULAR SOLID

25F-49.

HEMISPHERE AND CONE

$$\dfrac{\text{Cone}}{\text{Volume}} = \dfrac{1}{4}\left[\dfrac{\text{Hemisphere}}{\text{Volume}}\right]$$

0.0454
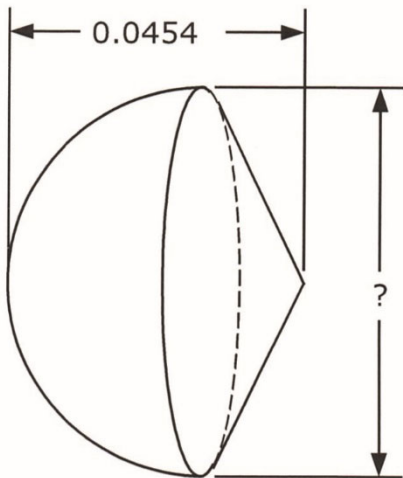
25F-50.

RECTANGULAR SOLID

AB = 1.45   BC = 1.33   BD = 1.83

25F-49 =_____   25F-50 =_____

25F-51. $10^{+(0.283)} + 10^{-(0.841)} + \left[10^{(0.424/0.429)} - 10^{(0.619)}\right]^{1/2}$ 51=_____

25F-52. $\dfrac{(-86 - 41.7)\, e^{(0.931)(2.52)}}{e^{-(7.97 - 6.53)}}$ -- 52=_____

25F-53. $\dfrac{(4.47\text{x}10^{-4} + 5.05\text{x}10^{-4})\, \text{Log}\left\{1/9.39\text{x}10^{-4}\right\}}{\text{Log}\left\{(6.98\text{x}10^{-4})/(6.72\text{x}10^{-4} + 8.47\text{x}10^{-4})\right\}}$ ------------------ 53=_____

25F-54. $\dfrac{1}{(0.573)^{(-0.23)}} + (0.82 + 0.178)^{(0.507 - 0.374)}$ ----------------- 54=_____
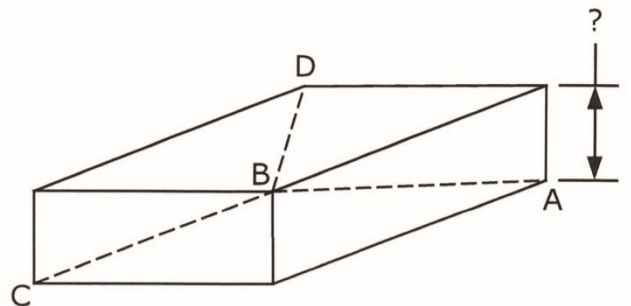
25F-55.(rad) $\arctan\left[\dfrac{(3600)(0.725)}{(5.7)(54.7)}\right] + (0.865)(1.55)$ --------------------- 55=_____

25F-56. For what value of x less than 5 does the slope of the curve
$y = 7(x-5)^3$ equal 2? -- 56=_____

25F-57. The bases in baseball form a square with 90 ft between bases. A
batter hits a single and runs towards first base at 14 mph. A runner on
first with a 5-ft lead off starts for second base at the same time and at 14
mph. What is the runners' linear distance of closest approach? --------------- 57=_____ft

25F-58. What is G_{12} if **G** = 3**H**+7**I**, **H**= $\begin{bmatrix} 9 & 33 \\ 7 & -3 \end{bmatrix}$, and **I** = $\begin{bmatrix} 32 & -51 \\ -4 & -4 \end{bmatrix}$? --------- 58=_____

25F-59.
SOLID OF REVOLUTION (y = 1)

$y=6-2(x-5)^2$

y = 3

Volume = ?

25F-59 =_____

25F-60.
INFINITE SQUARES

Each square side dimension equals 0.8 times
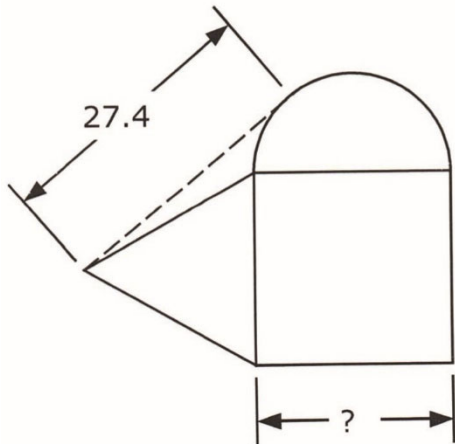that of the next larger square

0.8a

a = 9.07

?

25F-60 =_____

25F-61. How long after 3:30 do the minute and hour hands of a clock
align? -- 61=_____ min

25F-62. A google is 10^{100}. What is a google raised to the 57th power? ------ 62=_____

25F-63. Eliana has a super sling shot that, angled at 57° relative to the
horizontal, fires a projectile 220 ft. What minimum, positive angular
adjustment will change the distance to 200 ft? -------------------------------- 63=_____ degrees

25F-64. EQUILATERAL TRIANGLE, SQUARE, AND SEMICIRCLE	25F-65. SQUARE AND EQUILATERAL TRIANGLE
27.4 ?	$\dfrac{\text{Square}}{\text{Perimeter}} = \dfrac{\text{Triangle}}{\text{Perimeter}}$ 308 ?
25F-64 =_____	25F-65 =_____
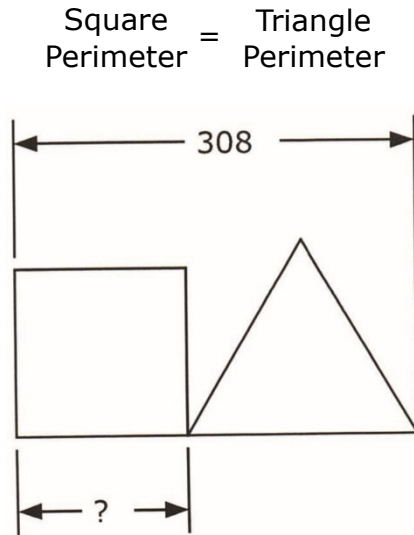
25F-66. $\dfrac{\sqrt{e^{-(0.158 + 0.146)}}}{\left\{e^{(0.973 - 0.2)}\right\}^2} \times \sqrt[3]{(5.4)^2}$ ------------------------------------ 66=_____

25F-67. (rad) $\dfrac{\sin(4.41)}{\cos(4.41)}\sqrt{1 - \{\sin(0.12 \times 8.23)\}^2}$ ------------------------- 67=_____

25F-68. (rad) $\dfrac{98.2}{6(-3.51)}\left\{(-0.805) + (-0.449)\sin(\pi)\right\}^5$ -------------------- 68=_____

25F-69. $(0.31) - \dfrac{(0.31)^2}{2} + \dfrac{(0.31)^3}{3} - \dfrac{(0.31)^4}{4}$ ------------------------------ 69=_____

25F-70. $\dfrac{0.0959}{\sqrt{0.859}} \text{Ln}\left[\dfrac{\sqrt{(-0.94)^2 + (0.52)} + \sqrt{0.829}}{\sqrt{0.559} + (65.5)(0.00605)}\right]$ ---------------------- 70=_____

25F-1   = 0.169
         = 1.69×10^{-1}

25F-2   = 3790
         = 3.79×10^{3}

25F-3   = 0.115
         = 1.15×10^{-1}

25F-4   = 789
         = 7.89×10^{2}

25F-5   = 0.00893
         = 8.93×10^{-3}

25F-6   = 0.210
         = 2.10×10^{-1}

25F-7   = 341
         = 3.41×10^{2}

25F-8   = 530 integer

25F-9   = 54.1
         = 5.41×10^{1}

25F-10   = 81.4
         = 8.14×10^{1}

25F-11   = 0.00117
         = 1.17×10^{-3}

25F-12   = 1.36×10^{-8}

25F-13   = 0.000320
         = 3.20×10^{-4}

25F-14   = −645
         = -6.45×10^{2}

25F-15   = −23.9
         = -2.39×10^{1}

25F-16   = 393 integer

25F-17   = $69.78

25F-18   = 2.78×10^{9}

25F-19   = 0.307
         = 3.07×10^{-1}

25F-20   = 597
         = 5.97×10^{2}

25F-21   = 1.15
         = 1.15×10^{0}

25F-22   = −0.136
         = -1.36×10^{-1}

25F-23   = 0.190
         = 1.90×10^{-1}

25F-24   = 0.00359
         = 3.59×10^{-3}

25F-25   = 104
         = 1.04×10^{2}

25F-26   = 10.1
         = 1.01×10^{1}

25F-27   = −20.2
         = -2.02×10^{1}

25F-28   = 4.40
         = 4.40×10^{0}

25F-29   = 5.69
         = 5.69×10^{0}

25F-30   = 15.8
         = 1.58×10^{1}

25F-31 = 275000
        = 2.75×10^5

25F-32 = 0.890
        = 8.90×10^{-1}

25F-33 = 1.49
        = 1.49×10^0

25F-34 = 269
        = 2.69×10^2

25F-35 = -9.65×10^{-10}

25F-36 = 3.64
        = 3.64×10^0

25F-37 = -4.938
        = -4.938×10^0 (4SD)

25F-38 = 100 integer

25F-39 = 1.29
        = 1.29×10^0

25F-40 = 0.337
        = 3.37×10^{-1}

25F-41 = -12100
        = -1.21×10^4

25F-42 = 2330
        = 2.33×10^3

25F-43 = -19900
        = -1.99×10^4

25F-44 = 24.9
        = 2.49×10^1

25F-45 = 0.565
        = 5.65×10^{-1}

25F-46 = 5.77
        = 5.77×10^0

25F-47 = 10.4
        = 1.04×10^1

25F-48 = 2.56
        = 2.56×10^0

25F-49 = 0.0605
        = 6.05×10^{-2}

25F-50 = 0.511
        = 5.11×10^{-1}

25F-51 = 4.42
        = 4.42×10^0

25F-52 = -5630
        = -5.63×10^3

25F-53 = -0.00853
        = -8.53×10^{-3}

25F-54 = 1.88
        = 1.88×10^0

25F-55 = 2.79
        = 2.79×10^0

25F-56 = 4.69
        = 4.69×10^0

25F-57 = 67.2
        = 6.72×10^1

25F-58 = -258
        = -2.58×10^2

25F-59 = 98.5
        = 9.85×10^1

25F-60 = 45.4
        = 4.54×10^1

25F-61 = 51.8
        = 5.18×10^1

25F-62 = 1.00×10^{5700}

25F-63 = 4.93
        = 4.93×10^0

25F-64 = 20.1
        = 2.01×10^1

25F-65 = 132
        = 1.32×10^2

25F-66 = 0.563
        = 5.63×10^{-1}

25F-67 = 1.77
        = 1.77×10^0

25F-68 = 1.58
        = 1.58×10^0

25F-69 = 0.270
        = 2.70×10^{-1}

25F-70 = 0.0626
        = 6.26×10^{-2}