Name _____

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

UIL Calculator Applications

Test 25A

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

    Incorrect: 12.30, 123.0, $1.23(10)^2$, $1.23 \cdot 10^2$, $1.230x10^2$, $1.23*10^2$, 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.
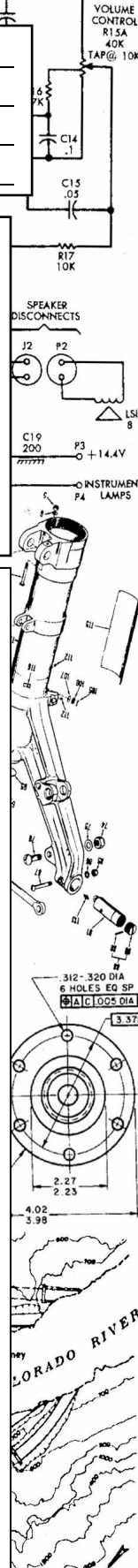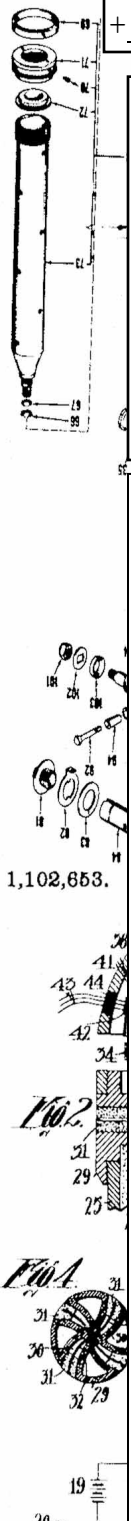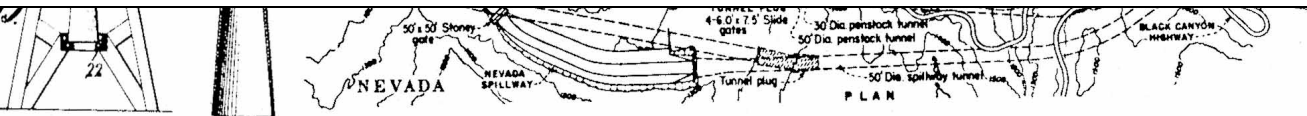
25A-1. $(-0.48/0.805) + 0.298$ -- 1=_____

25A-2. $(0.945 + 0.0486) \times (0.482) - 1.22$ ----------------------------------- 2=_____

25A-3. $(-2.57 - 1.62 - 2.7 + 1.6) \times (-2.33)$ ------------------------------- 3=_____

25A-4. $\dfrac{(-9.74)(-8.68 - 7.73 + 10.1)}{(0.343)(-5.7)}$ -- 4=_____

25A-5. $\dfrac{\{(0.0727 - 0.017 + 0.0241)/(-0.0838)\}}{\{(0.0154)(0.00796)/(-0.0626)\}}$ --------------------------- 5=_____

25A-6. Calculate the product of π and e. ------------------------------------- 6=_____

25A-7. What is the difference of 6.52 and 7.11, raised to the fourth
power? -- 7=_____

25A-8. Calculate the sum of 88 and 61.8, divided by 9220. ------------------- 8=_____
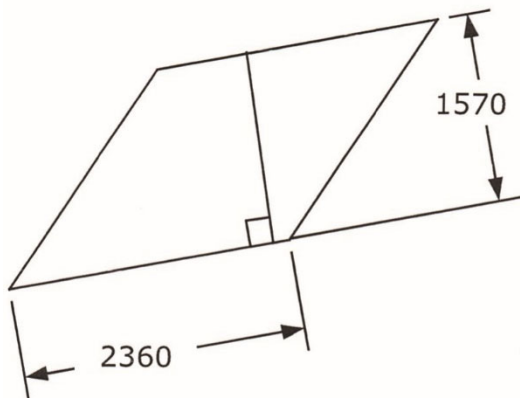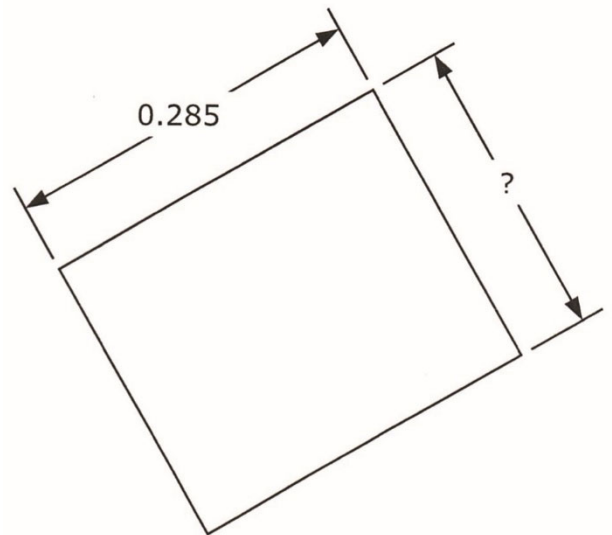
25A-9.	25A-10.
RHOMBUS	RECTANGLE
1570	0.285
2360	?
Area = ?	Perimeter = 1.05
25A-9 =_____	25A-10 =_____

25A-11. $\dfrac{(-4.87)(-9.94) - (2.18)(9.42) + 27.5}{-13.8 + (-6.12)(2.24)}$ ----------------------------- 11=_____

25A-12. $\dfrac{(88.1 + 57.8 - 89.7)(58.9)(49)}{(3.73 - 2.35)(-78.5 - 240)}$ ------------------------------- 12=_____

25A-13. $\dfrac{\{(-0.179 + 0.0589)(32.1 + 78) + (-18.4)\}(211)}{(-447)(19.8 + 21.7)(90.2)}$ ---------------- 13=_____
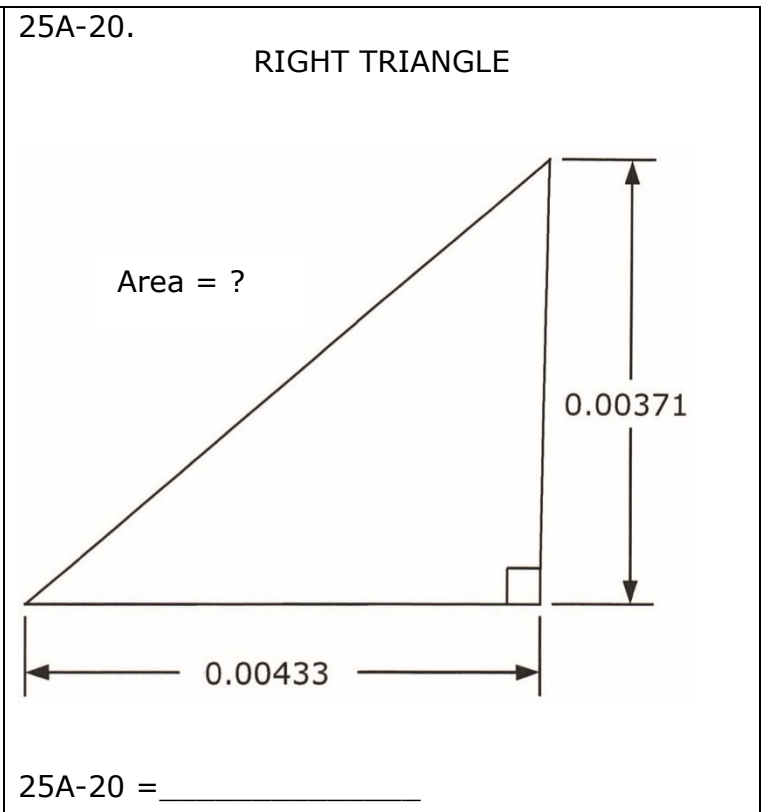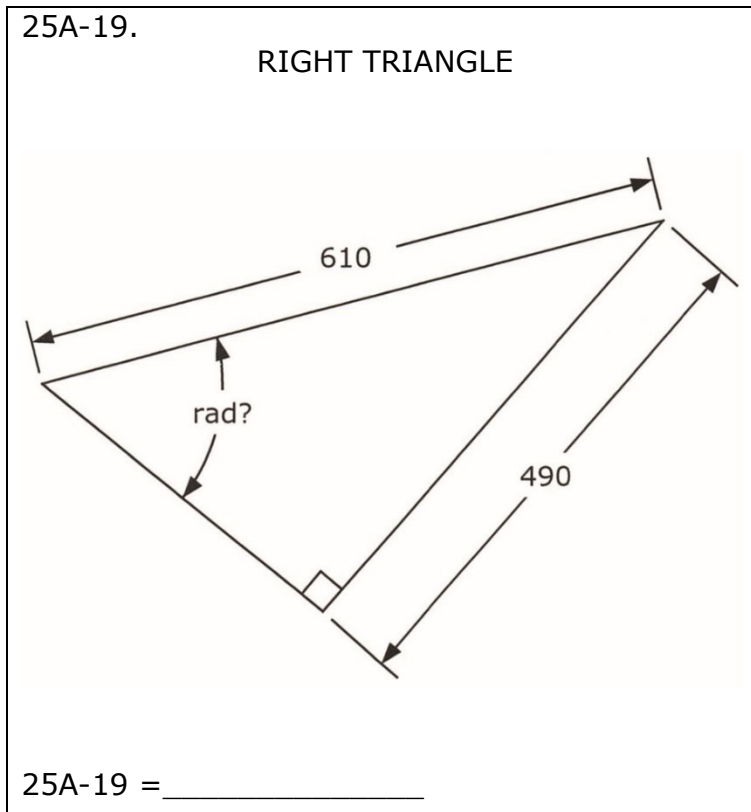
25A-14. $\dfrac{303 + 104 - 419}{(0.594)(0.388)} - \dfrac{(-7200)(5.49\text{x}10^{-4} + 4.53\text{x}10^{-4})}{0.175 + 0.075 - 0.0834}$ ----------- 14=_____

25A-15. $\dfrac{(65000 + 27700 - 41300)(0.822 - 0.212 - 0.431)}{(-8.47)(7.13)(\pi)(3.64 + 2.03 + 4.04)}$ ---------------- 15=_____

25A-16. Emma drives 200 mi at 55 mph. How long does this take? ---------- 16=_____ hr

25A-17. A square-shaped dog park occupies 3,520 ft^2. What is the
perimeter of the enclosing fence? -- 17=_____ ft

25A-18. Noah made a poster for school. The poster cost $1.02, the
marker cost $3.10, and a ruler cost $0.60. Including the 8.125% sales
tax, how much did he spend? -- 18=$_____

25A-19.
RIGHT TRIANGLE

610

rad?

490

25A-19 =_____

25A-20.
RIGHT TRIANGLE

Area = ?

0.00371

0.00433

25A-20 =_____

25A-21. $\sqrt{\dfrac{(4.93)(8.17)}{947 + 939}} + 0.0862$ --- 21=_____

25A-22. $\left[\dfrac{(0.133)(0.478)}{9.59} + 0.00174\right]^2 + \sqrt{1.99 \times 10^{-9}}$ ---------------------- 22=_____

25A-23. $(-53.2)(-0.00701)\sqrt{(-0.521)^2/0.865} + 1/\sqrt{8.97 + 11}$ ------------- 23=_____

25A-24. $\left[\dfrac{1.2 + 0.264 + \sqrt{0.985/0.698}}{-0.0973 + 0.0635}\right]^2$ ------------------------------------- 24=_____

25A-25. $\dfrac{\sqrt{842 + 798 + (6.05 \times 10^5)/(451)}}{-176 + 132}$ ------------------------------------ 25=_____

25A-26. Sophia can comfortably read 1-in tall letters from a distance of 20 ft. How tall should a letter on a Jumbotron scoreboard be, to be read from a distance of 170 yd? --- 26=_____ ft

25A-27. A sloth moves on ground at 13 ft/min. They swim much faster. If the percent increase in speed is 238%, what is a sloth's swimming speed? --- 27=_____ ft/min

25A-28. A neutron star is immensely dense, 1×10^{20} g/cm^3. Suppose a 240-lb person were collapsed into a sphere of the same density as a neutron star. What would the sphere diameter be? ---------------------------- 28=_____ micrometers

25A-29.	25A-30.
HEMISPHERE	SLANT CIRCULAR CYLINDER

25A-29.
HEMISPHERE

D = ?
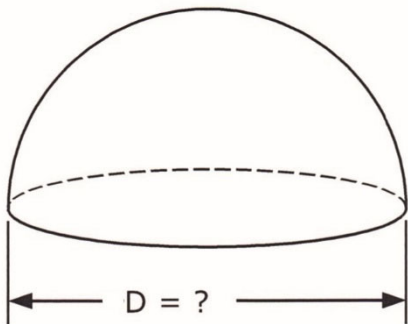
Total Surface Area = 0.521

25A-30.
SLANT CIRCULAR CYLINDER

?

D = 9.16

Volume = 817

25A-29 =_____
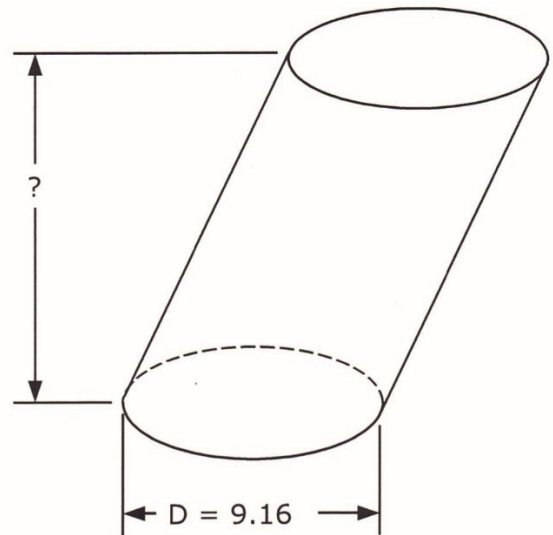
25A-30 =_____

25A-31. $\sqrt{\dfrac{5.8}{\sqrt{96.1 + 37.2}}} \times \left[\dfrac{1}{(5.88 - 4.15)^2} + \dfrac{1}{(6.25 + 1.79)^2}\right]$ ---------- 31=_____

25A-32. $\left[\dfrac{-33.5}{-90.9 + 38} + 0.717\right] \times \left\{292 + (-36.8)^2 - \sqrt{2.72 \times 10^6}\right\}$ --------- 32=_____

25A-33. $\dfrac{[(78500 - 70600)(0.697/0.775)]^{1/2}}{(0.661)^2 + (0.416 + 0.551)^2 + 0.752}$ ----------------------------- 33=_____

25A-34. $\dfrac{\sqrt{(0.00853)/\left\{(0.00726)/\sqrt{0.00765}\right\}}}{0.0422 + (0.183)(1.28)} + \left\{0.154 + 0.225\right\}^{1/2}$ ---- 34=_____
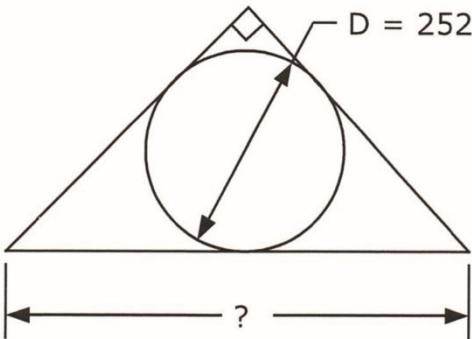
25A-35. $\dfrac{\dfrac{1}{3.52 \times 10^6} + \dfrac{0.0284}{(167 + 159)^2} - \dfrac{\sqrt{2.65 \times 10^{-10}}}{(7.81)^2}}{(8.72 + 14.6)^2 + (-548)}$ -------------------- 35=_____

25A-36. What is the percent increase in earth diameter based on its minimum (3,950 mi) and maximum (3,963 mi) diameters? ------------------ 36=_____ %

25A-37. The seats in a classroom are 30 in apart in a square array. Ezra is sitting next to his girlfriend, Luna, but they were being disruptive. The teacher moved Ezra three rows up and four seats over, all away from Luna. How far was Ezra from Luna after the move? -------------------------- 37=_____ ft
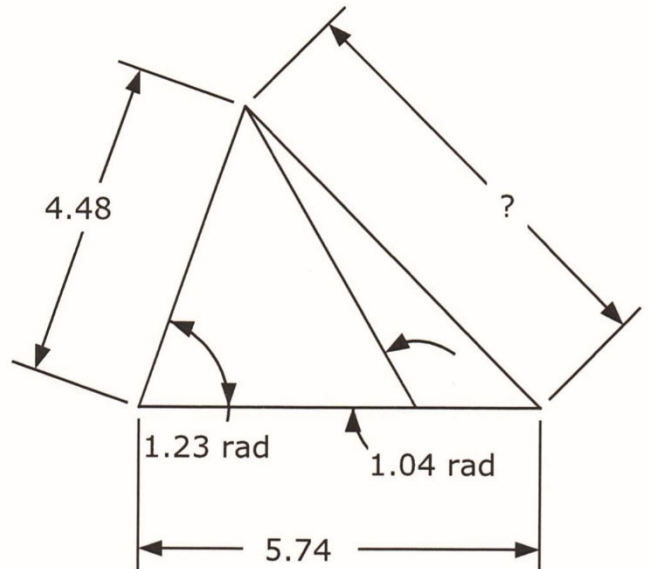
25A-38. The population of the world in 1998 and 2024 was 6,007,486,448 and 8,019,876,189, respectively. What is the percent error in estimating the annual growth rate to be 1.25%/yr? -- 38=_____ %(SD)

25A-39. RIGHT ISOSCELES TRIANGLE AND CIRCLE	25A-40. SCALENE TRIANGLES
D = 252 ?	4.48 1.23 rad 1.04 rad ? 5.74
25A-39 =_____	25A-40 =_____

25A-41. $10^{-\{(0.525 - 0.673)/(0.968 + 0.552)\}}$ ------------------------- 41=_____

25A-42. $\dfrac{(-28.3)}{(-65.1)}\left[1 - e^{-(0.688)(0.313)}\right]$ ---------------------------- 42=_____

25A-43. $(3.42 - 22.2)\,\text{Ln}\{(-8.41)(-1.75)\}$ ------------------------------ 43=_____

25A-44. $(394 + 509)^{1/3} + 1/\{(43.8)^{-0.123}\}$ ---------------------------- 44=_____

25A-45.(deg) $\{(-0.187)\sin(-152°)\} \times \{(-0.258)\cos(-114°)\}$ -------------- 45=_____

25A-46. Lily needs 78 3-in sized oranges to make a fruit salad for 125
people. If she substitutes 5-in sized grapefruit for the oranges,
maintaining the same serving size, how many grapefruit are needed? -------- 46=_____ integer

25A-47. Bamboo plants grow quickly. In the first four days after planting,
measured plant heights (in) were 4, 5, 10, and 12. What is the bamboo
plant height after 12 days? -- 47=_____ in

25A-48. Solve for f if $5f^2 + 6 = e^f$. -- 48=_____

25A-49.	25A-50.
SQUARE PYRAMID	CUBE AND SPHERE

25A-49.

SQUARE PYRAMID

?

0.60
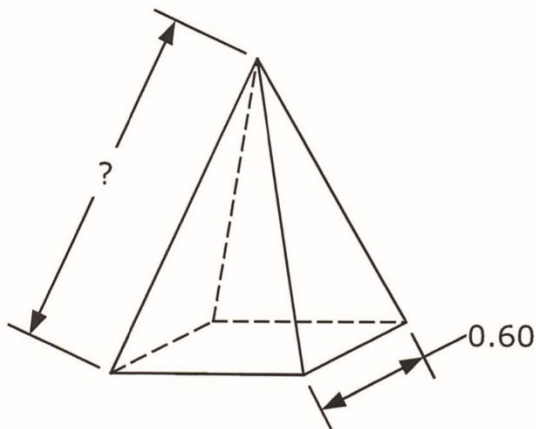
Volume = 0.178

25A-49 =_____

25A-50.

CUBE AND SPHERE

?

2.11
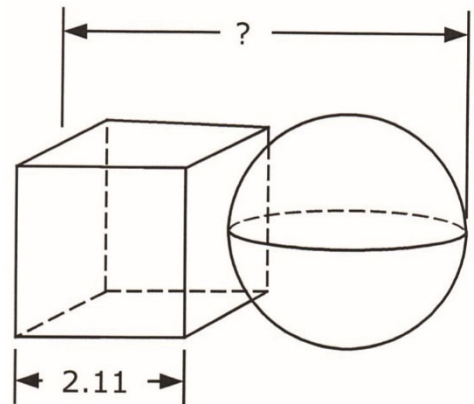
$\dfrac{\text{Cube Total}}{\text{Surface Area}} = \dfrac{\text{Sphere Total}}{\text{Surface Area}}$

25A-50 =_____

25A-51. $\dfrac{10^{(0.524)} \times 10^{-(0.741)} + 0.561}{10^{(0.788 + 0.138)}}$ ---------------------------------- 51=_____

25A-52. $\dfrac{1 + e^{+\{0.116 + (0.367)(1.86)\}}}{(-8.41)(\pi - e^{(-0.636)})}$ ---------------------------------- 52=_____

25A-53. $\dfrac{(64400)\,\text{Log}(430 + 865)}{\text{Log}(0.608) - (0.679)(0.845)}$ -- 53=_____

25A-54. $\dfrac{(8.41)^{0.701} - (\pi)^{-0.125}}{0.0605 + 0.0101}$ --- 54=_____

25A-55.(rad) $\dfrac{\arctan\{1.78 + (2.5)(0.417)\}}{\arcsin\{(5.81\text{x}10^5 + 5.46\text{x}10^5)/1.36\text{x}10^6\}}$ ---------------- 55=_____

25A-56. (rad) For what value of x between 0 and 1 does the slope of the
curve y = 7sin(x)cos(x) equal 1? --- 56=_____

25A-57. The number of bugs N in a large greenhouse increases with time
t according to $N=100\left(2^{t/dy}\right)$. A bird eats 5 bugs daily. How many birds
should be introduced into the greenhouse when the bug population is at
1,000 bugs to control the bug population to just less than 1,000 bugs? ------ 57=_____ integer

25A-58. What is D_2 if **D** = **JB**, **J** = $\begin{bmatrix} 3 & 2 & 6 \\ 5 & 9 & 12 \\ 7 & -5 & 8 \end{bmatrix}$ and **B** = $\begin{bmatrix} 18 \\ -27 \\ 14 \end{bmatrix}$? --------------- 58=_____

25A-59.	25A-60.
	INFINITE CONCENTRIC CIRCLES
	Each circle radius is half the radius of the next larger circle

25A-59.
y
$y= \dfrac{2}{x^2}$
$y= 2^x$
x
Hatched Area = ?

25A-59 =_____

R = ?
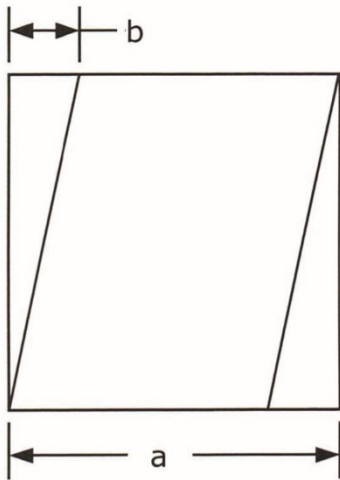
Sum of all Circle Circumferences = 84.9

25A-60 =_____
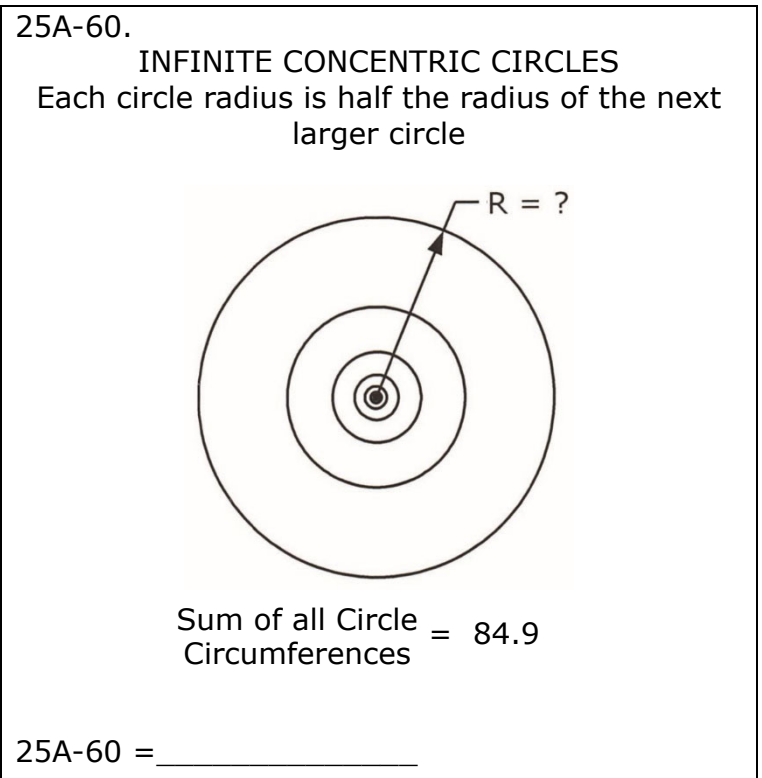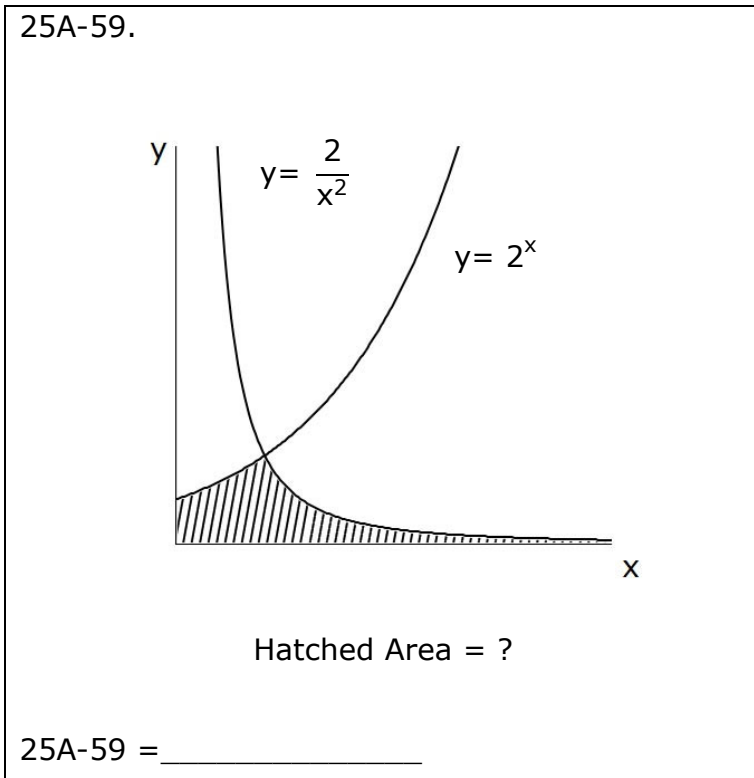
25A-61. Two strobes are hung in a dancehall and switched on simultaneously. One flashes 15 times per minute, and the other flashes 50 times per minute. What is the time interval between their flashing together? --- 61=_____s

25A-62. The chances of winning the jackpot in a power ball drawing are 1 in 292.2 million. What are the chances of winning 100 times in a row? ------ 62=_____

25A-63. Hudson throws a football 45 yd on earth. How far could he throw it on the moon where the gravitational constant is 5.331 ft/s^2? --------------- 63=_____yd

25A-64.
SQUARE AND PARALLELOGRAM

$$\frac{\text{Parallelogram}}{\text{Area}} = \left[\frac{\pi}{4}\right]\left[\frac{\text{Square}}{\text{Area}}\right]$$

b

a

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

25A-64 =_____

25A-65.
CIRCLE AND SQUARE

$$\frac{\text{Circle}}{\text{Circumference}} = \frac{\text{Square}}{\text{Perimeter}}$$

0.734

R = ?
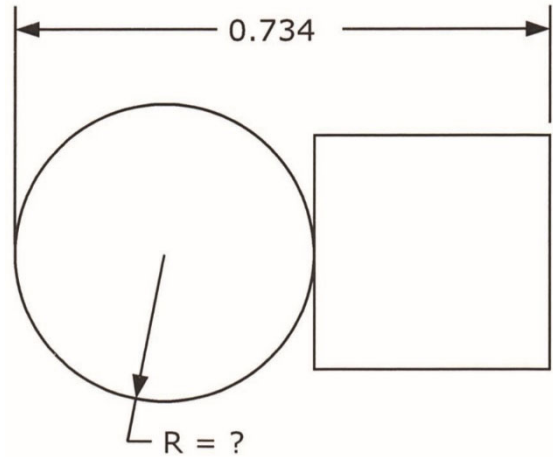
25A-65 =_____

25A-66. $2\text{Log}\sqrt{\dfrac{(5.84)(1.65)(7.72)}{(0.356)^3(3.77)^3}}$ --- 66=_____

25A-67. $(9.53)10^{\text{Log}[(6.51)(0.258)]} + \{(733)(0.926)\}^{1/2}$ --------------- 67=_____

25A-68. (rad) $\dfrac{1}{(87600)(0.111)} \text{Ln}\{(89.6) + (-79)\sin(1.67)\}$ -------------- 68=_____

25A-69. $(0.899) - \dfrac{(0.899)^2}{2} + \dfrac{(0.899)^3}{3} - \dfrac{(0.899)^4}{4}$ -------------------------- 69=_____

25A-70. (rad) $\dfrac{\arctan\left\{e^{-(0.238)(0.697)}\sqrt{(-9.73)/(-29.7)}\right\}}{(2.07)\sqrt{(20.1)(16.3)(25.8)}}$ -------------- 70=_____

25A-1   = −0.298
         = -2.98×10^{-1}

25A-2   = −0.741
         = -7.41×10^{-1}

25A-3   = 12.3
         = 1.23×10^{1}

25A-4   = −31.4
         = -3.14×10^{1}

25A-5   = 486
         = 4.86×10^{2}

25A-6   = 8.54
         = 8.54×10^{0}

25A-7   = 0.121
         = 1.21×10^{-1}

25A-8   = 0.0162
         = 1.62×10^{-2}

25A-9   = 3.71×10^{6}

25A-10   = 0.240
         = 2.40×10^{-1}

25A-11   = −2.01
         = -2.01×10^{0}

25A-12   = −369
         = -3.69×10^{2}

25A-13   = 0.00399
         = 3.99×10^{-3}

25A-14   = −8.76
         = -8.76×10^{0}

25A-15   = −4.99
         = -4.99×10^{0}

25A-16   = 3.64
         = 3.64×10^{0}

25A-17   = 237
         = 2.37×10^{2}

25A-18   = $5.10

25A-19   = 0.933
         = 9.33×10^{-1}

25A-20   = 8.03×10^{-6}

25A-21   = 0.232
         = 2.32×10^{-1}

25A-22   = 0.000115
         = 1.15×10^{-4}

25A-23   = 0.433
         = 4.33×10^{-1}

25A-24   = 6160
         = 6.16×10^{3}

25A-25   = −1.24
         = -1.24×10^{0}

25A-26   = 2.13
         = 2.13×10^{0}

25A-27   = 43.9
         = 4.39×10^{1}

25A-28   = 0.128
         = 1.28×10^{-1}

25A-29   = 0.470
         = 4.70×10^{-1}

25A-30   = 12.4
         = 1.24×10^{1}

25A-31 = 0.248
= 2.48×10^{-1}

25A-32 = -4.05
= -4.05×10^{0}

25A-33 = 39.7
= 3.97×10^{1}

25A-34 = 1.78
= 1.78×10^{0}

25A-35 = -6.81×10^{-8}

25A-36 = 0.329
= 3.29×10^{-1}

25A-37 = 14.6
= 1.46×10^{1}

25A-38 = 12
= 1.2×10^{1} (2SD)

25A-39 = 608
= 6.08×10^{2}

25A-40 = 5.99
= 5.99×10^{0}

25A-41 = 1.25
= 1.25×10^{0}

25A-42 = 0.0842
= 8.42×10^{-2}

25A-43 = -50.5
= -5.05×10^{1}

25A-44 = 11.3
= 1.13×10^{1}

25A-45 = 0.00921
= 9.21×10^{-3}

25A-46 = 17 integer

25A-47 = 35.3
= 3.53×10^{1}

25A-48 = 4.80
= 4.80×10^{0}

25A-49 = 1.54
= 1.54×10^{0}

25A-50 = 5.03
= 5.03×10^{0}

25A-51 = 0.138
= 1.38×10^{-1}

25A-52 = -0.147
= -1.47×10^{-1}

25A-53 = -254000
= -2.54×10^{5}

25A-54 = 50.7
= 5.07×10^{1}

25A-55 = 1.26
= 1.26×10^{0}

25A-56 = 0.714
= 7.14×10^{-1}

25A-57 = 139 integer

25A-58 = 15.0
= 1.50×10^{1}

25A-59 = 3.44
= 3.44×10^{0}

25A-60 = 6.76
= 6.76×10^{0}

25A-61 = 12.0
= 1.20×10^{1}

25A-62 = 2.70×10^{-847}

25A-63 = 272
= 2.72×10^{2}

25A-64 = 4.66
= 4.66×10^{0}

25A-65 = 0.206
= 2.06×10^{-1}

25A-66 = 1.49
= 1.49×10^{0}

25A-67 = 42.1
= 4.21×10^{1}

25A-68 = 0.000246
= 2.46×10^{-4}

25A-69 = 0.574
= 5.74×10^{-1}

25A-70 = 0.00237
= 2.37×10^{-3}