Texas Competitive Mathematics
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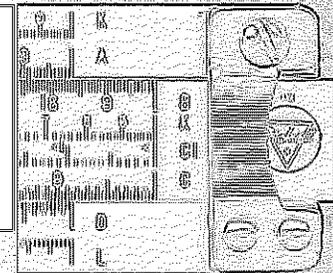
2008 UIL Calculator Appl Regional
(11 pages)
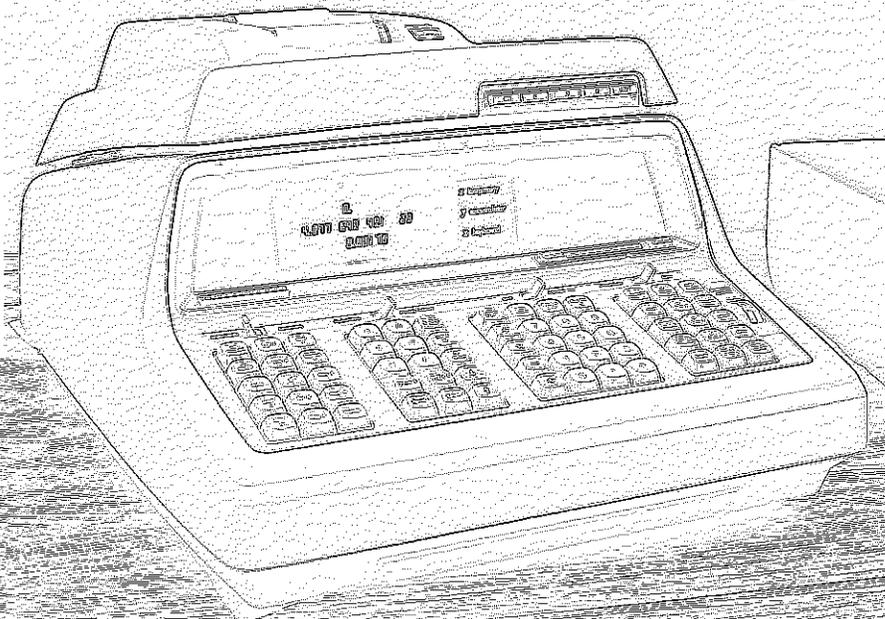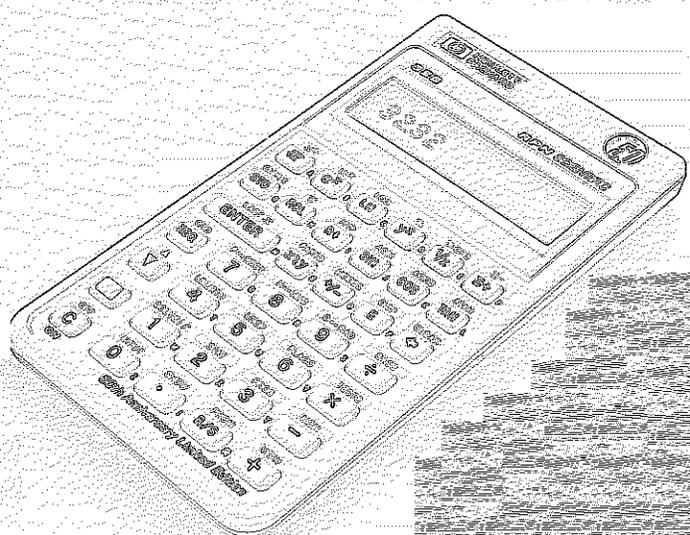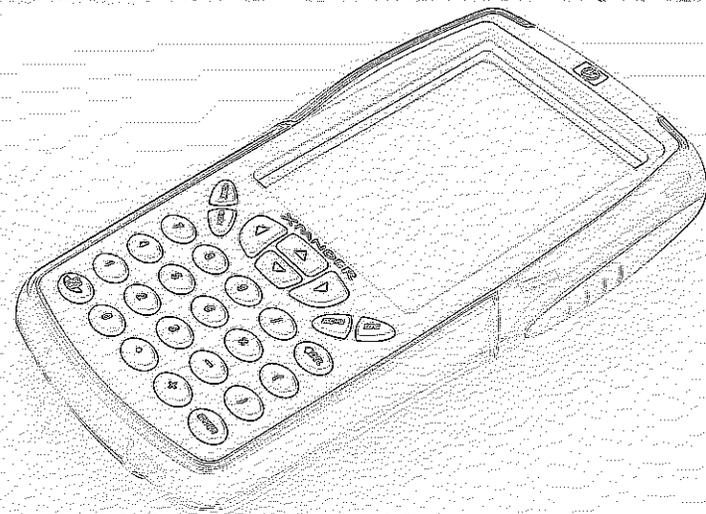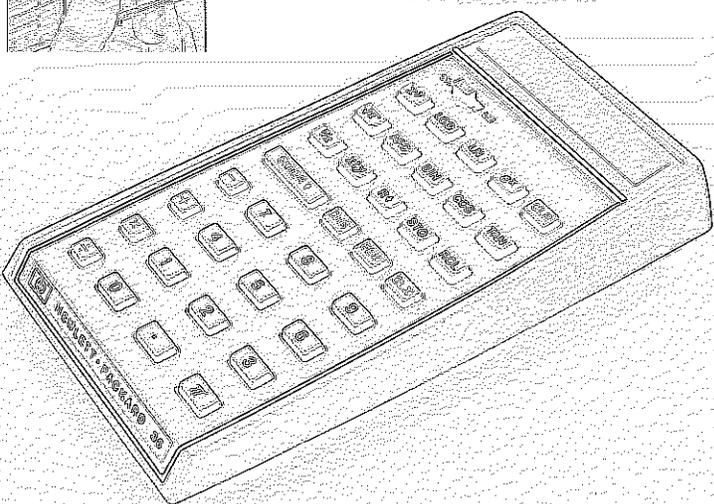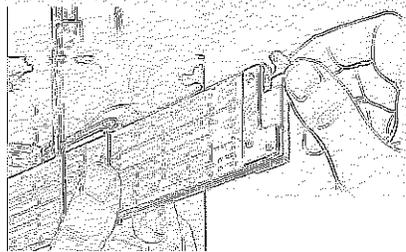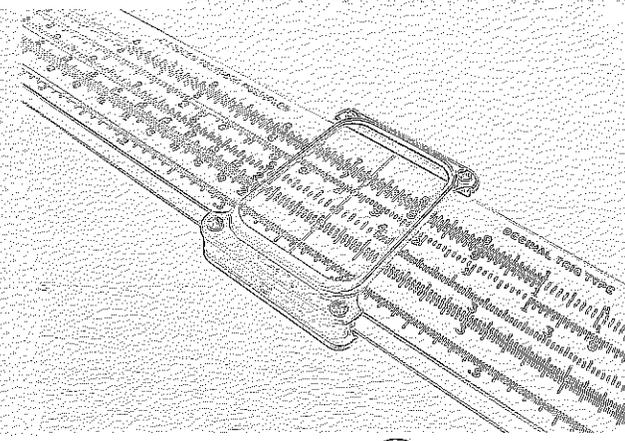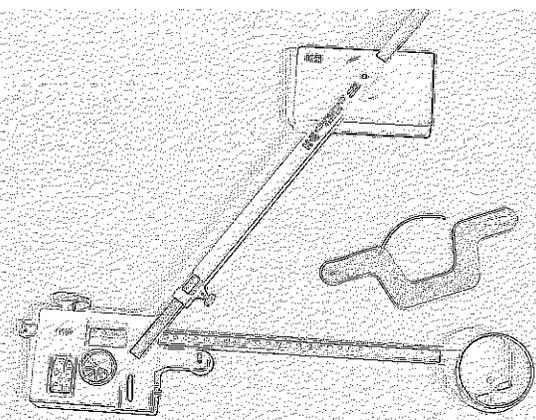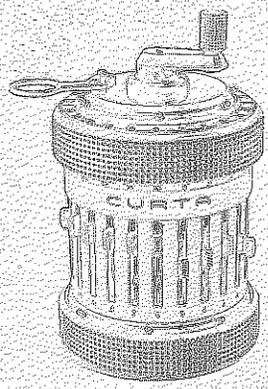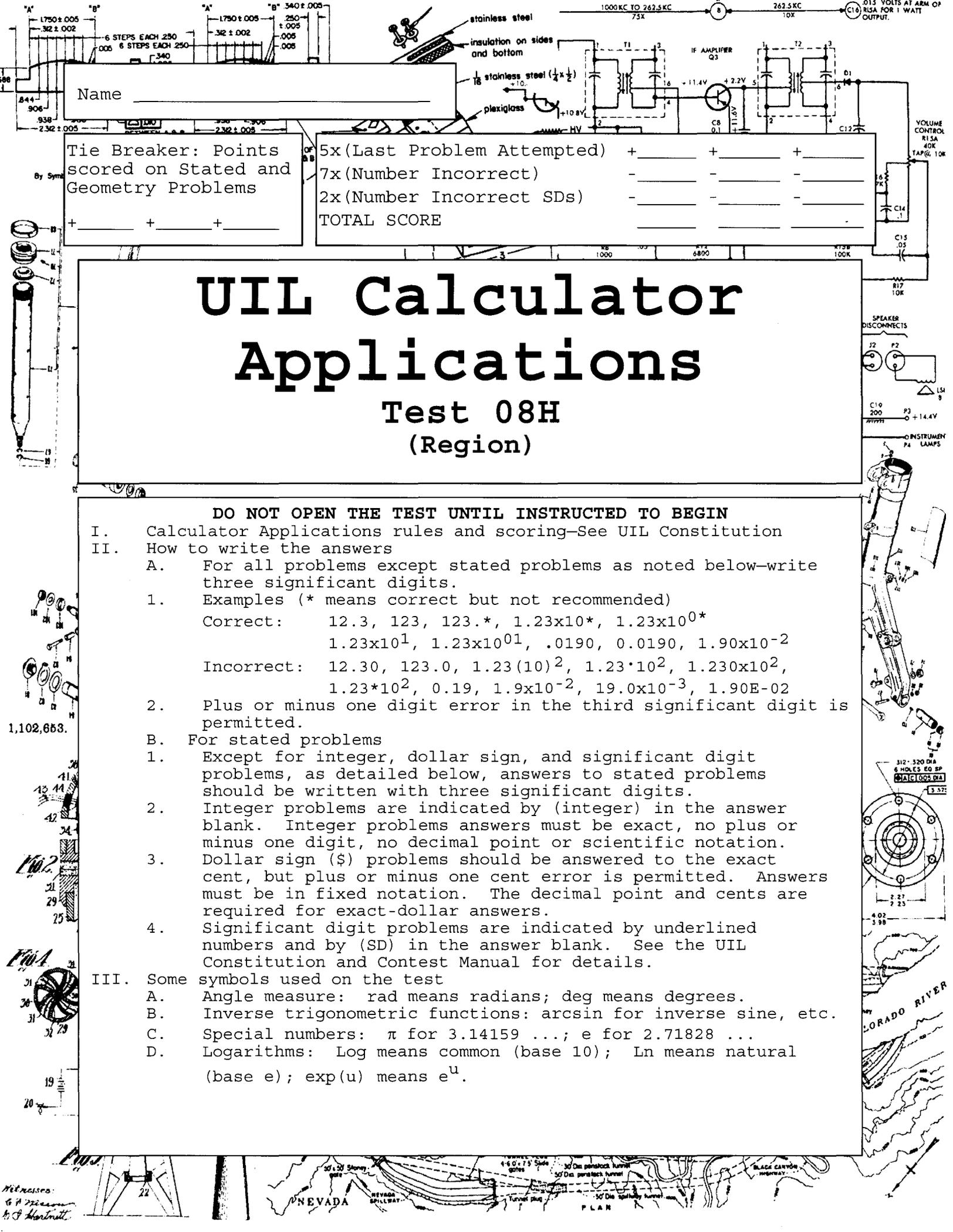
Name _____

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

UIL Calculator Applications
Test 08H
(Region)

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}, 1.23·10^{2}, 1.230x10^{2},
1.23*10^{2}, 0.19, 1.9x10^{-2}, 19.0x10^{-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}.
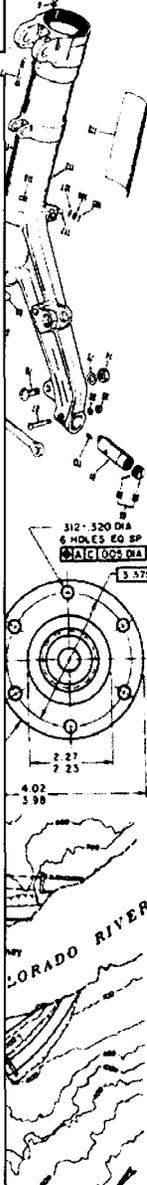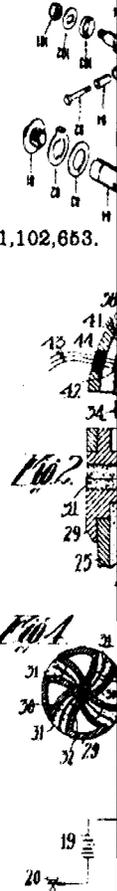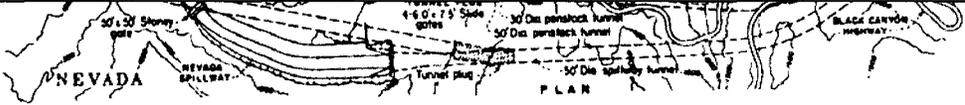
08H-1. (0.693 + 2.25) x 5.49 -- 1=_____

08H-2. $(\pi - 0.924)/(8.17) + 0.304$ --------------------------------- 2=_____

08H-3. $(92.2 + 232 - 92.5)/(-13.3) + \pi$ ---------------------------- 3=_____

08H-4. $\{ (-0.0606)(0.148 + 0.921 - 0.282)(0.00128)\} + 3.35 \times 10^{-5}$ ------ 4=_____

08H-5. $\dfrac{\{ (29.9 - 20.5 + 35.3)/(30.8)\}}{\{ (19.1)(-6.63)/(72.7)\}}$ --------------------------- 5=_____

08H-6. What is 596 times $4.96^{2.07}$? ------------------------- 6=_____

08H-7. Alison took 8 hr to read a 230 page book. How long
did it take to read one page? ----------------------------- 7=_____   min

08H-8. An 8.5 in x 11 in sheet of paper is reduced by 35%
on a copier. What is the length of the diagonal of the
reduced image? -- 8=_____   in

08H-9.

CIRCLE

D = ?
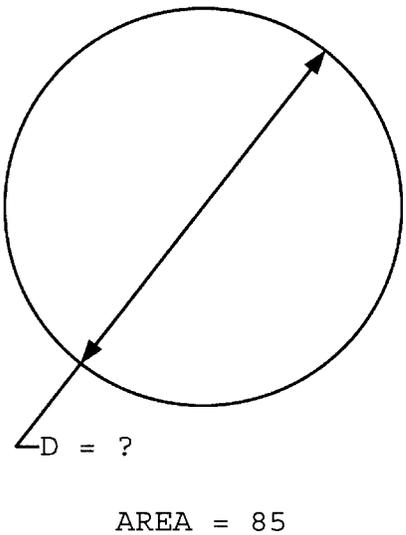
AREA = 85

08H-9 = _____

08H-10.

RECTANGLE

618
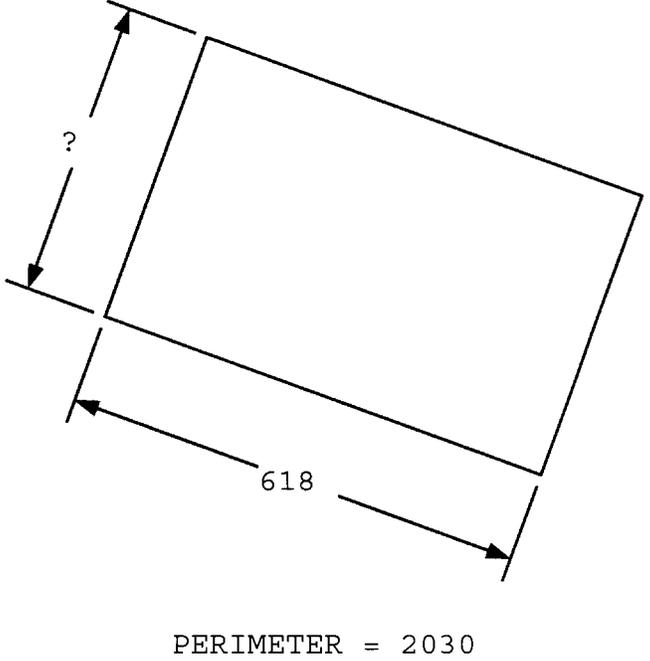
PERIMETER = 2030

08H-10 = _____

08H-11. $\dfrac{(-0.359)(1.34) + (-0.657)(0.844)}{-4.5 + 1.32 - (-8.83)(0.238)}$ ----------------------- 11=_____

08H-12. $\dfrac{(-0.12)(-1.56) - (-0.241 + 0.215)(-7.42)}{(2.97 + 3.31 + \pi)(-0.873)}$ ----------------- 12=_____

08H-13. $\dfrac{3.48 \times 10^5 + 6.24 \times 10^5}{(-0.816)(-0.646) + 2.24} + \dfrac{5940 - 4170 + 5580}{(-0.279)(-0.0603)}$ ------------- 13=_____

08H-14. $\dfrac{(8560 + 6360 - 2410)(0.00129 + 0.00309 - 0.00136)}{(-0.64 - 0.479)(-0.8)(-0.874 - 0.8)}$ ---------- 14=_____

08H-15. $\dfrac{1.60 \times 10^5 + 2.24 \times 10^5 - (69400 + 1.06 \times 10^5)(\pi - 0.141)}{(-975)(-0.527)(0.414)(435 - 414 + 516)}$ --------- 15=_____

08H-16. The largest tea party was 14,718 people who drank green tea in Nishio, Japan on October 8, 2006. If a serving was 6 oz, how much tea was needed? ------------------- 16=_____ gal

08H-17. Assuming 365 days per year with 5 work days per week, how many work days on average are in a year? ----------- 17=_____ days

08H-18. A baseball is 9 inches in circumference and weighs 5 oz. A bowling ball is 27 inches in circumference and weighs 16 lbs. What is the percent difference in density of a baseball and bowling ball? ---------------------------- 18=_____ %

08H-19.

RIGHT TRIANGLE

0.52 rad

0.197

AREA = ?

08H-20.

RIGHT TRIANGLE

?

30.5°

31.3

08H-19 = _____

08H-20 = _____

08H-21. $\left[\dfrac{\sqrt{2.08 - 1.82}}{5.79} + \dfrac{(0.541)}{8.78}\right]^2$ ----------------------------------- 21=_____

08H-22. $\sqrt{\dfrac{(6.37)(1.51)}{201 + 195}} + 0.146$ ---------------------------------- 22=_____

08H-23. $(-0.0158)(-64.4) + \sqrt{(1.5)/(7.86)} + [(0.592)(1.2)]^2$ ---------- 23=_____

08H-24. $\dfrac{\sqrt{118 + 30.2 + (9640)/(102)}}{645 + 218}$ ----------------------------- 24=_____

08H-25. $\left[\dfrac{0.865 + 0.3 + \sqrt{0.338/0.517}}{0.0516 + 0.0445}\right]^2$ ---------------------------- 25=_____

08H-26. The world record height for a jump by a pig is
70 cm. How long was the pig aloft? ----------------------- 26=_____ s

08H-27. Samantha weighs 147 lbs. She planned to lose 15
lbs in 15 days, but she only lost 12 lbs. What is the
percent difference between her desired weight at the end
of the diet and her actual weight at the end of the diet? ---- 27=_____ %

08H-28. Highway center stripes are 8 in wide, 10 ft long
and 30 ft apart. If a gallon of paint covers 250 ft^2, how
many gallons of paint are needed to paint the 48 mi long
road center stripe between Big Springs and Snyder? ---------- 28=_____ gal

08H-29.

CONE

1300
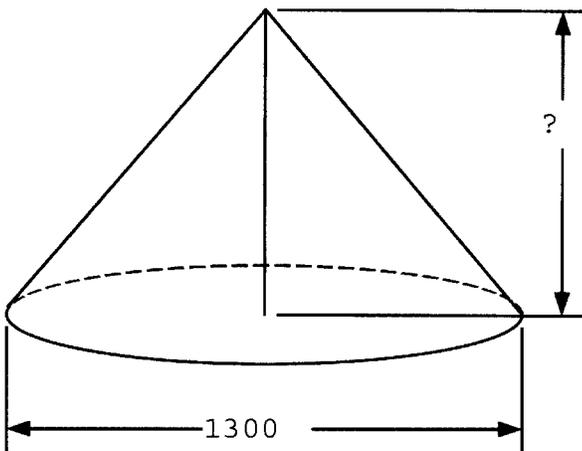
TOTAL SURFACE AREA = 3.39×10^6

08H-29 = _____

08H-30.

CYLINDER

6.4
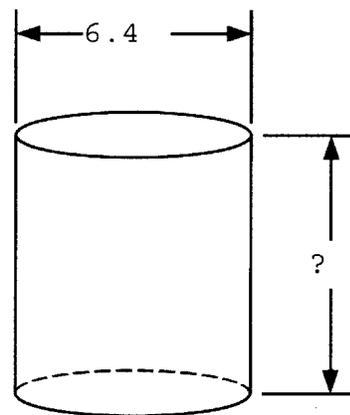
VOLUME = 226

08H-30 = _____

08H-31. $\sqrt{\dfrac{1.75}{\sqrt{49.6 + 9.79}}} \times \left[\dfrac{1}{(4.16 - 1.64)^2} + \dfrac{1}{(3.84 + 3.59)^2} \right]$ --------- 31=_____

08H-32. $\dfrac{(7.65\times10^{-6} + 1.35\times10^{-5})^2}{\sqrt{91 - 58.7}} + \dfrac{7.26\times10^{-13}}{\sqrt{2.03\times10^{-5} + 1.94\times10^{-4}}}$ --------- 32=_____

08H-33. $\dfrac{[4.55/(0.943 + 0.521) + 1/(0.22)]^{1/2}}{(0.41 + 1.06)^2 \times \sqrt{1.77 - (-0.972)}}$ ------------------ 33=_____

08H-34. $\dfrac{(3.12\times10^5)^2(5.63\times10^{-12} + 1.07\times10^{-12})}{2.51 + (-0.704)\,(-8.22)} + \dfrac{1}{\dfrac{1}{0.00798} + \dfrac{1}{(-0.074)}}$ -- 34=_____

08H-35. $\dfrac{\dfrac{1}{-81.1} + \dfrac{-79.7}{(113 + 56.3)^2} - \dfrac{\sqrt{27.8}}{(43.5)^2}}{(95 + 125)^2 + (-64000)}$ ------------------------ 35=_____

08H-36. How long after exactly 7:44 PM do the minute and
hour hands align? -- 36=_____ min

08H-37. A projectile is fired at 50 ft/s and hits a target
60 ft away. The firing angle may be either less than 45°
or greater than 45°. What is the positive difference in
time of flight for these two paths? ---------------------- 37=_____ s

08H-38. What is the distance between points of intersection of
the parabola $y = 6x^2+2$ and the circle $x^2+(y-2)^2 = 29$? -------- 38=_____

08H-39.
SCALENE TRIANGLE AND CIRCLE

0.649

1.25

D = ?

1.66

08H-40.
SCALENE TRIANGLE

rad?

613

0.7 rad

407

08H-39 = _____

08H-40 = _____

08H-41. $\dfrac{10^{-(3.44 - 3.62)}}{-9.8 + 3.86}$ --- 41=_____

08H-42. $\dfrac{e^{+0.758} + e^{-0.447}}{(-92400 + 6920)}$ ----------------------------------- 42=_____

08H-43. $-1.38 + (0.469)\text{Ln}(0.209 - 0.168)$ ----------------------- 43=_____

08H-44. $(594 + 826)^{1/3} + 1/\{(310)^{-0.357}\}$ --------------------- 44=_____

08H-45. (deg) $\dfrac{\cos\{(65.4°)/(6.93)\}}{\sin\{24.1° - 27.3°\}}$ ---------------------------------- 45=_____

08H-46. Light intensity varies as the inverse square of distance from the source. If 50 watt bulbs are strung on a line 15 ft apart, at what distance should 100 watt bulbs be strung if the minimum light intensity along the line remains the same? -- 46=_____ ft

08H-47. The population of Texas in ten-year increments starting in 1960 is 9.92 million, 12.1 million, 14.5 million, 17.2 million and 20.1 million. Based on these, predict the year in which the population will exceed 35 million. -- 47=_____ integer

08H-48. What is the positive value of x for $x^{2x} = 10-3x^2$? ---- 48=_____


08H-49.

SPHERE AND CONES
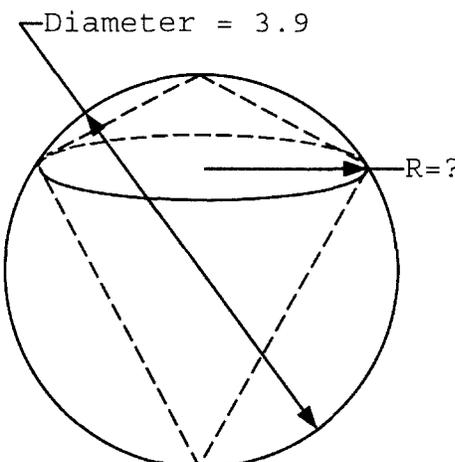
Diameter = 3.9

R=?

VOLUME(SPHERE)-VOLUME(CONES) = 20.3

08H-49 = _____

08H-50.

SPHERE AND CYLINDER
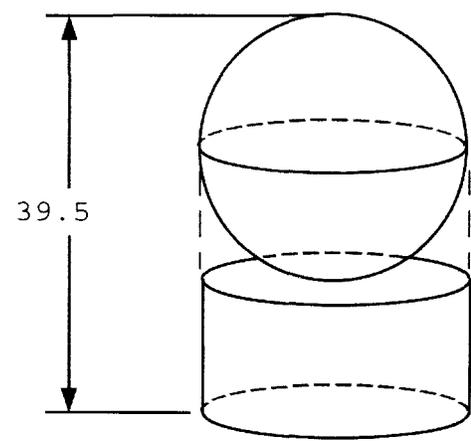
39.5

TOTAL SURFACE AREA(SPHERE) =
TOTAL SURFACE AREA(CYLINDER) = ?

08H-50 = _____

08H-51. $\dfrac{(-7.13 \times 10^{-8})\ 10^{-(6.29\ -\ 0.962)}}{-2.14 \times 10^{-7} + 1.97 \times 10^{-7}}$ ------------------------------ 51=_____

08H-52. $\dfrac{1 + e^{+\{0.683\ +\ (0.71)(6.37)\}}}{(80)(9.28 - e^{(-0.554)})}$ ------------------------------ 52=_____

08H-53. $\dfrac{\text{Log}\{1.90 \times 10^{8} + (12400)(54000)\}}{4.21 - \text{Log}\{(37.5)/(0.012)\}}$ ------------------------ 53=_____

08H-54. $\dfrac{1}{(0.606)^{(-0.523)}} + (0.271 + 0.962)^{(0.689\ -\ 0.47)}$ ------------- 54=_____

08H-55. (rad) $\text{arctan}\left[\dfrac{(2660)(0.842)}{(5.17)(56)}\right] + (0.205)(1.74)$ ---------------- 55=_____

08H-56. (rad) What is the slope of the function f(x) = xsin(2x-π) at x = π? --------------------------------- 56=_____

08H-57. Two numbers sum to 25 and multiply to P. What is the largest value of P? ------------------------------- 57=_____

08H-58. What is d if $[\mathbf{C}] = \begin{bmatrix} 2 & 7 & 1 \\ 7 & d & 8 \\ 1 & 8 & -5 \end{bmatrix}$, $[\mathbf{B}] = \begin{bmatrix} 2 & 9 & -6 \\ 9 & 6 & 1 \\ -6 & 1 & 2 \end{bmatrix}$,

$[\mathbf{Y}] = [\mathbf{B}][\mathbf{C}]$ and $Y_{12} = 0$. --------------------------------- 58=_____

08H-59.

RADIANS

$y = \dfrac{x}{5}\sin\left(\dfrac{\pi x}{5}\right)$

08H-59 = _____

08H-60.

CIRCLE AND SQUARE

AB IS TRISECTED

CD/AB = ?

08H-60 = _____
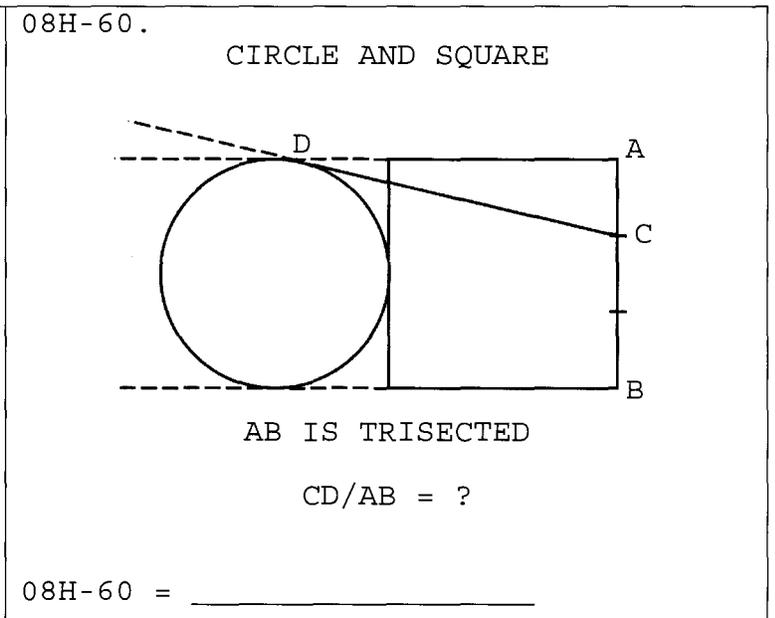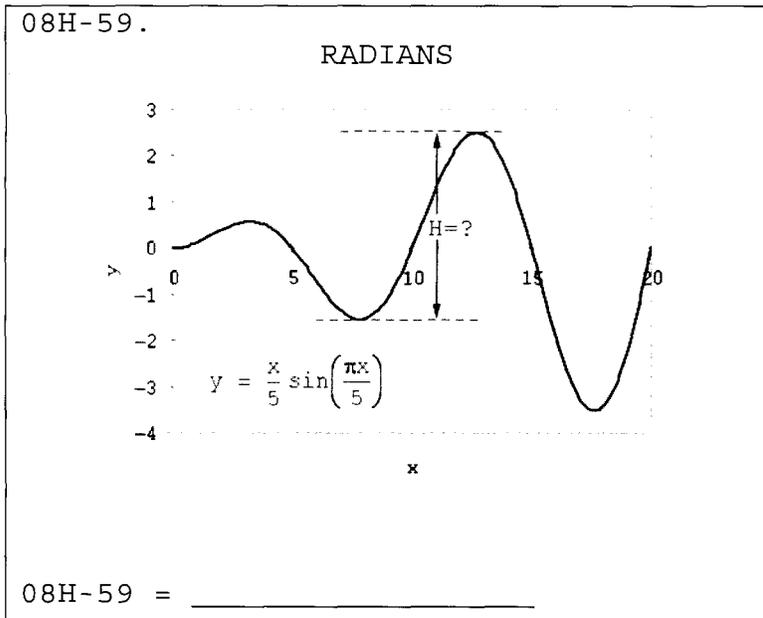
08H-61. $\dfrac{(10^{4.99})\,(10^{4.33})\,(10^{0.392})}{10^{\{(4.78)\,(0.581)\}}}$ ----------------------------- 61=_____

08H-62. $(92.8 - 39.7)^2 + (7.19 + 21.5)e^{Ln(2.6)}$ -------------------- 62=_____

08H-63. (deg) $\left\{\cos^2(11.8°) - \sin^2(11.8°)\right\} \times \dfrac{\tan(11.8°)}{1 - \tan^2(11.8°)}$ --------- 63=_____

08H-64. $1 + (0.93) + \dfrac{(0.93)^2}{2} + \dfrac{(0.93)^3}{6} + \dfrac{(0.93)^4}{24}$ ------------------ 64=_____

08H-65. $\dfrac{-6.94}{\sqrt{7.57}} \; Ln\left[\dfrac{\sqrt{(5.52)^2 + (5.59)} + \sqrt{11.3}}{\sqrt{0.662} + (78.3)\,(0.00655)}\right]$ -------------------- 65=_____

08H-66. Two gallons of salt water solution are 8% salt.
Water is added to make a 5.7% solution. How much 5.7%
solution is there? -- 66=_____ gal

08H-67. Rod letters a sign by hand in 14 minutes, but it
only takes 12 minutes if he uses a stencil. If he needs
39 minutes to make the stencil, what is the minimum number
of signs for which using a stencil takes less time than
lettering by hand? --- 67=_____ integer

08H-68. A 2 meter long piece of dental floss is pulled
tight 1.2 meters above the ground. It is then relaxed
by moving one end 95 mm towards the other end. Assuming
the sagged floss forms a circular arc, how far above the
ground is the midpoint of the floss? ----------------------- 68=_____ cm

08H-69.

SQUARE AND SEMICIRCLE

|←—18.5

60.6

36.2

HATCHED AREA = ?

08H-69 = _____

08H-70.

CIRCLE AND RIGHT TRIANGLES

15.3°

55.2°

HATCHED AREA = 0.0577
DIAMETER = ?

08H-70 = _____

08H-1 = 16.2
       = 1.62×10^1

08H-2 = 0.575
       = 5.75×10^{-1}

08H-3 = -14.3
       = -1.43×10^1

08H-4 = -2.75×10^{-5}

08H-5 = -0.833
       = -8.33×10^{-1}

08H-6 = 16,400
       = 1.64×10^4

08H-7 = 2.09
       = 2.09×10^0

08H-8 = 9.04
       = 9.04×10^0

08H-9 = 10.4
       = 1.04×10^1

08H-10 = 397
       = 3.97×10^2

08H-11 = 0.960
       = 9.60×10^{-1}

08H-12 = 0.000695
       = 6.95×10^{-4}

08H-13 = 788000
       = 7.88×10^5

08H-14 = -25.2
       = -2.52×10^1

08H-15 = -1.25
       = -1.25×10^0

08H-16 = 690
       = 6.90×10^2

08H-17 = 261
       = 2.61×10^2

08H-18 = 89.6
       = 8.96×10^1

08H-19 = 0.0339
       = 3.39×10^{-2}

08H-20 = 53.1
       = 5.31×10^1

08H-21 = 0.0224
       = 2.24×10^{-2}

08H-22 = 0.302
       = 3.02×10^{-1}

08H-23 = 1.96
       = 1.96×10^0

08H-24 = 0.0181
       = 1.81×10^{-2}

08H-25 = 422
       = 4.22×10^2

08H-26 = 0.756
       = 7.56×10^{-1}

08H-27 = 2.27
       = 2.27×10^0

08H-28 = 169
       = 1.69×10^2

08H-29 = 773
       = 7.73×10^2

08H-30 = 7.03
       = 7.03×10^0

08H-31 = 0.0837 = 8.37×10^{-2}

08H-32 = 1.28×10^{-10}

08H-33 = 0.773 = 7.73×10^{-1}

08H-34 = 0.0876 = 8.76×10^{-2}

08H-35 = 1.15×10^{-6}

08H-36 = 59.6 = 5.96×10^{1}

08H-37 = 1.48 = 1.48×10^{0}

08H-38 = 1.88 = 1.88×10^{0}

08H-39 = 0.401 = 4.01×10^{-1}

08H-40 = 0.442 = 4.42×10^{-1}

08H-41 = -0.255 = -2.55×10^{-1}

08H-42 = -3.24×10^{-5}

08H-43 = -2.88 = -2.88×10^{0}

08H-44 = 19.0 = 1.90×10^{1}

08H-45 = -17.7 = -1.77×10^{1}

08H-46 = 21.2 = 2.12×10^{1}

08H-47 = 2059 integer

08H-48 = 1.49 = 1.49×10^{0}

08H-49 = 1.62 = 1.62×10^{0}

08H-50 = 2180 = 2.18×10^{3}

08H-51 = 1.97×10^{-5}

08H-52 = 0.263 = 2.63×10^{-1}

08H-53 = 12.5 = 1.25×10^{1}

08H-54 = 1.82 = 1.82×10^{0}

08H-55 = 1.80 = 1.80×10^{0}

08H-56 = -6.28 = -6.28×10^{0}

08H-57 = 156 = 1.56×10^{2}

08H-58 = 3.78 = 3.78×10^{0}

08H-59 = 4.05 = 4.05×10^{0}

08H-60 = 1.42 = 1.42×10^{0}

08H-61 = 8.61×10^{6}

08H-62 = 2890 = 2.89×10^{3}

08H-63 = 0.200 = 2.00×10^{-1}

08H-64 = 2.53 = 2.53×10^{0}

08H-65 = -4.93 = -4.93×10^{0}

08H-66 = 2.81 = 2.81×10^{0}

08H-67 = 20 integer

08H-68 = 93.8 = 9.38×10^{1}

08H-69 = 2230 = 2.23×10^{3}

08H-70 = 0.399 = 3.99×10^{-1}