

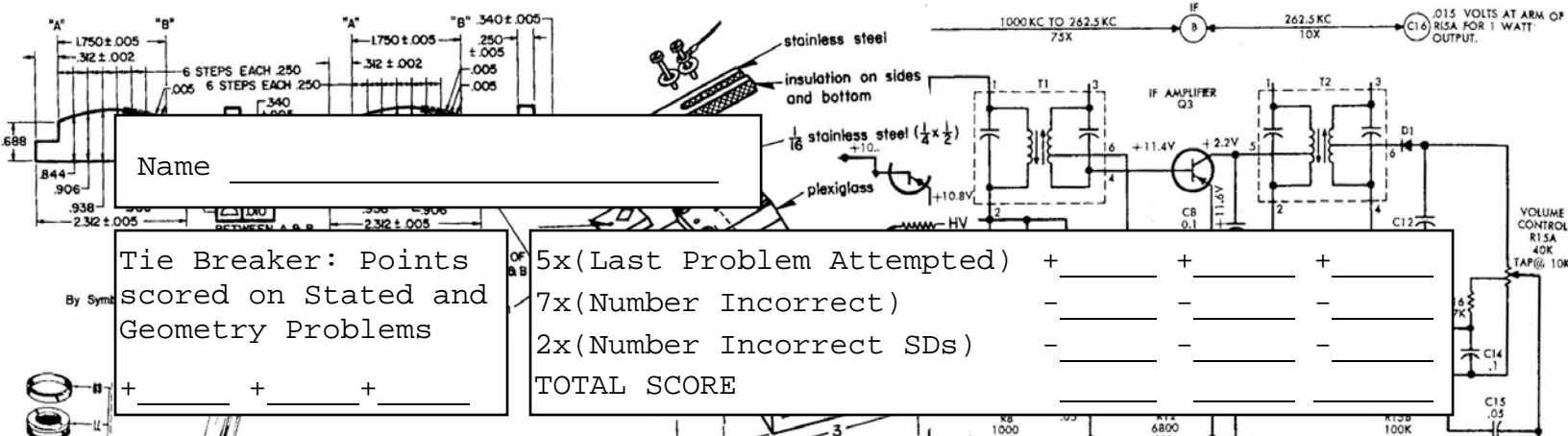


UNIVERSITY INTERSCHOLASTIC LEAGUE

# Calculator Applications Study Packet 2020

This Calculator Applications packet contains tests and keys from **only** 2020 Invitational A, B and District. Region and State are not available.

This item is intended for High School grade levels.



Name \_\_\_\_\_

Tie Breaker: Points scored on Stated and Geometry Problems  
 + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_

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

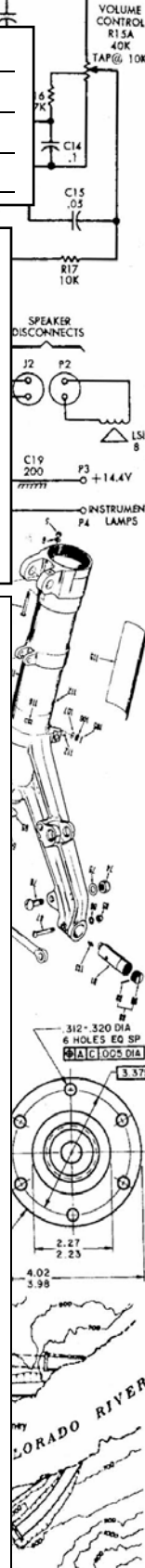
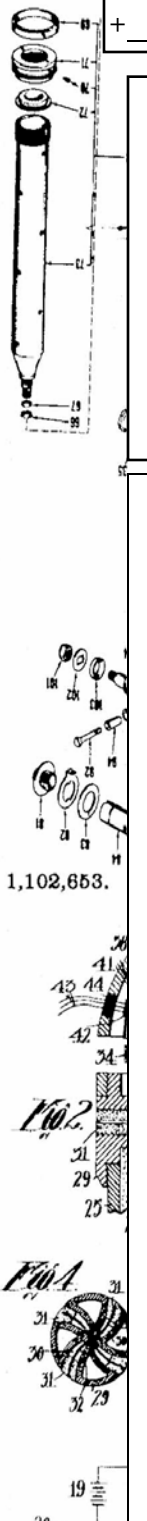
# UIL Calculator Applications

## Test 20A

(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<sup>0\*</sup>, 1.23x10<sup>1</sup>, 1.23x10<sup>01</sup>, .0190, 0.0190, 1.90x10<sup>-2</sup>  
 Incorrect: 12.30, 123.0, 1.23(10)<sup>2</sup>, 1.23•10<sup>2</sup>, 1.230x10<sup>2</sup>, 1.23\*10<sup>2</sup>, 0.19, 1.9x10<sup>-2</sup>, 19.0x10<sup>-3</sup>, 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<sup>u</sup>.



Witnesses:  
 G. P. Wilson  
 J. J. Hartnett

20A-1.  $(3.54 + 5.73) \times 0.996$  ----- 1= \_\_\_\_\_

20A-2.  $(0.259 + 0.278) \times (-0.39) - 0.443$  ----- 2= \_\_\_\_\_

20A-3.  $(3.29 + 12.8 - 2.45)/(\pi) + 0.648$  ----- 3= \_\_\_\_\_

20A-4.  $\frac{(53.8)(28.9 - 13.9 + 25.6)}{(-84)(10.8)}$  ----- 4= \_\_\_\_\_

20A-5.  $\frac{(-0.00711 - 0.00567)(5.66)}{\{(-8.21)/(-68.7)\}} - (\pi - 1.2)$  ----- 5= \_\_\_\_\_

20A-6. What is the cube root of -957? ----- 6= \_\_\_\_\_

20A-7. What is the remainder of 4830 divided by 5.36? ----- 7= \_\_\_\_\_

20A-8. What is 2 cubed divided by 3 squared? ----- 8= \_\_\_\_\_

20A-9.

SQUARE

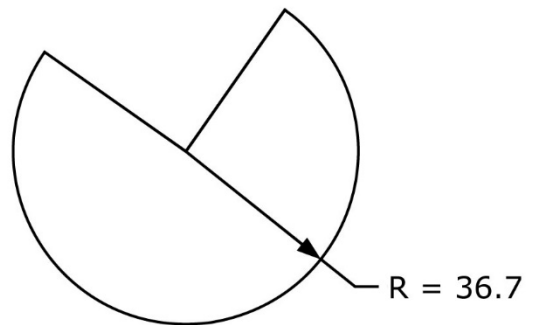


Area = 0.245

20A-9 = \_\_\_\_\_

20A-10.

THREE QUARTER CIRCLE



Area = ?

20A-10 = \_\_\_\_\_

20A-11.  $\frac{(-0.0817)(0.0178) + (0.0651)(-0.044)}{-3.57 + 0.496 - (-5.54)(0.35)}$  ----- 11= \_\_\_\_\_

20A-12.  $\frac{-0.0701 + 0.0445}{(0.711)(1.54)(-5.61 \times 10^{-9})} + (757 + 1250)(592 - 105)$  ----- 12= \_\_\_\_\_

20A-13.  $\frac{2.33 \times 10^5 + 3.32 \times 10^5}{(-0.913)(-0.632) + 0.894} + \frac{5120 - 3310 + 7320}{(-3.76 \times 10^{-5})(-390)}$  ----- 13= \_\_\_\_\_

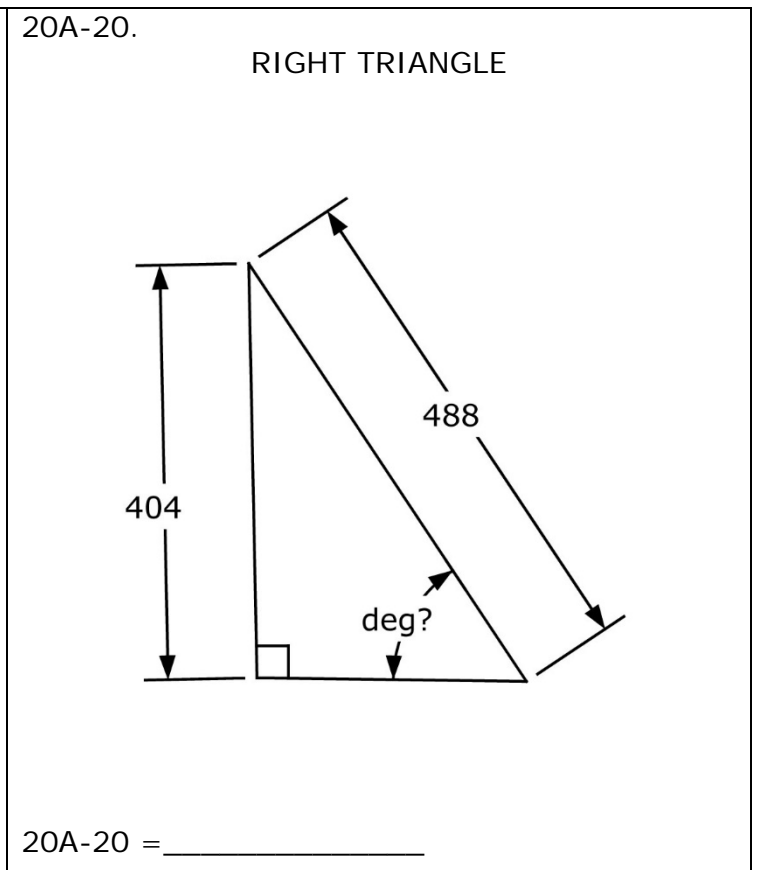
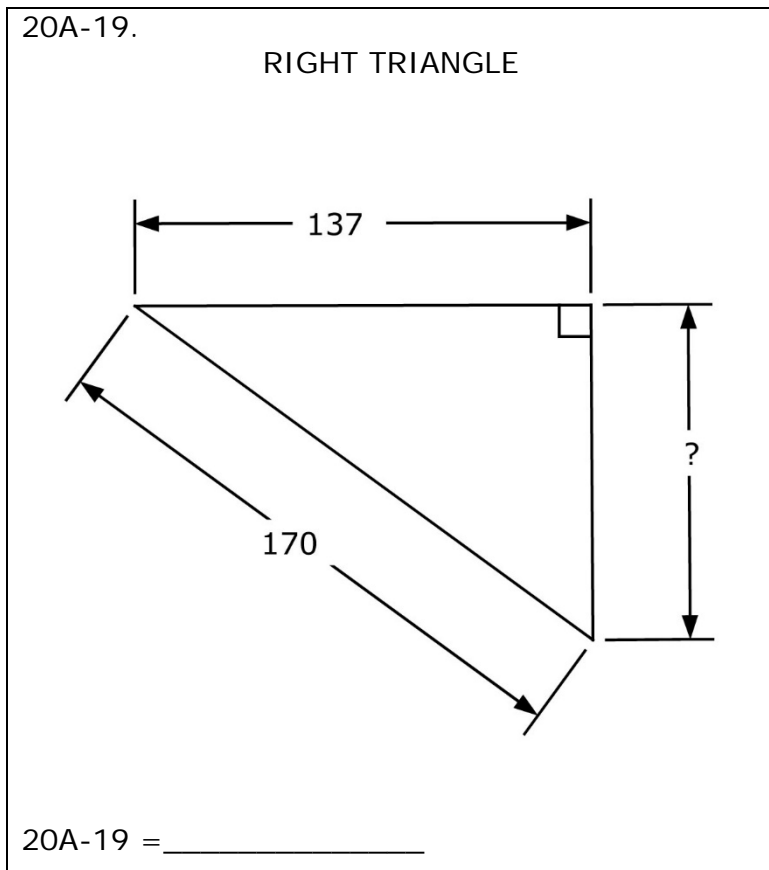
20A-14.  $\frac{367 + 300 - 339}{(0.247)(5.16)} - \frac{(95300)(2.68 \times 10^{-4} + 1.03 \times 10^{-4})}{0.649 + 0.462 - 0.84}$  ----- 14= \_\_\_\_\_

20A-15.  $\frac{1.33 \times 10^5 + 3.87 \times 10^5 - (97300 + 1.18 \times 10^5)(\pi - 1.95)}{(-555)(-7.84)(-7.65)(514 - 253 + 1520)}$  ----- 15= \_\_\_\_\_

20A-16. A ream of paper has 500 sheets. A box has 10 reams, and a pallet has 40 boxes. How many sheets of paper are in a pallet? ----- 16= \_\_\_\_\_ integer

20A-17. US lifespan is 78.7 yr. The average human heartbeat rate is 72 beats/min. How many times does the heart beat in a lifetime? ----- 17= \_\_\_\_\_

20A-18. Wally has \$3500 for a "new" car. He finds a car for \$9000, and he can take out a 3-yr loan at 0% annual interest for the difference, making equal monthly payments. If insurance and gas are \$182 monthly, what does he pay monthly? ----- 18= \$ \_\_\_\_\_



20A-21.  $\frac{1}{\pi + 2.48} + \frac{1}{3.07 - 4.15} + \frac{1}{(0.805)}$  ----- 21=\_\_\_\_\_

20A-22.  $\sqrt{\frac{(4.66)(\pi)}{166 + 29.8}} + 0.264$  ----- 22=\_\_\_\_\_

20A-23.  $(-8.82)(-0.0993)\sqrt{(-0.942)^2/0.758} + 1/\sqrt{0.306 + 2.17}$  ----- 23=\_\_\_\_\_

20A-24.  $\left[\frac{\pi + 1.3 + \sqrt{0.492/0.165}}{-54.6 + 30.5}\right]^2$  ----- 24=\_\_\_\_\_

20A-25.  $(1.52)(5.27) + \sqrt{(38.5)/(3.79)} + [(0.262)(8.24)]^2$  ----- 25=\_\_\_\_\_

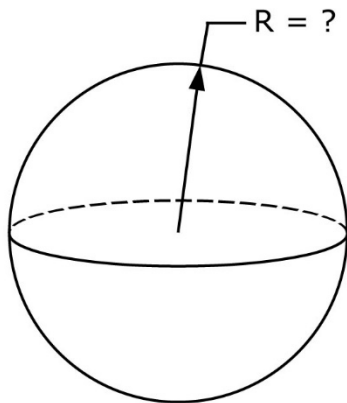
20A-26. A contact lens is, on a mass basis, considerably more expensive than gold. Six lenses cost \$25, and each lens weighs 14 mg. Gold costs \$18,000/lb. What is the ratio of the cost/mass of a lens to the cost/mass of gold? ----- 26=\_\_\_\_\_

20A-27. Greenland has the lowest population density of all countries. It has a land area of 836,297 mi<sup>2</sup> with a population of 55,877 people. What is the percent error in its reported population density of 0.08 people/mi<sup>2</sup>? ---- 27=\_\_\_\_\_%(SD)

20A-28. Mannie has \$5000 but needs \$5800 in two years. What annual interest rate must she find? ----- 28=\_\_\_\_\_%

20A-29.

SPHERE

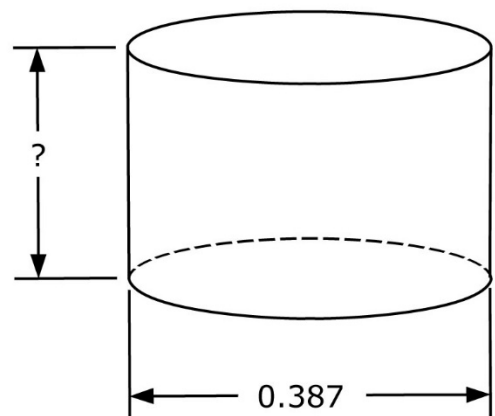


Surface Area = 623

20A-29 = \_\_\_\_\_

20A-30.

CYLINDER



Volume = 0.0291

20A-30 = \_\_\_\_\_

20A-31.  $\sqrt{\frac{6.27}{\sqrt{91 + 65.4}}} \times \left[ \frac{1}{(8.18 - 7.95)^2} + \frac{1}{(0.738 + 0.729)^2} \right]$  ----- 31 = \_\_\_\_\_

20A-32.  $\left[ \frac{-9.43 \times 10^{-6}}{3.97 \times 10^{-4} + 2.03 \times 10^{-4}} + 0.0174 \right] \times \left\{ 759 + (-39)^2 - \sqrt{4.10 \times 10^6} \right\}$  32 = \_\_\_\_\_

20A-33.  $\frac{[0.0222/(0.508 + 0.484) + 1/(7.04)]^{1/2}}{(5.2 + 39.7)^2 \times \sqrt{0.752 - (-0.229)}}$  ----- 33 = \_\_\_\_\_

20A-34.  $\frac{\sqrt{(80800)/\{(12400)/\sqrt{19300}\}}}{5.39 + (0.889)(\pi)} + \{8.48 + 12.1\}^{1/2}$  ----- 34 = \_\_\_\_\_

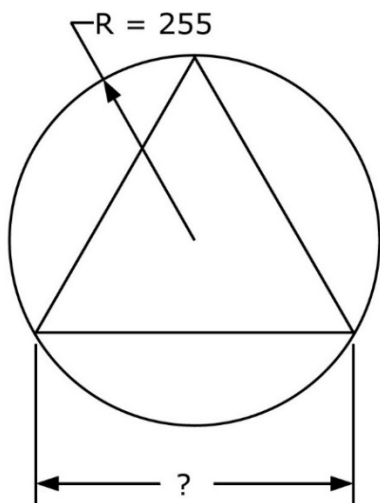
20A-35.  $\frac{\left[ \frac{(716 + 587)}{(996 + 3730)} \right]^2 + \sqrt{\frac{0.00139 + 0.00251}{\sqrt{0.559}}}}{\{(658)/(-906)\}^2}$  ----- 35 = \_\_\_\_\_

20A-36. It's estimated that there are as many as  $10^{19}$  insects in the world.  
 What is the average insect density on earth's surface? ----- 36 = \_\_\_\_\_ insects/ft<sup>2</sup>

20A-37. John and Jose start running together on a 440-yd track. Jose runs a mile in 5.8 min, 10% faster than John. How long will it take Jose to lap John? ----- 37 = \_\_\_\_\_ min

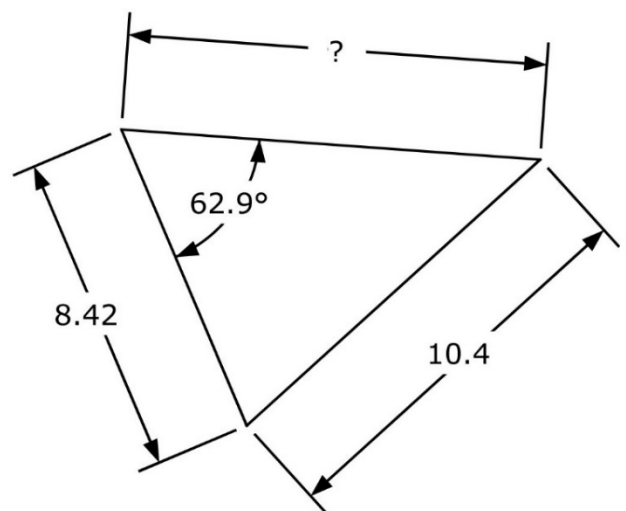
20A-38. Translucent plates absorb light according to  $I = I_0 \exp(-\alpha t)$ , where  $I$  is the transmitted light,  $I_0$  the incident light,  $t$  the thickness of the plate and  $\alpha$  is an absorption constant. What thickness of plate is needed to absorb 85% of the incident light if  $\alpha$  equals 0.16/mm? ----- 38 = \_\_\_\_\_ mm

20A-39. CIRCLE AND EQUILATERAL TRIANGLE



20A-39 = \_\_\_\_\_

20A-40. SCALENE TRIANGLE



20A-40 = \_\_\_\_\_

20A-41.  $\frac{10^{-(2.74 - 6.56)}}{3.07 \times 10^6 + 1.00 \times 10^6}$  ----- 41 = \_\_\_\_\_

20A-42.  $-5.47 e^{0.207} + (-1.13) e^{-0.499}$  ----- 42 = \_\_\_\_\_

20A-43.  $\frac{4.74 - 5.54}{\text{Log}(9.98 + 7.35)}$  ----- 43 = \_\_\_\_\_

20A-44.  $(877 + 1430)^{1/3} + 1/\{(604)^{-0.371}\}$  ----- 44 = \_\_\_\_\_

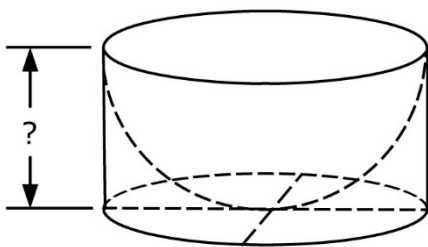
20A-45. (deg)  $\sin \left[ 90^\circ \times \frac{(-83000)}{(1.57 \times 10^5)} \right] + \cos \{ 33.6^\circ - 31.2^\circ \}$  ----- 45 = \_\_\_\_\_

20A-46. If it takes 22 blows to fill an 8 in diameter balloon, what is the diameter of a balloon that requires 85 blows to fill? ----- 46 = \_\_\_\_\_ in

20A-47. Earth's gravitational constant is latitude dependent. At the equator (0°), it is 32.0878 ft/s<sup>2</sup>. At the north pole (90°), it is 32.2577 ft/s<sup>2</sup>. Other values are (25°, 32.1180), (50°, 32.1873) and (60°, 32.2151). At what latitude is the gravitational constant equal to the "official" UIL value, 32.174 ft/s<sup>2</sup>? ----- 47 = \_\_\_\_\_ °

20A-48. (rad) For what value of x between 0 and π/2 does tanx = 1-x? ----- 48 = \_\_\_\_\_

20A-49. CYLINDER WITH HEMISPHERICAL CAVITY

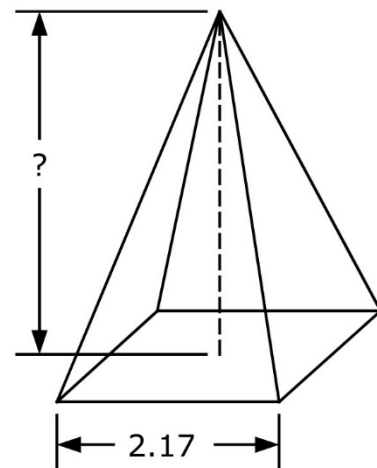


Volume = 464

20A-49 = \_\_\_\_\_

20A-50.

SQUARE PYRAMID



Total Surface Area = 19.6

20A-50 = \_\_\_\_\_

20A-51.  $10^{+(0.987)} + 10^{-(0.691)} + [10^{(0.181/0.214)} - 10^{(0.455)}]^{1/2} - 51 =$  \_\_\_\_\_

20A-52.  $\frac{1 + e^{\{0.931 + (0.798)(2.89)\}}}{(6.25 \times 10^{-7})(9.62 - e^{(-0.882)})}$  ----- 52 = \_\_\_\_\_

20A-53.  $\frac{(7.35 \times 10^{-4} + 0.00401) \text{Log}\{1/0.0674\}}{\text{Log}\{(0.027)/(0.0341 + 0.0858)\}}$  ----- 53 = \_\_\_\_\_

20A-54.  $\frac{(4.84)^{0.862} - (2.25)^{-0.699}}{2.4 + 0.4}$  ----- 54 = \_\_\_\_\_

20A-55. (rad)  $\frac{\arcsin\{(76)(7.07)/(2840)\}}{560 + (-88.3)(-14.4)}$  ----- 55 = \_\_\_\_\_

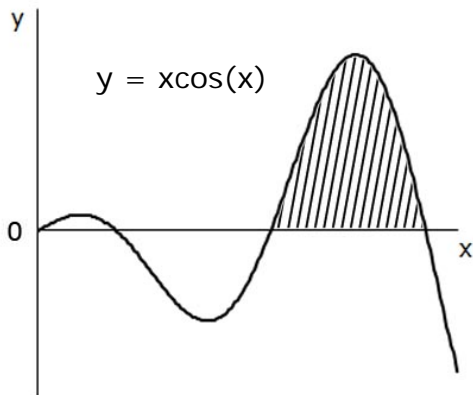
20A-56. Calculate the area under the curve  $y = 5\sin(\pi x/4)$  for  $0 < x < 4$ . ----- 56 = \_\_\_\_\_

20A-57. A line passing through the point (2,3) forms a right triangle with the x- and y-axes. What is the minimum area of this triangle? ----- 57 = \_\_\_\_\_

20A-58. What is the determinant of the product of  $\begin{bmatrix} 5 & 6 \\ 6 & -4 \end{bmatrix}$  times  $\begin{bmatrix} 2 & 3 \\ 3 & -1 \end{bmatrix}$ ? ----- 58 = \_\_\_\_\_

20A-59.

RADIANS

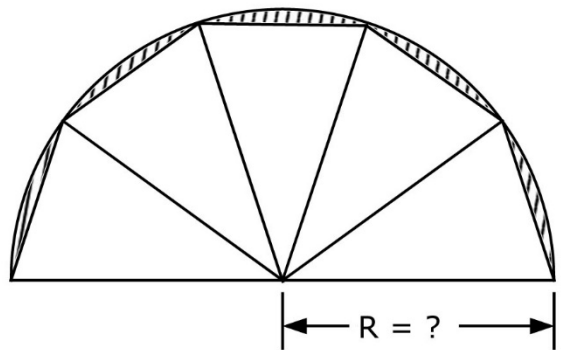


Hatched Area = ?

20A-59 = \_\_\_\_\_

20A-60.

CONGRUENT ISOSCELES TRIANGLES AND SEMICIRCLE



Hatched Area = 7100

20A-60 = \_\_\_\_\_

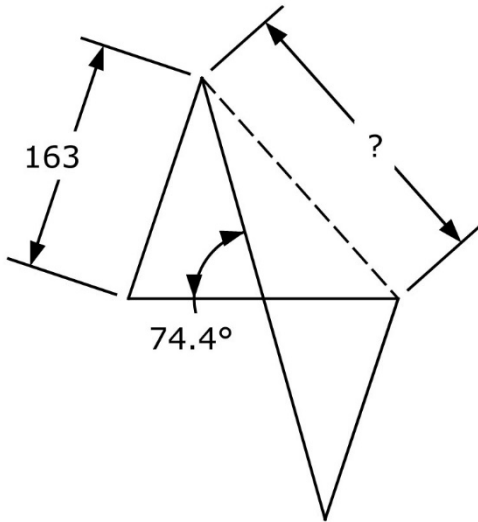


20A-61. The density of a spherical particle is 2.54 g/cc. What is the particle diameter if the surface area per unit mass is 20 m<sup>2</sup>/g? ----- 61= \_\_\_\_\_ μm

20A-62. What is 6.022 × 10<sup>23</sup> (Avogadro's number) raised to the 50<sup>th</sup> power? ----- 62= \_\_\_\_\_

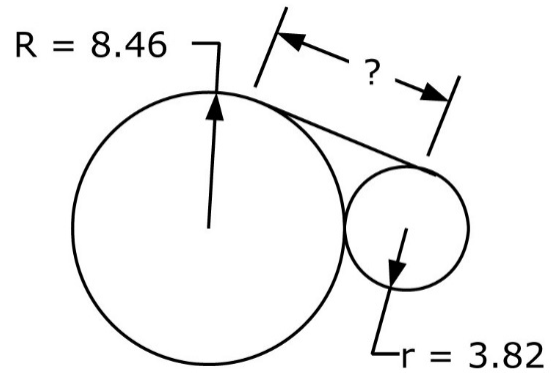
20A-63. Randy fires a gun with a muzzle velocity of 1000 ft/s. The bullet travels 3 mi, and the initial trajectory angle is less than 45°. Neglecting air resistance, what was the bullet maximum vertical height? ----- 63= \_\_\_\_\_ ft

20A-64. CONGRUENT ISOSCELES TRIANGLES



20A-64 = \_\_\_\_\_

20A-65. CIRCLES



20A-65 = \_\_\_\_\_

20A-66. 
$$\frac{\sqrt{(3.96)^3} \times \{e^{(7.31)(0.0589)}\}^3}{\sqrt[3]{e^{(2.14)} \times e^{(-0.83)}}}$$
 ----- 66= \_\_\_\_\_

20A-67.  $(92.8 - 22.6)^2 + (1.12 + 3.99)e^{\ln(446)}$  ----- 67= \_\_\_\_\_

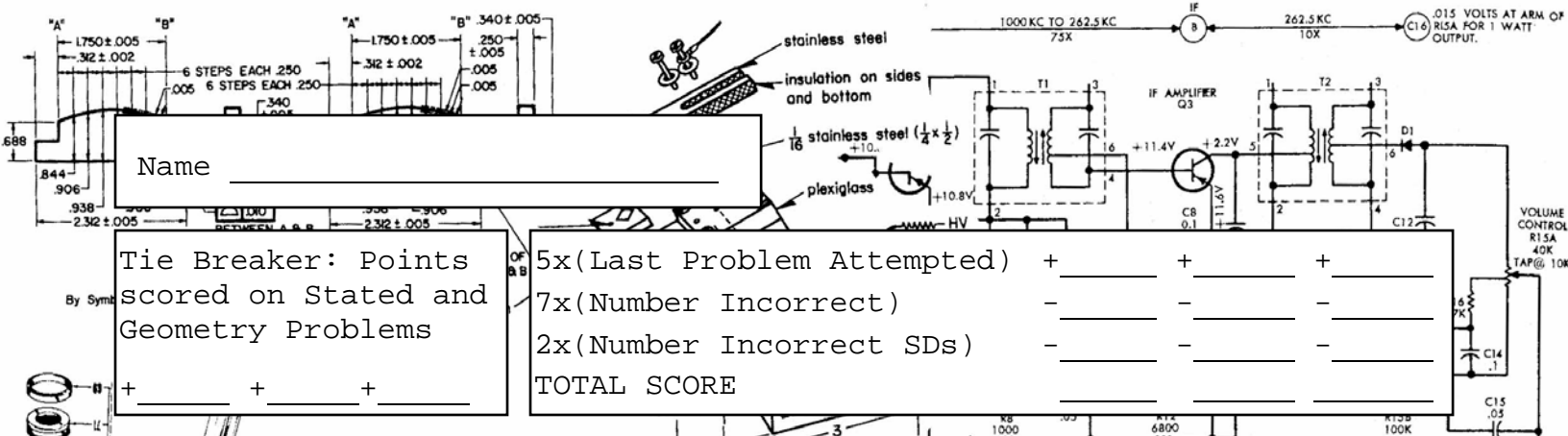
20A-68.  $(\text{rad}) \frac{98.2}{6(7.95)} \{ (2.88) + (1.93)\sin(\pi) \}^5$  ----- 68= \_\_\_\_\_

20A-69.  $1 + 0.73 + (0.73)^2 + \frac{(0.73)^4}{8} - \frac{(0.73)^5}{15}$  ----- 69= \_\_\_\_\_

20A-70.  $\frac{(50.8)}{(-0.963)} - \frac{(0.571)}{(-0.142)^2} \ln \left[ \frac{(-0.0972)^2 + (0.00468)}{(-0.527) + \sqrt{1.4}} \right]$  ----- 70= \_\_\_\_\_

20A-1	= 9.23 = $9.23 \times 10^0$	20A-11	= 0.00380 = $3.80 \times 10^{-3}$	20A-21	= 0.494 = $4.94 \times 10^{-1}$
20A-2	= -0.652 = $-6.52 \times 10^{-1}$	20A-12	= $5.15 \times 10^6$	20A-22	= 0.537 = $5.37 \times 10^{-1}$
20A-3	= 4.99 = $4.99 \times 10^0$	20A-13	= $1.01 \times 10^6$	20A-23	= 1.58 = $1.58 \times 10^0$
20A-4	= -2.41 = $-2.41 \times 10^0$	20A-14	= 127 = $1.27 \times 10^2$	20A-24	= 0.0655 = $6.55 \times 10^{-2}$
20A-5	= -2.55 = $-2.55 \times 10^0$	20A-15	= -0.00444 = $-4.44 \times 10^{-3}$	20A-25	= 15.9 = $1.59 \times 10^1$
20A-6	= -0.985 = $-9.85 \times 10^{-1}$	20A-16	= 200,000 integer	20A-26	= 7.50 = $7.50 \times 10^0$
20A-7	= 0.640 = $6.40 \times 10^{-1}$	20A-17	= $2.98 \times 10^9$	20A-27	= 19.73 = $1.973 \times 10^1$ (4SD)
20A-8	= 0.889 = $8.89 \times 10^{-1}$	20A-18	= \$334.78	20A-28	= 7.70 = $7.70 \times 10^0$
20A-9	= 0.495 = $4.95 \times 10^{-1}$	20A-19	= 101 = $1.01 \times 10^2$	20A-29	= 7.04 = $7.04 \times 10^0$
20A-10	= 3170 = $3.17 \times 10^3$	20A-20	= 55.9 = $5.59 \times 10^1$	20A-30	= 0.247 = $2.47 \times 10^{-1}$

20A-31	= 13.7 = $1.37 \times 10^1$	20A-41	= 0.00162 = $1.62 \times 10^{-3}$	20A-51	= 11.9 = $1.19 \times 10^1$	20A-61	= 0.118 = $1.18 \times 10^{-1}$
20A-32	= 0.430 = $4.30 \times 10^{-1}$	20A-42	= -7.41 = $-7.41 \times 10^0$	20A-52	= $4.60 \times 10^6$	20A-62	= $9.71 \times 10^{1188}$
20A-33	= 0.000203 = $2.03 \times 10^{-4}$	20A-43	= -0.646 = $-6.46 \times 10^{-1}$	20A-53	= -0.00858 = $-8.58 \times 10^{-3}$	20A-63	= 1080 = $1.08 \times 10^3$
20A-34	= 8.21 = $8.21 \times 10^0$	20A-44	= 24.0 = $2.40 \times 10^1$	20A-54	= 1.19 = $1.19 \times 10^0$	20A-64	= 205 = $2.05 \times 10^2$
20A-35	= 0.281 = $2.81 \times 10^{-1}$	20A-45	= 0.261 = $2.61 \times 10^{-1}$	20A-55	= 0.000104 = $1.04 \times 10^{-4}$	20A-65	= 11.4 = $1.14 \times 10^1$
20A-36	= 1820 = $1.82 \times 10^3$	20A-46	= 12.6 = $1.26 \times 10^1$	20A-56	= 12.7 = $1.27 \times 10^1$	20A-66	= 18.5 = $1.85 \times 10^1$
20A-37	= 16.0 = $1.60 \times 10^1$	20A-47	= 45.4 = $4.54 \times 10^1$	20A-57	= 12.0 = $1.20 \times 10^1$	20A-67	= 7210 = $7.21 \times 10^3$
20A-38	= 11.9 = $1.19 \times 10^1$	20A-48	= 0.480 = $4.80 \times 10^{-1}$	20A-58	= 616.00 = $6.16 \times 10^2$	20A-68	= 408 = $4.08 \times 10^2$
20A-39	= 442 = $4.42 \times 10^2$	20A-49	= 7.62 = $7.62 \times 10^0$	20A-59	= 12.6 = $1.26 \times 10^1$	20A-69	= 2.28 = $2.28 \times 10^0$
20A-40	= 11.0 = $1.10 \times 10^1$	20A-50	= 3.26 = $3.26 \times 10^0$	20A-60	= 265 = $2.65 \times 10^2$	20A-70	= 55.9 = $5.59 \times 10^1$



Name \_\_\_\_\_

Tie Breaker: Points scored on Stated and Geometry Problems  
 + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_

5x(Last Problem Attempted) + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_  
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 TOTAL SCORE \_\_\_\_\_

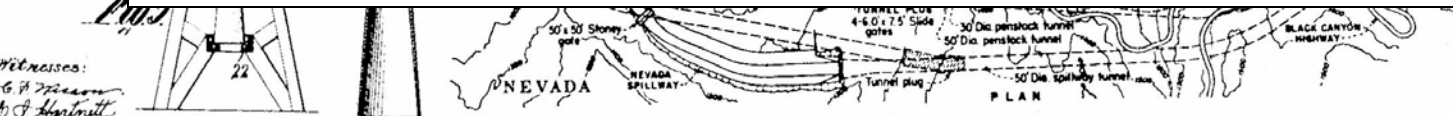
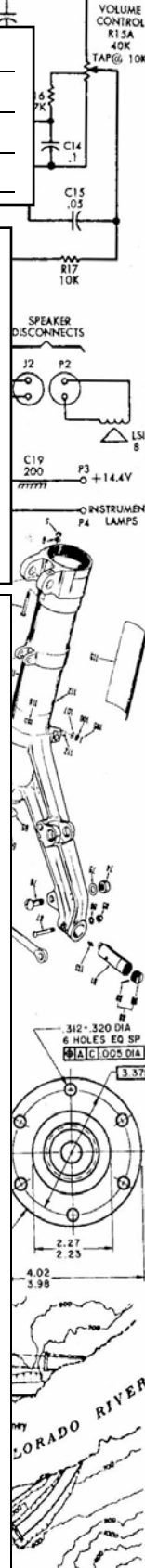
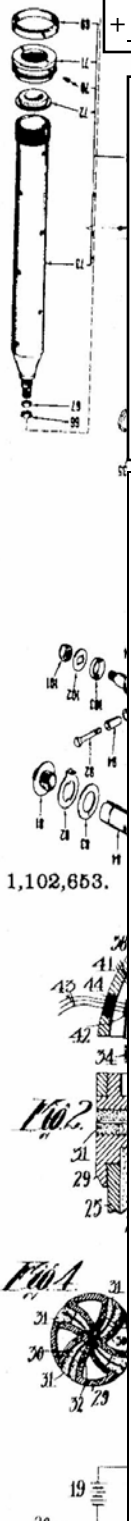
# UIL Calculator Applications

## Test 20B

### (Invitational B)

**DO NOT OPEN THE TEST UNTIL INSTRUCTED TO BEGIN**

- I. Calculator Applications rules and scoring—See UIL Constitution
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      - 1. Examples (\* means correct but not recommended)
      - Correct: 12.3, 123, 123.\*, 1.23x10\*, 1.23x10<sup>0\*</sup>  
 1.23x10<sup>1</sup>, 1.23x10<sup>01</sup>, .0190, 0.0190, 1.90x10<sup>-2</sup>
      - Incorrect: 12.30, 123.0, 1.23(10)<sup>2</sup>, 1.23•10<sup>2</sup>, 1.230x10<sup>2</sup>,  
 1.23\*10<sup>2</sup>, 0.19, 1.9x10<sup>-2</sup>, 19.0x10<sup>-3</sup>, 1.90E-02
    - 2. Plus or minus one digit error in the third significant digit is permitted.
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    - 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<sup>u</sup>.



20B-1.  $(0.101/0.0985) + 0.128$  ----- 1= \_\_\_\_\_

20B-2.  $(-8.97 + 4.55 - 1.12) \times \pi$  ----- 2= \_\_\_\_\_

20B-3.  $\frac{(-0.162)(0.688)(0.234)}{0.167} + 0.0778$  ----- 3= \_\_\_\_\_

20B-4.  $\frac{(-0.671)(0.794 - 0.659 + 2.78)}{(0.313)(-0.036)}$  ----- 4= \_\_\_\_\_

20B-5.  $\frac{(-0.00593 - 0.0047)(0.195)}{\{(-0.409)/(0.637)\}} - (0.00353 - 5.56 \times 10^{-4})$  ----- 5= \_\_\_\_\_

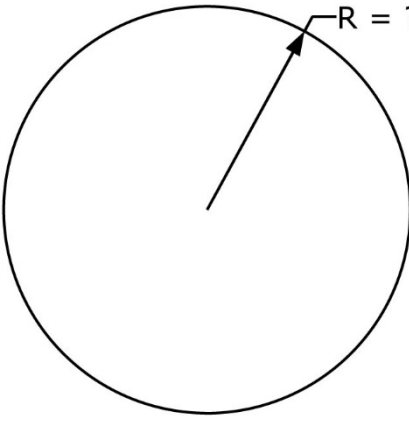
20B-6. What is the positive difference of 37.5 and  $10\pi$ ? ----- 6= \_\_\_\_\_

20B-7. What number when divided by 405 yields 77.8? ----- 7= \_\_\_\_\_

20B-8. Solve for x if  $4x = 17/x^2$ . ----- 8= \_\_\_\_\_

20B-9.

CIRCLE

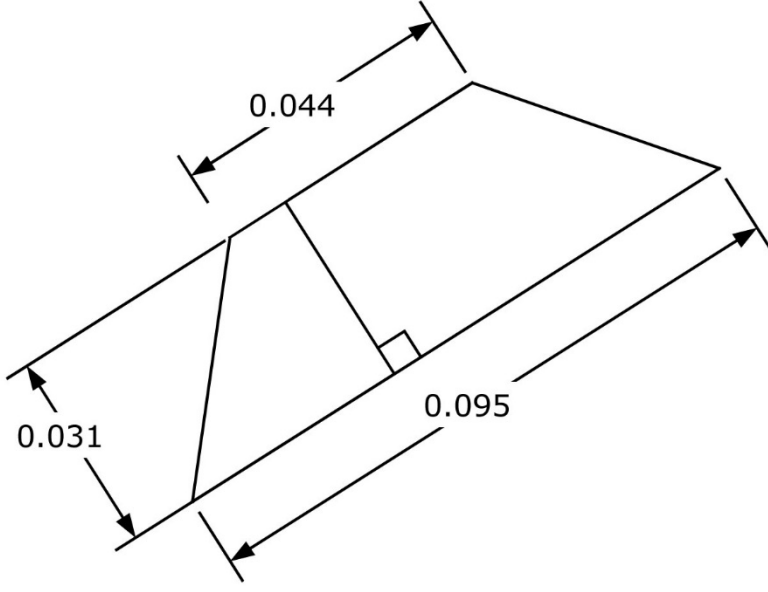


Perimeter = 894

20B-9 = \_\_\_\_\_

20B-10.

ISOSCELES TRAPEZOID



Area = ?

20B-10 = \_\_\_\_\_

20B-11.  $\frac{(6340 + 6120)}{(0.24 - 0.259)} + \frac{(-2.65 \times 10^6 + 3.98 \times 10^6)}{(8.7 - 1.12)}$  ----- 11 = \_\_\_\_\_

20B-12.  $\frac{-237(3.48 \times 10^{-5} + 1.31 \times 10^{-5})}{(289 - 533)(792)} - \frac{-7.61 \times 10^{-9}}{-0.345 - 0.275}$  ----- 12 = \_\_\_\_\_

20B-13.  $\frac{8.49 \times 10^5 + 3.22 \times 10^6}{(-1.58)(-0.513) + 0.852} + \frac{5620 - 4750 + 26500}{(0.0294)(0.0491)}$  ----- 13 = \_\_\_\_\_

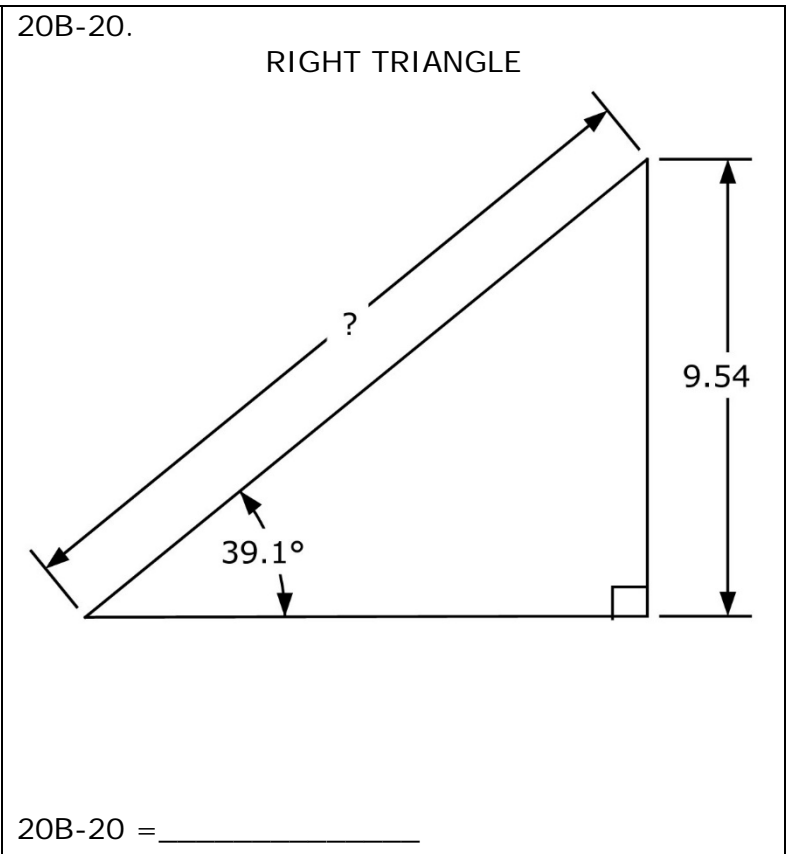
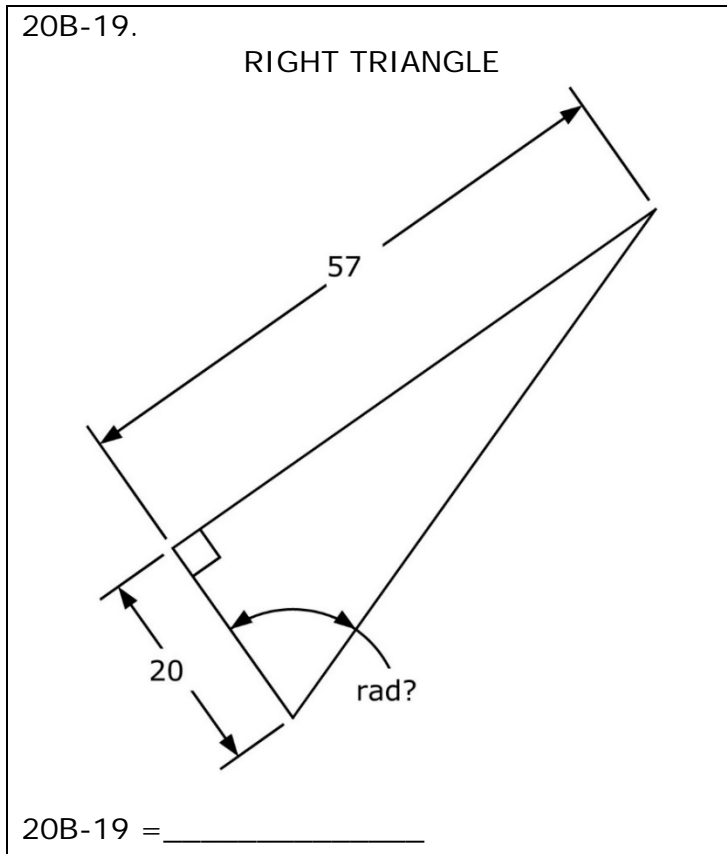
20B-14.  $\frac{(4690 + 3320 - 2250)(0.00761 + 0.036 - 0.0199)}{(5.78 - 3.18)(-7.32)(-7.74 - 6.24)}$  ----- 14 = \_\_\_\_\_

20B-15.  $\frac{(82100 + 29700 - 44900)(0.749 - 0.171 - 0.596)}{(-55.8)(-6.14)(-21.9)(8.45 + 7.8 + 36.4)}$  ----- 15 = \_\_\_\_\_

20B-16. In 2019, the US national debt reached 22 trillion dollars. If the population of the US in 2019 was 327.2 million people, what is the average per capita debt? ----- 16 = \$ \_\_\_\_\_

20B-17. What is the percent error in assuming the value 3 for  $\pi$ ? ----- 17 = \_\_\_\_\_ %

20B-18. If a person with 20-20 vision can read letters that are 0.2 in tall when standing 20 ft away, how tall should letters be if the person can read them from a distance of 1 mi? ----- 18 = \_\_\_\_\_ ft



20B-21.  $\frac{-0.124 + 1/(-6.84)}{1/(0.457) + 2.8} + \frac{1}{(-5.21)}$  ----- 21= \_\_\_\_\_

20B-22.  $\sqrt{\frac{(7.64)(7.19)}{339 + 142}} + 0.0902$  ----- 22= \_\_\_\_\_

20B-23.  $[-24.3 + \sqrt{201}]^2 \times [392 + 863]^2 \times \sqrt{2.45/5.63}$  ----- 23= \_\_\_\_\_

20B-24.  $\left[ \frac{2.47 + 1.24 + \sqrt{0.487/0.781}}{-4.89 + 2.98} \right]^2$  ----- 24= \_\_\_\_\_

20B-25.  $(0.866)(0.862)\sqrt{(-0.171)^2/0.585} + 1/\sqrt{33.8 + 43.3}$  ----- 25= \_\_\_\_\_

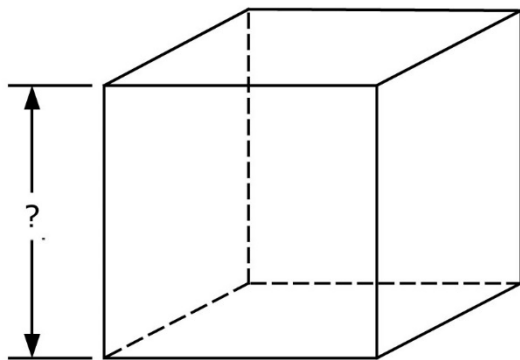
20B-26. The Singapore Flyer is the second-largest Ferris wheel in the world, 165 meters in diameter. If it takes 30 min to go around once, what is the car velocity? ----- 26= \_\_\_\_\_ m/s

20B-27. William lives 2.75 mi from high school. He can either walk to school or rent a scooter. Scooters cost \$1 to unlock and \$0.15 for each mile or fraction of a mile. If he wants to spend no more than \$10/wk on transportation, how many times weekly can he take a scooter round-trip to/from school? ----- 27= \_\_\_\_\_ integer

20B-28. Andy uses a 25-ft tape measure to measure a canoe. He measures 16 ft 4.53 in. Later he finds that his tape measure is not accurate. The tape measure total length is actually only 24 ft 11.48 in. What is the actual canoe length? ----- 28= \_\_\_\_\_ ft(SD)

20B-29.

CUBE

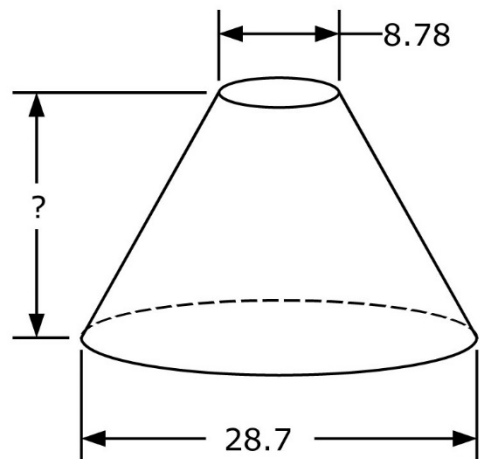


Surface Area = 0.773

20B-29 = \_\_\_\_\_

20B-30.

FRUSTUM



Volume = 5340

20B-30 = \_\_\_\_\_

20B-31.  $\left[ \frac{-0.0586}{0.0701 + 0.0673} + 0.459 \right] \times \left\{ 1090 + (-53)^2 - \sqrt{3.54 \times 10^7} \right\}$  --- 31= \_\_\_\_\_

20B-32.  $\frac{1}{4.89 \times 10^{-4}} + \frac{1}{\sqrt{2.56 \times 10^{-6}}} + \frac{(9.64 + 12.7 - 9.51)^2}{\sqrt{2.17 - 2.07}}$  ----- 32= \_\_\_\_\_

20B-33.  $\frac{[0.835/(0.534 + 0.337) + 1/(0.268)]^{1/2}}{(7.3 + 10)^2 \times \sqrt{6.84 - (-6.24)}}$  ----- 33= \_\_\_\_\_

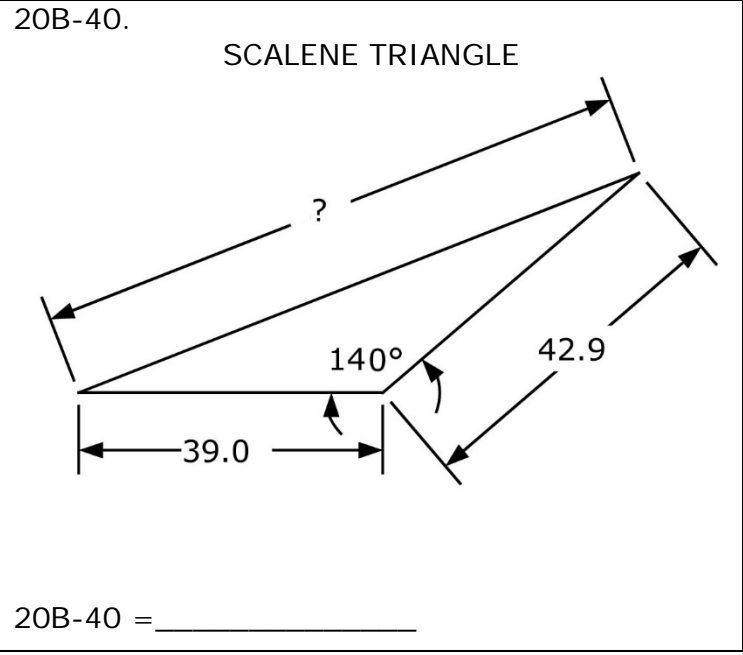
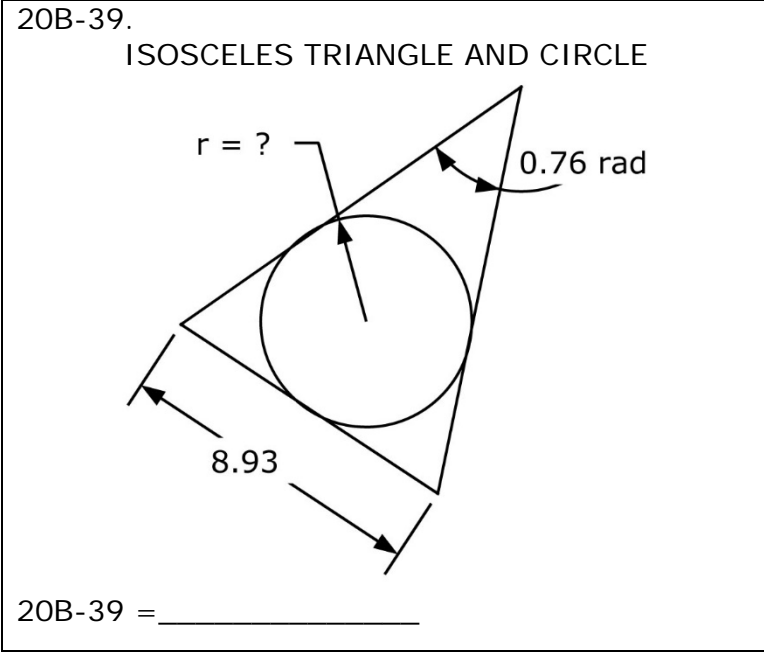
20B-34.  $\frac{(9.9)^2 + \sqrt{7160}}{\sqrt{(4.86)(-62.4)^2}} + \frac{\sqrt{\sqrt{(2.39 \times 10^5)(0.905)}}}{8.24 + 8.43}$  ----- 34= \_\_\_\_\_

20B-35.  $\frac{\left[ \frac{(-7620 + 4550)}{(453 + 845)} \right]^2 + \sqrt{\frac{15.6 + 68.2}{\sqrt{0.122}}}}{\{(-7790)/(9680)\}^2}$  ----- 35= \_\_\_\_\_

20B-36. Calculate the length of the line segment formed by the intersection of the parabolas  $y = (x+5)^2 - 8$  and  $y = -2(x-7)^2 + 300$ . ----- 36= \_\_\_\_\_

20B-37. For carbon-10, 88.4% decays in one minute. What is the isotope's half life? ----- 37= \_\_\_\_\_ s

20B-38. A car makes one loop around the Indianapolis 500 track, 2.5 mi. The car accelerates from rest to 85 mph and then travels at that speed to the finish line. What was the acceleration if the car's time for the loop was 1.9 min? ----- 38= \_\_\_\_\_ ft/s<sup>2</sup>





20B-41.  $10^{-\{(0.153 - 0.812)/(0.706 + 0.52)\}}$  ----- 41 = \_\_\_\_\_

20B-42.  $\frac{(4.70 \times 10^{-5})}{(-4.67 \times 10^{-5})} [1 - e^{-(0.885)(0.698)}]$  ----- 42 = \_\_\_\_\_

20B-43.  $(-0.475) \text{Log} \{ (0.464)(\pi + 1/0.313) \}$  ----- 43 = \_\_\_\_\_

20B-44.  $(36900 + 41400)^{-(0.71 + 0.418)}$  ----- 44 = \_\_\_\_\_

20B-45. (deg)  $\frac{\cos\{(37^\circ)/(1.83)\}}{\sin\{116^\circ - 200^\circ\}}$  ----- 45 = \_\_\_\_\_

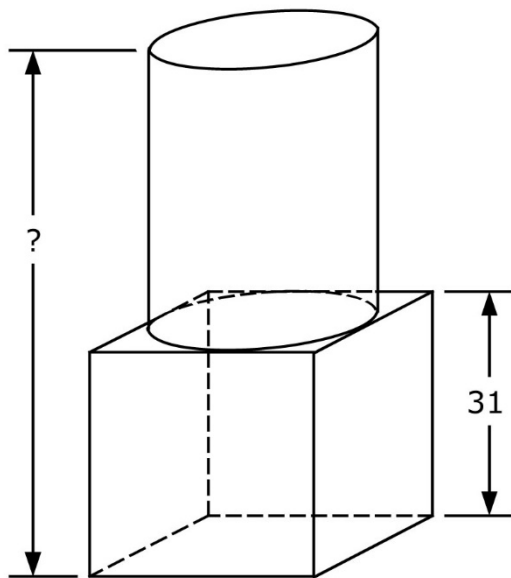
20B-46. A 6-in long bag holds 108 candies. How many candies are in a 16-in long bag of identical shape? ----- 46 = \_\_\_\_\_

20B-47. Wire diameter is inversely proportional to  $\exp(\text{gage number}/10)$ . Some (gage number, wire diameter) pairs are: (0, 0.34 in), (10, 0.134 in), (20, 0.035 in), (30, 0.012 in). What is the percent error in the interpolated value for a 25 gage wire if the actual diameter is 0.020 in? ----- 47 = \_\_\_\_\_ %

20B-48. (rad) Solve for the smallest positive value of x if  $x \sin(x) = \cos(x) + x - 8$ . ----- 48 = \_\_\_\_\_

20B-49.

CUBE AND CYLINDER

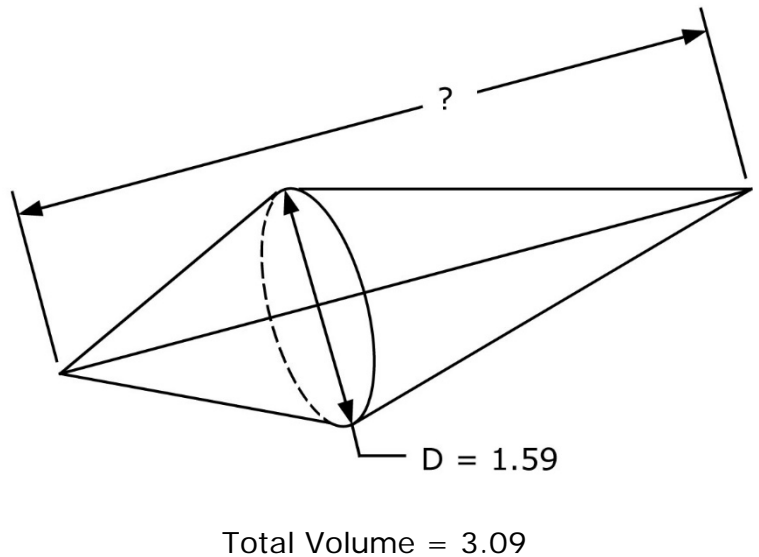


Cube Volume = Cylinder Volume

20B-49 = \_\_\_\_\_

20B-50.

CONES



Total Volume = 3.09

20B-50 = \_\_\_\_\_

20B-51.  $10^{+(0.759)} + 10^{-(0.171)} + [10^{(0.514/0.326)} - 10^{(1.57)}]^{1/2}$  -- 51=\_\_\_\_\_

20B-52.  $\frac{1 + e^{\{0.825 + (0.371)(1.93)\}}}{(-6.73 \times 10^{-4})(\pi - e^{(-0.199)})}$  ----- 52=\_\_\_\_\_

20B-53.  $\frac{(0.508) \text{Log}(-0.548 + 2.97)}{\text{Log}(0.779) - (0.961)(0.36)}$  ----- 53=\_\_\_\_\_

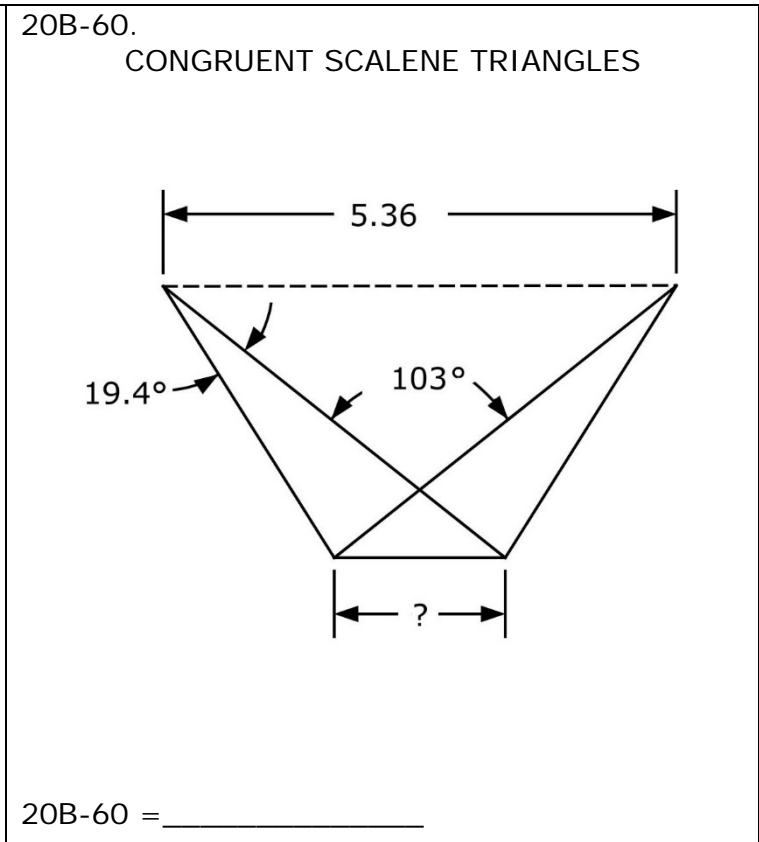
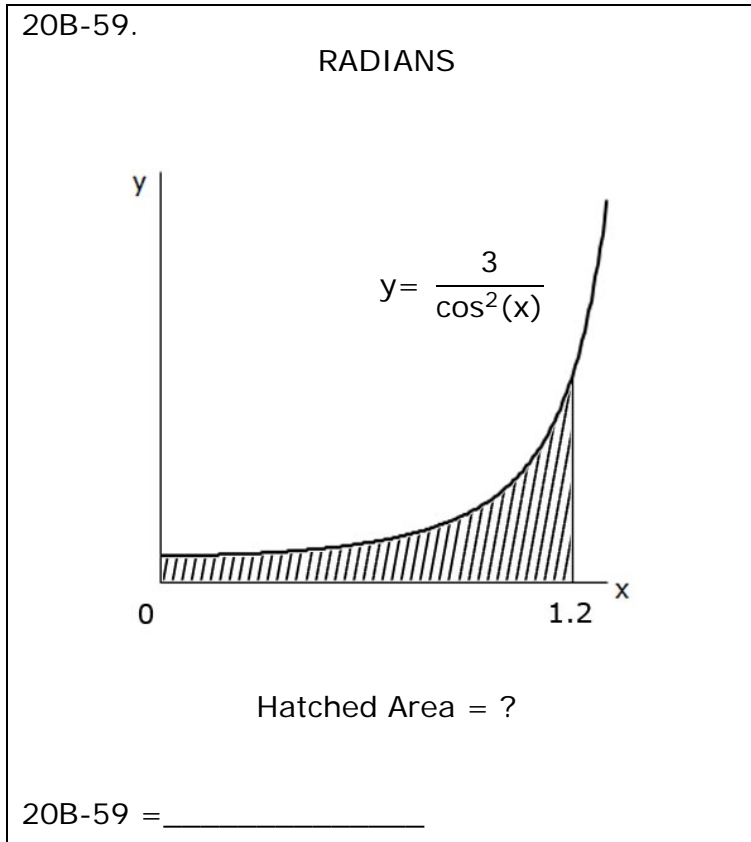
20B-54.  $\frac{(-31.8 + 66.2)^{-0.577}}{(15.1)^{-(0.685 + 0.749)}}$  ----- 54=\_\_\_\_\_

20B-55. (rad)  $\frac{\arctan\{7.3 + (7.93)(0.645)\}}{\arcsin\{(78.7 + 54.5)/1210\}}$  ----- 55=\_\_\_\_\_

20B-56. (rad) Calculate the slope of the curve  $y = x^2 \cos(x)$  at  $x = 13$ . ----- 56=\_\_\_\_\_

20B-57. A sector has a perimeter of 10 in. What is R if the area is maximized? ----- 57=\_\_\_\_\_ in

20B-58. Solve for  $K_{22}$  if  $\mathbf{K} = 2\mathbf{L} + 5\mathbf{M}$ ,  $\mathbf{L} = \begin{bmatrix} 41 & 48 \\ 48 & 43 \end{bmatrix}$ , and  $\mathbf{M} = \begin{bmatrix} -12 & 16 \\ 16 & 9 \end{bmatrix}$  .---- 58=\_\_\_\_\_

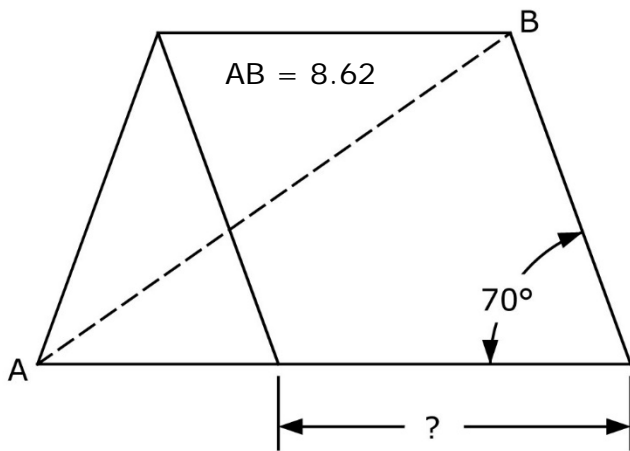


20B-61. Sailing around the world requires traveling a distance greater than the earth's circumference due to the land masses. A yacht sails at 7 knots and takes 2 years to sail around the world, sailing 8 hr/dy. If a knot is 1.151 mph, how much further does the yacht travel than the earth circumference? ----- 61 = \_\_\_\_\_ mi

20B-62. Solve  $5^{5^5}$ . ----- 62 = \_\_\_\_\_

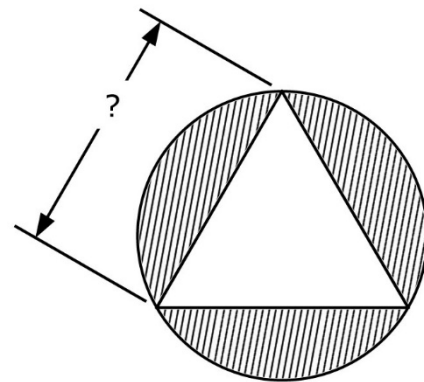
20B-63. A soldier fires a charge at an angle of  $35^\circ$  relative to horizontal at a target that is on the ground 1 mi off. They miss their target by 138 ft, landing short. What should the new angle be to hit the target? ----- 63 = \_\_\_\_\_  $^\circ$

20B-64. ISOSCELES TRIANGLE AND RHOMBUS



20B-64 = \_\_\_\_\_

20B-65. EQUILATERAL TRIANGLE AND CIRCLE



Hatched Area = 110

20B-65 = \_\_\_\_\_

20B-66.  $\text{Log}(6.49) + \text{Log}(1.64) + \text{Log}(6.65) + \text{Log} \left[ \frac{(4.34)}{(1.64)} \right]$  ----- 66 = \_\_\_\_\_

20B-67.  $e^{\text{Ln}[(9.52)(90.6)]} + 10^{\text{Log}[(0.754)(660)]}$  ----- 67 = \_\_\_\_\_

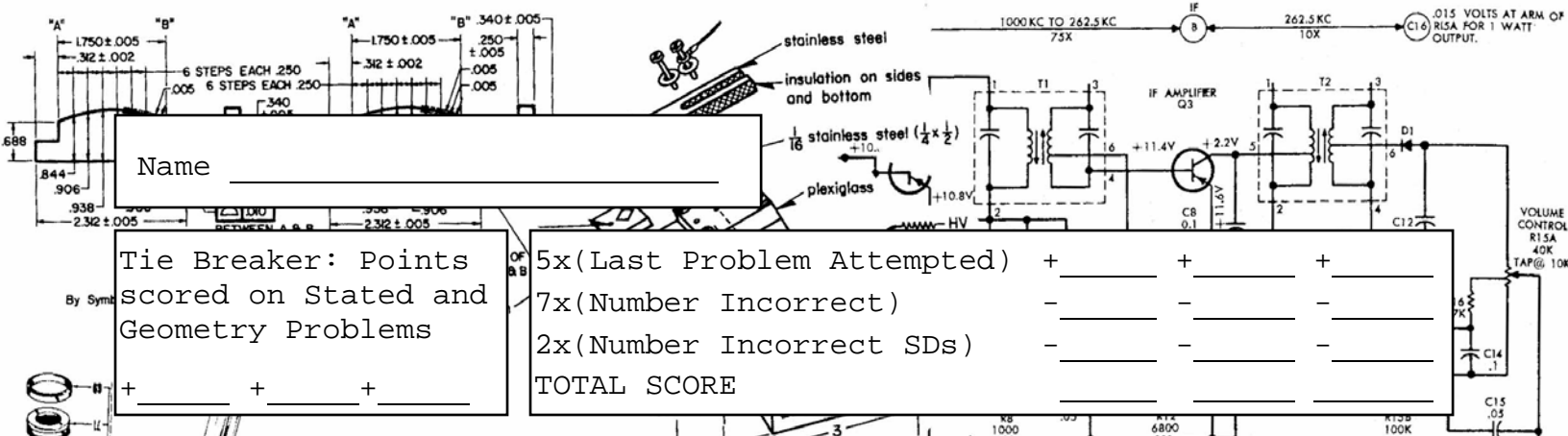
20B-68.  $(\text{deg}) \sin(-13.4^\circ)\cos(109^\circ) + \cos(-13.4^\circ)\sin(109^\circ)$  ----- 68 = \_\_\_\_\_

20B-69.  $1 + \frac{(0.85)^4}{2} - \frac{(0.85)^6}{6} + \frac{(0.85)^8}{24} - \frac{(0.85)^{10}}{120}$  ----- 69 = \_\_\_\_\_

20B-70.  $\frac{1}{\sqrt{(69.7)^2 - (2260)}} \text{Ln} \left\{ \frac{(140) - \sqrt{(69.7)^2 - (2260)}}{(140) + \sqrt{(69.7)^2 - (2260)}} \right\}$  ----- 70 = \_\_\_\_\_

20B-1	= 1.15 = $1.15 \times 10^0$	20B-11	= -480000 = $-4.80 \times 10^5$	20B-21	= -0.246 = $-2.46 \times 10^{-1}$
20B-2	= -17.4 = $-1.74 \times 10^1$	20B-12	= $4.65 \times 10^{-8}$	20B-22	= 0.428 = $4.28 \times 10^{-1}$
20B-3	= -0.0784 = $-7.84 \times 10^{-2}$	20B-13	= $2.14 \times 10^7$	20B-23	= $1.06 \times 10^8$
20B-4	= 174 = $1.74 \times 10^2$	20B-14	= 0.513 = $5.13 \times 10^{-1}$	20B-24	= 5.55 = $5.55 \times 10^0$
20B-5	= 0.000254 = $2.54 \times 10^{-4}$	20B-15	= 0.00305 = $3.05 \times 10^{-3}$	20B-25	= 0.281 = $2.81 \times 10^{-1}$
20B-6	= 6.08 = $6.08 \times 10^0$	20B-16	= \$67,237.16	20B-26	= 0.288 = $2.88 \times 10^{-1}$
20B-7	= 31500 = $3.15 \times 10^4$	20B-17	= -4.51 = $-4.51 \times 10^0$	20B-27	= 3 integer
20B-8	= 1.62 = $1.62 \times 10^0$	20B-18	= 4.40 = $4.40 \times 10^0$	20B-28	= 16.349 = $1.6349 \times 10^1$ (5SD)
20B-9	= 142 = $1.42 \times 10^2$	20B-19	= 1.23 = $1.23 \times 10^0$	20B-29	= 0.359 = $3.59 \times 10^{-1}$
20B-10	= 0.00215 = $2.15 \times 10^{-3}$	20B-20	= 15.1 = $1.51 \times 10^1$	20B-30	= 17.7 = $1.77 \times 10^1$

20B-31	= -66.7 = $-6.67 \times 10^1$	20B-41	= 3.45 = $3.45 \times 10^0$	20B-51	= 7.17 = $7.17 \times 10^0$	20B-61	= 22200 = $2.22 \times 10^4$
20B-32	= 3190 = $3.19 \times 10^3$	20B-42	= -0.464 = $-4.64 \times 10^{-1}$	20B-52	= -3630 = $-3.63 \times 10^3$	20B-62	= $1.91 \times 10^{2184}$
20B-33	= 0.00200 = $2.00 \times 10^{-3}$	20B-43	= -0.222 = $-2.22 \times 10^{-1}$	20B-53	= -0.429 = $-4.29 \times 10^{-1}$	20B-63	= 37.4 = $3.74 \times 10^1$
20B-34	= 2.62 = $2.62 \times 10^0$	20B-44	= $3.02 \times 10^{-6}$	20B-54	= 6.37 = $6.37 \times 10^0$	20B-64	= 5.26 = $5.26 \times 10^0$
20B-35	= 32.6 = $3.26 \times 10^1$	20B-45	= -0.944 = $-9.44 \times 10^{-1}$	20B-55	= 13.5 = $1.35 \times 10^1$	20B-65	= 13.4 = $1.34 \times 10^1$
20B-36	= 270 = $2.70 \times 10^2$	20B-46	= 2050 = $2.05 \times 10^3$	20B-56	= -47.4 = $-4.74 \times 10^1$	20B-66	= 2.27 = $2.27 \times 10^0$
20B-37	= 19.3 = $1.93 \times 10^1$	20B-47	= 18.9 = $1.89 \times 10^1$	20B-57	= 2.50 = $2.50 \times 10^0$	20B-67	= 1360 = $1.36 \times 10^3$
20B-38	= 7.68 = $7.68 \times 10^0$	20B-48	= 4.34 = $4.34 \times 10^0$	20B-58	= 131 = $1.31 \times 10^2$	20B-68	= 0.995 = $9.95 \times 10^{-1}$
20B-39	= 3.02 = $3.02 \times 10^0$	20B-49	= 70.5 = $7.05 \times 10^1$	20B-59	= 7.72 = $7.72 \times 10^0$	20B-69	= 1.21 = $1.21 \times 10^0$
20B-40	= 77.0 = $7.70 \times 10^1$	20B-50	= 4.67 = $4.67 \times 10^0$	20B-60	= 1.79 = $1.79 \times 10^0$	20B-70	= -0.0150 = $-1.50 \times 10^{-2}$



Name \_\_\_\_\_

Tie Breaker: Points scored on Stated and Geometry Problems  
 + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_

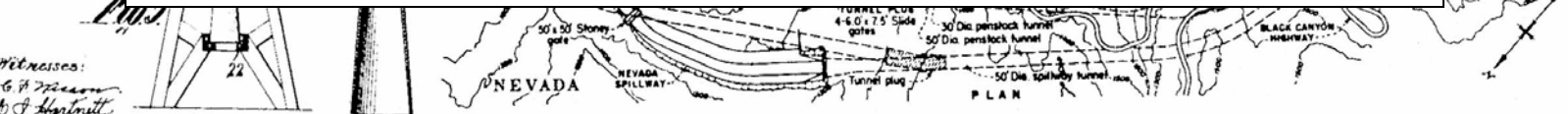
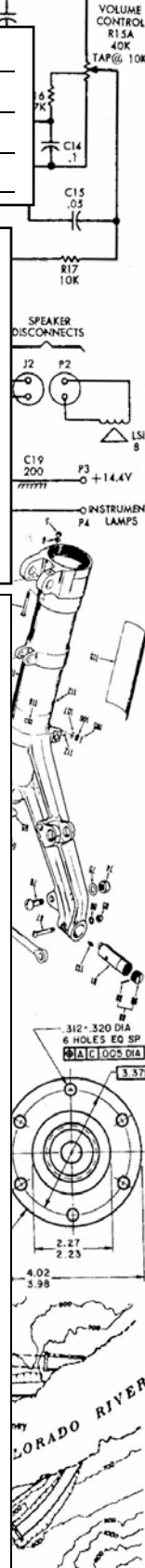
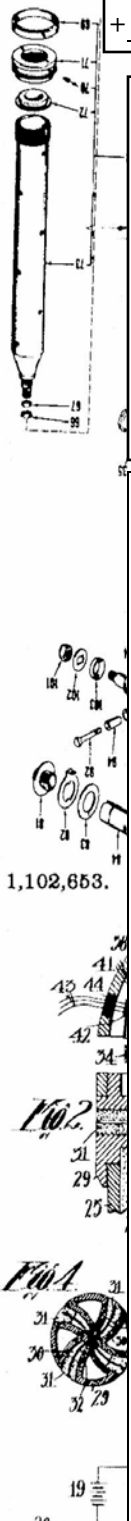
5x(Last Problem Attempted) + \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_  
 7x(Number Incorrect) - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_  
 2x(Number Incorrect SDs) - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_  
 TOTAL SCORE \_\_\_\_\_

# UIL Calculator Applications

## Test 20F (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\*, 1.23x10<sup>0\*</sup>  
 1.23x10<sup>1</sup>, 1.23x10<sup>01</sup>, .0190, 0.0190, 1.90x10<sup>-2</sup>
      - Incorrect: 12.30, 123.0, 1.23(10)<sup>2</sup>, 1.23•10<sup>2</sup>, 1.230x10<sup>2</sup>,  
 1.23\*10<sup>2</sup>, 0.19, 1.9x10<sup>-2</sup>, 19.0x10<sup>-3</sup>, 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.
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  - 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<sup>u</sup>.



20F-1.  $(-9.11 - 7.73)/(7.88)$  ----- 1= \_\_\_\_\_

20F-2.  $(48 + 9.32 - 2.22) \times 47.6$  ----- 2= \_\_\_\_\_

20F-3.  $(-1.28 - 0.702 + 1.87 + 0.558)/(-7.77)$  ----- 3= \_\_\_\_\_

20F-4.  $\{(42.9 - 35.1 + 114)(-8.79)(9.26)\} - 3790$  ----- 4= \_\_\_\_\_

20F-5.  $\frac{12100 + 9390}{(837)(283)(-65.5)} + 0.00205 - 4.09 \times 10^{-4}$  ----- 5= \_\_\_\_\_

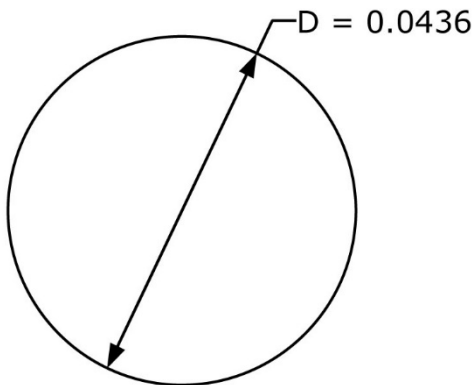
20F-6. What is the average of 5.98, 3.22 and  $\pi$ ? ----- 6= \_\_\_\_\_

20F-7. What is the positive product of the square root of 44.4 and the cube root of 999? ----- 7= \_\_\_\_\_

20F-8. What is the positive square root of the sum of 29.6 and  $\pi^2$ ? ----- 8= \_\_\_\_\_

20F-9.

CIRCLE

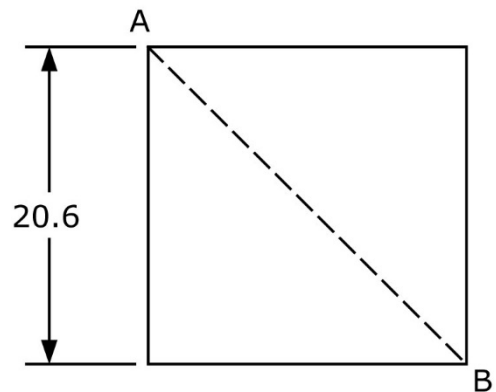


Area = ?

20F-9 = \_\_\_\_\_

20F-10.

SQUARE



AB = ?

20F-10 = \_\_\_\_\_

20F-11.  $\frac{(-0.00826)(0.0128) - (-0.0027)(0.032) + 8.74 \times 10^{-5}}{-0.00211 + (0.0306)(-0.0635)}$  ----- 11 = \_\_\_\_\_

20F-12.  $\frac{(-0.378 + 0.039 - 0.0599)(-0.502)(-0.397)}{(1.99 - 1.31)(-0.656 - 1.89)}$  ----- 12 = \_\_\_\_\_

20F-13.  $\frac{6.10 \times 10^5 + 2.00 \times 10^6}{(-0.904)(-0.939) + 2.23} + \frac{7620 - 5650 + 6360}{(5.02 \times 10^{-4})(17.2)}$  ----- 13 = \_\_\_\_\_

20F-14.  $\frac{875 + 239 - 319}{(0.419)(59.4)} - \frac{(14900)(8.84 \times 10^{-4} + 2.82 \times 10^{-4})}{0.637 + 0.165 - 0.177}$  ----- 14 = \_\_\_\_\_

20F-15.  $\frac{(98400 + 22200 - 71300)(0.447 - 0.33 - 0.479)}{(598)(829)(-32.9)(3.72 + 1.28 + \pi)}$  ----- 15 = \_\_\_\_\_

20F-16. Rock Springs, Texas is 58.5 mi from Rocksprings, Texas. How long does it take to drive this distance at 55 mph? ----- 16 = \_\_\_\_\_ min

20F-17. For a fundraiser, Don buys 12 extra large pizzas and then resales slices for \$2 each at a park. There are 10 slices per pizza, and he pays \$13 for each pizza. What is his profit, if there are 7 slices left over? ----- = \$ \_\_\_\_\_

20F-18. A Fibonacci series is extended by adding the previous two numbers in the series. The first six Fibonacci numbers are 0, 1, 1, 2, 3, 5. What is the tenth Fibonacci number? ----- 18 = \_\_\_\_\_ integer

20F-19.

RIGHT TRIANGLE

20F-19 = \_\_\_\_\_

20F-20.

RIGHT TRIANGLE

20F-20 = \_\_\_\_\_



20F-21.  $\sqrt{\frac{(7.46)(2.63)}{331 + 109}} + 0.151$  ----- 21= \_\_\_\_\_

20F-22.  $\frac{1}{0.237 + 0.661} + \frac{1}{0.118 - 0.251} + \frac{1}{(0.759)}$  ----- 22= \_\_\_\_\_

20F-23.  $[-83.2 + \sqrt{6200}]^2 \times [891 + 6600]^2 \times \sqrt{0.358/0.893}$  ----- 23= \_\_\_\_\_

20F-24.  $\left[ \frac{1.24 + 0.582 + \sqrt{0.543/0.411}}{0.0907 + 0.0181} \right]^2$  ----- 24= \_\_\_\_\_

20F-25.  $\frac{\sqrt{8.7 + 6.84 + (75.4)/(9.52)}}{5.19 + 4.53}$  ----- 25= \_\_\_\_\_

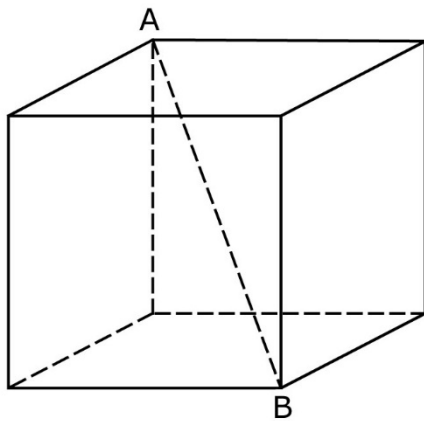
20F-26. The return stroke of current that causes the visible flash of lightning travels at a speed of about 320 million ft/s. What fraction of the speed of light is this, if the speed of light is 186,000 mi/s? ----- 26= \_\_\_\_\_ %

20F-27. A football field is 160 ft wide. What is the area of the football field between the 5-yard lines? ----- 27= \_\_\_\_\_ acres

20F-28. A church band plays 7 songs every week, 3 of which are new, having never been played before. On average, what is the fewest number of different songs played by the band in a year? ----- 28= \_\_\_\_\_

20F-29.

CUBE



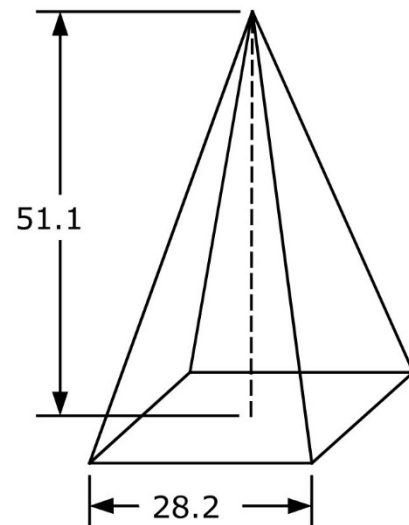
AB = 263

Surface Area = ?

20F-29 = \_\_\_\_\_

20F-30.

SQUARE PYRAMID



Volume = ?

20F-30 = \_\_\_\_\_

20F-31.  $\frac{(-4.26 \times 10^{-7} + 8.71 \times 10^{-7})^2}{\sqrt{47.9 - 26.8}} + \frac{4.60 \times 10^{-17}}{\sqrt{8.08 \times 10^{-7} + 1.17 \times 10^{-6}}}$  ----- 31 = \_\_\_\_\_

20F-32.  $\sqrt{\frac{1/(973 - 169)}{(270)(1.36 + 0.925)^2}} + (6.81 \times 10^{-7})^2(2.76 \times 10^9)$  ----- 32 = \_\_\_\_\_

20F-33.  $\frac{[(525 - 260)(0.638/0.648)]^{1/2}}{(0.58)^2 + (0.243 + 0.374)^2 + 0.211}$  ----- 33 = \_\_\_\_\_

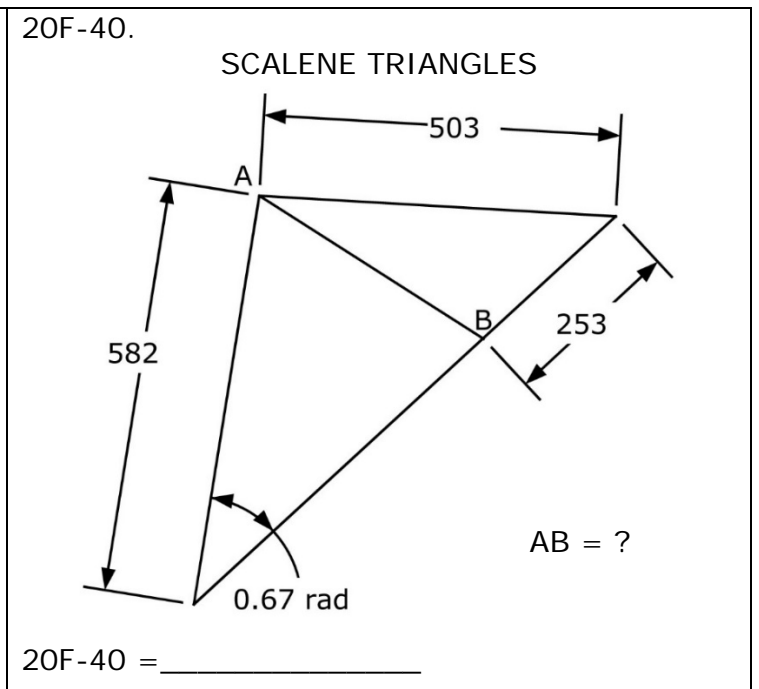
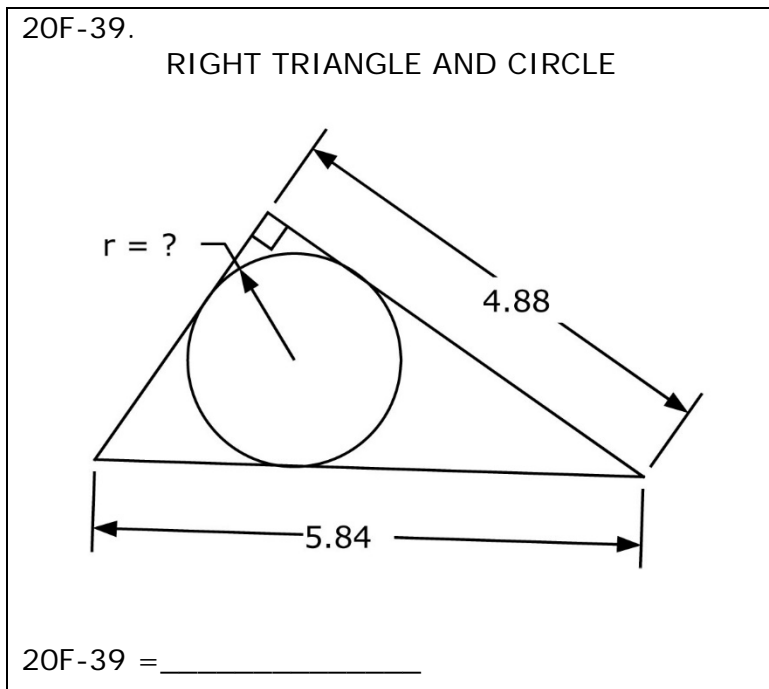
20F-34.  $\frac{[4790/(0.801 + 0.467) + 1/(1.32 \times 10^{-4})]^{1/2}}{(4.03 \times 10^{-4} + 5.81 \times 10^{-4})^2 \times \sqrt{7.62 \times 10^{-4} - (-6.32 \times 10^{-4})}}$  ----- 34 = \_\_\_\_\_

20F-35.  $\frac{\left[\frac{(-67500 + 40600)}{(984 + 1380)}\right]^2 + \sqrt{\frac{10300 + 14200}{\sqrt{0.171}}}}{\{(-52900)/(46300)\}^2}$  ----- 35 = \_\_\_\_\_

20F-36. The perimeter of a square plot was estimated to be 355.5 ft. A surveyor measured one side to be 89 ft 1.3 in. What is the percent error in the estimate? ----- 36 = \_\_\_\_\_ % (SD)

20F-37. In a locale, a bug population doubles every 25 days. The birds eat the bugs. There's 1800 birds that each eat 28 bugs a day. If an equilibrium bug population is reached, how many bugs are in the locale? Base your answer on the increase in bugs in 1 hour. ----- 37 = \_\_\_\_\_

20F-38. A mercury fever thermometer has a bulb of mercury that expands as it is heated, moving it into a thin capillary tube that is scaled to measure the temperature. The bulb is cylindrical, 0.5 in long with a diameter of 0.16 in. The mercury volume increases by  $10^{-4}$  for every degree (F) change. If a  $1^\circ\text{F}$  change in temperature moves the thermometer reading 0.2 in, what is the capillary diameter? ----- 38 = \_\_\_\_\_ milli-in



20F-41.  $(0.00402)(0.00954)10^{\{0.00995/0.00533\}}$  ----- 41 = \_\_\_\_\_

20F-42.  $\frac{e^{+0.9} + e^{-0.866}}{(0.00971 + 0.0054)}$  ----- 42 = \_\_\_\_\_

20F-43.  $(-0.00271 - 0.00324) \ln\{(-0.00353)(-3.89 \times 10^{-4})\}$  ----- 43 = \_\_\_\_\_

20F-44.  $(7.18)^3 + (38.1 - 7.54)^{1.54}$  ----- 44 = \_\_\_\_\_

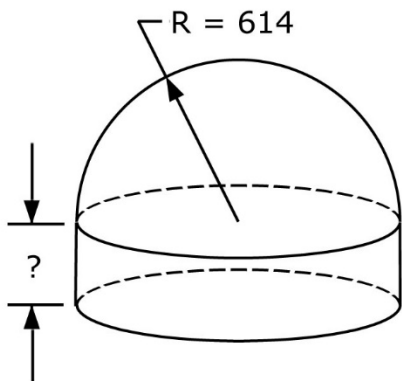
20F-45.  $(\text{deg}) \{(6.69 \times 10^{-6}) \sin(-151^\circ)\} \times \{(-4.69 \times 10^{-6}) \cos(-29.9^\circ)\}$  --- 45 = \_\_\_\_\_

20F-46. An 8-in tall model of a 3D artwork required 2 oz of paint to complete it. How much paint will be needed for the 12-ft tall actual artwork? ----- 46 = \_\_\_\_\_ gal

20F-47. The density of water (g/cc) is temperature dependent. From 10°C to 50°C in 10-degree increments, the density is: 0.999728, 0.998234, 0.995678, 0.992247, 0.988066. What is the percent error in the extrapolated density at 90°C and the actual value, 0.965340? ----- 47 = \_\_\_\_\_ %(SD)

20F-48. Solve for h if  $h = \frac{6}{h} - \sqrt{h}$ . ----- 48 = \_\_\_\_\_

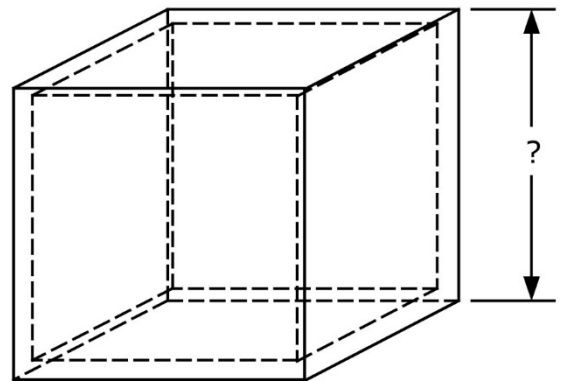
20F-49. CYLINDER AND HEMISPHERE



Cylinder Total Surface Area = Hemisphere Total Surface Area

20F-49 = \_\_\_\_\_

20F-50. HOLLOW CUBE WITH WALL THICKNESS t



t = 0.679  
Hollow Cube Volume = 349,000

20F-50 = \_\_\_\_\_

20F-51.  $\frac{10^{(0.747)} \times 10^{-(0.791)} + 0.944}{10^{(1.17 + 0.124)}} \dots\dots\dots 51 = \underline{\hspace{2cm}}$

20F-52.  $\frac{(-5.21 \times 10^{-6} - 2.09 \times 10^{-6}) e^{(0.463)(1.55)}}{e^{-(3.52 - 0.583)}} \dots\dots\dots 52 = \underline{\hspace{2cm}}$

20F-53.  $\frac{\text{Log}\{1.54 \times 10^5 + (528)(427)\}}{\pi - \text{Log}\{(46)/(0.0512)\}} \dots\dots\dots 53 = \underline{\hspace{2cm}}$

20F-54.  $\frac{1}{(0.376)^{(-0.33)}} + (0.463 + 0.339)^{(0.728 - 0.948)} \dots\dots\dots 54 = \underline{\hspace{2cm}}$

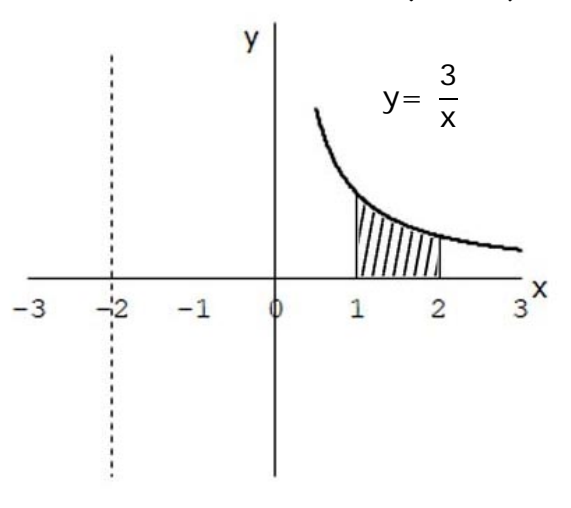
20F-55. (rad)  $\frac{\arctan\{4.14 + (5.09)(0.569)\}}{\arcsin\{(5750 + 2990)/63200\}} \dots\dots\dots 55 = \underline{\hspace{2cm}}$

20F-56. What is the area bounded by the x axis and the curve  $y = 13 - x^2$ ? ---- 56 =                                 

20F-57. A track has a 440 yd perimeter and is composed of a rectangular field with semicircles on either end, much like a regular track around a football field. What is the radius of the semicircles for which the combined rectangle and semicircles area is maximized? ----- 57 =                                  ft

20F-58. What is the determinant of  $\begin{bmatrix} -3.8 & 1.1 & -8.1 \\ 1.1 & 5.1 & 1.8 \\ 8.1 & 1.8 & 3.9 \end{bmatrix}$ ? ----- 58 =                                 

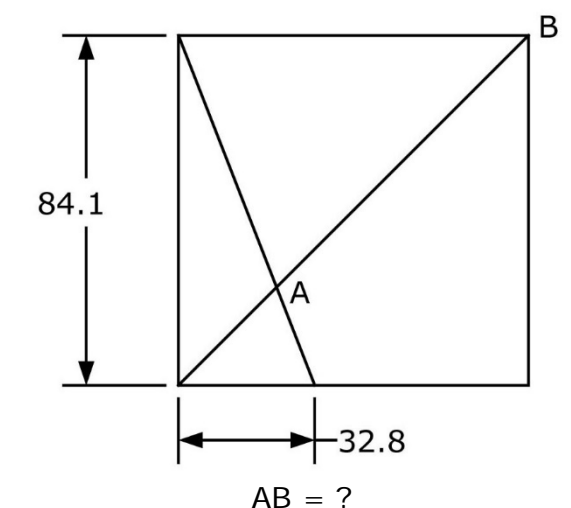
20F-59. SOLID OF REVOLUTION ( $x = -2$ )



Volume = ?

20F-59 =                                 

20F-60. SQUARE



AB = ?

20F-60 =

20F-61. Summers in Texas are hot. The high temperature is 100°F at 5 PM and the low is 75°F at 5 AM. Assuming a sinusoidal temperature variation, what is the temperature at 1 PM? ----- 61= \_\_\_\_\_ °F

20F-62. The probability of being dealt "four of a kind" in poker is 1 in 4165. What is the probability of being dealt four of a kind 160 times in a row? ----- 62= \_\_\_\_\_

20F-63. An object is thrown off the roof of a 285-ft tall building with a release angle of 33° relative to the horizontal. The release velocity was 37 mph. What is the time of flight of the object? ----- 63= \_\_\_\_\_ s

20F-64. **SQUARES AND CIRCLE**

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

20F-64 = \_\_\_\_\_

20F-65. **EQUILATERAL TRIANGLE AND RECTANGLE**

$AB = ?$

20F-65 = \_\_\_\_\_

20F-66.  $\text{Ln} \left[ \frac{(3.39)^2 - 2(3.39)(11.6) + (11.6)^2}{(117)^2} \right]^2$  ----- 66= \_\_\_\_\_

20F-67. (rad)  $\cos(0.56 - 0.27) - \cos(0.56 + 0.27)$  ----- 67= \_\_\_\_\_

20F-68. (deg)  $\sqrt{1 + \left[ \frac{\cos(76.5^\circ)}{\sin(76.5^\circ)} \right]^2} \times \frac{\cos(-31.1^\circ)}{\sin(-31.1^\circ)}$  ----- 68= \_\_\_\_\_

20F-69.  $\frac{1}{(0.14)} + \frac{1}{3(0.14)^3} + \frac{1}{5(0.14)^5} + \frac{1}{7(0.14)^7}$  ----- 69= \_\_\_\_\_

20F-70. (rad)  $e^{(7.89)} \left[ \frac{(0.265)\sin(2) - (0.18)\cos(-0.438)}{(9.76)\sqrt{(0.265)^2 + (0.18)^2}} \right]$  ----- 70= \_\_\_\_\_

20F-1	= -2.14 = $-2.14 \times 10^0$	20F-11	= -0.0168 = $-1.68 \times 10^{-2}$	20F-21	= 0.362 = $3.62 \times 10^{-1}$
20F-2	= 2620 = $2.62 \times 10^3$	20F-12	= 0.0459 = $4.59 \times 10^{-2}$	20F-22	= -5.09 = $-5.09 \times 10^0$
20F-3	= -0.0574 = $-5.74 \times 10^{-2}$	20F-13	= $1.81 \times 10^6$	20F-23	= $7.07 \times 10^8$
20F-4	= -13700 = $-1.37 \times 10^4$	20F-14	= 4.14 = $4.14 \times 10^0$	20F-24	= 746 = $7.46 \times 10^2$
20F-5	= 0.000256 = $2.56 \times 10^{-4}$	20F-15	= 0.000134 = $1.34 \times 10^{-4}$	20F-25	= 0.498 = $4.98 \times 10^{-1}$
20F-6	= 4.11 = $4.11 \times 10^0$	20F-16	= 63.8 = $6.38 \times 10^1$	20F-26	= 32.6 = $3.26 \times 10^1$
20F-7	= 66.6 = $6.66 \times 10^1$	20F-17	= \$70.00	20F-27	= 0.992 = $9.92 \times 10^{-1}$
20F-8	= 6.28 = $6.28 \times 10^0$	20F-18	= 34 integer	20F-28	= 161 = $1.61 \times 10^2$
20F-9	= 0.00149 = $1.49 \times 10^{-3}$	20F-19	= 1.00 = $1.00 \times 10^0$	20F-29	= 138,000 = $1.38 \times 10^5$
20F-10	= 29.1 = $2.91 \times 10^1$	20F-20	= 2.48 = $2.48 \times 10^0$	20F-30	= 13500 = $1.35 \times 10^4$

20F-31	= 7.58x10 <sup>-14</sup> = 0.00282 = 2.82x10 <sup>-3</sup>	20F-41	= 0.00282 = 2.82x10 <sup>-3</sup>	20F-51	= 0.0939 = 9.39x10 <sup>-2</sup>	20F-61	= 93.8 = 9.38x10 <sup>1</sup>
20F-32	= 0.00222 = 2.22x10 <sup>-3</sup>	20F-42	= 191 = 1.91x10 <sup>2</sup>	20F-52	= -0.000282 = -2.82x10 <sup>-4</sup>	20F-62	= 7.27x10 <sup>-580</sup>
20F-33	= 17.4 = 1.74x10 <sup>1</sup>	20F-43	= 0.0803 = 8.03x10 <sup>-2</sup>	20F-53	= 29.7 = 2.97x10 <sup>1</sup>	20F-63	= 5.23 = 5.23x10 <sup>0</sup>
20F-34	= 2.95x10 <sup>9</sup>	20F-44	= 564 = 5.64x10 <sup>2</sup>	20F-54	= 1.77 = 1.77x10 <sup>0</sup>	20F-64	= 1.41 = 1.41x10 <sup>0</sup>
20F-35	= 286 = 2.86x10 <sup>2</sup>	20F-45	= 1.32x10 <sup>-11</sup>	20F-55	= 10.3 = 1.03x10 <sup>1</sup>	20F-65	= 4.76 = 4.76x10 <sup>0</sup>
20F-36	= -0.26 = -2.6x10 <sup>-1</sup> (2SD)	20F-46	= 5.06 = 5.06x10 <sup>0</sup>	20F-56	= 62.5 = 6.25x10 <sup>1</sup>	20F-66	= -10.6 = -1.06x10 <sup>1</sup>
20F-37	= 1.82x10 <sup>6</sup>	20F-47	= 1.229 = 1.229x10 <sup>0</sup> (4SD)	20F-57	= 210 = 2.1x10 <sup>2</sup>	20F-67	= 0.283 = 2.83x10 <sup>-1</sup>
20F-38	= 2.53 = 2.53x10 <sup>0</sup>	20F-48	= 1.86 = 1.86x10 <sup>0</sup>	20F-58	= 267 = 2.67x10 <sup>2</sup>	20F-68	= -1.70 = -1.70x10 <sup>0</sup>
20F-39	= 1.12 = 1.12x10 <sup>0</sup>	20F-49	= 307 = 3.07x10 <sup>2</sup>	20F-59	= 45.0 = 4.50x10 <sup>1</sup>	20F-69	= 139000 = 1.39x10 <sup>5</sup>
20F-40	= 374 = 3.74x10 <sup>2</sup>	20F-50	= 293 = 2.93x10 <sup>2</sup>	20F-60	= 85.6 = 8.56x10 <sup>1</sup>	20F-70	= 66.6 = 6.66x10 <sup>1</sup>