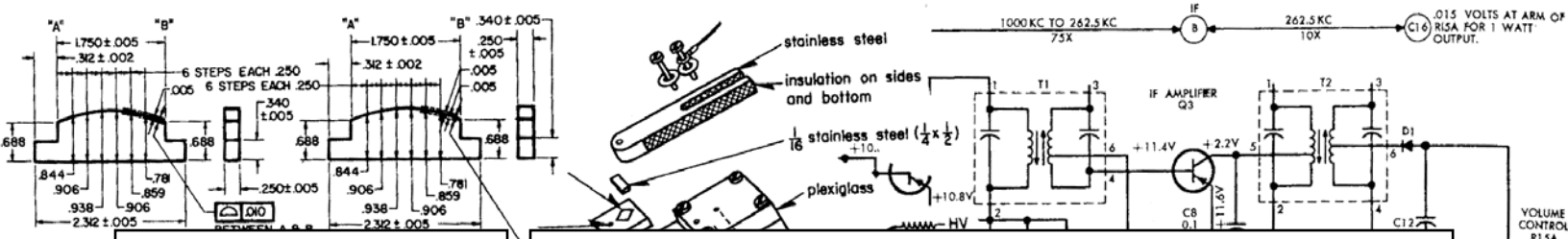


Tie Breaker: Points scored on Stated and Geometry Problems			
	+	+	+

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

UIL Calculator Applications

Test 15I

(State)

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, $1.23(10)^{2}$, $1.23\cdot10^{2}$, $1.230\text{x}10^{2}$, $1.23*10^{2}$, 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}.

15I-1. (–8.35/3.67) + 0.879 ---------- 1=_____

15I-2. (3.27 x π) – (18.4 – 34.2) ---------- 2=_____

15I-3. (9.83 – 8.73 + 14.2) x (–5.17) – 132 ---------- 3=_____

15I-4. {(3.78)(0.168 + 0.288 – 0.172)(–4.89)} + 1.79 ---------- 4=_____

15I-5. $-35900 + 15000 - 15700 + \frac{(-24400 + 20800)}{(-0.86)(-0.153)}$ ---------- 5=_____

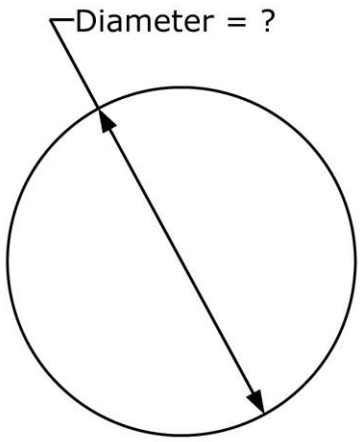
15I-6. What is the sum of the number of letters in the alphabet and the number of stars on a US flag?---------- 6=_____integer

15I-7. What is x if 10^x equals 8.5? ---------- 7=_____

15I-8. What is the remainder of 397,456 divided by 187? ---------- 8=_____integer

15I-9.

CIRCLE

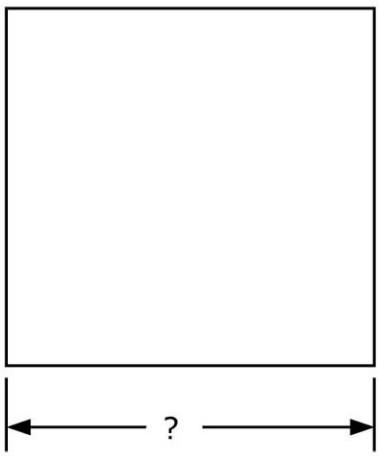


Circumference = 5200

15I-9 =_____

15I-10.

SQUARE



Area = 8.19

15I-10 =_____

15I-11. $\dfrac{(8.28)(5.8) + (6.88)(9.95)}{-10.4 + 3.31 - (\pi)(0.908)}$ ---------- 11=_____

15I-12. $\dfrac{-565(1.23\text{x}10^{-5} + 6.41\text{x}10^{-6})}{(121 - 615)(345)} - \dfrac{-2.64\text{x}10^{-9}}{-0.471 - 0.067}$ ---------- 12=_____

15I-13. $\dfrac{(-7.10\text{x}10^{-5} - 2.72\text{x}10^{-4})\{2040 + (-51)(-8.1)\}}{(25.2)(-0.506 + 0.481)(61.7)(18.1)}$ ---------- 13=_____

15I-14. $\dfrac{(3430 + 1440 - 1100)(0.00341 + 0.00786 - 0.00297)}{(4.24 - 3.81)(-8.73)(2.36 - \pi)}$ ---------- 14=_____

15I-15. $\dfrac{(0.881 + 1.62)}{3.62 - 16.4} + \dfrac{-0.0508}{67.1 + 109} + \dfrac{(0.223)(515 - 354)}{(-419)(0.979)}$ ---------- 15=_____

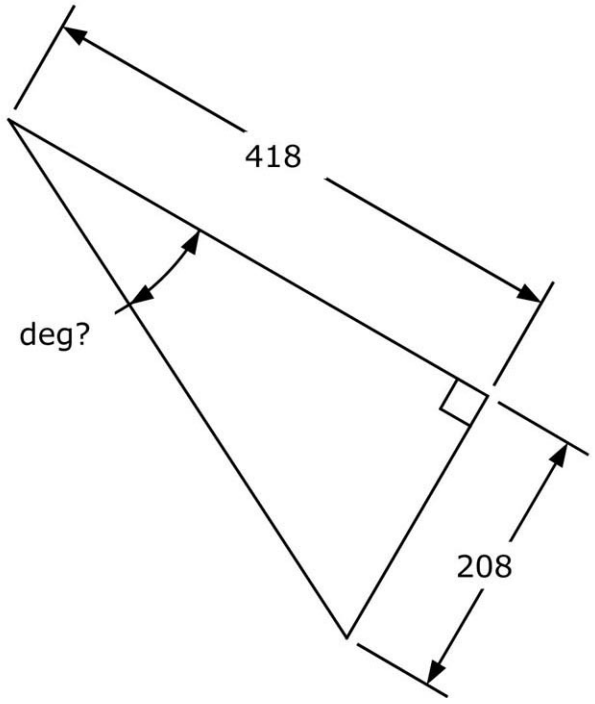
15I-16. A furnace heats at 25°C/min and cools at 14°C/min. How long would it take to anneal a bar of steel for 91 min at 1200°C, including the heating and cooling time? Room temperature is 25°C. ---------- 16=_____hr(SD)

15I-17. Water expands 4% when it freezes. Water is poured into a 12-oz can such that the can is completely filled with ice when frozen. What is the percent difference between 12 oz and the amount of water added? ------ 17=_____%

15I-18. How long would it take to fly a space ship 8000 parsecs to the center of our galaxy, assuming it could fly at 70% of the speed of light? The speed of light is 186,000 mi/s, and a parsec is 19 trillion miles. ---------- 18=_____years

15I-19.

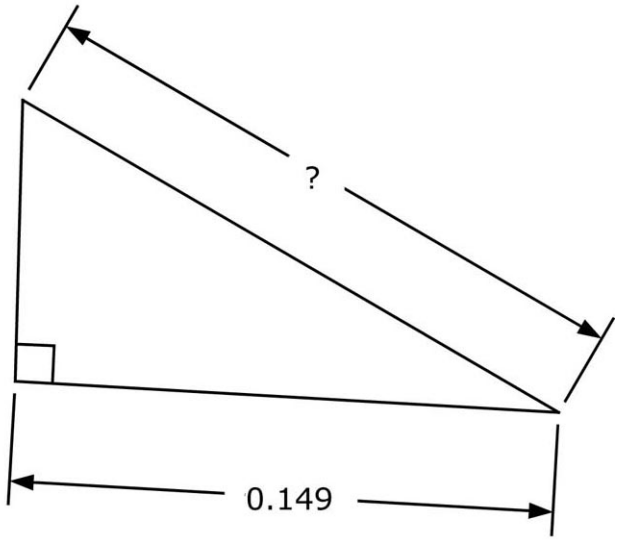
RIGHT TRIANGLE



15I-19 =_____

15I-20.

RIGHT TRIANGLE



Area = 0.00573

15I-20 =_____

15I-21. $\left[\frac{\sqrt{2.5 - 2.02}}{-4.53} + \frac{(-0.0839)}{3.26}\right]^2$ ---------- 21=_____

15I-22. $\left[\frac{(0.512)(0.1)}{\pi} + 0.00163\right]^2 + \sqrt{5.63 \times 10^{-9}}$ ---------- 22=_____

15I-23. $\frac{\sqrt{813 + 648 + (8.95 \times 10^5)/(864)}}{-492 + 448}$ ---------- 23=_____

15I-24. $\left[\frac{\pi + 0.222 + \sqrt{0.73/0.67}}{-9.01 + 3.1}\right]^2$ ---------- 24=_____

15I-25. $(4.7)(3.77) + \sqrt{(15.1)/(6.89)} + [(0.429)(3.77)]^2$ ---------- 25=_____

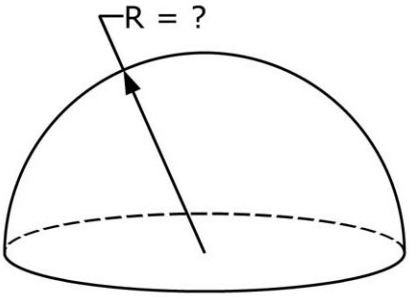
15I-26. If boiling water converts 0.62 gal into steam per hour, how long does it take the water level in a 7.5 in diameter saucepan of boiling water to drop 1 in? ---------- 26=_____min

15I-27. In a fundraising event, 250 people wrote their names on a slip of paper and placed them in a hopper. An organizer then started drawing single slips randomly to award prizes. If a person could only win one prize, what is the probability of being the 18th name called? ---------- 27=_____

15I-28. One cup of thinner is added to 1 gal of thick paint to make a paintable mixture. How much paintable mixture can be made if 1 gal of thinner is used? ---------- 28=_____gal

15I-29.

HEMISPHERE

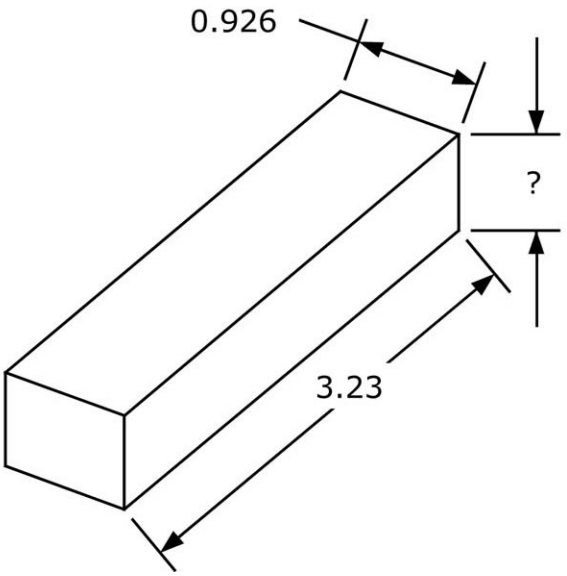


Total Surface Area = 4.35

15I-29 =_____

15I-30.

RECTANGULAR SOLID



Total Surface Area = 11.9

15I-30 =_____

15I-31. $\dfrac{(1.53\text{x}10^{-5} + 2.41\text{x}10^{-5})^2}{\sqrt{14.5 - 5.79}} + \dfrac{2.28\text{x}10^{-12}}{\sqrt{9.93\text{x}10^{-6} + 1.04\text{x}10^{-5}}}$ ------- 31=_____

15I-32. $\left[\dfrac{-4.22\text{x}10^{6}}{1.11\text{x}10^{6} + 6.95\text{x}10^{5}} + 3.55\right] \text{x} \left\{2500 + (-56)^2 - \sqrt{1.21\text{x}10^{7}}\right\}$ 32=_____

15I-33. $\dfrac{[(8.2 - 7.01)(0.526/0.816)]^{1/2}}{(1.48)^2 + (0.346 + 1.5)^2 + 1.41}$ ---------- 33=_____

15I-34. $\dfrac{[0.0047/(0.342 + 0.379) + 1/(87.2)]^{1/2}}{(73.8 + 76.5)^2 \text{ x } \sqrt{143 - (80.6)}}$ ---------- 34=_____

15I-35. $\dfrac{\left[\dfrac{(-3.96 + 0.611)}{(304 + 1050)}\right]^2 + \sqrt{\dfrac{2.54\text{x}10^{-11} + 1.18\text{x}10^{-10}}{\sqrt{0.857}}}}{\{(-5.87)/(8.39)\}^2}$ ---------- 35=_____

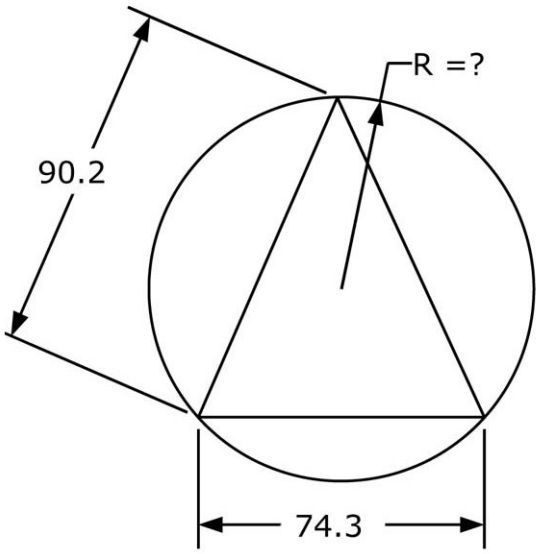
15I-36. Sammy puts $500 in the bank which pays 4.4% annual interest. One year later, she deposits another $500. She does this three more times. Five years after the initial deposit, how much money does Sammy have? ---------- 36=$_____

15I-37. The probability of winning a lottery is 1 in 175 million. What is the probability of winning the lottery ten times in a row? ---------- 37=_____

15I-38. 100,000 lbs of fine space debris land daily on the earth's surface. Assuming the debris is composed of spherical particles with 2 μm diameter, and the density is 7.9 g/cm^3, how many particles land daily over 1 ft^2? ------ 38=_____part/ft^2

15I-39.

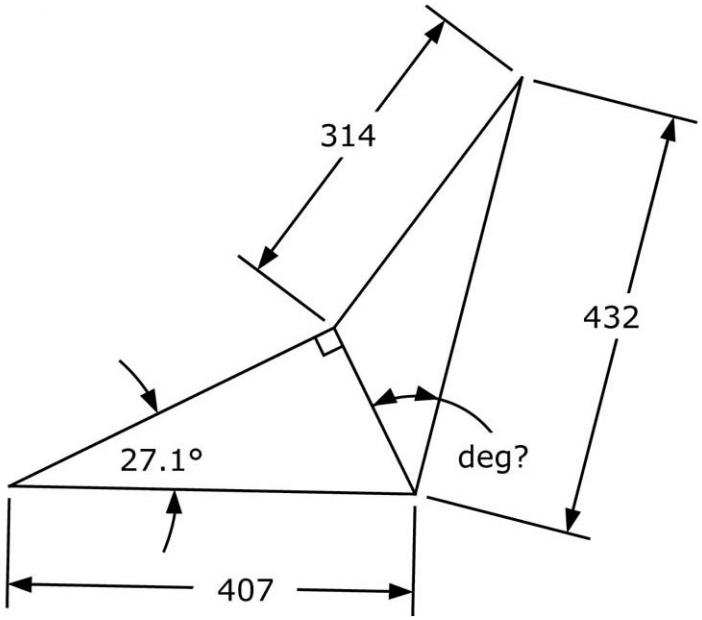
ISOSCELES TRIANGLE AND CIRCUMSCRIBED CIRCLE



15I-39 =_____

15I-40.

RIGHT AND SCALENE TRIANGLE



15I-40 =_____

15I-41. $10^{-\{(0.916 - 0.987)/(0.924 + 0.182)\}}$ ---------- 41=_____

15I-42. $-6740\, e^{0.435} + (-4420)\, e^{-0.392}$ ---------- 42=_____

15I-43. $\dfrac{\text{Ln}(0.00985 + 0.0122 - 0.00649)}{(0.0094)}$ ---------- 43=_____

15I-44. $(3.86 + 6.66)^{-(0.328 + 0.901)}$ ---------- 44=_____

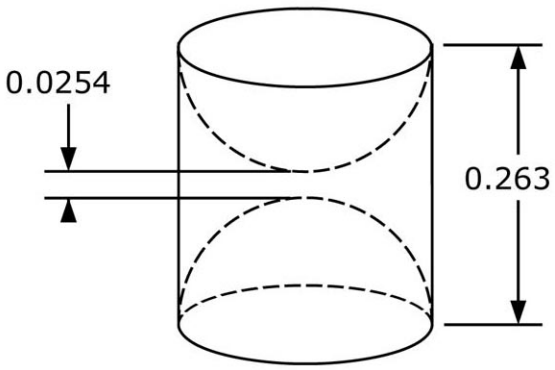
15I-45.(deg) $\dfrac{\cos\{(15.2°)/(6.07)\}}{\sin\{106° - 154°\}}$ ---------- 45=_____

15I-46. Material cost for a 8-in tall prototype of a sculpture is $850.
What is the material cost for the full-sized 35-in long sculpture? ---------- 46=$_____

15I-47. The population of El Paso was measured every ten years between 1960 and 2010: 276,687; 339,615; 425,259; 515,342; 563,662; 649,121. Estimate the population of El Paso in 2015. ---------- 47=_____

15I-48. What is b if ln(10b) = log(eb)? ---------- 48=_____

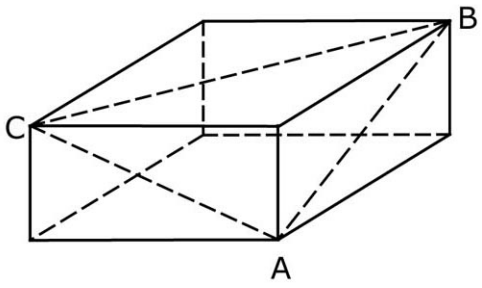
15I-49.
CYLINDER WITH HEMISPHERICAL CAVITIES



Volume = ?

15I-49 =_____

15I-50.
RECTANGULAR SOLID



AB = 56.1 AC = 55.3 BC = 72.9

Total Surface Area = ?

15I-50 =_____

15I-51. $10^{+(0.526)} + 10^{-(0.98)} + \left[10^{(0.661/0.556)} - 10^{(1.18)}\right]^{1/2}$ --- 51=_____

15I-52. $\dfrac{145 + e^{(4.49 + 2.31)}}{0.924 - e^{-(0.637 - 0.621)}}$ ---------- 52=_____

15I-53. $\dfrac{\text{Ln}(0.00882 + 0.0516)}{1.95\text{x}10^{-5}} + \dfrac{\text{Ln}(0.00755)}{0.00362 - 0.00334}$ ---------- 53=_____

15I-54. $\dfrac{1}{(0.776)^{(-0.512)}} + (0.995 + 0.547)^{(0.531 - 0.772)}$ ---------- 54=_____

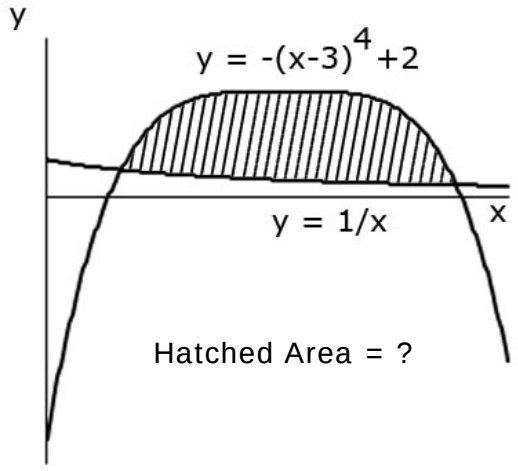
15I-55.(rad) $\arctan\left[\dfrac{(3630)(0.187)}{(4.6)(30.9)}\right] + (0.332)(1.03)$ ---------- 55=_____

15I-56. Calculate the minimum value of y for the function
$y = x^4\text{-}500x^3\text{+}2000x\text{-}40$. ---------- 56=_____

15I-57. Tom moves on a flat x-y coordinate system according to x = 3t and y =4t-6 where t is time in seconds. Clancy moves on the same coordinate system according to x = $2\sqrt{t}$ and y = 12-2t. At what time t do Tom and Clancy move closest to each other? ---------- 57=_____sec

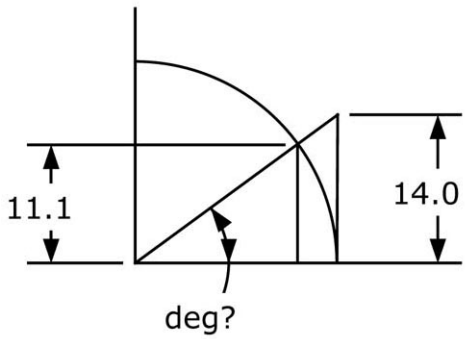
15I-58. Solve for w if **S** = **TU**, S_1 = 2310, **T** = $\begin{bmatrix} 65 & 7 \\ 34 & 22 \end{bmatrix}$, and **U** = $\begin{bmatrix} w \\ 43 \end{bmatrix}$. ---- 58=_____

15I-59.



15I-59 =_____

15I-60.
RIGHT TRIANGLES AND QUARTER CIRCLE



15I-60 =_____

15I-61. $\text{Log}\left[(2.32)^{-1.38}\right] + (9.83)\text{Log}\left[(2.32)^{(7.96)}\right]$ ---------- 61=_____

15I-62. $(58.8)10^{\text{Log}[(5.24)(0.488)]} + \{(24000)(0.926)\}^{1/2}$ ---------- 62=_____

15I-63. $(\text{deg})\sqrt{1 + \left[\frac{\cos(125°)}{\sin(125°)}\right]^2} \times \frac{\cos(-75.6°)}{\sin(-75.6°)}$ ---------- 63=_____

15I-64. $1 + \frac{(0.41)^4}{2} - \frac{(0.41)^6}{6} + \frac{(0.41)^8}{24} - \frac{(0.41)^{10}}{120}$ ---------- 64=_____

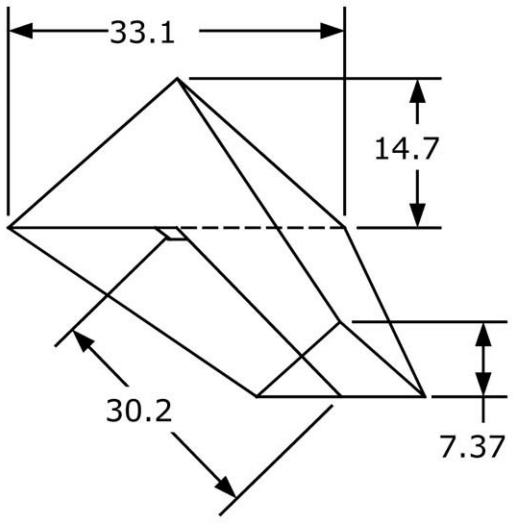
15I-65. $\frac{1}{\sqrt{(27.9)^2 - (740)}}\ \text{Ln}\left\{\frac{(8.83) - \sqrt{(27.9)^2 - (740)}}{(8.83) + \sqrt{(27.9)^2 - (740)}}\right\}$ ---------- 65=_____

15I-66. Brad left San Saba driving to Plainview, 318 mi away, at 55 mph. Brandon left Plainview 45 min after Brad left, driving to San Saba on the same highway. If they met in Snyder which is 121 mi from Plainview, what was Brandon's velocity? ---------- 66=_____mph

15I-67. The mass of the earth is 5.9742 × 10^{24} kg. What is the percent error in calculating the mass based on an average density of 5.625 g/cm^3? -- 67=_____%(SD)

15I-68. What is the closest approach of the line y = -4x+13 to the origin? --- 68=_____

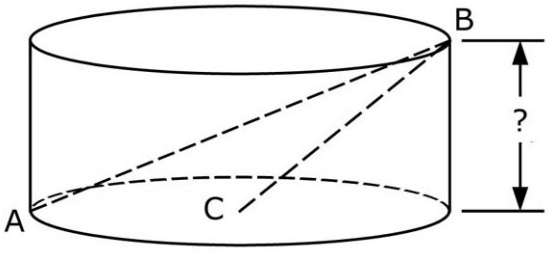
15I-69.
TRUNCATED ISOSCELES TRIANGULAR PYRAMID



Volume = ?

15I-69 =_____

15I-70.
CYLINDER



C = Center

AB = 571 BC = 339

15I-70 =_____