

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 09B
(Invitational B)

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*}
1.23x10¹, 1.23x10⁰¹, .0190, 0.0190, 1.90x10⁻²
Incorrect: 12.30, 123.0, 1.23(10)², 1.23·10², 1.230x10²,
1.23*10², 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.

09B-1. $0.144 + 0.0298 - 0.299$ ----- 1= _____

09B-2. $(9.29 + 3.17 - 2.97) \times 73.5$ ----- 2= _____

09B-3. $(5.48 + 33.6 - 20.5)/(6.7) + 2.17$ ----- 3= _____

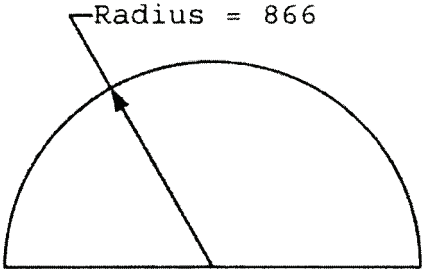
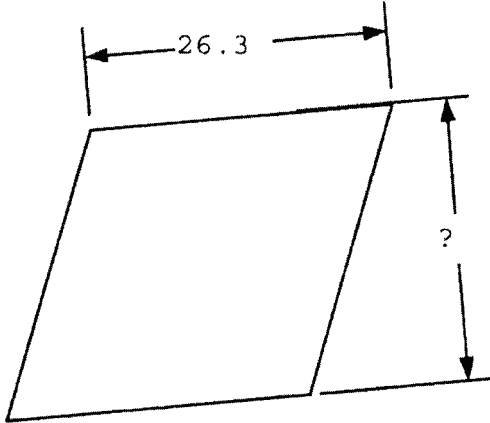
09B-4. $\frac{(-3.58)(5.32 - 2.53 + 3.68)}{(-7.76)(4.94)}$ ----- 4= _____

09B-5. $25.9 + 22.3 - 110 + \frac{(-64700 + 42100)}{(78.9)(-54.4)}$ ----- 5= _____

09B-6. What is 100 subtracted from 25 times pi? ----- 6= _____

09B-7. Gas was \$3.15/gal a month ago but jumped to \$3.98/gal. How much extra does it cost to gas up a car with an empty 18-gallon tank? ----- 7=\$ _____

09B-8. An ipod costs \$249 on-line and weighs 5.7 oz. What is the ratio of the cost per unit mass of an ipod and silver, which is \$17.50/oz? ----- 8= _____

<p>09B-9.</p> <p style="text-align: center;">SEMICIRCLE</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Perimeter = ?</p> <p>09B-9 = _____</p>	<p>09B-10.</p> <p style="text-align: center;">RHOMBUS</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Area = 653</p> <p>09B-10 = _____</p>
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09B-11. $\frac{(-383 + 212)(392 + 1050)}{(-2.17)(0.198)(3200 - 3750)}$ ----- 11= _____

09B-12. $\frac{(-167 + 155 - 247)(900)(-586)}{(1.23 - 0.971)(817 - 1030)}$ ----- 12= _____

09B-13. $\frac{5.9010^5 + 6.8510^5}{(-0.133)(-0.854) + 0.125} + \frac{7810 - 3740 + 12500}{(-5.0010^{-5})(-17.2)}$ ----- 13= _____

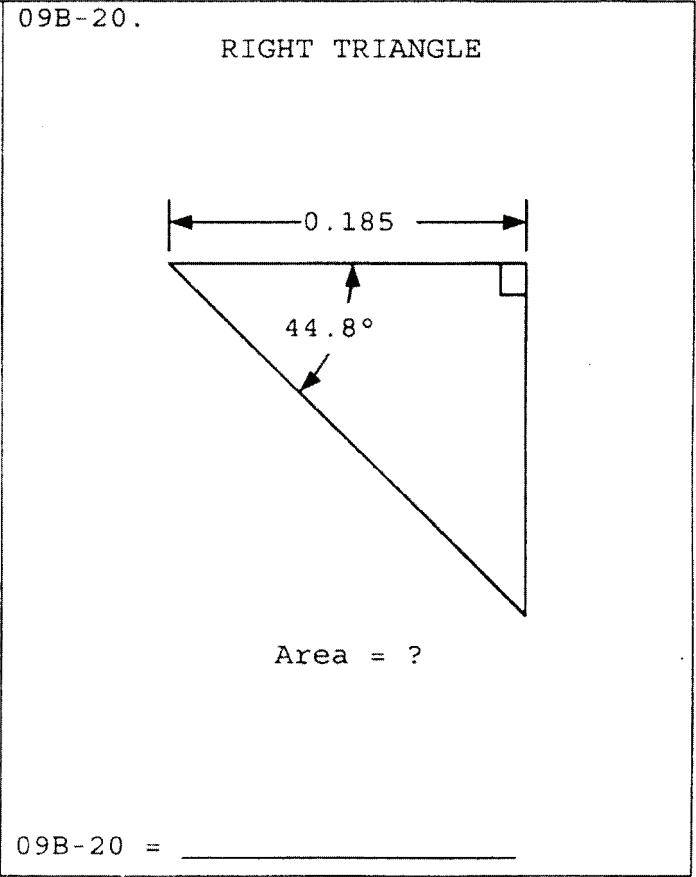
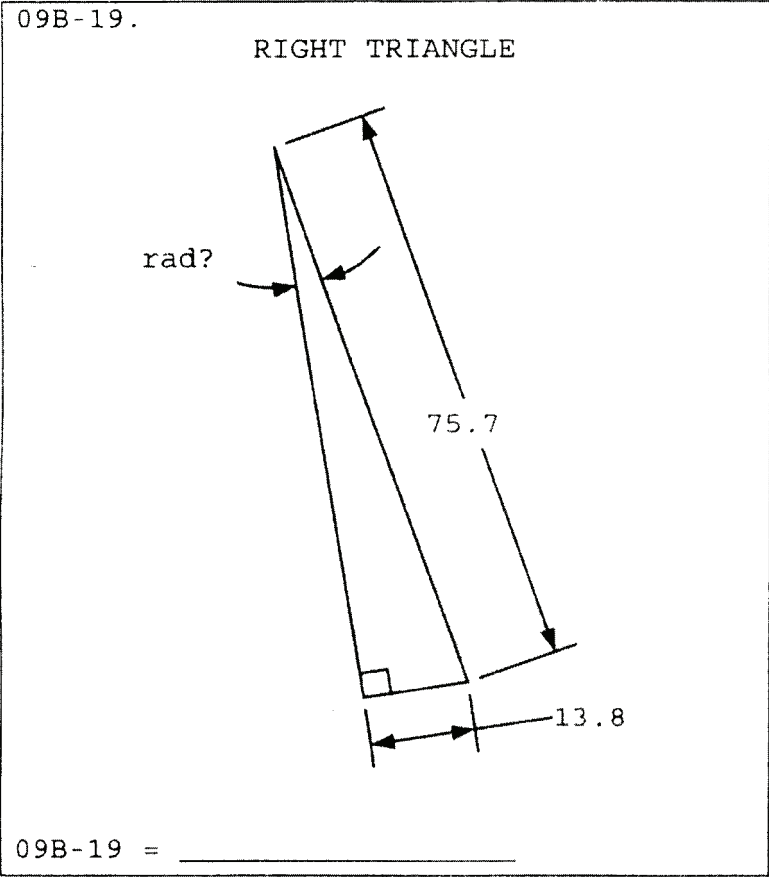
09B-14. $\frac{(7940 + 841 - 386)(0.00295 + 0.00643 - 0.00412)}{(20.1 - 4.83)(11.8)(-85.9 - 39.9)}$ ----- 14= _____

09B-15. $\frac{(1.2 + 4.33)}{9.29 - 30.9} + \frac{-0.0355}{11.5 + 14.4} + \frac{(0.59)(163 - 78.1)}{(-900)(0.523)}$ ----- 15= _____

09B-16. A 28-in diameter tire has a 50,000 mile warranty. How many times does it rotate in its expected lifetime? ----- 16= _____

09B-17. Sweet Adelines, a female barbershop singing organization, grew from 1500 members in 1949 to 30,000 in 2007. What was the average annual growth in membership? ----- 17= _____%

09B-18. The tortoise crawls at 2 ft/min and the hare hops at 5 ft/sec. If the tortoise just wins a mile-long race, what fraction of the race time did the hare stop and rest? ----- 18= _____%



09B-21. $\frac{-0.113 + 1 / (-5.99)}{1 / (0.135) + 7.44} + \frac{1}{(-50.2)}$ ----- 21= _____

09B-22. $\sqrt{\frac{(3.33)(0.659)}{854 + 608}} + 0.0248$ ----- 22= _____

09B-23. $\left[\frac{0.939 + 0.575 + \sqrt{0.202 / 0.847}}{5.77 + 3.96} \right]^2$ ----- 23= _____

09B-24. $(-0.0618)(-12.9)\sqrt{(-0.978)^2 / 0.866} + 1 / \sqrt{0.656 + 0.743}$ ----- 24= _____

09B-25. $\frac{\sqrt{0.603 + 0.361 + (0.0217) / (0.0522)}}{-0.994 + 0.417}$ ----- 25= _____

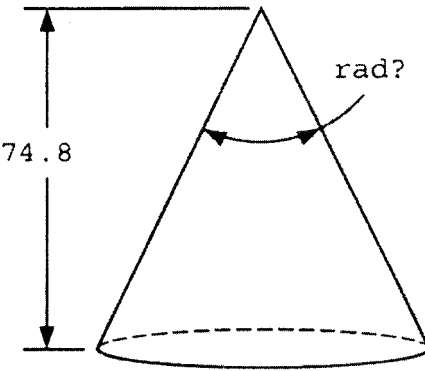
09B-26. If $xy = 19$ and $x - y = 15$, what is the absolute value of $x + y$? ----- 26= _____

09B-27. What is the percent difference in the total land area of Iowa, $55,875 \text{ mi}^2$, and Illinois, $55,593 \text{ mi}^2$? ----- 27= _____ % (SD)

09B-28. What is the barrel minimum inside diameter of a 10 gauge shotgun? The 'gauge' is the number of spherical projectile balls equal to the barrel size, made from a pound of lead. The density of lead is 11.35 g/cm^3 . ----- 28= _____ in

09B-29.

CONE

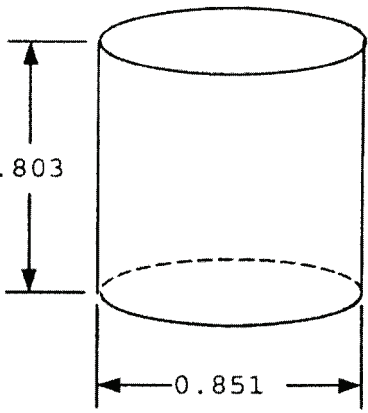


Volume = 100,000

09B-29 = _____

09B-30.

CYLINDER



Total Surface Area = ?

09B-30 = _____

09B-31. $\left[\frac{-8.22 \times 10^{-6}}{-2.53 \times 10^{-8} + 2.17 \times 10^{-8}} + 4230 \right] \times \left\{ 503 + (-29.3)^2 - \sqrt{5.90 \times 10^6} \right\}$ 31= _____

09B-32. $\frac{(9.17 \times 10^6 + 3.19 \times 10^7)^2}{\sqrt{86.6 - 11.7}} + \frac{5.40 \times 10^{17}}{\sqrt{7.56 \times 10^6 + 8.77 \times 10^6}}$ 32= _____

09B-33. $\frac{[1030 / (0.508 + 0.603) + 1 / (1.63 \times 10^{-4})]^{1/2}}{(8.99 \times 10^{-4} + 0.00169)^2 \times \sqrt{3.46 \times 10^{-4} - (-2.37 \times 10^{-4})}}$ 33= _____

09B-34. $\frac{\sqrt{(916) / \{(366) / \sqrt{616}\}}}{\pi + (0.77)(1.16)} + \{2.19 + 2.81\}^{1/2}$ 34= _____

09B-35. $\frac{1}{-3300} + \frac{-6.17}{(126+107)^2} - \frac{\sqrt{7.48 \times 10^{-6}}}{(4.9)^2}$ 35= _____
 $(-3.87+5.29)^2 + (-7.34)$

09B-36. What is the length of the line segment on $y = 4x+3$ intersecting the inside of the circle $x^2 + y^2 = 20$? 36= _____

09B-37. A water park has diving platforms that are 20 ft and 5 ft above the water. How long after a person steps off the tall platform should a person step off the short platform if they hit the water simultaneously? 37= _____ sec

09B-38. A basketball court is 84 ft long, and the basket is 10 ft off the ground. If a person 80 ft from the basket releases the ball 5 ft off the ground at an angle of 28° and makes the basket, what is the time of flight of the ball? 38= _____ sec

09B-39. SCALENE TRIANGLE AND CIRCLE

09B-39 = _____

09B-40. SCALENE TRIANGLE

09B-40 = _____

09B-41. $10^{-\{(0.544-0.734)/(0.981+0.752)\}}$ ----- 41= _____

09B-42. $15 e^{0.767} + (1.76)e^{-0.921}$ ----- 42= _____

09B-43. $\frac{0.81 - 1.25}{\text{Log}(0.42 + 0.12)}$ ----- 43= _____

09B-44. $(-0.00349 + 0.00579)^{-\{0.458+0.492\}}$ ----- 44= _____

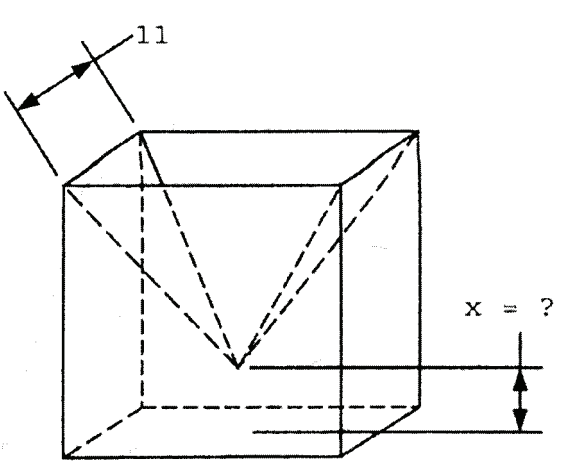
09B-45. (deg) $\sin\left[90^\circ \times \frac{(361)}{(431)}\right] + \cos\{169^\circ - 145^\circ\}$ ----- 45= _____

09B-46. A 2-layer cake is 9 inches across, and 4 cups of flour were used. How far across is a 3-layer cake made using 7 cups of flour if the layers are geometrically similar? ----- 46= _____ in

09B-47. Five 100 gram samples of iron at room temperature received separate heat inputs of 50 to 250 calories in 50 calorie increments. The sample temperatures increased by 5, 10, 12, 16 and 25 Kelvins, respectively. What is percent error in the best fit specific heat of iron if the actual value is 0.106 cal/gK? ----- 47= _____ %

09B-48. Solve for the negative value of w if $5w^2 = w^6 + \frac{3}{w}$. ---- 48= _____

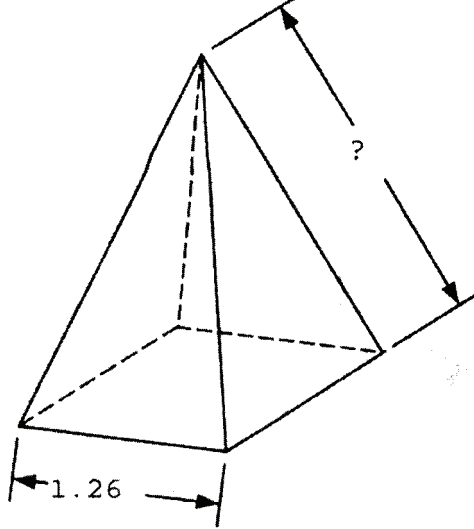
09B-49. CUBE WITH PYRAMIDAL CAVITY



Volume = 1000

09B-49 = _____

09B-50. SQUARE PYRAMID



Total Surface Area = 6.87

09B-50 = _____

09B-51. $\frac{10^{(0.324)} \times 10^{-(0.178)} + 0.677}{10^{(2.68+0.942)}} \dots\dots\dots 51 = \underline{\hspace{2cm}}$

09B-52. $\frac{15.9 + e^{(2.6+1.56)}}{0.314 - e^{-(0.758-0.186)}} \dots\dots\dots 52 = \underline{\hspace{2cm}}$

09B-53. $\frac{(2.41 \times 10^{-4} + 3.79 \times 10^{-4}) \text{Log}\{1 / 0.0249\}}{\text{Log}\{(0.0693) / (0.00475 + 0.0119)\}} \dots\dots\dots 53 = \underline{\hspace{2cm}}$

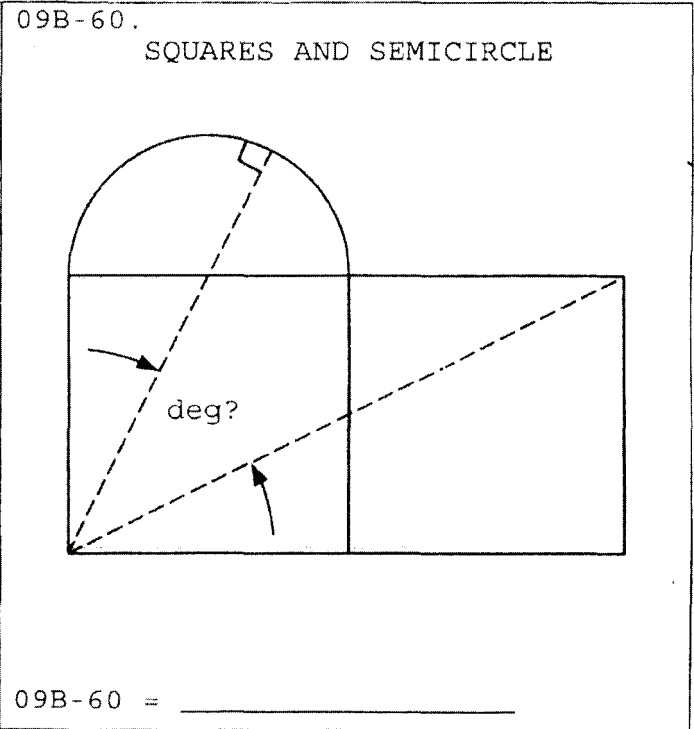
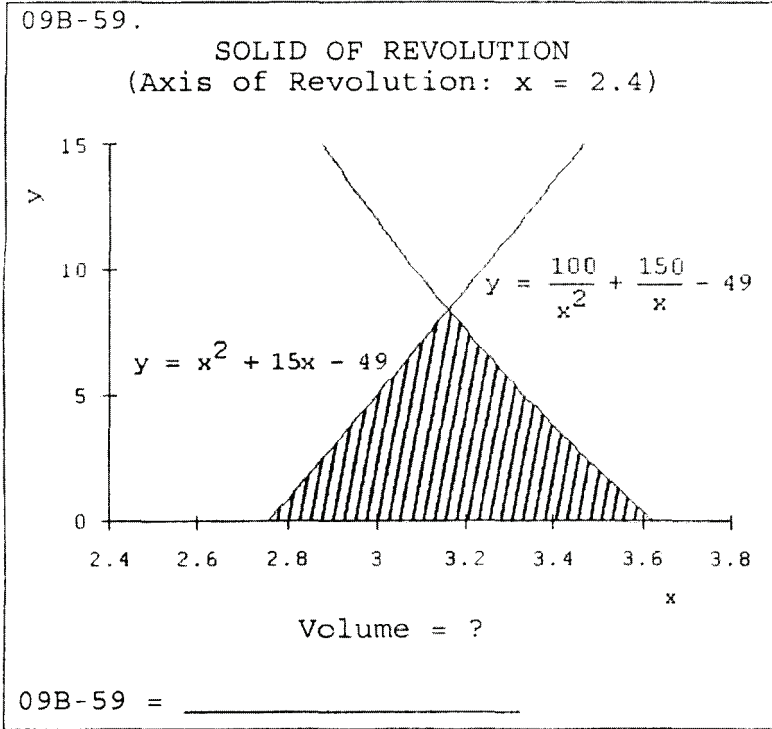
09B-54. $\frac{(3.26 \times 10^{-4} + 5.77 \times 10^{-4})^{-0.342}}{(3.31 \times 10^{-4})^{-(0.88+0.395)}} \dots\dots\dots 54 = \underline{\hspace{2cm}}$

09B-55. (rad) $\frac{\arctan\{1.85 + (2.13)(0.812)\}}{\arcsin\{(3.92 + 3.01) / 18.1\}} \dots\dots\dots 55 = \underline{\hspace{2cm}}$

09B-56. What is the area under the curve $y = (1+6x^2)^{-1}$ between $x = 0$ and $x = 1.5$? $\dots\dots\dots 56 = \underline{\hspace{2cm}}$

09B-57. An algae population was initially 1000 algae, and it doubled every 3 days. What was the growth rate after 6 weeks? $\dots\dots\dots 57 = \underline{\hspace{2cm}}$ algae/min

09B-58. For what value of L_2 does $N_2 = 5$ if $\mathbf{L} = \begin{bmatrix} 17 \\ L_2 \\ 13 \end{bmatrix}$, $\mathbf{M} = \begin{bmatrix} 29 \\ 17 \\ 24 \end{bmatrix}$ and $\mathbf{N} = 6\mathbf{L} + \mathbf{M}$? $\dots\dots\dots 58 = \underline{\hspace{2cm}}$



09B-61. $2\text{Log} \sqrt{\frac{(3.7)(2.97)(\pi)}{(9.36)^3(6.17)^3}}$ ----- 61= _____

09B-62. $(0.78)_{10} \text{Log}[(7.5)(0.288)] + \{(6.65)(0.926)\}^{1/2}$ ----- 62= _____

09B-63. (deg) $\sin(-85.9^\circ)\cos(36.6^\circ) + \cos(-85.9^\circ)\sin(36.6^\circ)$ ----- 63= _____

09B-64. $1 + 0.1 + (0.1)^2 + \frac{(0.1)^4}{8} - \frac{(0.1)^5}{15}$ ----- 64= _____

09B-65. $\frac{30.8}{\sqrt{40}} \text{Ln} \left[\frac{\sqrt{(-80)^2 + (4020)} + \sqrt{10700}}{\sqrt{2.88 + (64.4)(0.00913)}} \right]$ ----- 65= _____

09B-66. Two players stand 95 yards apart. One starts running toward the other with a velocity of 12 mph (neglect acceleration). How long after that does the other player throw a ball with velocity 58 mph and angle relative to the horizontal of 35° if the other catches it without breaking stride? ----- 66= _____ sec

09B-67. x and y are integers. If $x^2 - y^2 = 3608$ and $x - y = 44$, what is y? ----- 67= _____ integer

09B-68. For what value of z does the sum of the natural and base ten logarithms equal 18? ----- 68= _____

09B-69. CIRCLE, TANGENT LINES

Hatched Area = ?

09B-69 = _____

09B-70. SECTOR, EQUILATERAL AND ISOSCELES TRIANGLES

AREA(SECTOR) = 20,800

09B-70 = _____

09B-1 = -0.125 = -1.25×10^{-1}	09B-11 = -1040 = -1.04×10^3	09B-21 = -0.0388 = -3.88×10^{-2}
09B-2 = 698 = 6.98×10^2	09B-12 = -2.48×10^6	09B-22 = 0.0635 = 6.35×10^{-2}
09B-3 = 4.94 = 4.94×10^0	09B-13 = 2.46×10^7	09B-23 = 0.0424 = 4.24×10^{-2}
09B-4 = 0.604 = 6.04×10^{-1}	09B-14 = -0.00195 = -1.95×10^{-3}	09B-24 = 1.68 = 1.68×10^0
09B-5 = -56.5 = -5.65×10^1	09B-15 = -0.364 = -3.64×10^{-1}	09B-25 = -2.04 = -2.04×10^0
09B-6 = -21.5 = -2.15×10^1	09B-16 = 3.60×10^7	09B-26 = 17.3 = 1.73×10^1
09B-7 = \$14.94	09B-17 = 5.30 = 5.30×10^0	09B-27 = -0.505 (3SD) = -5.05×10^{-1}
09B-8 = 2.50 = 2.50×10^0	09B-18 = 99.3 = 9.93×10^1	09B-28 = 0.775 = 7.75×10^{-1}
09B-9 = 4450 = 4.45×10^3	09B-19 = 0.183 = 1.83×10^{-1}	09B-29 = 0.891 = 8.91×10^{-1}
09B-10 = 24.8 = 2.48×10^1	09B-20 = 0.0170 = 1.70×10^{-2}	09B-30 = 3.28 = 3.28×10^0

09B-31	= -6.95x10 ⁶	09B-41	= 1.29	09B-51	= 0.000496	09B-61	= -3.75
			= 1.29x10 ⁰		= 4.96x10 ⁻⁴		= -3.75x10 ⁰
09B-32	= 3.29x10 ¹⁴	09B-42	= 33.0	09B-52	= -319	09B-62	= 4.17
			= 3.30x10 ¹		= -3.19x10 ²		= 4.17x10 ⁰
09B-33	= 5.19x10 ⁸	09B-43	= 1.64	09B-53	= 0.00161	09B-63	= -0.758
			= 1.64x10 ⁰		= 1.61x10 ⁻³		= -7.58x10 ⁻¹
09B-34	= 4.19	09B-44	= 321	09B-54	= 0.000402	09B-64	= 1.11
	= 4.19x10 ⁰		= 3.21x10 ²		= 4.02x10 ⁻⁴		= 1.11x10 ⁰
09B-35	= 9.97x10 ⁻⁵	09B-45	= 1.88	09B-55	= 3.30	09B-65	= 21.9
			= 1.88x10 ⁰		= 3.30x10 ⁰		= 2.19x10 ¹
09B-36	= 8.83	09B-46	= 9.47	09B-56	= 0.533	09B-66	= 1.15
	= 8.83x10 ⁰		= 9.47x10 ⁰		= 5.33x10 ⁻¹		= 1.15x10 ⁰
09B-37	= 0.558	09B-47	= -3.65	09B-57	= 2630	09B-67	= 19 integer
	= 5.58x10 ⁻¹		= -3.65x10 ⁰		= 2.63x10 ³		
09B-38	= 1.53	09B-48	= -1.55	09B-58	= -2.00	09B-68	= 282,000
	= 1.53x10 ⁰		= -1.55x10 ⁰		= -2.00x10 ⁰		= 2.82x10 ⁵
09B-39	= 5.19	09B-49	= 2.79	09B-59	= 17.3	09B-69	= 2.02x10 ⁸
	= 5.19x10 ⁰		= 2.79x10 ⁰		= 1.73x10 ¹		
09B-40	= 0.679	09B-50	= 2.19	09B-60	= 36.9	09B-70	= 53.6
	= 6.79x10 ⁻¹		= 2.19x10 ⁰		= 3.69x10 ¹		= 5.36x10 ¹