

Name \_\_\_\_\_

Tie Breaker: Points scored on Stated and Geometry Problems

+ \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_

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

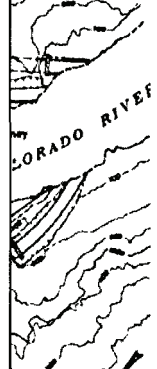
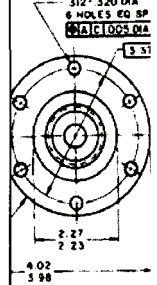
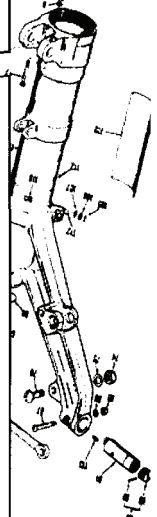
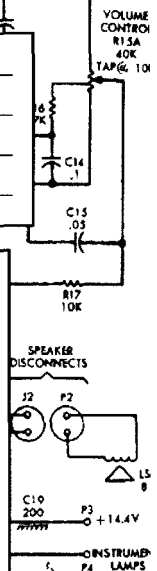
# UIL Calculator Applications

## Test 09E

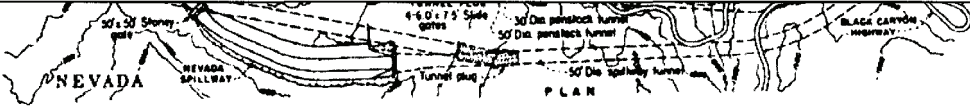
### (TMSCA State)

**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\*, 1.23x10<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.
    - 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>.



Address: G.H. Mason & Son



09E-1.  $-9.43 + 6.6 - 21.1$  ----- 1= \_\_\_\_\_

09E-2.  $(0.321 + 0.423) \times (-0.737) - 0.875$  ----- 2= \_\_\_\_\_

09E-3.  $(\pi - 3.02 + 16.5) \times (-2.91) - 521$  ----- 3= \_\_\_\_\_

09E-4.  $\frac{9940 + 32300 - 29900}{(-747)(503)(-111)}$  ----- 4= \_\_\_\_\_

09E-5.  $\frac{(469 + 373 - 586)(71.9)}{(904)(249)(-976)}$  ----- 5= \_\_\_\_\_

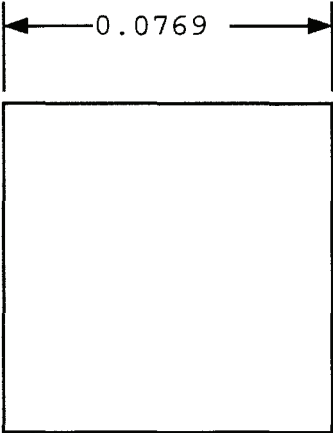
09E-6. What is the square of the product of 4.56 and 7.65? --- 6= \_\_\_\_\_

09E-7. What is the sum of the number of days in a week, the number of cards in a deck (no jokers) and the number of feet in the playing length of a football field? ----- 7= \_\_\_\_\_ integer

09E-8. Frank runs a mile in 7 min 25 sec. What is his time in a 26.22 mile marathon if his velocity decreases by 10%? ----- 8= \_\_\_\_\_ hr

09E-9.

SQUARE

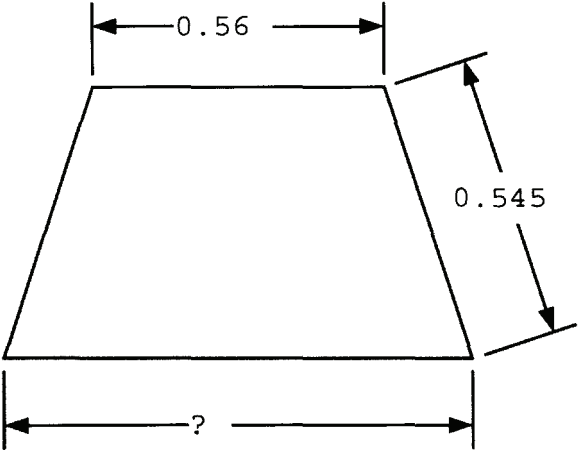


Area = ?

09E-9 = \_\_\_\_\_

09E-10.

ISOSCELES TRAPEZOID



Perimeter = 2.55

09E-10 = \_\_\_\_\_

09E-11.  $\frac{(6.6 + 4.36)(5.76 + 17.3)}{(-8.39)(0.79)(8650 - 9860)}$  ----- 11= \_\_\_\_\_

09E-12.  $\frac{\{-114 + (5.67)(3.62)(-5.68)\}}{(0.292 + 0.414)(-5.77)(1.19 + 0.722)}$  ----- 12= \_\_\_\_\_

09E-13.  $\frac{(-4.79 \times 10^{-5} - 5.28 \times 10^{-5})\{36300 + (-86.8)(-71.9)\}}{(-6.45)(-0.157 + 0.155)(94.3)(25.6)}$  ----- 13= \_\_\_\_\_

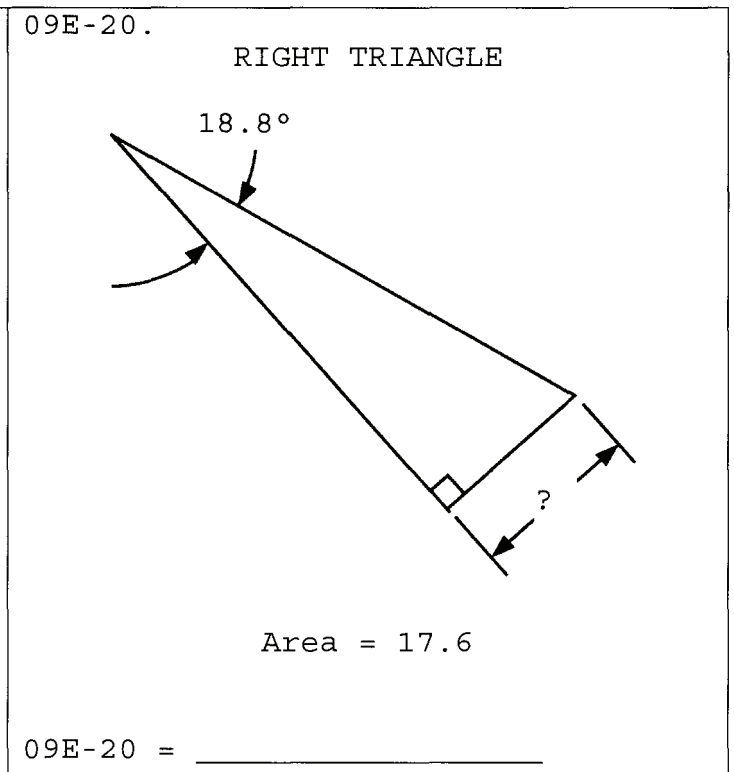
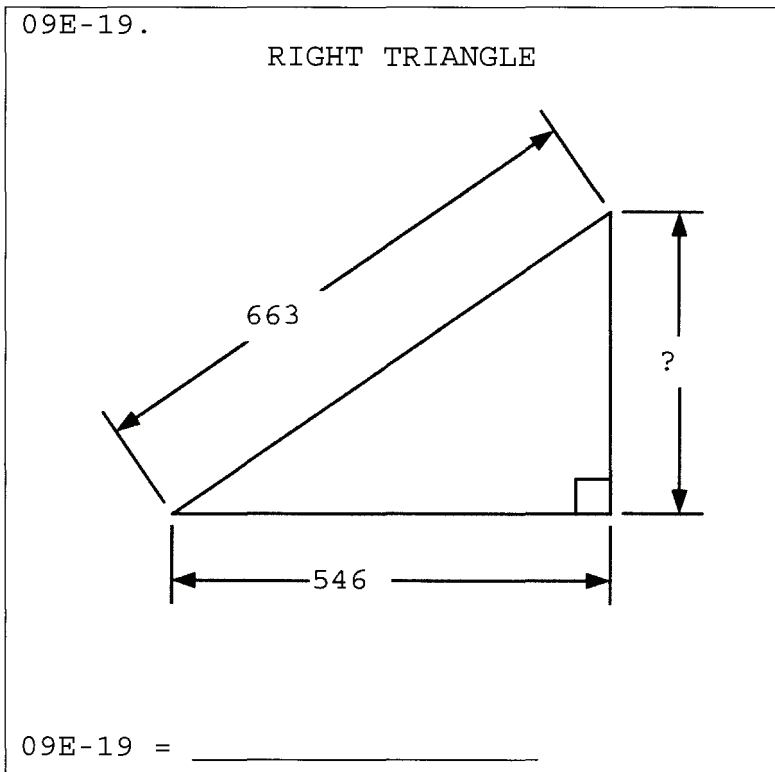
09E-14.  $\frac{(1030 + 761 - 552)(0.00402 + 0.00854 - 0.00307)}{(-4.71 - 0.524)(-3.2)(3.51 - 0.943)}$  ----- 14= \_\_\_\_\_

09E-15.  $\frac{(\pi + 1.47)}{8.69 - 23.1} + \frac{-0.575}{85.3 + 90.9} + \frac{(0.147)(639 - 312)}{(-173)(0.428)}$  ----- 15= \_\_\_\_\_

09E-16. A plane flies to a destination in 38 minutes but it takes a car 3.4 hr to get there. What is the percent difference in the average traveling speed of a car and a plane? ----- 16= \_\_\_\_\_ %

09E-17. If a light-second is 186,000 miles, how many nanometers are there in a light-second? ----- 17= \_\_\_\_\_ nm

09E-18. In May 2008, a wildfire burned 4,000 acres near Santa Clara, California. How many Super-Walmarts does this area equate to if a Super-Walmart is 100,000 square feet? ----- 18= \_\_\_\_\_



09E-21.  $\frac{-0.212 + 1 / (-4.68)}{1 / (1.57) + 3.14} + \frac{1}{(-5.17)}$  ----- 21= \_\_\_\_\_

09E-22.  $\frac{1}{8.98 + 9.44} + \frac{1}{2.74 - 6.87} + \frac{1}{(17.4)}$  ----- 22= \_\_\_\_\_

09E-23.  $(0.23)(3.14)\sqrt{(-0.466)^2 / 0.282} + 1 / \sqrt{\pi + 2.01}$  ----- 23= \_\_\_\_\_

09E-24.  $\left[ \frac{\pi + 0.855 + \sqrt{0.867 / 0.911}}{-1.99 + 1.93} \right]^2$  ----- 24= \_\_\_\_\_

09E-25.  $\frac{\sqrt{1.87 + 1.21 + (27.2) / (9.67)}}{9.79 + 4.91}$  ----- 25= \_\_\_\_\_

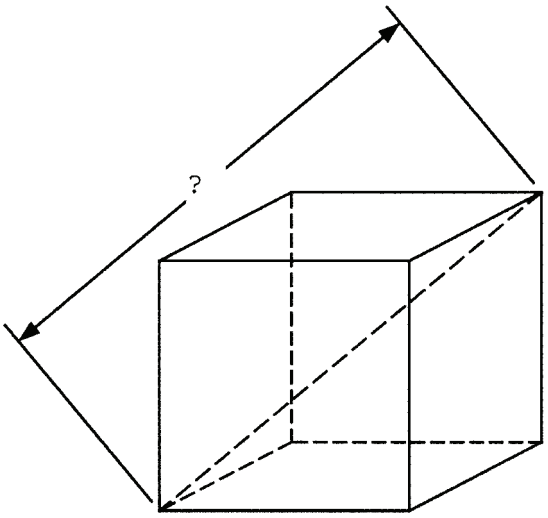
09E-26. Gene invests \$100 at 4% annual interest. How long will it take to double his money? ----- 26= \_\_\_\_\_ yr

09E-27. The monthly payment MP equals  $P \left[ i + \frac{i}{(1 + i)^n - 1} \right]$  where P is the principal, i is the annual interest rate divided by 12 and n is the number of months. If Harry can afford to pay \$350 monthly for a car, and the annual interest rate is 5.4%, how many months will it take him to pay out a \$19,900 loan? -- 27= \_\_\_\_\_ mo(integer)

09E-28. NASA sent the Phoenix Probe to Mars in 2007/08. It traveled 423 million mi on the trip from Earth to Mars. If the mean orbital radii of the Earth and Mars are  $1.496 \times 10^8$  km and  $2.279 \times 10^8$  km, respectively, what is the percent difference in the average closest approach of the planets and the distance Phoenix traveled? ----- 28= \_\_\_\_\_ % (SD)

09E-29.

CUBE

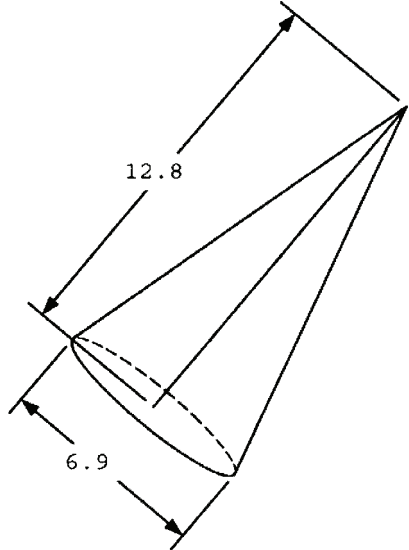


Total Surface Area = 0.912

09E-29 = \_\_\_\_\_

09E-30.

CONE



Volume = ?

09E-30 = \_\_\_\_\_

09E-31.  $\left[ \frac{-1.35 \times 10^7}{-9.05 \times 10^7 + 4.45 \times 10^7} + 0.454 \right] \times \{139 + (-11.8)^2 - \sqrt{20100}\}$  -- 31= \_\_\_\_\_

09E-32.  $\sqrt{\frac{1 / (514 - 189)}{(798) (5.56 + 4.08)^2} + (5.34)^2 (8.21 \times 10^{-6})}$  ----- 32= \_\_\_\_\_

09E-33.  $\frac{(4.15 \times 10^5)^2 (3.19 \times 10^{-12} + 1.15 \times 10^{-12})}{33.2 + (-0.338) (-511)} + \frac{1}{\frac{1}{0.00341} + \frac{1}{(-0.00147)}}$  33= \_\_\_\_\_

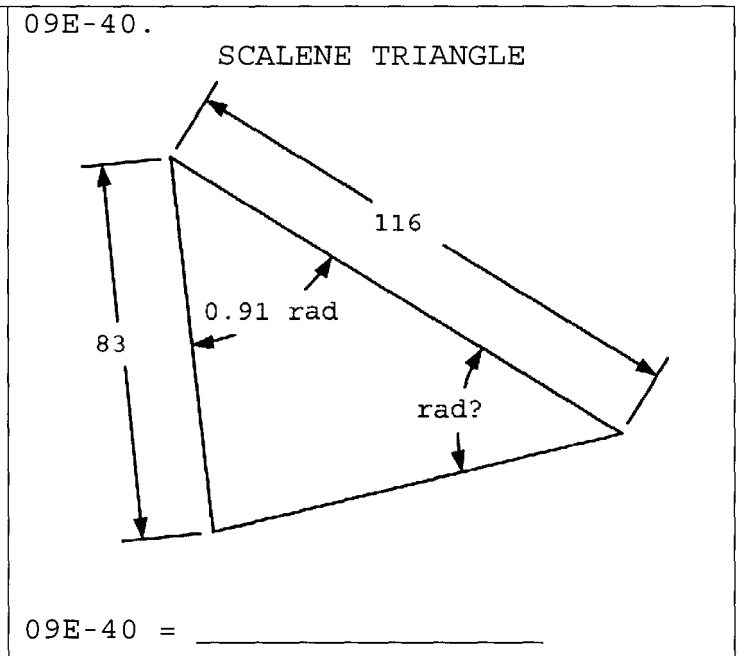
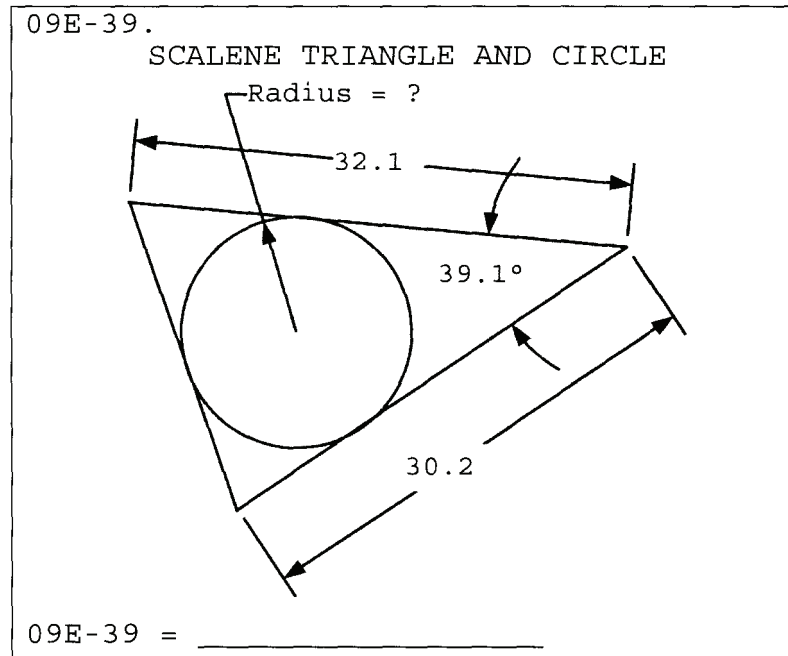
09E-34.  $\frac{[(812 - 87.7) (0.159 / 0.85)]^{1/2}}{(0.37)^2 + (0.123 + 0.278)^2 + 0.149}$  ----- 34= \_\_\_\_\_

09E-35.  $\frac{\left[ \frac{(862 + 330)}{(815 + 1030)} \right]^2 + \sqrt{\frac{0.0937 + 0.276}{\sqrt{0.156}}}}{\{(-149) / (-154)\}^2}$  ----- 35= \_\_\_\_\_

09E-36. The volume of water in the world's oceans is 317 million cubic miles which is 97.24% of the total water on the earth. What fraction of the earth's volume is water? ----- 36= \_\_\_\_\_ %

09E-37. The Colossus of Rhodes, one of the seven wonders of the ancient world, stood 100 ft. It was clad with bronze plate averaging 0.5 in thickness. The surface area of a man 6 ft tall is 1.9 m<sup>2</sup>. Based on this, estimate the weight of bronze used in the Colossus. The density of bronze is 8.75 g/cm<sup>3</sup>. -- 37= \_\_\_\_\_ lb

09E-38. Lenny starts with a full, 2-cup container of 30% salt solution. He divides the solution in half. To one half, he adds water to double the volume and refills the original container, discarding the left-over mixture. How many times must this procedure be done to dilute the original 30% solution down to just less than 5%? ----- 38= \_\_\_\_\_ integer



09E-41.  $10^{-\{(0.109-0.698) / (0.183+0.0735)\}}$  ----- 41= \_\_\_\_\_

09E-42.  $\frac{(-2.38 \times 10^{-6})}{(-1.65 \times 10^{-6})} \left[ 1 - e^{-(0.143)(0.418)} \right]$  ----- 42= \_\_\_\_\_

09E-43.  $\frac{(-6.57 \times 10^7) \text{Log}(5.83 \times 10^7 - 3.73 \times 10^7)}{(1.41 \times 10^7)}$  ----- 43= \_\_\_\_\_

09E-44.  $(1.15)^3 + (14.1 - 12.9)^{2 \cdot 3}$  ----- 44= \_\_\_\_\_

09E-45. (deg)  $\sin \left[ 90^\circ \times \frac{(9.09 \times 10^5)}{(9.20 \times 10^5)} \right] + \cos \{167^\circ - 124^\circ\}$  ----- 45= \_\_\_\_\_

09E-46. A stone mason stacks rectangular cut stones to build a wall of fixed height and length. The stones are available in different sizes but have the same shape. The cost of a stone is proportional to its volume. If the wall materials cost is \$2000 when an 8-in stone is used, what is the cost of the wall when 10-in stones are used? ----- 46=\$ \_\_\_\_\_

09E-47. Jon is writing a book. He started keeping track of his daily writing after 78 pages were written. On consecutive days, he wrote 5 pages, 8 pages, 3 pages, 9 pages and 6 pages. Estimate the total time required for Jon to completely write the book if the finished book is 478 pages. ----- 47= \_\_\_\_\_ days

09E-48. (rad) What is the value of x between 0 and 2 if  $\sin(x + 7) = x^3 \cos(5 - 2x)$ ? ----- 48= \_\_\_\_\_

09E-49. CORNER OF A CUBE

Volume = 9.43

09E-49 = \_\_\_\_\_

09E-50. RECTANGULAR SOLID

AB = ?

09E-50 = \_\_\_\_\_

09E-51.  $\frac{10^{(0.64)} \times 10^{-(0.28)} + 0.311}{10^{(3.62+0.767)}} \dots\dots\dots 51=$  \_\_\_\_\_

09E-52.  $\frac{(\pi - 2.97)e^{(0.841)} (4.28)}{e^{-(5.22-3.76)}} \dots\dots\dots 52=$  \_\_\_\_\_

09E-53.  $(-65300) \ln \left[ \frac{61800 + (14100) (3.33)}{76800 + 3.02 \times 10^5} \right] \dots\dots\dots 53=$  \_\_\_\_\_

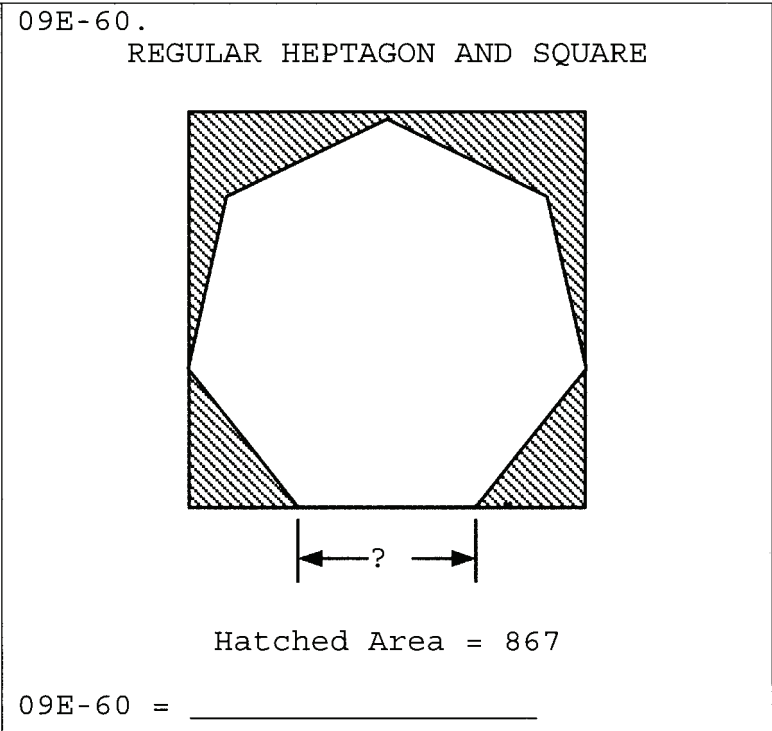
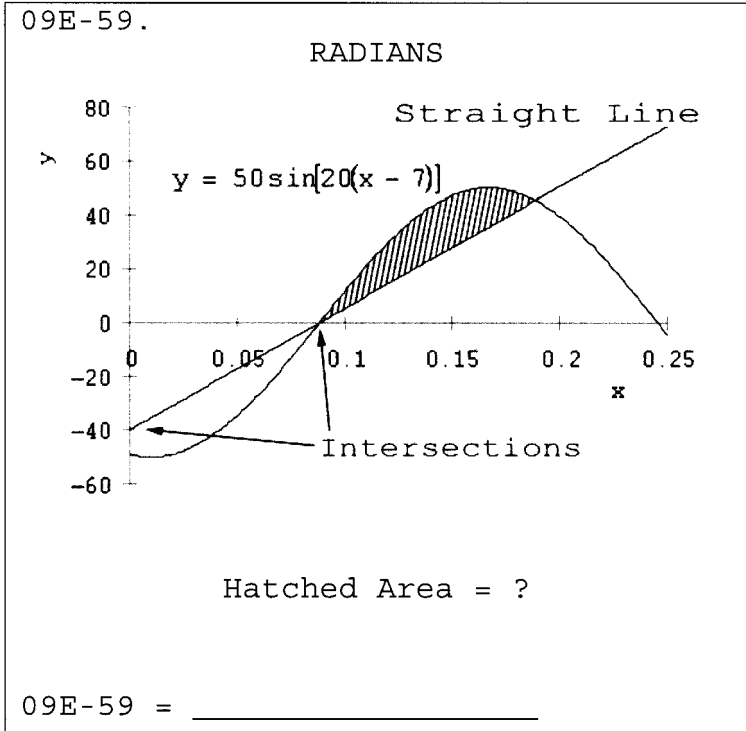
09E-54.  $\frac{(-15900 + 28900)^{-0.23}}{(87200)^{-(0.924+0.686)}} \dots\dots\dots 54=$  \_\_\_\_\_

09E-55. (rad)  $\frac{\arctan\{5.62 + (2.59) (0.394)\}}{\arcsin\{(0.661 + 0.307) / 2.09\}} \dots\dots\dots 55=$  \_\_\_\_\_

09E-56. What is the minimum value of x for the ellipse  $3x^2 - 5x + y^2 = 238$ ?  $\dots\dots\dots 56=$  \_\_\_\_\_

09E-57. A backpacker is 2 miles away from a straight road and 10 miles away from a town. The road goes directly to the town. If the backpacker hikes at 3 mph off-road and 4 mph on the road, at what angle should she hike toward the road (directly towards the road is zero degrees) to get to the town as quickly as possible?  $\dots\dots\dots 57=$  \_\_\_\_\_ deg

09E-58. Calculate p given that  $B_3 = 263$ ,  $C = \begin{bmatrix} 25 & 16 & 18 \\ 4 & 3 & 3 \\ 6 & 27 & 20 \end{bmatrix}$  and  $D = \begin{bmatrix} 8 \\ 5 \\ p \end{bmatrix}$ .  
and  $B = CD$ .  $\dots\dots\dots 58=$  \_\_\_\_\_



09E-61.  $2\text{Log} \sqrt{\frac{(6.72)(1.66)(4.22)}{(2.76)^3(9.53)^3}}$  ----- 61= \_\_\_\_\_

09E-62. (rad)  $\frac{\sin(8.75)}{\cos(8.75)} \sqrt{1 - \{\sin(0.9666 \times 5.27)\}^2}$  ----- 62= \_\_\_\_\_

09E-63. (rad)  $\frac{1}{(6620)(0.111)} \text{Ln}\{(8.2) + (-6.81) \sin(1.44)\}$  ----- 63= \_\_\_\_\_

09E-64.  $1 + (0.78) + \frac{(0.78)^2}{2} + \frac{(0.78)^3}{6} + \frac{(0.78)^4}{24}$  ----- 64= \_\_\_\_\_

09E-65.  $\frac{1}{\sqrt{(36.3)^2 - (474)}} \text{Ln} \left\{ \frac{(36.6) - \sqrt{(36.3)^2 - (474)}}{(36.6) + \sqrt{(36.3)^2 - (474)}} \right\}$  ----- 65= \_\_\_\_\_

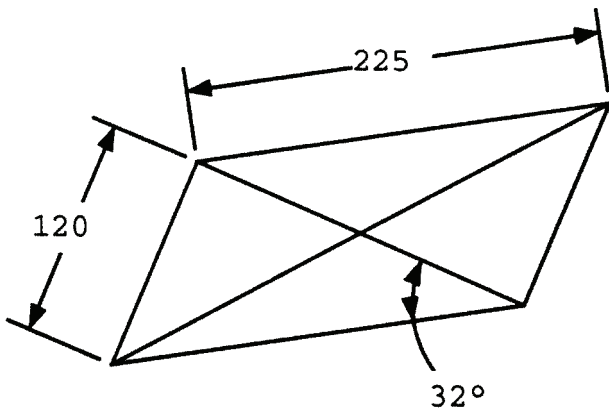
09E-66. Compass bearing is the angle in degrees measured clockwise from north. If Hank hikes 1.8 mi at a bearing of 250° and then hikes another 4 mi at 300°, how far is he from where he started? ----- 66= \_\_\_\_\_ mi

09E-67. What is the distance from the point (18, 9) to the intersection of the lines  $y = 8x+4$  and  $y = -3x+6$ ? ----- 67= \_\_\_\_\_

09E-68. A thin-walled circular cylinder is filled 72% with water, closed up and then tipped over on a table so it would roll if pushed. What is the height of the water level over the tabletop divided by the cylinder diameter? ---- 68= \_\_\_\_\_

09E-69.

PARALLELOGRAM

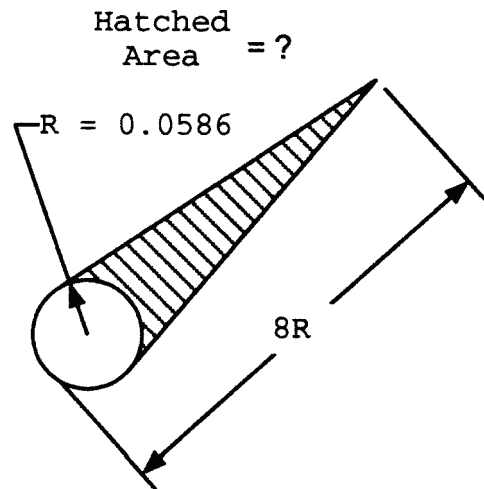


Product of Diagonals = ?

09E-69 = \_\_\_\_\_

09E-70.

CIRCLE, TANGENT LINES



09E-70 = \_\_\_\_\_



09E-1 = -23.9 = $-2.39 \times 10^1$	09E-11 = 0.0315 = $3.15 \times 10^{-2}$	09E-21 = -0.306 = $-3.06 \times 10^{-1}$
09E-2 = -1.42 = $-1.42 \times 10^0$	09E-12 = 29.6 = $2.96 \times 10^1$	09E-22 = -0.130 = $-1.30 \times 10^{-1}$
09E-3 = -569 = $-5.69 \times 10^2$	09E-13 = -0.138 = $-1.38 \times 10^{-1}$	09E-23 = 1.07 = $1.07 \times 10^0$
09E-4 = 0.000296 = $2.96 \times 10^{-4}$	09E-14 = 0.273 = $2.73 \times 10^{-1}$	09E-24 = 6870 = $6.87 \times 10^3$
09E-5 = $-8.38 \times 10^{-5}$	09E-15 = -0.972 = $-9.72 \times 10^{-1}$	09E-25 = 0.165 = $1.65 \times 10^{-1}$
09E-6 = 1220 = $1.22 \times 10^3$	09E-16 = 437 = $4.37 \times 10^2$	09E-26 = 17.7 = $1.77 \times 10^1$
09E-7 = 359 integer	09E-17 = $2.99 \times 10^{17}$	09E-27 = 66 integer
09E-8 = 3.60 = $3.60 \times 10^0$	09E-18 = 1740 = $1.74 \times 10^3$	09E-28 = 769 (3SD) = $7.69 \times 10^2$
09E-9 = 0.00591 = $5.91 \times 10^{-3}$	09E-19 = 376 = $3.76 \times 10^2$	09E-29 = 0.675 = $6.75 \times 10^{-1}$
09E-10 = 0.900 = $9.00 \times 10^{-1}$	09E-20 = 3.46 = $3.46 \times 10^0$	09E-30 = 160 = $1.60 \times 10^2$

09E-31 = 102	09E-41 = 198	09E-51 = 0.000107	09E-61 = -2.59
= 1.02x10 <sup>2</sup>	= 1.98x10 <sup>2</sup>	= 1.07x10 <sup>-4</sup>	= -2.59x10 <sup>0</sup>
09E-32 = 0.000438	09E-42 = 0.0837	09E-52 = 27.0	09E-62 = -0.296
= 4.38x10 <sup>-4</sup>	= 8.37x10 <sup>-2</sup>	= 2.70x10 <sup>1</sup>	= -2.96x10 <sup>-1</sup>
09E-33 = 0.00105	09E-43 = -34.1	09E-53 = 81500	09E-63 = 0.000504
= 1.05x10 <sup>-3</sup>	= -3.41x10 <sup>1</sup>	= 8.15x10 <sup>4</sup>	= 5.04x10 <sup>-4</sup>
09E-34 = 26.1	09E-44 = 3.04	09E-54 = 1.02x10 <sup>7</sup>	09E-64 = 2.18
= 2.61x10 <sup>1</sup>	= 3.04x10 <sup>0</sup>		= 2.18x10 <sup>0</sup>
09E-35 = 1.48	09E-45 = 1.73	09E-55 = 2.95	09E-65 = -0.0744
= 1.48x10 <sup>0</sup>	= 1.73x10 <sup>0</sup>	= 2.95x10 <sup>0</sup>	= -7.44x10 <sup>-2</sup>
09E-36 = 0.125	09E-46 = \$2500.00	09E-56 = -8.11	09E-66 = 5.34
= 1.25x10 <sup>-1</sup>		= -8.11x10 <sup>0</sup>	= 5.34x10 <sup>0</sup>
09E-37 = 129,000	09E-47 = 76.7	09E-57 = 48.6	09E-67 = 18.2
= 1.29x10 <sup>5</sup>	= 7.67x10 <sup>1</sup>	= 4.86x10 <sup>1</sup>	= 1.82x10 <sup>1</sup>
09E-38 = 7 integer	09E-48 = 1.77	09E-58 = 4.00	09E-68 = 0.677
	= 1.77x10 <sup>0</sup>	= 4.00x10 <sup>0</sup>	= 6.77x10 <sup>-1</sup>
09E-39 = 7.35	09E-49 = 2.93	09E-59 = 1.28	09E-69 = 60700
= 7.35x10 <sup>0</sup>	= 2.93x10 <sup>0</sup>	= 1.28x10 <sup>0</sup>	= 6.07x10 <sup>4</sup>
09E-40 = 0.789	09E-50 = 1.58	09E-60 = 24.8	09E-70 = 0.0189
= 7.89x10 <sup>-1</sup>	= 1.58x10 <sup>0</sup>	= 2.48x10 <sup>1</sup>	= 1.89x10 <sup>-2</sup>